IDAF/ WP / 35 March 1991

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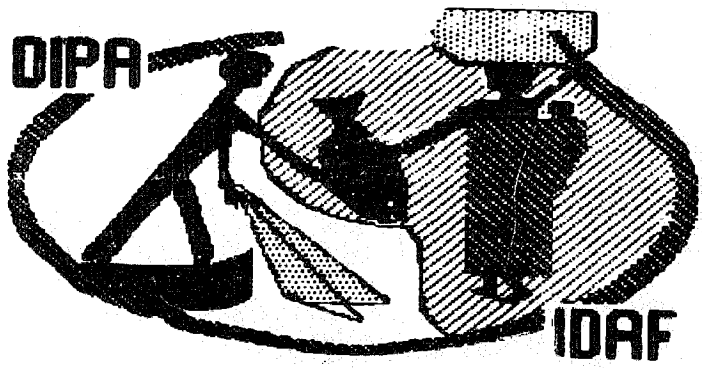

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THE GHANAIAN DUG-OUT CANOE AND THE CANOE CARVING INDUSTRY IN GHANA

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Programme de Développement Intégré des Pêches Artisanales en Afrique de l'Ouest - DIPA

Programme for Integrated Development of Artisanal Fisheries in West Africa - IDAF

GCP/RAF/192/DEN

With financial assistance from Denmark and in collaboration with the Republic of Benin, the Fisheries Department of FAO is implementing in West Africa a programme of small scale fisheries development, commonly called the IDAF Project. This programme is based upon an integrated approach involving production, processing and marketing of fish, and related activities ; it also involves an active participation of the target fishing communities.

This report is a working paper and the conclusions and recommendations are those considered appropriate at the time of preparation. The working papers have not necessarily been cleared for publication by the government (s) concerned nor by FAO. They may be modified in the light of further knowledge gained at subsequent stages of the Project and issued later in other series.

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CONTENTS

1 GENERAL BACKGROUND TO FOREST RESOURCES IN GHANA (1)

The total area of Ghana is 23.9 million ha of which 8.2 million ha is considered as the high forest zone. Increasing pressure of shifting cultivation due to population increase over the last 15 to 20 years has transformed closed forest into open forests and fallow lands. The closed forest is estimated at 1.7m ha which is approximately the same as the reserved forest area of 1.68m ha. This latter area is used exclusively for forestry production.

Exploitation pressures on both these zones have increased in recent years. World Bank figures claim that if the largely uninhabited reserved forest areas are excluded the 2.5% increase in population since 1970 now indicates a population density of 32 persons/km in Brong Ahafo and 119 persons/km in the central region. This increasing population with its concomitant increased demand for agricultural land has progressively destroyed the closed forest through swidden agriculture and has imposed increasing pressure on the reserved forests. This increase in demand for land at the expense of forest reserves is expected to increase in the foreseeable future. The national population growth rate is expected to increase between 1985 and 2000 to 3.5%. This will have important implication for forest management, for even in earlier years of lower population growth rates, pressure on the land from shifting agriculture led to the disappearing of the virgin forest by 1980, and between 1981-1988 the closed forests area of 1.7m ha was undergoing deforestation at an annual rate of 1.3% or 22,000 ha.

Industrial forestry which in 1985 contributed 7% to GDP and 30% to export receipts, operate in both the reserved forest zone and the unreserved zone. While

1) This section is mainly from the World Bank "Ghana Forestry Reveiw". 1987

the unreserved zone resources are diminishing and will continue to do so at an increasing rate the total log production between 1970-1974 averaged 1.85 million m3 per year but declined to 680,000 m3 in 1983 due to extreme difficulties in the Ghanaian economy which prevented the acquisition of the necessary imputs for extraction. In the last five years however, there has been a five fold increase in exports and the World Bank was predicting a total extraction of around 1.0 million m3 in 1986, which was close to the annual allowable cut of 1.1 m3.

Total log production in 1987 however was 1,027,457 m3 which represented a 28% increase over 1986. When logging wastes are considered which can be as high as 25% - 50% the this extraction rate represents an actual cutting rate of 1.4 million m3 - 2.0 million m3.

Even now the traditional red woods and odum are likely to be exhausted within 2-3 decades at current felling rates.

In Ghana therefore the forestry industry is marked by a rapidly diminishing resource in the unreserved forest zone and an extraction rate in the Reserved Forest which at least for some species has exceeded its renewable resource ceiling.

1.1 Current Status of Wawa Logs suitable for Canoe Carving

While the general picture is necessary as a background, the needs of the Ghanaian canoe fleet and its sustainability requires a more detailed focus on the policies and practices which affect the availability of wawa trees (*Triplichiton sclerexylon*) from which all Ghanaian canoes are made.

Wawa is the most abundant tree species in Ghana and comrises 21% of F.I.P. class 1 volume timber in trees greater than 70cm in diameter (2). Although

2) K.K. Ghartey (Project Manager F.I.P.) - "Results of the Inventory" fromForest Inventory Project Proceedings 29-30 March 1989; Accra. the F.I.P. Class 1 represents species which have been exported at least once in the last 15 years.

found in all vegetation zones it is most abundant in the moist semi-deciduous north-west sub-type, which occurs in the area of western Ashanti Region, southern Brong Ahafo Region and to the north of the Western Region. It is also abundant but less so in the moist semi-deciduous south-east zone which covers the south eastern portion of the Eastern Region. See figure 1.1.

The species is also the most heavily exploited comprising 32% of all forest extraction, and has a stock life of 114 years (3).

It would apear therefore that the future of the canoe fleet in Ghana would be secure. However, canoes are built from the largest trees available and the numbers of these decrease in relation to increasing size class.

From interviews with canoe carvers and fishermen and measurements of canoes it has been established that it is now difficult to find trees in sufficient quantities to carve a canoe above 157cm beam. This would need a tree with a diameter of at least 165cm which would allow for loss of bark and trimming during construction.

Detailed information on the availability of trees of this size and over was supplied by the Forest Resource Management Project in Kumasi. This project has been operational for 6 years and has prepared an inventory of the existing forestry resources in the Reserved Forest Area. Based on a sampling grid of 1 ha plots for each 400 ha of forest reserve, the project staff furnished Table 1 which gives the numbers of wawa trees above 165cm diameter for the areas sampled.

These estimates were accompanied by certain provisos which are pertinent to assessing the status of wawa stems available for canoe building. The relevant portion of the accompanying document is reproduced below.

3) Dr D. Alder "Natural Forest Increment, Growth and Yield" ibid.

Administrative regions in the high forest zone of Ghana

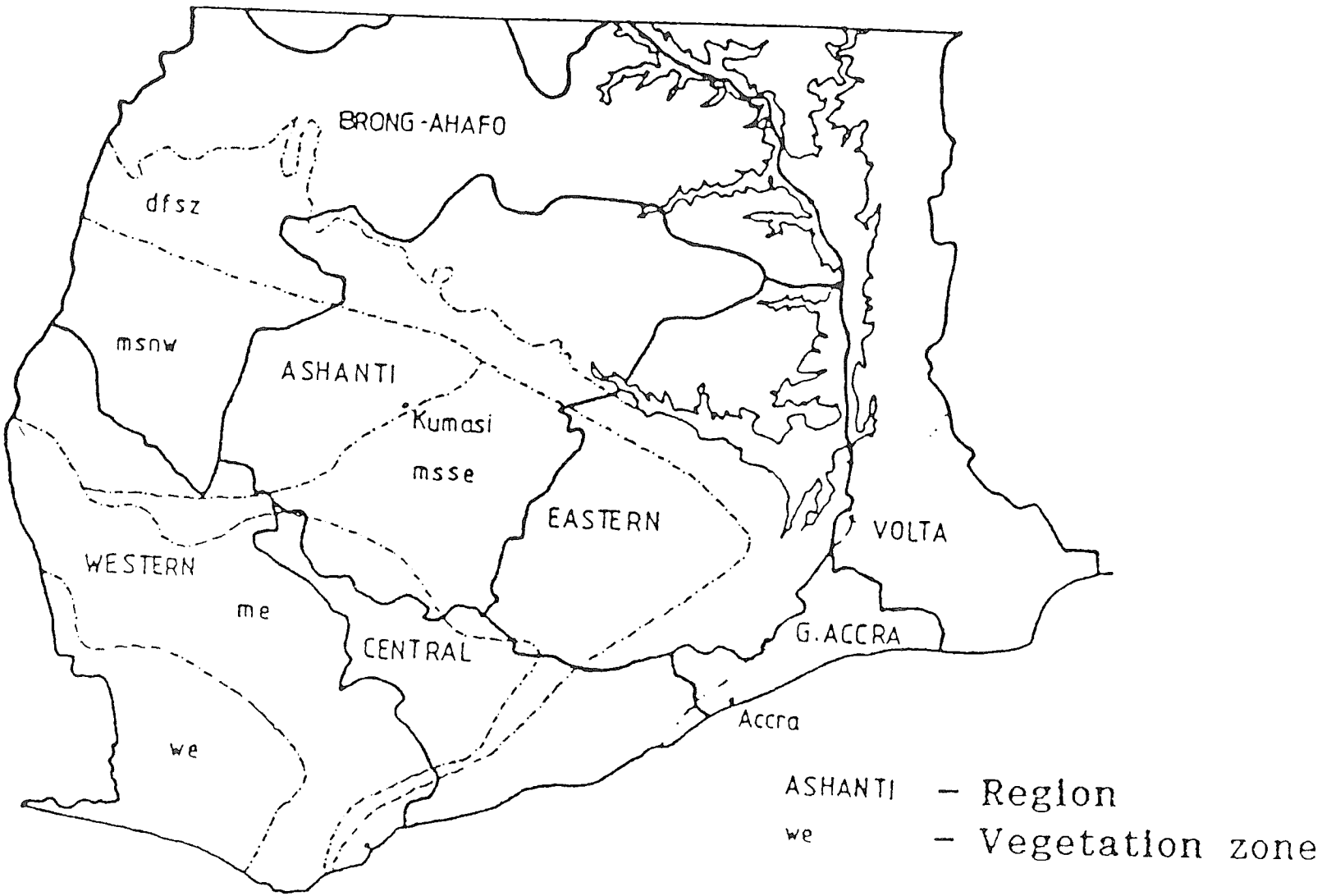


Figure 1.1

"The stocking estimates of remaining Wawa trees greater than 165cm within the forest reserves of Ghana is 29,784. This estimate supersedes those given in the previous report of January 1989.

These estimates are presented as an average or mean of what can be expected to be found in Ghana. A Reliable Minimum Estimate was not available at the time of writing this report due to the urgency of your request.

As stated, this value could be considerably reduced due to fire, illegal felling and encroachment etc. More accurate values will be available at a later date when an overall assessment of the location and extent of forest reserve within The High Forest of Ghana is carried out using the projects Satellite Imagery Apparatus.

However, the loss of Wawa trees in reserves through fire, illegal felling and encroachment etc., may be compensated by their presence outside reserves. Unfortunately we are not yet in a position to assess the number of Wawa trees outside reserves until our Inventory Oustide Reserves commences later this year.

Wawa is currently the most abundant commercial tree species. It is also the timber industry's mainstay and is one of the very few species which approximates to being harvested on a sustained yield basis. However, the Forestry Department feels that management for the sustainability of such large sized trees required by the fishing industry cannot be ensured for the following reasons:

1) The current commercial felling limit for Wawa is lower than required by the traditional canoe builders.

2) There are insufficient stocks of trees greater than 165cm to sustain canoe builders' current demands until trees below 165cm are recruited into the required size class (passage of time for Wawa from 90-109cm to 110cm d.b.h. is 43.48 years).

3) A higher rate of return is realized from the sale of Wawa trees to the industry than for canoe building.

4) A large amount of wood waste is incurred during the construction of traditional canoes.

The Department therefore does not consider the sustainability of large sized Wawa trees a management priority. Their feeling is that because the demand by the Fishing Industry for Wawa, canoes cannot be sustained from the current resource, alternative timbers or method of construction should be considered".

1.2 Availability of Wawa for Canoe building

The maximum number of trees suitable for carving large canoes is therefore around 30,000 in both the reserved and unreserved forest. While it is not possi-

Table 1.1

Stocking of large Wawa (Triplochiton scleroxylon) in Ghana

Reserve	No of plots	Number of stems per square kilometre 165-174	175-184	185-194	195-205	> 205
Afram Headwaters	50	0.00	0.00	0.00	0.00	0.00
Amama Shelterbelt	12	0.00	0.00	0.00	0.00	0.00
Angoben Shelterbelt	8	0.00	0.00	0.00	0.00	0.00
Anum Su	10	0.00	20.00	10.00	0.00	0.00
Anwiaso Group	45	0.00	0.00	0.00	0.00	0.00
Asenanyo	57	0.00	0.00	0.00	1.75	0.00
Asukese	63	0.00	0.00	0.00	0.00	0.00
Atewa Range	61	1.64	0.00	0.00	0.00	0.00
Ayiolia/Bediako /Nuensa	25	0.00	4.00	0.00	0.00	0.00
Ayum	30	0.00	3.33	10.00	0.00	0.00
Ben Group	69	0.00	0.00	0.00	0.00	0.00
Bandai Hills	36	0.00	0.00	0.00	0.00	0.00
Bia South	59	3.39	3.39	0.00	0.00	0.00
Bia Tano	50	2.00	4.00	2.00	4.00	0.00
Boi Tano	39	0.00	0.00	0.00	0.00	0.00
Boin River	75	0.00	1.33	0.00	0.00	0.00
Bura River	25	0.00	0.00	0.00	0.00	0.00
Dome River	15	0.00	0.00	0.00	0.00	0.00
Fum Headwaters	21	0.00	0.00	0.00	0.00	0.00
Furo Headwaters	41	0.00	0.00	0.00	0.00	0.00
Jema Asemkrom	16	0.00	0.00	0.00	0.00	0.00
Krokusua Hills	115	0.87	3.48	1.74	0.87	1.74
Mamang River	14	0.00	7.14	0.00	0.00	0.00
Mamiri	11	0.00	0.00	0.00	0.00	0.00
Mpameso	86	0.00	1.16	2.33	0.00	0.00
Nkrabia	26	0.00	0.00	0.00	0.00	0.00
Oda River	40	0.00	0.00	0.00	0.00	0.00
Pra Anum	30	0.00	3.33	0.00	0.00	0.00
Subin/Denyau S'belt	8	0.00	0.00	0.00	0.00	0.00
Tain Tributaries II	126	0.00	0.00	0.00	0.00	0.00
Tano Anwia	36	0.00	0.00	0.00	0.00	0.00
Tano Suhien	22	0.00	0.00	0.00	0.00	0.00
Tano Suraw	26	3.85	0.00	0.00	0.00	3.85
Tinte Bepo	28	0.00	0.00	0.00	0.00	0.00
Tonton	35	0.00	0.00	0.00	0.00	0.00
Totua Shelterbelt	18	0.00	0.00	0.00	0.00	0.00
Yoyo River	57	0.00	0.00	0.00	0.00	0.00
Ghana	1475	0.11	1.08	0.61	0.27	0.20
Total stems for Ghana using 11,590 km² as forest area		4,751	12,517	7,069	3,129	2,318

Total Wawa stems in Ghana greater than 165 cm dbh = 29,784

ble to quantify the numbers available in the two areas, foresters and canoe carvers confirm that the availability of large trees in the unreserved forest is much less than the reserved forests and also under more indiscriminate pressure through logging and in particular farming practices which involve burning off existing ground cover. This is confirmed by canoe carvers who claim that previously, virtually all canoes were constructed in the unreserved forest zone but now they are being obliged to operate in the reserved forest if and when a concessionnaire will allow them access.

Basing the discussion on 30,000 trees of a suitable size for canoe carving estimated to exist, not all of those are available to canoe carvers. Ghana's demand for foreign currency encourages exploitation of the reserved and unreserved forest, but also the 15 years felling cycle introduced in 1971, was expressly to reduce the number of large and overmature trees in the forest. Older trees while still increasing in cubic volume, increase in diameter at a decreasing rate. They are also much more susceptible to insect and fungal attacks and are less reproductive.

The introduction of the 15 year felling cycle and its intended objection of eliminating large overmature trees was only partially effective due to the economic downturn which starved the forestry industry of the necessary inputs for efficient operation. Since the commencement of the World Bank Economic Rehabilitation programme, forest industries have been reequipped and ageing plant and machinery renewed, and the larger companies in particular are capable of extracting any size of tree from their concessions. All sawmillers acknowledged that they preferred as big logs as possible because the conversion rate was higher. Overmature trees, however, often had defects and up to 70-80% could be of inferior quality for sawmilling purposes.

With the introduction of a 40 year felling cycle in 1990, it is likely that the pressure to fell large overmature trees for conversion will be reduced with loggers preparing to extract trees in the 110-130cm size range which have a better and more consistent quality.

The 40 year cycle will however operate against canoe carvers. In such a cycle theoretically, only 2.5% of the reserved forest is under exploitation at any one time. If all the 30,000 trees suitable for canoe carving were in the forest reserves then in theory, if they had a uniform spatial distribution, an average of only 750 trees would be available annually. In fact, desirable stems for canoe carving are concentrated to the west and north of Ashanti and Brong Ahafo Regions and all the existing trees are not in the reserved forest area, and the main source of supply for the moment is from outside the reserves.

Thus the total number of large Wawa trees which are composed of those present in the reserved and unreserved forest is being depleted rapidly by exploitation outside the reserves. This will mean that the main source of trees suitable for canoe carving will eventually be concentrated in the forest reserves which are now subject to a 40 year felling cycle. Although unquantifiable, the reduction of the number of trees in the free access area in the unreserved forest will reduce the total available, and in consequence reduce the average number of trees annually available from the reserved forest areas.

Even then all of the existing trees will not be available to canoe carvers, as often concessionaries will not allow carvers access to their reserves and often trees on felling are found to be defective and unutiliseable for carving. This is discussed in more detail below.

1.3 Perception on the availability and supply of Wawa to the Carving Industry

a) Timber Concessionaires

At present timber concessionaires provide a source of supply for large wawa for canoe carving from within the forest reserves. However, the large companies are much better equipped than previously and are now capable of extracting larger logs from more inaccessible sites. This coupled with a greater demand for wawa export and local use, has reduced the potential supply of trees for canoe carving. Conversely, however, timber companies often hesitate to cut large wawa as overmature trees are often subject to heart rot and other defect. It is estimated by canoe carvers and loggers that 2 to 3 out of 10 overmature trees may be found unsuitable for canoe carving once felled. These trees may also be misshapen and of little value either to the logging companies or canoe carvers. Nevertheless large trees are exploited by loggers, as these have a higher conversion rate when processed.

Many concession holders even if they have large wawa suitable for canoes in their concession will not allow carvers access because of the difficulty of controlling the carvers' activities. Several companies only allow carvers to operate in the forest if they themselves are active there, expressly so that they can monitor the activities of the carvers. The main source of complaints was that carvers damaged other trees when felling wawa, but more importantly the access tracks cut for the extraction of canoes allowed more rapid encroachment by farmers, villagers seeking fire wood and illegal fellers.

Smaller, less well equipped companies on the other hand tend to "cream" the forest, i.e. extract the higher quality timbers and leave (for them) trees of lower value. In this case small companies are more prepared to sell wawa to carvers especially if they do not have their own saw mills or if a saw mill is not located at an economic transport distance from their concession. This is reckoned in Kumasi to be about 75 miles.

When trees are sold to carvers they will be charged 2000c-3000c per m3 for each log in the forest. This will represent a price to the carver of up to 100,000c, even more in some cases depending on the volume of the utilisable timber. In some cases, a concessionaire will not charge for the trees cut by carvers but will request that a canoe or canoes be carved for him to sell. This practice is not popular with carvers, as it considerably reduces their profits. One particular company demanded one canoe for every three carved - a proportion considered totally uneconomic by the carving team involved.

Despite the fact that wawa supplies for canoes do originate in the reserved forest zone, it is clear from interviews with carvers themselves that the main source of raw materials originate outside the reserved forest and mainly from cocoa farming areas, especially in farms with old, less productive cocoa trees which if damaged represents less loss to the farmers.

b) Canoe carvers

A total of nine canoe carving teams were interviewed. These can be classified broadly into three categories; sedentary, indigenous part-time carvers and farmers; formerly migrant carvers now sedentary, part-time carvers and farmers;

and highly migratory full time carvers. The first two categories were now confined to operating in an area close to their adopted or home village and were now using trees already known but rejected previously as being unsuitable, due to size or shape. The impression was that the north and westward progression of the industry had passed them by and left them like flotsam stuck on a river bank. In Obogu for example (south of Juaso and 160 km from the coast by road), the chief carver had arrived 35 years previously with his father who was also a canoe carver. At this time there was a total of seven groups in the area, now there are only three all of which engage in part time farming. The other four groups had already moved on in search of a supply of large trees. As an indication of the quality of tree now being used by this carver, within a 3-5 mile radius of the village, of six canoes built in 1989 four were rejected by fishermen as being of inferior quality.

This and other sedentary groups were in contrast to the professional migrant carvers who operated in an area until the supply of suitable trees were exhausted and sent "scouts" ahead to contact concessionaires within promising forest areas.

It would have been thought that sedentary carvers residing in one village for a lifetime or for a considerable period would have found greater difficulty in finding suitable trees. In fact this was not the case, all said that they knew of 3-4 trees in the vicinity but now had to travel further to operate.

On the other hand all migrant carvers complained of the scarcity of trees. However, it was evident from the product that the migrants were interested mainly in large canoes i.e. + 16m, carving smaller canoes as a by-product when a large log allowed more than one canoe to be carved or when a tree on felling was found to be defective thus limiting carving to small canoes.

In all cases migrants stated that a move to another site was prompted by exhaustion of the available trees in their previous area of operation. This did not always mean that no trees existed, as on several occasions, carvers said that trees were known in the forest reserves nearby but the concessionaires would not allow carving. Other reasons for moving were too many carvers in one area or the available trees being too small. To justify a move three or four trees would have to be on offer.

Apart from the verbal information given by carvers on scarcity of trees, other corroborative evidence was noted. In one case a group originally from Prampram numbering thirteen people and composed of three mastercarvers, four general carvers and six apprentices, had taken temporary accomodation with their families at Akrodie (in Brong Ahafo Region about 20km from Goaso). This group walked 16km into the forest to the hamlet of Kusikrom where they lodged for three to four days walking each day three kilometres into the forest to carve. In the 1 month they had operated at Kusikrom, three trees had been felled. Of these two trees had been afflicted with heart rot. One was totally discarded, from the other two they had managed to carve one large 17.2m canoe plus a 11m canoe from the one sound tree, and a 12m canoe from the other which was affected by heart rot. This group was now awaiting information on the location of further trees in the vicinity. Also at Suntreso (in Brong Ahafo Region about 50km in the bush from Mim) two groups of Fanti and Ga Adangme were located. The leader of the Fanti group was working on his last tree, carving a 14.8m canoe for Senya Bereku and had no more "in stock". His group of seven carvers had arrived here two months previously but had found only the one tree despite active searching. Already four of the group had been sent home because of lack of work. The leader himself was worried about the future of canoe carving and had resolved to return home to Esetwe near Mankessim (Central Region) to take up farming, if carving prospects

did not improve. Within a kilometre of the Fanti group a sixteen-man Ga Adangme group from Prampram were working. They had been here four months and had carved 13 canoes from 8 trees. They were also working on their last tree but hoped that tree spotters would inform them of others. Both groups were working in unreserved forest near to a reserved forest under a concession in which they were forbidden to fell.

c) Fishermen

In all 39 fishing villages were visited and meetings were arranged by Fisheries Department staff with the Chief Fishermen and elders. All fishermen spoken to were aware of the problem, some spontaneously stating that availability and increasing price of new canoes were major constraints to their operations. In two cases chief fishermen said that they did not think that they would be able to continue after 5-6 years. In several other cases it was stated that canoes are now being repaired much more than previously due to the difficulty of finding replacements. At Jamestown, it was said that up to 10 years ago fishermen used their canoes for only 1-2 years and then would sell them on and buy a replacement. This is no longer the case and the replacement figure is now around 10 canoes per year. As indicators of the problem all chief fishermen in the Central and Greater Accra Regions were asked a series of questions - Source of log supply 10-15 years ago, and source now, price of canoes now, number of canoes in fleet, replacements per year, and duration of a new canoe under normal circumstances. The responses are shown in tabular form in tables 1.2 and 1.3 and on the map figure 1.2. It should be noted that the source of canoes plotted is not exhaustive and the plots refer to the nearest main settlement. The acutal source of the logs is in the surrounding forest. If a centre of gravity analysis is performed on the data in

figure 1.2 the locus of canoe source between 1975 and 1980 has moved from 6°15'N; 0°45'W to 6°40'N; 2°15'N over the period. That is from a position with a centre near Abomoso in Eastern Region in 1975 to near Kukuom in Brong Ahafo Region in 1990 - a linear displacement in locus North and West of approximately 200 km. It should also be noted that the time of delivery refers to the time taken between placing an order for a new canoe and its arrival at the beach if no intervening problems arise. In many cases fishermen said that it took up to 2 years to have a replacement, due to suitable trees being damaged or found with heart rot on felling. Furthermore demand for canoes was so high that carvers would often sell an ordered canoe to another fisherman if a higher price was offered and the original buyer was not present.

It would seem that canoe supply has been seen as a problem for quite some time. In 1982 for instance, the fishermen at Apam made representations to the Fisheries Department to institute measures to ensure a sustainable supply of suitable logs for canoes. Also the fishermen at Teshie had brought up the matter with the Chief Fisherman for the Greater Accra Region who had discussed the problem with the fisheries authorities and had even visited Japan to investigate the possibility of introducing G.R.P. canoes to the canoe fleet. The most recent official approach has been by the Gbese Fishermen Association which as recently as February 1990, wrote to the Ministry of Agriculture on the matter of canoe supply.

Figure 1.2

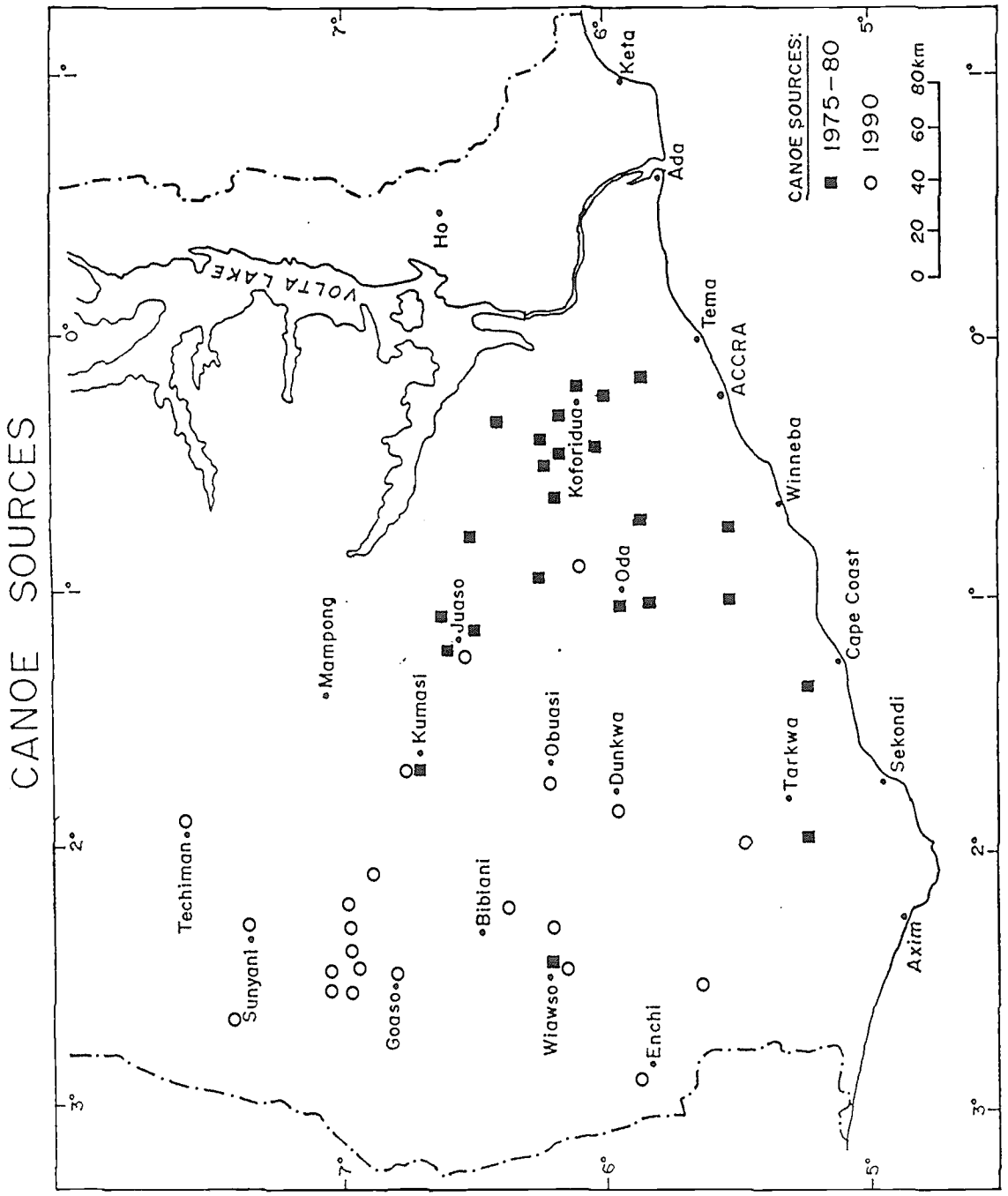

CANOE SOURCES
CANOE SOURCES:
1975-80
1990
0 20 40 60 80km
VOLTA LAKE
Techiman
Sunyani
Goaso
Mampong
Kumasi
Juaso
Bibiani
Obuasi
Wiawso
Enchi
Dunkwa
Oda
Koforidua
Ho
Keta
Ada
Tema
ACCRA
Winneba
Cape Coast
Tarkwa
Sekondi
Axim
1°
2°
3°
5°
6°
7°
0°

TABLE 1.2

Base data on canoe Demand

CENTRAL REGION

Village	Awareness of problem	Tot. N° Local CANOES	Replacements per year	Life Span Yrs	Prices	Delivery Time Months
Komenda (1)	Very high	60	+ 10	5 - 6	800,000C-1MC	
Elmina	Medium	+ 25	2 - 3	+ 10	800,000 C	
Cape Coast	High	+ 200	6 - 10	7 - 8	+ 1 M C	+ 6
Moree	High	+ 100	15 - 20	3 - 4	+ 600,000	
Biriwa	Medium	84	+ 10	5 - 6	+ 700,000	1 ½
Kromantse	High	35	3 - 5	5 - 7	+ 1.2 M C	
Ankaful	Very High	38	8 - 10	5	1.1 MC - 1.3 MC	2
Otoam	Very high	48	2 - 10	6 - 10	1.2 M C	1 - 6
Gomoa-Dago	Very high	89		6	1.2 M C	3 - 6
Mumford	High	30	Possible change over from Inshore Trawlers			
Apam	Very high	130	6 - 8		720,000 C	+ 6
Winneba	Medium	300		6 - 7	800,000 C	+ 6
Senya Bereku	Medium	200		5 - 6	+ 1 M C	+ 1 ½

GREATER ACCRA REGION

Bortianor	Low	100	3 - 4	4 - 6	+ 800,000 C	
Chorkor	Medium	215	10	3 - 4	+ 900,000 C	1 - 2
James Town	Very high		10	4 - 6	+ 900,000 C	4 - 6
Osu	High	130	14	6 - 10	7-800,000 C	+ 1 ½
Teshi	High	200	20 - 22	8 - 10	650,000-1.2M C	+ 6
Tema	High		40	+ 6	+ 1.2 M C	6 - 12
Prampram (2)	High	-	-	6	-	-
Kporgnya (3)	High	50	4	5 - 7	+ 1 M C	2 - 7
Akplabanya	High	97	30	6 - 7	900,000 C	1 - 4

Notes

1) A further 110 canoes from Komenda operate in foreign countries
2) Prampram is the main source of canoe carvers. Here the chief fisherman was very reluctant to divulge precise information.
3) There are now only 12 canoes fishing from Kporgnya most fishermen have migrated to the Volta Lake. The 50 canoes refered to were in the fleet previously.

ALPHABETIC KEY TO REASONS IN LAST COLUMNS TABLE 1.3

A - Scarcity of Trees/Big trees are scarce
Mature trees are scarce.

B - High transportation cost of canoes/Problems with transportation.

C - Depletion of nearer forests/Trees are further away/We have to move into deep forest/Trees are inaccessible.

D - Restrictions by Forestry Department officials.

E - Because of timber exportation.

G - High price of canoes.

H - Due to changes in beach, canoes need frequent replacement.

I - Due to smuggling of canoes to neighbouring countries.

Table 1.3 - CANOE SUPPLY

S/NO. QUEST.	REGION	VILLAGE	ORIGIN OF NEW CANOE		MORE DIFFICULT		IF YES REASON
			VILLAGE	REGION	YES	NO	
1	Western	Half Assini	Sefwi Asawinso	Western	Yes		A, B
			Kade	Eastern			
2	Western	Half Assini	No Response	N/A	-	-	-
3	Western	Axim	Sefwi Bromikrom	Western	Yes		A, C
			Assin Fosu	Central			
4	Western	Axim	Assin Fosu	Central	Yes		A, C
			Tepa	Ashanti			
			Goaso	Brong Ahafo			
			Sefwi	Western			
			Enchi	Western			
5	Western	Axim	Tepa	Ashanti	Yes		A
			Konongo	Ashanti			
			Kwamekrom	Brong Ahafo			
6	Western	Axim-Adisi	Sefwi Bekwai	Western	Yes		A
			Tepa	Ashanti			
			Enchi	Western			
			Nkawkaw	Eastern			
7	Western	Dix cove	Tepa	Ashanti	Yes		C, B
			Kwamekrom	Brong Ahafo			
8	Western	New Takoradi	Sefwi Amoankro	Western			A, B
			Kofi Badukrom	Brong Ahafo			
9	Western	Sekondi	Sefwi Wiawso	Western	Yes		A,C
			Assin Fosu	Central			
			Akim Oda	Eastern			
10	Western	Aboade	Sefwi Asawinso	Western	Yes		A, B
11	Western	Abuesi	Assin Fosu	Central	Yes		A, C
			Hwidiem	Brong Ahafo			
			Assin Ayensu	Central			
			Sefwi-Bekwai	Western			

S/NO. QUEST.	REGION	VILLAGE	ORIGIN OF NEW CANOE		MORE DIFFICULT		IF YES REASON
			VILLAGE	REGION	YES	NO	
12	Western	Shama	Sefwi Asawinso	Western	Yes		A, C
			Sefwi Buako	Western			
13	Western	Shama	Sefwi Asawinso	Western	yes		D
			Sefwi Buako	Western			
14	Central	Komenda	Apegya	Central	Yes		C
			Apenimdi	Brong Ahafo			
			Sefwi Asawinso	Western			
15	Central	Elmina	Kenyase	Brong Ahafo		No	-
			Hwidiem	Brong Ahafo			
			Sefwi Wiawso	Western			
			Dunkwa	Western			
			Juambo	Western			
16	Central	Ankaful	Sefwi Wiawso	Western	Yes		E
			Tepa	Ashanti			
			Hwidiem	Brong Ahafo			
17	Central	Moree	Daaman	Central	Yes		A
			Jakai	Central			
			Ehwirem	Brong Ahafo			
18	Central	Winneba	Akim Oda	Eastern	Yes		A
			Juaso	Ashanti			
			Sefwi Wiawso	Western			
19	Central	Apam	Kumasi	Ashanti	Yes		G
			Sunyani	Brong Ahafo			
			Tepa	Brong Ahafo			
			Nkaseim	Brong Ahafo			
			Akim Oda	Eastern			
			Akim Ofoase	Eastern			
			Akim Ayirebi	Eastern			
20	Central	Mumford	Essarkyir	Central	Yes		C
			Akim Akokoaso	Eastern			
			Akim Ntronang	Eastern			
			Akim Ayirebi	Eastern			

S/NO. QUEST.	REGION	VILLAGE	ORIGIN OF NEW CANOE		MORE DIFFICULT		IF YES REASON
			VILLAGE	REGION	YES	NO	
21	Central	Otuam	Oseinso	Brong Ahafo	Yes		C
			Apagya	Brong Ahafo			
			Goaso	Brong Ahafo			
			Ahinsu	Brong Ahafo			
			Akim Oda	Eastern			
			Akim Abirem	Eastern			
			Akim Kade	Eastern			
			Kumasi	Ashanti			
			Dunkwa	Central			
22	Central	Dago	Akim Oda	Eastern	Yes		C
			Kade, Nkawkaw	Eastern			
			Sefwi Wiawso	Western			
			Tepa, Kumasi	Ashanti			
			Berekum	Brong Ahafo			
23	Central	Senya Beraku	Goaso	Brong Ahafo	Yes		A
			Techiman	Brong Ahafo			
			Dunkwa	Central			
24	Central	Cape Coast	Krobo	No Information	Yes		C
			Heman	No Information			
			Ayensudu	Central			
			Wiawso	Western			
			Kyebi (Tarkwa)	Western			
25	Central	Kromantse	Sefwi Wiawso	Western	Yes		E
			Kade	Eastern			
26	Central	Biriwa	Sefwi Wiawso	Western	Yes		E
			Sefwi Asawinso	Western			
			Tepa	Ashanti			

S/NO. QUEST.	REGION	VILLAGE	ORIGIN OF NEW CANOE		MORE DIFFICULT		IF YES REASON
			VILLAGE	REGION	YES	NO	
27	Volta	Atorkor	Tema	Gt. Accra		No	-
28	Volta	Woe	No information	N/A	-		-
29	Volta	Vodza	Tema	Gt. Accra	Yes		J, D
			Kpone	Gt. Accra	Yes		
30	Volta	Adzido	Tema	Gt. Accra	Yes		J
			Kpone	Gt. Accra			
31	Volta	Abutiakope	Ada	Gt. Accra	Yes		I
			Kpone	Gt. Accra			
32	Volta	Denu	Ada, Goryi	Gt. Accra	Yes		A, G
			Tema, Lolonya	Gt. Accra			
			Akpablanya	Gt. Accra			
33	Volta	Adina	Adina	Gt. Accra		No	-
			Ningo, Tema	Gt. Accra			
			Ada, Lolonya	Gt. Accra			
			Akpablanya	Gt. Accra			
34	Volta	Agavedzi	Ningo, Tema	Gt. Accra		No	-
			Lolonya, Akpablanya	Gt. Accra			
35	Volta	Hedzranano	Hedzranano	Gt. Accra	Yes		A, G
			Gonyi, Ada	Gt. Accra			
			Tema, Lolonya	Gt. Accra			
			Akpablanya	Gt. Accra			
36	Gt. Accra	Chorkor	Tapleso No.1	Brong Ahafo	Yes		L
			Tapleso No.2	Brong Ahafo			
			Insihuu	Eastern			
			Obuase	Ashanti			
			Wamfie	Brong Ahafo			

S/NO. QUEST.	REGION	VILLAGE	ORIGIN OF NEW CANOE		MORE DIFFICULT		IF YES REASON
			VILLAGE	REGION	YES	NO	
37	Gt. Accra	Anwiam	-	Ashanti		No	-
38	Gt. Accra	Kpone	-	Brong Ahafo			A, C
39	Gt. Accra	Old Ningo	-	-	Yes		D
40	Gt. Accra	Teshie	Asamankese	-	Yes		A, G
			Kumasi	Ashanti			
41	Gt. Accra	Gbese (Accra)	Goaso	Brong Ahafo	Yes		C
			Suntreso	Brong Ahafo			
			Obogu	Ashanti			
42	Gt. Accra	Chorkor	Kumasi	Ashanti	Yes		A
			Goaso	Brong Ahafo			
43	Gt. Accra	Goi	-	-	Yes		A, C, K
44	Gt. Accra	Akplabaya	-	-	Yes		K

2 RECENT DEVELOPMENTS IN THE GHANAIAN CANOE FLEET

2. 1 Developments in vessels and gear

The largest category of canoe in the Ghanaian artisanal fleet both in numbers and size is the Ali/Poli/Watsa type. These local names refer to the type of net operated. The Ali is a sardinella drift/surround net, while the Watsa and Poli are purse seines, the main difference between the two being the twine and mesh size used in their construction. The Poli has a much smaller mesh size and is used extensively for the capture of anchovy, the Watsa mainly being used for larger sized pelagic species . In fact it is now rare to find a pure Poli or Watsa net as fishermen are increasingly combining the different mesh sizes including even Ali in one net, known loosely as a "mixed net". This obviates the need to change over specific nets for different species and seasons.

The average lengths of the various canoe types used in Ghana are given in table 2.1

Table 2.1 Average size (in metres) of each category of canoe by Region

Region	APW	BS	SN	LN	DGN
Volta	12.7	11.1	7.7	8.9	12.3
Greater Accra	14.1	11.9	9.7	9.9	10.7
Central	13.3	11.5	6.6	8.5	8.0
Western	13.6	9.4	7.4	7.8	8.9

Source : "A Report on the Ghana Canoe Frame Survey"
K.A. Koranteng and O.O. Nmashie FRUB Tema

These average figures disguise large variations in lengths of canoes, also grouping Ali, Poli and Watsa canoes together obscure the fact that Ali canoes are generally smaller than Poli and Watsa canoes. Average canoe lengths also vary depending on their home beach. Nevertheless, canoes have been tending to become bigger in recent years, for several reasons. In the main the Poli and Watsa nets in particular have increased in size over the last six to eight years from around 200-250 fathoms long to 400-450 fathoms and by 15 fathoms deep to 50 fathoms deep. This increase in netting volume has demanded an increased capacity in canoes for crew (up to and even exceeding 20 men) and increased catch.

New building, and recently acquired Poli and Watsa canoes were measured at various beaches and in the majority of cases were over 15m. To obtain even more capacity all canoes had topside planking to increase their freeboard. It was noticeable however that the height of the planking increased the newer the vessel. But on several beaches older canoes were also observed to be undergoing heightening. Some measurements taken on Axim beach will illustrate the trend. These are given in Table 2.2.

Table 2.2 Measurements of Canoes on Axim Beach

Age of Canoe	Length	Beam Hull/log	Beam Gunwale	Topside Planking Height
10 yrs	13.9m	142cm	176.5cm	33cm
4 yrs	15m		190cm	51cm
4 yrs	16m		174cm	46cm
1 yr	16.6m	198cm	250cm	66cm
1 yr	17m	175cm	191cm	55cm
1 yr	17m	180cm	218cm	63.5cm
New	16m	157cm	200cm	38cm

On many of these canoes and others seen elsewhere, the addition of planking meant that the outboard motor was mounted on its bracket some way below the gunwale, thus preventing the speed and steering control arm to be used in its normal horizontal position. In these cases, the motor was operated and the canoe steered with the control arm in the vertical position.

Observation of Poli canoes at moorings showed that many with nets on board were heeling at an angle of 10° - 15° indicating a loss of stability. It was confirmed by fishermen that the increasing height of planking had introduced greater instability and in some cases canoes were tested for stability during fitting out to ascertain the most appropriate height of freeboard. Despite this, fishermen interviewed denied capsizing at sea was more frequent than previously but now the fishing operation demanded more agility on the part of the crew to prevent a canoe turning over, especially when fishing is heavy. Calculations made by the naval architect Gulbsandsen shows that these canoes are in fact inherently unstable and have less stability than is considered a minimum by international safety standards and will swamp at 40° heel.

When it is considered that a wawa tree of the necessary diameter for large canoe carving can be well over 30m in length, fishermen and canoe builders, when asked why canoes were not made longer instead of increasing freeboard, which would give greater capacity without diminishing stability, gave two reasons - that a larger canoe was difficult to steer and also that larger canoes can crack when being beached on rollers or even at sea when perched on a passing wave. The first reason is self evident, also foresters and wood technicians confirmed that the longitudinal strength of wawa is limited due to its short fibres.

If indeed the length is conditioned by these factors then it is considered that these canoes have reached a ceiling in their development. If nets are to get larger, requiring yet more space for crew and storage, it will not be possible to increase capacity by heightening the canoes' sides. Either the artisanal industry will

stagnate at its present level of development or a vessel of a different design to replace the large dug out will have to be found.

2.2 Composition of the Ghana canoe fleet

Regular canoe frame surveys have been carried out in Ghana since 1969 and from these it is possible to have a time series of the composition of the canoe fleet. This is shown in Table 2.3

Table 2.3 Composition of Ghana Canoe Fleet 1969-1989

Canoe type	1969	1973	1977	1981	1986	1989 (1)
Ali/Poli/Watsa (APW)	2315	2244	3005	3359	3969	3684
Beach Seine (BS)	1587	1081	761	833	797	850
Set Net (SN)	3347	2973	3532	1734	1852	1858
Line (N)	734	767	1174	661	1004	1114
Drift Gill Net (DGN)				351	450	366
TOTAL	7983	7065	8472	6938	8072	7872

Source : "A Report on the Ghana Canoe Frame Survey"
K.A. Koranteng and O.O. Nmashie FRUB Tema

(1) 1989 Figures from 1989 Ghana Canoe Frame Survey

Several observers have remarked on the increasing number of canoes in the APW category in recent years and the tendency is shown in the table. The main reason for the increase up to the 1986 report is thought by the Fisheries Department to have been the high cost of locally available inshore vessels and the lack of spare parts to keep those in the fleet running. As an alternative, inshore vessel owners and potential owners therefore invested in canoes.

The latest survey shows that the past trend has reversed. When all canoes are taken into consideration including O.M.C. canoes the fleet has fallen in total numbers by 162 or 2% over the 1986 numbers. The greatest decrease is found in the APW. canoes which declined by 285 vessels, a reduction of 7%.

Several possibilities are given to explain these reductions. The high rate of migration of canoes and canoe fishermen may mean that 162 canoes have left Ghana to fish in neighbouring countries. Also some APW. canoes may have been converted to line canoes as these are also becoming bigger to give more capacity for fuel and ice to allow extended trips. The other reason mentioned in the report is that the figures represent a real reduction in the numbers of large canoes operating due to the difficulty in finding sufficient large wawa trees for replacement, although it was thought that it was too early to attribute the decrease in canoe numbers to this problem. According to fishermen interviewed during the course of this survey, many were of the opinion that the high cost of fishing inputs was discouraging new or replacement investment. This they claimed has slowed down the growth in the industry as many fishermen cannot acquire new equipment. Also the low returns for fishing makes it unprofitable for entrepreneurs to invest.

2.3 Prices in the Ghana canoe fleet

There are three basic investment costs in fishing operations: the canoe, the motor and the gear. For the Poli, Ali, Watsa beach seine and drift gill net fishing, the gear in fact costs more than the canoe, and to equip a new large Poli fishing unit the cost would be between 6 million and 10 million C, depending on the size of canoe and net used.

Figures for the 1989 canoe frame survey show the variation in prices for all gear. Some are reproduced in table 2.4 below.

Table 2.4 Average national price ranges for different fishing operations

FISHING METHOD	ITEM	COST RANGE (in 000 C)
ALI	GEAR	50 - 6,000
	CANOE	160 - 1,500
WATSA	GEAR	170 - 6,000
	CANOE	500 - 1,800
POLI	GEAR	400 - 8,500
	CANOE	500 - 1,800
LINE	GEAR	3 - 1,000
	CANOE	10 - 900
	OUTBOARD MOTORS	160 - 575

Due to the very high inflation in the Ghanaian economy during the last number of years, the cost of fishing inputs have risen dramatically over the period. From the 1986 survey, the national average cost of fishing inputs for an APW canoe were: canoe 318,500 C; gear 976,750 C; and motor 211,500 C. The prices in both the 1986 and 1989 surveys refer to new investment costs. During the period from 1986 to 1989, the Consumer Price Index for Ghana has risen from a 100 base in 1989 to 229.9 in 1989. The development in the C.P.I. is shown in Table 2.5.

Table 2.5 Ghana Consumer Price Index 1986 - 1989

1986	1987	1988	1989
100	139.8	183.6	229.9

Source: Based on IMF, International Financial Statistics, June 1990.

Using this index, the effect of inflation on fishing input costs can be calculated for canoes and outboard motors. This is shown in Tables 2.6 and 2.7. A similar exercise cannot be performed for gear due to the wide variation in specifications. Large canoes and 40 hp outboards have however remained standard over the period.

Table 2.6 Developments of canoe prices between 1986 and 1989

	1986	1989
CPI	100	229.9
Cost APW canoes at current prices	355,000	1,200,000
Cost APW canoes constant 1986 prices	355,000	521,739
Cost APW canoes if price followed inflation	355,000	816,500

2.7 Development of outboard motor prices between 1986 and 1989

	1986	1989
CPI	100	229.9
Cost 40 hp O.M. at current prices	249,000	760,000
Cost 40 hp O.B. at constant 1986 prices	249,000	330,000
Cost of 40 hp O.B. if price had followed inflation	249,000	572,700

Notes on Tables 2.6 and 2.7

1) Price of APW canoes in 1986 is taken from the 1986 Canoe Frame Survey. The highest price given i.e. for Greater Accra Region was used instead of the national average of 318,500 C as the greatest average length APW canoes were found in that region. The price of large APW canoes for 1989 is from verbal information from fishermen and is considerably lower than the 1.5 m - 1.8 m price range given in the 1989 Canoe Frame Survey.

2) The price of an outboard motor in 1986 is again from the 1986 Canoe Frame Survey and again the highest price given is used instead of the national average of 211,500 C. The current price of 760,000 is that quoted on the open market by the Yamaha agency. The price is that of a 40 hp motor as used by all APW canoes.

2.4 Explanation and significance of tables 2.6 and 2.7

Both tables show the changes in real and money terms in prices of canoes and 40hp outboard motors in the period between 1986 and 1989.

In table 2.6 the cost of canoes in money terms has risen from 355,000 C in 1986 to 1.2 mC in 1989, a rise of 238%. After adjustment for the rise in inflation the price in real terms is 521,739 C. If the price had risen consistently with inflation the price would have been 816,500C. In fact therefore canoe prices at 1.2 mC have risen 47% more than inflation since 1986.

On the other hand the price of outboard motors in table 2.7 has risen in money terms from 249,000 C to 760,000 C, an increase of 205%, while if the price increase had followed inflation it should have been 572,700 C. Thus the price of outboard motors has risen 33% more than inflation.

Both of these price rises indicate upward pressures other than inflation affecting the prices of canoes and motors. The price increase in canoes however is considerably greater than for motors. Also the figures in tables 2.6 and 2.7 have been taken from the 1986 Canoe Frame Surey for a base price for 1986 and from actual confirmed prices for 1989. In fact these figures may be conservative.

It is known for example that in 1986 the prices of 40hp outboard motors from the Agriculture Develpment Bank and the Rural Development Bank were 360,000 C and 400,000 C respectively. If a similar exercise is performed using the average price of 380,000 C then the 1989 price is in fact 15% lower in real terms. Similarly the 1.2 mC canoe price may be too low. From the 1989 Canoe Frame Survey the lowest price of APW canoes is given as 1.5 mC also canoe agents have confirmed that prices of 1.4 mC are now common. If the exercise is repeated using a current canoe price of 1.5 mC then in money terms canoes have risen 323%, and in real terms by 84% in the period between 1986 and 1989.

These figures show that at best the price of the imported inputs (outboard motor) while rising at a faster rate than inflation over the period 1986-1989 has done so at a considerably lower rate than the home produced input (canoe. At worst the outboard motor price has in fact fallen in real terms by 15% while the canoe price has risen by 84%.

Whichever scenario is chosen it is clear that canoe prices have been subject to underlying upward pressure considerably in excess of inflation. The main cost in canoe carving is the cost of the tree which represents some 60% of total cost in the carving process (excluding labour costs which are minimal). It may be assumed therefore that the increasing cost of canoes in real terms is due to the increased cost of wawa trees.

This assumption is confirmed by canoe carvers and agents who have stated that landowners and concessionnaires now had a greater awareness of the demand for large wawa and realised its scarcity value for carving and had responded by increasing prices. This is in contrast to the situation a few years ago when farmers especially were happy to sell a tree for a small sum to carvers as, to the

farmers the tree represented no value and would be burned or felled in any case to clear land for crops.

2.5 Implications of recent fishery and forestry trends for the continued supply of Ghanaian dug-out canoes

From the foregoing in Chapter I the forestry policy in Ghana was to eliminate the large wawa trees in the forest. This was the explicit reason for the introduction of the 15 year felling cycle in 1971. This was partially successful and led to a reduction in the large trees needed for APW (+15m) canoes, now mostly in demand. With inputs becoming more freely available through the World Bank Economic Recovery programme and the Export Income Retention scheme, the forest in general is becoming more effectively exploited. In fact now the annual cut is near the allowable cut.

Recently a 40 year felling cycle was introduced by the Forestry Department. This will have the effect of "locking up" existing large wawa trees in the reserved forest compartments not under exploitation and where felling is prohibited. This will put even more pressure on the remaining trees outside the reserved forest area, so reducing the total numbers available.

At present the minimum felling size for wawa is 11' girth (107cm diametre). If therefore all trees above 107cm diametre are cut during the felling cycle and those remaining are allowed to grow for a further 40 years, this will result in an exploitable resource of trees between 107cm and approximately 140cm to be harvested in the next felling period. This is the situation in an efficiently managed forest, but it is unlikely that no trees of over 140cm will remain after this period,

their number will however be drastically reduced and they will occur sporadically with greater densities in inaccessible or difficult areas.

The main source for an uninterrupted supply of logs for dug-out canoes will therefore eventually come from the trees of a size between a minimum of 107cm and 140cm. No accurate data exists on how long the remaining large, ie. +165cm diametre trees will last. In theory, with a 40 year felling cycle some should still be in existence in 40 years time. The total quantity however will be reducing in the interim.

Briefly the situation is one where the largest trees +165cm - those in demand by canoe carvers - are under pressure and will continue to be so. These will not be allowed to regenerate due to forest policy. The climax vegetation which resulted in the existence of these large trees will then be replaced by a cultured vegetation, managed specifically to prevent their emergence. In the not too distant future therefore, the sustainable supply of logs suitable for canoe carving will be culled from the forest resources of wawa of between 107cm to 140cm with probably an intermittent but diminishing supply of larger logs.

The implications for the canoe fleet will be far reaching. Below in Table 2.8 is given length to beam ratios of canoes measured at four different sites. At Jamestown (Lighthouse Beach Accra) and at Ankaful the smallest of the APW canoes on the beach were measured and at Akplabanya the measurements were of six new Watsa canoes either completed or being finished off. In Benin the measurements of smaller canoes with a beam of between 80m and 1.30m were measured. This beam would correspond approximately to trees between 107cm and 140cm after removal of bark and trimming during carving.

Table 2.8 Length to beam ratios of canoes at selected sites

Ankaful		James Town		Akplabanga		Cotonou	
Poli canoes		Poli/Ali		Watsa		Line/Set net	
L	B	14.0	1.47	15.4	1.83	6.83	.80
15.77	1.65	13.0	1.66	15.85	1.68	7.68	.86
16.45	1.77	11.6	1.51	15.35	1.76	6.70	1.06
15.70	1.78	12.8	1.66	13.40	1.68	7.37	1.10
12.90	1.59	12.4	1.43	14.30	1.63	9.57	1.14
14.00	1.69	Line Canoes		15.56	1.93	11.55	1.24
13.80	1.76	12.5	1.49			11.36	1.25
14.10	1.91	12.6	1.60			11.05	1.30
14.00	1.66	13.8	1.61			11.45	1.30
14.77	2.23	13.1	1.64			12.80	1.30
15.50	1.99	13.5	1.77			10.43	1.31
		12.5	1.57				
		13.5	1.60				

From the table above all APW canoes measured had been carved from trees with diametres in excess of 165cm. At Ankaful and Jamestown the measurements were taken from the smallest of this type of canoe.

At Jamestown a selection of the largest line canoes were also measured and from the table the majority of these also required trees in the 165cm diametre range.

Comparing the Cotonou data with the figures in Table 2.1. indicates that given the size range of trees which will eventually be available it will still be able to build canoes of up to 12.8m in length. This would imply that the smallest APW ca-

noe could still be built. In effect however the beam of 1.30m is much too narrow for Watsa and Poli fishing, particularly with the bigger nets now in use, and besides it has already been noted that the demand now is for much larger APW canoes. It will therefore not be possible to continue carving these larger canoes indefinitely with the available forest resources, which will eventually exclude all canoe carving above the larger Beach Seine canoes. However, it is not only the APW canoes which are increasing in size. As is shown from the data for Jamestown many large line canoes now also have a beam of over 160cm. These also have side planking fitted to allow extended trips through increased capacity for fuel, bait, and crew members.

If this trend continues then many line canoes may also fall outside the size category of tree available. This will leave the smaller sized Beach Seine canoes, smaller line canoes, set net canoes and drift gill net canoes as the categories which it may be possible to carve given the tree sizes available. This will mean that only the smaller sized canoes will be available in the future which will in effect regress the industry by eliminating the larger most productive fishing units.

3 THE MARKET IN GHANAIAN CANOES

3.1 Canoe Supply

From the known numbers of canoes in the Ghanaian fleet and those Ghana canoes operating in other countries, around 10,000 in all, an earlier exercise estimated around 1000 canoes were needed as replacements annually. This rough calculation was based on an expected average life span of 10 years for a canoe. The average life span was estimated taking into consideration the canoes which operated mainly from ports and sheltered creeks which it was thought had a durability of up to 15 years, and those which landed in harsher open conditions with a life of 4 to 6 years.

With more research and a structured survey of canoes being transported to the coast a more detailed analysis could be made although an element of estimation still had to be introduced as all the factors could not be precisely quantified.

The canoe transport survey consisted of issuing log books at the permanent police and Forest Products Inspection Bureau (F.P.I.B.) checkpoints. The log books recorded the date, lorry number, source, destination and number of canoes being transported on each vehicle which passed. This combination of information allowed canoes to be traced as they passed subsequent barriers and prevented double counting.

In general, the system operated adequately although in some cases it was reported that canoes could pass and not be recorded if traffic was heavy. Also

some periods would elapse with no registration if, when police personnel were rotated the outgoing officers failed to instruct their relief officers. On the Kumasi-Accra road where the majority of canoes pass, this did not present a major problem as the log books kept at Asankora and Achimota police barriers could be used to corroborate each other. At the other barriers where canoes passed less frequently it was difficult to determine whether canoes had not been registered or whether canoes were passing intermittently. Apart from Asankora and Achimota barriers log books were also placed at Moree and Apramdu (Takoradi) police barriers and at the FPIB kiosks at Inchaban and Agona Junction (W/R).

The FPIB officials and the police admitted that on several occasions, especially concerning FPIB, canoe transporters did not stop to be checked although by law they were obliged to.

A further limitation to total coverage was the absence of any permanent or other checks on several of the main (but badly surfaced) roads running southwards in the Eastern and the Central Regions. It is known that canoes are transported on these roads but no quantitative information could be obtained.

Despite the limitations encountered with the survey, a clearer picture of the source and distribution of canoes has been obtained and a more accurate estimate of annual replacements can be calculated.

The most comprehensive information was collected from the two checkpoints on the Kumasi to Accra road. Because of two independent registrations it was possible to compare the data to arrive at an accurate figure for canoes transported during the survey period, their source and destination. The survey began at Achimota on 28 February 1990 and at Asankora on 18 May 1990. The data was

analyzed up to 13 September 1990. In total therefore the survey was continuous for 197 days at Achimota and 119 days at Asankora. Because of the greater accuracy in using corroborative data the period between 18/5/90 and 13/9/90 was analyzed, and the additional data for Achimota was excluded.

3.2 Numbers of Canoes recorded - Kumasi-Accra Road

From the Brong Ahafo Region any canoes passing towards Accra must pass the Asankora barrier. On the other hand, canoes can join the road below Asankora and not be recorded until they reach Achimota, unless they branch off at Nsawam. These canoes will be recorded neither at Asankora nor at Achimota. It is known that this does occur but quantification is not possible.

The methodology was to count all canoes recorded at both barriers and add those only recorded at Achimota or Asankora to the combined total. This gave a total number of canoes which passed along the Kumasi-Accra road, some of which may have been recorded at Asankora but branched off to the Central Region, while others may have joined the road below Asankora but which were recorded at Achimota. The totals for each check point therefore differ.

This arithmetic gave a total number of 189 canoes passing Asankora during the period and 199 passing Achimota.

The average number of canoes passing therefore would be the totals divided by the days of the survey. However, it is thought by comparison of the information in the log books that each check point collected no data for one week, but not the same week in both cases. This is shown by the non correspondence of

traffic passing through the different barriers. This would therefore give a total survey period of 112 days and not 119.

The average number of canoes passing per day at Asankora therefore is 1.59 if a survey period of 119 days is taken and 1.69 if 112 days are taken. Similarly for Achimota the average daily figures are 1.67 and 1.78. On an annual basis, this would give totals of between 580 and 616 canoes passing Asankora and 610 to 648 passing Achimota. If the average of the two extremes are taken, this gives an annual total of 629 canoes transported along the Kumasi to Accra road.

3.3 Number of canoes recorded - other checkpoints

For various reasons explained above the survey was not so systematically carried out at other check points and also an important area in the Central Region was not covered because of the absence of police and FPIB controls. Nevertheless, analysis of the data and annualising using the methodology above gives an additional 206 individual canoes reaching the coast. In fact the total passing through exceeds this as canoes which were registered at one barrier were seldom noted at a following barrier which the canoe had to pass in order to reach its destination. The margin of error is impossible to quantify precisely but FPIB officials estimated independently that at least 50% of canoes were not noted, either because the vehicles failed to stop or deliberately passed at first light before the officials were on station, after parking overnight as required by the transport regulations.

3.4 Demand for Ghanaian Canoes

From the foregoing the canoe transport survey has shown that at least 835 traceable canoes are being shipped annually from the forest. But it is known that this figure underestimates the actual numbers.

Analysis of the data from the Kumasi-Accra road over the 119 survey period shows that 32% of some 630 canoes transported were destined for the Central Region and 68% for the Greater Accra Region.

If it is assumed that the 428 canoes destined for the Greater Accra Region are the annual replacements necessary for the Greater Accra and Volta Region fleets (V/R is supplied by canoes from GA/R), then simple division of the total fleet in those districts 3690, (1989 Canoe Frame Survey) by 428 gives a coefficient of replacement of 8.65 which in fact would be the life span of a canoe.

This duration is much higher than that given by chief fishermen interviewed in the Greater Accra Region, who put the life span, depending on the village beach conditions, at a minimum of 3 years and a maximum of 10 with a general average of 6-7 years.

In the Central Region 202 canoes were supplied via the Kumasi-Accra route and 52% of the other 206 traced canoes were destined for Central Region, which gives a total of 309 known canoes arriving at the Central Region. Based on a total fleet of 2717 canoes (1989 Canoe Frame Survey). This would give a replacement coefficient/life span of 8.79. Again this average figure is high compared with the average figures of 5-7 years given by chief fishermen in the Central Region.

Both figures are further suspect when it is considered that they are derived from a calculation based only on canoes actually in the country. In fact there are sizeable Ghanaian canoe fleets based in neighboring and other countries. In most countries accurate figures do not exist. However, from various sources, an attempt has been made to estimate the number of Ghanaian canoes in operation along the west coast of Africa. This is shown in table 3.1 below.

Table 3.1 Ghanaian canoes present in various West African countries

Country	No of canoes	Source
Ghana	8052	(1)
Togo	462	(2)
Benin	654	(3)
Côte d'Ivoire	706	(4)
Liberia	268	(5)
Congo	139	(6)
Cameroon	100	(7)
Gabon	N.K.	
Nigeria	N.K.	
Total	10,381	

1) Ghana Canoe Frame Survey 1989 : K.A. Koranteng

2) Rapport national du Togo : K. Amégavié 1984

3) Rapport sur les études Socio-Economiques du milieu des Pecheurs Marins au Bénin Août 1988 : Direction des Pêches Cotonou R. Bénin

4) Report on the Technical Consultation on Pelagic Resources in the Côte d'Ivoire, Ghana, Togo, Benin area 6-9 September 1988. This figure represnts only pelagic canoes the total number of canoes is likely to be substantially higher.

5) Report on Artisanal Fisheries Sector Study Liberia : McAlister Elliot and Partners June 1988.

6) Individual and Social attitudes of Fishermen Towards new techniques : P. Jorion 1985.

7) Figure supplied by A. Ijff, IDAF Socio Economist 1990.

The above total can only be considered as an estimation of the total number of Ghanaian canoes on the coast and it is probably an underestimation but also it is possible because the sources are widely divergent chronologically that some canoes have been double counted due to migration. This proportion nevertheless is likely to be small.

If indeed the life span of a canoe is in the region of 8.7 years as is suggested by the figures then the annual demand would be around 1200 canoes of all sizes. If as is more likely, the life span is nearer the six to seven years as given independently by chief fishermen interviewed, then replacement would require some 1600 canoes annually.

If canoe fleets in other countries are composed similarly to that of Ghana then around 50% will comprise large APW type canoes which require the largest size logs of 165cm and over in their constuction. This would indicate that a total annual log supply of 600 to 800 would be needed to replace the existing fleet. If it is considered that 20% to 30% of trees on felling may be found unsuitable for car-

ving due to felling damage or rot then the total number of large trees required will be between 750 and 1000.

Even if the 30,000 trees of the large size estimated to exist were all available to canoe carvers this would only provide a supply of logs for between 30 and 40 years.

However under the 40 year felling cycle, if it is assumed all the 30,000 trees are in the reserved forest only 750 trees will be available theoretically to the entire industry including canoe carvers of which 25% may be unusable due to various defects. But the 30,000 trees are distributed in unknown proportions between the reserved and unreserved forest with the supply in the unreserved forest being depleted rapidly. In consequence when the main supply will eventually come exclusively from the reserved forest the total number of suitable trees will be substantially less and also their annual availability will be reduced.

3.5 Source and Distribution of Ghanaian Dug-out Canoes

Over the last 15 to 20 years the locus of canoe carving operations has moved gradually north and west from the Central and Eastern Regions to the present concentration in Ashanti and Brong Ahafo Regions and to the north of Western Region. The changing pattern as perceived by fishermen is shown in figure 1.2. More detail of the source and distribution of canoes was obtained from the canoe transport survey, especially from the police check points at Achimota and Asankora. The geographical pattern of source and distribution of the canoes registered at these two checkpoints is shown in figure 3.1.

The map was compiled using all canoes registered including those passing Achimota prior to 18/5/90.

In all a total of 251 individual canoes were registered during the total 197 days of the survey. Thirty-eight canoes registered could not be traced to source as the village/hamlet of origin could not be located. These were known however to have passed Asankora and therefore the flow diagram has been increased by 38 at this point.

Of the 251 canoes traced, 224 originated in Ashanti and Brong Ahafo Regions and north of the Western Region from around Beyerebon.

The most distant sources were from Wamfie and Suntreso some 400 km from the coast at Accra and only 30-40 km from the Côte d'Ivoire border.

Even when reaching the coast the canoes can be transported considerable distances. The two canoes delivered to Axim in Western Region for example originated from Goaso in Brong Ahafo Region. Thus the total distance travelled by these canoes was nearly 600 km.

A significant feature of the distribution pattern of canoes along the coast is the high number which go to the Greater Accra Region, especially between Accra and Ada. This region accounts for 76% of destinations. To some extent this is explained by the registration of canoes passing only through Achimota before 18/5/90 when a certain proportion can be expected to have passed off to the Central and Western Regions above Achimota. Nevertheless the relatively and absolutely low figures for canoes destined for the Central and Western regions from the Kumasi-Accra route indicate strongly that other routes exist. This is confirmed

by the high incidence, 43% of new canoes originating in the Western and Central Regions' forests and destined for fishing communities in these regions, as shown in Table 1.3.

Of the high number of canoes arriving in the Greater Accra Region not all will be to replace existing canoes at their destination. At Kpone, Tema and Prampram there are groups of carpenters who specialise in finishing off canoe hulls from the forest. A proportion of canoes arriving at these sites therefore will be completed there before entering the local fleet or being distributed to their final destination. Some of these will go to the Central and Western Regions, although reciprocally canoes from these regions will also enter the Greater Accra fleet. The majority of canoes arriving at the Greater Accra Region however will stay, to replace ageing canoes which will be scrapped or sold on as second hand depending on their condition.

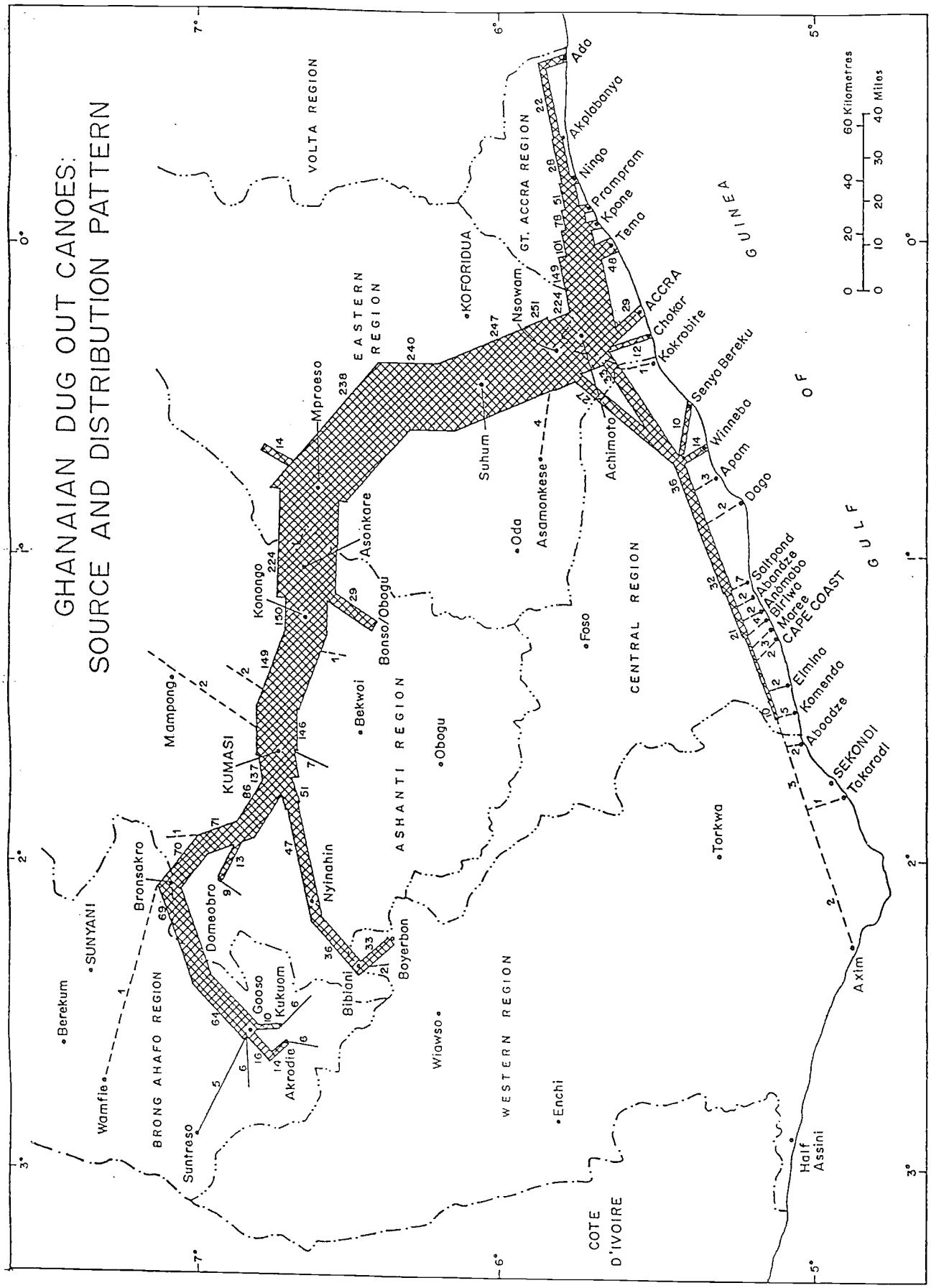
There is for example a strong demand for second hand canoes in Volta Region where beach seining is predominant. This type of fishing, operated close to the shore and often non motorised, does not demand such a strong and seaworthy canoe as would purse seining or deep sea hand lining. Thus it is often possible for a 2-3 year old sea-going canoe to be sold second hand to beach seine fishermen to be replaced by a new, more dependable vessel. The beach seine fisherman thus buys a cheaper canoe which he can use for 4-5 years.

There is also a considerable trade in canoes from the Greater Accra Region with neighbouring countries. In 1989 for example, it is known that 9 Poli canoes were fitted out at Lighthouse beach for Nigerian buyers from Calabar. These canoes now operate with Accra fishermen hired to train Nigerian crews. Other villages also have trading links with neighbouring countries such as at Anyaman and

Ningo where canoes are sold to Côte d'Ivoire, and to countries to the east as far as Cameroon.

This trade can involve second hand or new canoes but according to fishermen and canoe carvers the demand for export is always for the larger sizes of craft.

Figure 3.1


GHANAIAN DUG OUT CANOES:
SOURCE AND DISTRIBUTION PATTERN
VOLTA REGION
EASTERN REGION
GT. ACCRA REGION
ASHANTI REGION
CENTRAL REGION
BRONG AHAFO REGION
WESTERN REGION
GULF OF GUINEA
COTE D'IVOIRE
Ada
Akplabanya
Ningo
Prampram
Kpone
Tema
ACCRA
Chokor
Kokrobite
Senya Bereku
Winneba
Apom
Dago
Saltpond
Abandze
Anomabo
Biriwa
Maree
CAPE COAST
Elmina
Komenda
Abaadze
SEKONDI
Takoradi
Axim
Half Assini
Tarkwa
Achimota
Suhum
Nsawam
KOFORIDUA
Oda
Asamankese
Foso
Mprosso
Asonkare
Konongo
Bonso/Obogu
Bekwoi
Obogu
Mampong
KUMASI
Nyinahin
Boyerbon
Bibiani
Wiawso
Enchi
Bronsakro
Domeobro
Gooso
Kukuom
Akrodie
Suntreso
Wamfie
Berekum
SUNYANI
0 20 40 60 Kilometres
0 10 20 30 40 Miles

4 CANOE CARVING INDUSTRY

4.1 Organisation Structure of the Ghanaian canoe carving industry

There is no doubt that the dugout canoe has featured in Ghana's fisheries and trade since earliest times. In Cape Coast Castle reproductions of early 16th century prints by Visscher depict canoes much as can be seen today and in the 17th century Shama on the Prah River was a centre for the supply of large cargo carrying canoes. (see Albert Van Dantzig - "Forts and Castles of Ghana" P19. Incidentally canoes are still carved in the Agona area of the Central Region and floated down the Prah to Shama).

It is generally agreed that the industry was begun by the Fanti peoples in the Central/Western Region of what is now Ghana and the trade did not spread to the Greater Accra Region particularly Prampram (Ga Adangme people) until the late 19th century.

The present industry is characterised by a continuance of Fanti and Ga Adangme in the trade with greater involvement of the latter. There are also some Ashanti carvers involved. It has been estimated that for Prampram about 600 persons are engaged in canoe carving. This represents the greatest concentration of carvers in Greater Accra Region although other neighboring villages also have their carvers such as Kpongunor (5 groups) Ahwiam (3) Mangotsonya (4) Old Ningo (2) (personal communication chief Fishermen Gbetete Obodai, Kpongunor).

In the Central Region the industry is less concentrated with a centre at Mankessim and individual and small groups of carvers based at or migrating from between Twifo Praso and Jukwa. Figures for these groups are not available but there are about 10 sedentary part-time carvers based between Jukwa and Twifu Praso, with other unkown numbers of groups having migrated as part of the general north and westward movement in search of a better supply of larger trees.

4.2 Migration in the Canoe Carving industry

Although some Ashanti carvers are involved in the trade and who are resident in the forest area, the greatest proportion of carvers came from the coastal villages especially in the Greater Accra Region. Until about 25 years ago the main source of canoes was from the Eastern Region around Suhum and Koforidua supplying the Greater Accra Region and around Oda also in the Eastern Region supplying the Central Region. Although some canoes, mainly smaller, are still carved in these areas the majority are now coming from Ashanti and Brong Ahafo Regions. In the canoe transport survey the furthest distance travelled by a canoe to the coast was from Wamfie in Brong Ahafo to Chorkor in the Greater Accra Region - a distance of 400 km by road.

The need to travel to find trees and the sporadic nature of their occurrence introduces a high degree of migration into the carving industry, with groups operating in an area for some months or even up to a few years and then moving on to other areas where trees can be found. Also when based in an area there is a certain degree of temprorary migration from the established base to temporary bases ocupied on a weekly or monthly periods while trees are being carved. While

the short term migrations involve relatively short distances perhaps up to 20 km, long term migrations cover considerable distances.

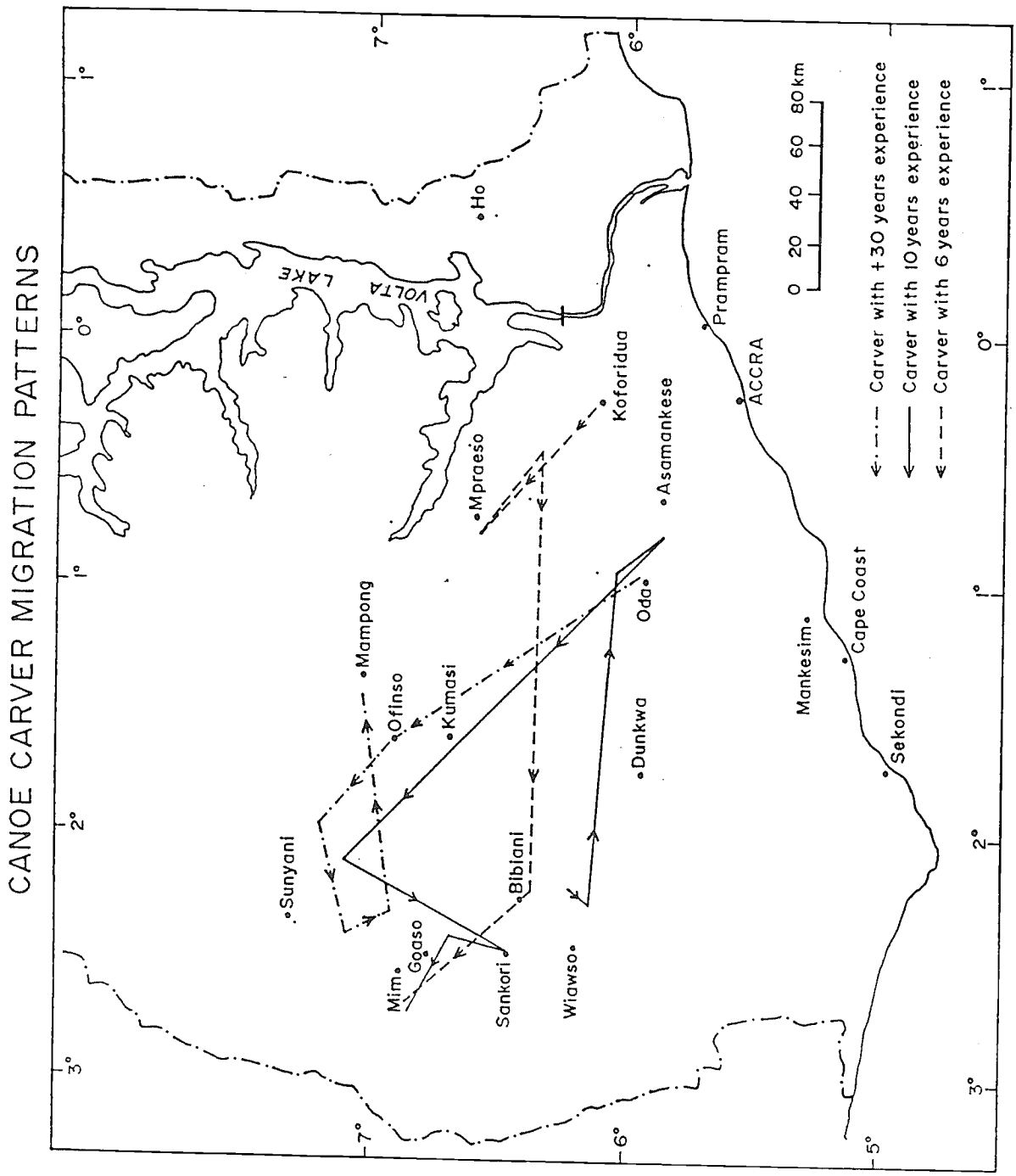
The migration pattern of three master carvers are shown in the map figure 4.1. In each case it should be noted that the general pattern is north and west in each case.

4.3 Relationships in Canoe Carving groups

Of the nine groups and individual carvers interviewed only three groups claimed close family relationship. One Fanti group of three people now based at Wiamaso (A/R) and originally from Mankessim, a group of 15 originally from Prampram and a three-man group at Obogu which was composed of the leader and his brother and a close friend. In the Prampram group the leader was the father of one chief carver and the father-in-law of the second. Other members of the group included nephews and cousins.

Although the other groups did not claim relationship to each other it is safe to assume that their origins in the same small village conferred some sort of kinship however far removed. Individual sedentary carvers tended to work independently but pooled their labour to execute heavy work during the carving process. Although it was confirmed by chief carvers in Prampram and others involved in the trade that the industry was not generally organised on family liaisons (which would have been expected in such a traditional artisanal industry) the point was made that groups which were closely related tended to operate more harmoniously with problems being regulated within the family.

Figure 4.2


CANOE CARVER MIGRATION PATTERNS
VOLTA LAKE
Ho
Koforidua
Asamankese
Mpraeso
Prampram
ACCRA
Mampong
Ofinso
Kumasi
Sunyani
Bibiani
Oda
Dunkwa
Mim
Goaso
Sankori
Wiawso
Mankesim
Cape Coast
Sekondi
0 20 40 60 80 km
Carver with +30 years experience
Carver with 10 years experience
Carver with 6 years experience

In all groups a hierarchical division could be detected with two to three carvers capable of carrying out all tasks required from felling the tree (considered the most dangerous and skillful operation) to finishing the hull. The general carvers were able to use the basic hand tools to the finishing stage while the apprentices performed general tasks such as labouring and cooking to rough excavation with the general purpose adze (Asorkwa, Fanti; Omee, Ga Adangme).

It would appear that no formal apprenticeship system exists. An aspirant carver can join a group at virtually any age and progress though the various skill levels taking 2-4 years to become an accomplished carver depending on his capabilities and assiduity. However in some cases group members never master the craft totally and remain "apprentices". When an apprentice is regarded by his master carver to have attained the necessary skills he is handed the long handled chisel (Apam, Fanti; Tii, Ga Adangme) by the master as a sign of his acceptance as a master carver.

Formerly, before an aspirant carver was accepted as an apprentice, it was the practice to give a cock and two bottles of schnapps before being accepted by a master carver for training. This form of indenture is now largely ignored as is the previous practice of a former apprentice, on setting up his own carving group, to donate his first canoe to his previous master.

4.4 Share system in the Carving industry

The various skills within a carving group is reflected in the payments received. In general sedentary carvers will share profits equally once the canoe has

been completed and sold. Professional migrant groups however tend to share the cumulative profits of the carving season at the annual Homowo (Ga Adangme) festival (July/August). In fact this festival marks the end of the carving season for some professional groups who will recommence operations in December and January giving a carving season of six to eight months, most carvers however return to the forest once the festival is over.

Several methods of sharing profits were described but in all cases the master carver received the greatest share as would be expected. It was stated that before introduction of the chain saw (early 1970's) the master would take 2 shares, one for himself and one for the tools which he supplied. One other share would go to the craftsman and the apprentices. At this time a carving group would consist of one master supported by one craftsman, the rest being apprentices making in some cases a total group of twelve persons. The remaining share would be divided usually in the proportion of 40% to the craftsman and 60% divided between the apprentices with the master deciding the allocation to each individual. With the advent of the chain saw the most common practice now is for the saw itself to receive a share so that in the above case the master would receive 2 shares as before, the chain saw one share and the remaining share again divided according to the master carver's decision. In other cases the first canoe of the season would be sold as a working capital fund for the repair of the chain saw; any surplus remaining at the end of the season going to the master. A particularly precise breakdown of the share system was given in Kpone where a group of five carvers comprising a master carver, three craftsmen and one apprentice applied the following system;

machine and tools	=	2 shares
master	=	2 shares
carvers 1.5 shares each	=	4.5 shares
apprentice	=	.75 share
Total :		9.25 shares

4.5 Relationship between fishermen and canoe carvers

Although mention was made of certain fishermen having special relationships with individual carvers and groups, carvers generally operate independently and carve to order for whomsoever wants a canoe. An example of a long standing relationship between a carver met at Obogu and several Jamestown fishermen should however be cited. On the part of one well known fishing family the relationship stretches back to the time when the father of the family ordered his canoes from the father of the present carver who came from Accra and was known to the family. Over time, continuous patronage and mutual trust now allows the carver to sell to this particular family on credit. This is not a usual procedure, as usually a carver will demand an advance before work is started and payment in full before the canoe is handed over. In the last 20 years one member of the family has ordered 7 canoes from this particular carver. As an indication of his loyalty this last canoe was ordered 2 years ago but it has not yet been delivered because a suitable tree has not been found. (In fact 3 trees have been cut during this time but all were defective). Despite the delay and the fisherman having to purchase a second hand canoe in order to keep fishing, he categoriacally refused to contact another carver. It is almost certain other fishermen have relations-

hips like this with carvers but on the whole they will be exceptions rather than the rule.

Normally a carver will build to order. The approach can be in two forms; either a fisherman will seek out a carver either by chance or through recommendation from a satisfied customer and will order his canoe directly, specifying the beam and length and other characteristics. On the other hand, the carver after finding a suitable tree will then visit the coastal areas, usually in his home region to seek out buyers.

Once the three vital ingredients of carver, fishermen and tree are brought together, the business arrangements begin.

Generally but not always the fisherman will accompany the carver to the forest to inspect the tree and if acceptable will request that it is felled. The fisherman will then specify the shape of canoe required. This is done by roughly indicating the height at bow and stern by body measurements e.g. bow to be at forehead height, amidships at midriff height and, stern at chin height. (No measuring tapes or other conventional measures are used at any time during construction). When the shape has been decided it is roughly etched by a machete or other instrument on the bark of the log. At this stage an advance of 50-100,000 C is then paid to the carver to begin work. In some cases this advance is sufficient to complete the work; the final payment for the hull taking place after negotiation when the carving is finished and the canoe ready to haul from the forest. In other cases, the fisherman is requested to visit the work site at regular periods (+/- 2weeks) to pay further advances and to inspect progress. It is also known for a fisherman (or his representatives) to remain at the site during the whole carving phase to prevent the canoe being sold to a rival. To fishermen this was a ma-

jor problem, because if the canoe is sold to another not only does he lose his canoe but also probably his advance. On the other hand regular visits to the carving site or a permanent presence there costs time and money which adds to the indirect cost of the finished hull.

4.6Role of the Canoe agent

Because of the distance from the coast it is now necessary to travel to find sufficient trees of suitable size and the concomitant inconvenience for fishermen, coastal based canoe agents are becoming more important in the industry.

These individuals who are usually well respected in the community by both fishermen and carvers act as "honest brokers" between the two parties. He will guarantee the fisherman the canoe he desires at the price agreed and will act as business manager and banker for the carvers. In one case, the agent for a Pram-pram group of carvers also supervised the construction of their dwellings in their home village. These agents, usually men of some substance can also extend credit to both fishermen and carvers either to buy canoes or to finance carving. They will also arrange transport from the forest. In this case it was claimed that all the transport trucks came from the coast and expenses were defrayed by carrying commodities inland like roofing and other building materials for the local agricultural communities and smoked fish to sell on the local markets. These agents will also sell any "by product" canoes which have been carved from the surplus timber left after the completion of an ordered canoe.

One of the main roles played by these agents is the provision of working capital and arranging logisitics for the carvers in the forest. Both the agent and the

master carver keep records which form the basis of their accounting system. The various responsibilities for expenses are clearly defined. For the carvers these include :

i) Purchase of tree
ii) Lands commission levy
iii) Stool chief libation
iv) Fuel
v) Chain saw expenses
vi) Food, board
vii) Pocket money
viii) Damage to farm crops

The agent on the other hand guarantees to buy all canoes carved subject to quality but also pays :

i) Tractor extraction from carving site
ii) Transport from forest
iii) District council levy

The agent makes periodic visits to the carving teams disbursing advances as required until the work is finished. In one particular case between april-june 1990 this represented in money terms :

	Period	
a)	8/4/90 - 11/4/90	100,000 C
b)	26/4/90 - 15/5/90	189,500 C
c)	22/5/90 - 24/5/90	18,000 C
	canoe completed	---- --- - --------
		307,500 C
d)	1/6/90 - 6/6/90	28,800 C
e)	10/6/90 - 16/6/90	6,250 C

	Total	342,550 C

In the above the main expenses during periods a) - c) included advances for fuel, living expenses, purchase of tree, incidental transport for the carvers and pocket money. Period d) represents payments for labour to extract the canoe from the forest, compensation to farmers for damage to crops, lands commission levy and stool chief libation. In fact, there still remained 17,000C outstanding to pay for crop damage and 3000 C to the stool chief. Period e) which covers one week represents payment advances for food for the carving group while awaiting the transporting lorry which was delayed. All the advances disbursed make payments to this carving group 362,550 C in the forest. In addition a further 80,000 C was paid to the group on delivery of the canoe at its destination along with 15,000 C for a new chain saw blade, making a total of 457,550 C disbursed. The particular canoe to which these advances refer is being negotiated at 815,000 C but the agent thinks he will have to pay only 700,000 C. In which case he will actually pay only 242,450 C to the carvers.

The agent has however other expenses which fall on him, these are, the cost of the tractor for extraction from the forest, 65,000 C, lorry transport to the coast, 100,000 C and the district council levy of 40,000 C. Then the total cost of the hull delivered to the coast to the agent is as below :

Advances to carvers	457,550 C
District council levy	40,000 C
Tractor	65,000 C
Transport	100,000 C

Total expenses	662,550 C
Balance to carvers at negotiated price of 700,000 C	242,450 C
Total cost of canoe delivered to coast	905,000 C

This case is complicated to a certain extent in that the advances covered the cost of two canoes built one of which was found to be damaged nearing completion and was refused by the agent. This cost is borne by the carvers who will receive the balance for the canoe purchased after deduction of the total advances. Nevertheless the description alone adequately illustrates the financial symbiosis between the carver and agent.

On the other hand the canoe buyer must also finance the agent. Here the advances are made over a shorter period of time but in larger amounts. The agent therefore acting as "go between" handles the end purchaser's money in an effective manner and ensures that the canoe ordered will be built on time to the quality standard required by the purchaser. His management of this operation also of

course obviates the need for the fisherman himself to go to the carving site with all the attendant inconveniences.

Complicating the whole system is the fact that the industry is enmeshed in a web of credit. It is often the case that a purchaser will not have sufficient funds to advance before carving can start. In this case the agent may pay the advances required from his own resources and even by obtaining a loan himself, until such time as the purchaser can amass the required capital, again often through credit from family or fish dealers and money lenders. Even then the end purchaser may not be able to meet the total cost of the negotiated price when the canoe is ready for delivery and the agent must wait until further credit can be raised by the purchaser or his fishing operations enable him to cancel his debt.

It was said that canoe agents do not charge interest on these outstanding debts, however this risk is accounted for in the final negotiated price of the canoe, which will be higher if paid in installments.

4.7 Cost of carving and canoe prices in forest

The time taken to carve a canoe depends not so much on the size of the group working but rather on the number of chain saws, the servicibility of these and the availability of sufficient suitable trees. A lone carver can make 4-5 large canoes a year if no difficulties arise. In fact carvers seldom work entirely alone and will enlist the assistance of other individuals in the vicinity, whereby a group of three can in theory make 12-15 canoes per year. In practice according to carvers this figure is rarely reached and a more realistic figure would be around a maximum of eight large canoes completed each year. With around one month for carving each canoe the rest of the time is taken off for illness, family visits and

other reasons, for example searching for trees or seeking customers. In larger groups carving time is around two weeks but depends more on the number of chain saws, and the completion rate depends on the supply of trees.

The major direct expenses involved in canoe carving after the purchase of a tree is in the operation of the chain saw. Below is given the direct costs for carving by different groups in different locations.

Group No 1

(Part time carver helped by another 2 independent carvers)

Location - Hwidiem (Anumfrom)

Canoes carved 17m x 1.68m

12.5m x 1.37m

Cost of Tree (one)

Land owner (farmer)	50,000 C
Concessionaire	80,000 C
Stool chief	7,000 C

	137,000 C

Cost of carving

19 gallons of petrol at 380 C/gallon	7,220 C
9 gallon lub oil at 2600 C/gallon	23,400 C
8 gallon diesel oil at 360 C/gallon	2,880 C
1 1/2 chains at 10,000 C each	15,000 C
3 files at 800 C each	2,400 C
4 Adze heads and handles	10,000 C

	60,900 C

Total cost	197,900

Group No 2

(group of 15 migrating professional carvers originating from Prampram)

Location - Akrodi

Canoes carved 17.2m x 1.93m
12.0m x 1.6m
13.0m x 1.65m

Cost of trees (Two; three felled but one found to be rotten)

Land owner (farmer)	15,000 C
Concessionaire	100,000 C
Stool chief (village development)	50,000 C
	165,000 C

Cost of carving

40 gallons petrol at 360 C/gallon	14,000 C
20 gallons of Lub oil at 2500 C/gallon	50,000 C
1 pkt files at 3500 C	3,500 C
4 spark plugs at 600 C each	2,400 C
15 gallons diesel oil at 300C/gallon	4,500 C
2 chains at 10,000 C	20,000 C
Adze heads and handles	20,000 C
	114,400 C

Total cost	279,400 C

(1) Note the prices of fuel oil and lub oil for this group is less than group No 1 as these had been supplied by their agent from Accra.

(2) These costs do not include food, lodging, repairs to the chain saw and other incidental expenses which are discussed in section 4.6.

(3) Lubrication of the chain blade is with a 50% mixture of diesel and lub oil.

4.8 Profitability of canoe carving

It is not known with any precision the profit levels in the canoe carving industry. Some speculation can however be made using information from various sources. It is reckoned that a group of 3-5 canoe carvers can make up to 12 large canoes per year but seldom reach this target. From figures supplied by one canoe agent his carvers will receive at the end of the season a net balance of between 1.5 million C and 1.8 million C for carving 5-6 large canoes. This would put a net profit on each canoe of 300,000 C. This figure was also mentioned by other carvers interviewed in the forest. From other information supplied by the agent he will pay a net balance of around 242,450 C for his latest canoe (see section 4.6). This however represents the price of one canoe whereas expenses were disbursed for carving two, one being rejected upon completion. There the cost is borne by the carver. If both canoes had been acceptable and sold for 700,000 C each the total balance received by the carvers would have been 942,450 C. In fact this risk to the carver is quite high as anything from 2 to 3 trees out of ten may prove defective. The highest risk is however when the canoe is found to be unacceptable after the work is nearly completed and the carving costs have been incurred.

Nevertheless taking the low figure annual net balance paid by the agent to his carving group and applying their share system then annual income would appear as below :

Chain saw and tools x 2 shares	324,324 C
Master carvers x 2 shares	324,324 C
3 craftsmen x 1.5 shares each	729,729 C
Apprentice x .75 shares	121,621 C
	1,500,000 C

This however does not include food, lodgings and pocket money while employed in the forest. Excluding these at the end of a season a master carver would receive the equivalent of 27,000 C per month, a craftsman 20,300 C and the apprentice 10,135 C. These salaries should be compared with those of a bank clerk earning around 15,000 C per month.

Calculating profits made by the canoe agents is more difficult. The canoe hull for which costings were given in section 4.6 would cost at least another 150,000 C to finish off with side planking, painting and decorative work taking the price to 1,055,000 C. Such a canoe would sell for between 1.2 million C and 1.3 million C giving a profit of between 145,000 C and 245,000 C. Taken into acount however must be the high incidence of bad debt and late repayments which considerably reduce the profit margin of canoe agents.

A medium size canoe would cost slightly less to transport from the same area (in this case Ashanti Region) at around 80,000 C and also the district council levy would be less at 30,000 C. The tractor cost would be the same at 65,000 C. The

hull would however be considerably cheaper at around 450,000 C. This would give a total delivered cost at the beach of 625,000 C while finishing off would be in the region of 100,000 C, making the finished canoe 725,000 C. This canoe would sell for between 800,000 C and 900,000 C giving a profit of between 74,000 C and 175,000 C.

If the canoe comes from Brong Ahafo Region however the transport could be as high as 200,000 C but the district council levy is much lower at only 6,000 C for all canoes (May 1990).

4.9 Procedure for carving a Ghanaian canoe

a) The tools

When one sees a well made Ghanaian canoe from a perfect tree one wonders that such a fine form can be obtained from the rawest of raw materials using only hand wielded adzes and gouges. No conventional measuring instruments are used in the construction and the only modern tool is the chain saw which eases the work considerably but has not replaced the need for traditional craftsmanship in carving.

The tools used apart from the chain saw (Dolmar and Sthil) are blacksmith made and range from the heavy general purpose rough duty adze, Asorkwa (Fanti), Omee (Ga Adangme) to the long handled gouge Apam (Fanti), Tii (Ga Adangme). Illustrations of the tools seen, with their measurements are given in figure No 4.1. As these tools are non standard but blacksmith forged no doubt variations will exist from carver to carver depending on personal preferences.

b) The procedure

The sequence of payments from the fishermen to the carver can vary considerably. What is described below is a general case constructed from interviews with several carvers.

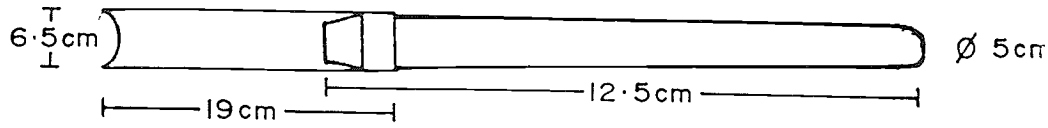
i) On approaching the carver the fisherman will give a small sum for drinks. This sum (Ayekoo, Ga Adangme) is a pledge of good-will on both sides and reserves that particular tree to be worked on for that particular fisherman. At this stage also an advance may be paid to enable work to start, this can vary substiantially but will usually be between 20,000 C and 100,000 C.

ii) Before cutting the tree, in some cases but not all, a libation is poured to placate the spirit of the tree in order to prevent accidents to the carvers when working.

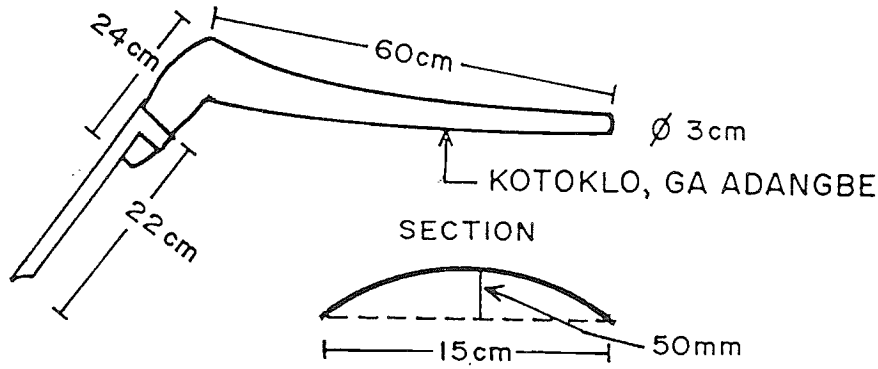
iii) Felling is the most dangerous operation and is usually undertaken by the chief carver. If the tree is not properly cut it can turn and fall on the feller or fall badly and be damaged. The feller then must carefully decide how he is to cut the tree so that it falls clear of any potentially damaging obstacles such as rocks and in a position in which it can be worked upon. Also if a tree falls without some cushion to absord the impact it may break on falling. To avoid this the feller tries to make his cut so that the tree hits other smaller trees as it falls. This of course may damage highly valued species. As these over mature wawa often suffer from heart-rot, especially spreading from the root upwards, after the feller begins to cut he may detect rot through a reduced resistance in the wood and the form of the saw-dust. If this occurs he will enlarge the cut he is making to enable the mid-rib of a palm frond (usually oil palm *Elaeis guineensis*) to be pushed upwards into the rot to guage the extent. If the rot extends too far the tree will be abandoned and another sought.

TOOLS USED IN GHANAIAN DUG OUT CANOE CONSTRUCTION

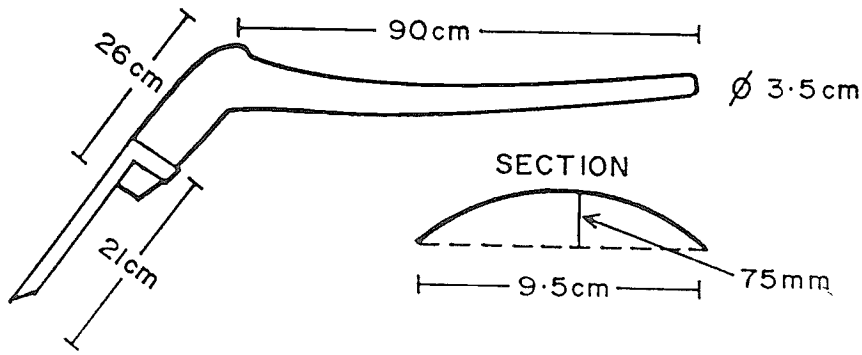
APAM, FANTI; TII, GA ADANGBE.



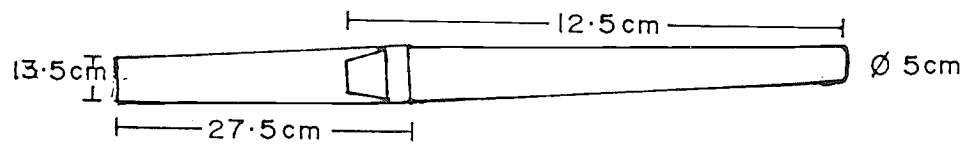
TETEWA, FANTI; TETEWA, GA ADANGBE.



ASORKWA, FANTI; OMEE, GA ADANGBE



SUSA, FANTI; USED WITH HANDLE KOTOKLO BY GA ADANGBE = ASANKROMA

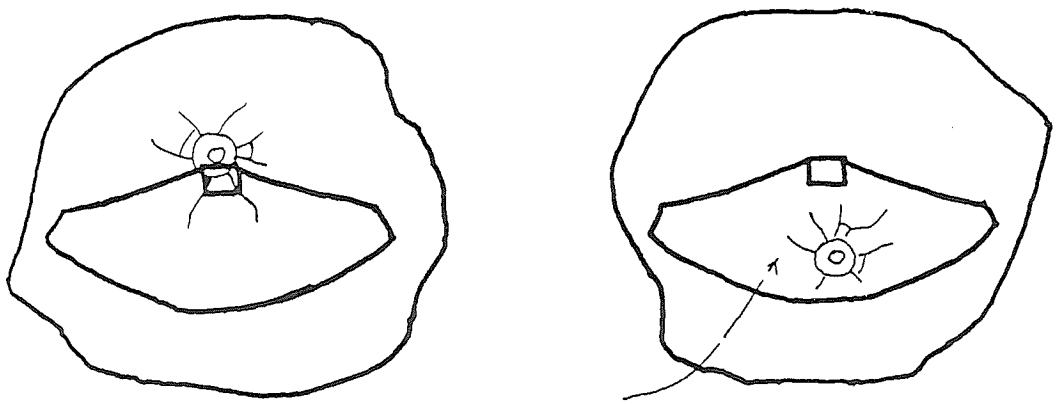


NOTE – DRAWINGS NOT TO SCALE

iv) After felling, the tree is cut to the required length. For a large canoe this is usually described as 19-19 1/2 yards (in fact 9-9 1/2 arm spans, measured from finger tip to finger tip). A certain amount of extra wood will be allowed for working at each end. With the log separated from the main tree its lie is inspected for ease of working. A decision to turn the log to a more convenient position may be taken because a flatter surface for carving the shear is available on another part of the circumference of the tree, or the heart wood is too high, or the log is simply unstable for working upon.

The reason for turning the log to have the heart wood in a lower position is so that the heart wood is not at the prow of the canoe where it would constitute a weakness, but well down in the hull where it can be strengthened by stapling with reinforcing bar staples when the canoe is being fitted out on the beach. The principle is shown in fig. 4.3.

Fig 4.3

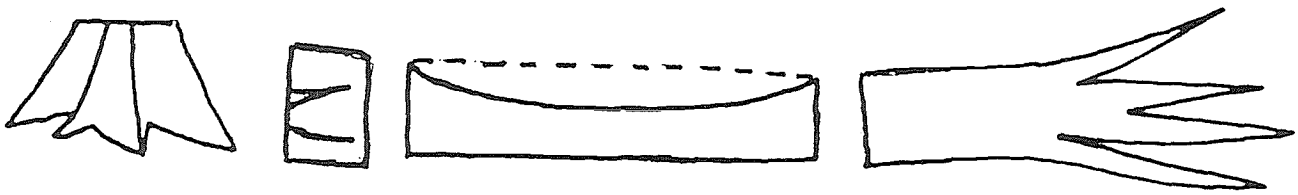


Once the log is positioned to the satisfaction of the carver he and the fisherman decide on the shape. Shear is measured using body measurements eg.

amidships at midriff or chest height and at bow and stern at chin or head height. The various combinations will depend on the fisherman's preference normally, although carvers supplying specific areas will know the design required and carve accordingly.

The basic profile is then, by eye, marked on the log using a machete or other tool and this section is chain sawed off leaving the log intact but with a flattened concave top surface. Chain sawing off this surface usually entails cutting blocks half a metre by half a metre and usually the cut is made about 5 cm oversize to allow for final carving. At this stage the log appears as in fig 4.4.

fig 4.4



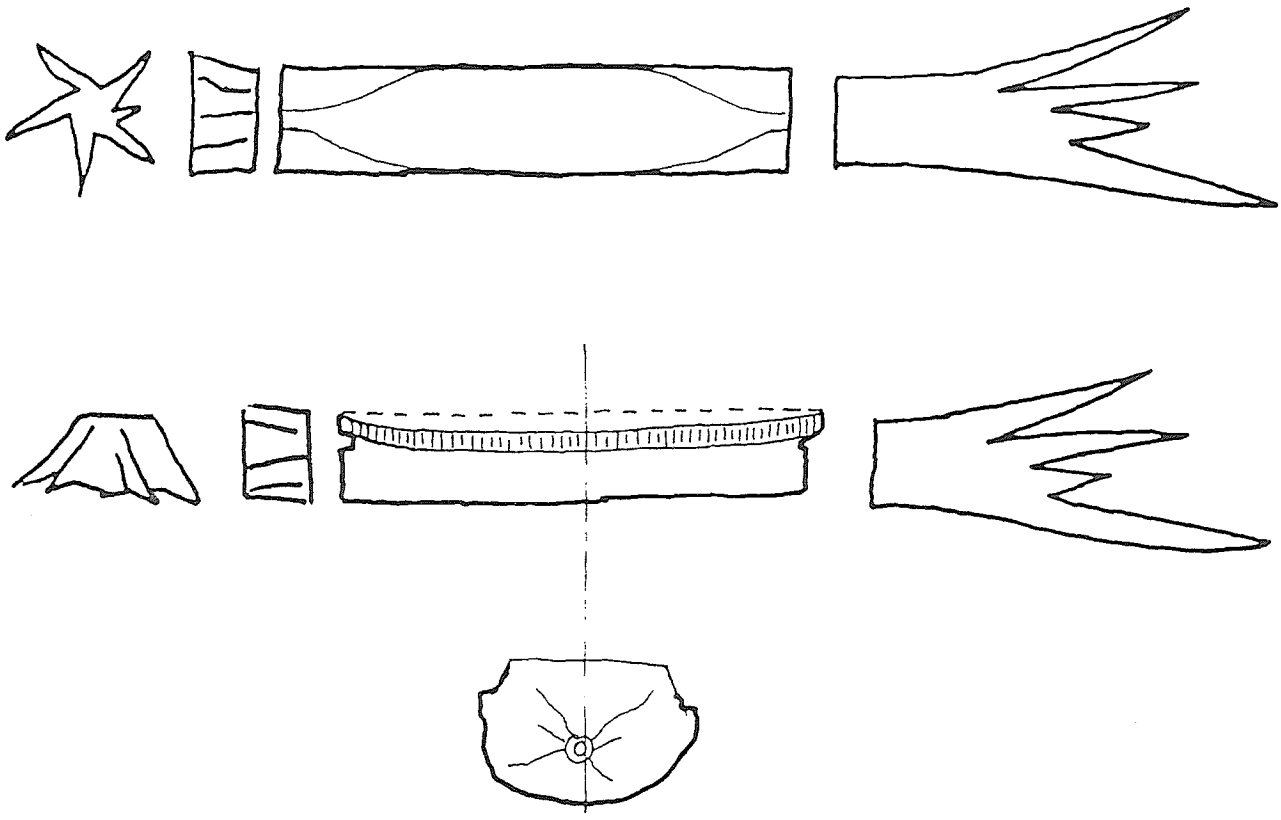
vi) Working on the flat concave top surface the carver then marks out the canoe plan. An 18 yard canoe needs a minimum beam of at least 176 cm at the outside top rail which may require a beam at the turn of the tumble home (Ntsiman, Ga Adangme; Ngyirema, Fanti) of 192 cm or more. The top rail beam amidships is measured using the carver's feet and fingers - seven feet + four fingers giving the standard minimum beam +/- 176 cm. (If the log allows, more beam will

be given). A mark is made 2-3 fingers inside the edge of the log and the required beam is marked off on the opposite site. These two marks represent the outside of the top rail at its widest point. Moving then to the fore and after end of the log the fore and aft extensions (Nkodua, Fanti; Shenkodua, Ga Adangme) which are characteristic of Ghanaian canoes will be marked out off the centre line using a hand span for measurement, for the length and width of the projection. (In some cases however these extensions have been measured to be larger than this, nevertheless the procedure remains the same). The next stage is to draw the outline of the canoe. To achieve the smoothly rounded plan shape the carver strips the side fronds from a palm branch (oil palm, *Elaeis guineensis*) and uses the naturally curved mid rib as his guide. Usually 4 of these are used to mark out the bow and stern. After marking with charcoal, these lines are joined up to the marks made amidships.

Carving begins by cutting away the waste wood at the bow and stern with the chain saw. This may be done roughly or with some degree of precision depending on the carver. Work is then begun on the final carving of the top sides (Abata, Fanti and Ga Adangme) as this cannot be done once the canoe is hollowed out. The measure for the top side varies with canoe size but is between 1 hand span and 1 hand span plus four fingers breadth in height. To achieve this the excess is removed by the chain saw and final finishing with the special gouge reserved for this task (Apam, Fanti; Tii, Ga Adangme). This tool gives a fluted effect to the topside (Utaapam, Fanti; Tii, Ga Adangme) which one carver claimed was to give purchase to haulers when previously canoes were smaller and manhandled from the forest without the use of tractors as today. Another characteristic of a well made canoe is that the topsides are inclined inwards so producing tumble home. It was claimed that no special measure was used to obtain this angle and it was cut by eye and depended on the experience of the carver. Never-

theless on several canoes of similar size the angle was measured and was in all cases +/- 15°. At this stage the log in plan and profile will appear as in figure 4.5.

Fig 4.5



Carving of the inside can now begin. The inside shape is first marked again using charcoal. The side thickness being four fingers breadth. This can be marked simply by using the hand or by a pencil attached to a piece of string marked at the appropriate length. The curvature of the outside is traced and the bow and stern either rounded off as in Fanti canoes or squared in Ga Adangme. Rough excavation then begins by cross hatching with the chain saw, the blocks being re-

moved with the Asankruma. Care must be taken at the sides. Given the inwardly inclined form of the Abata, if the chain saw cuts too deeply it will pierce the hull so reducing the value of the canoe. To measure the required depth of the inside cut to prevent penetrating the hull, and also to ensure a uniform thickness in the wood the Abata is measured with a twig. From this measurement three fingers breadth are subtracted, and this length is marked on the chain saw bar. By following the outside inclination in parallel, the required depth and angle is then achieved by the chain saw operator. The rough carving proceeds in this manner, with sufficient wood being left on the bottom and sides for final finishing off with the finer adzes (Tetewa, Fanti and Ga Adangme; and Asorkwa, Fanti; Omee, Ga Adangme). At this stage the customer may return to the work site to inspect progress and pay a further advance.

vii) When the canoe is finally carved inside, the outside form will then be shaped. The bulk of the remaining waste wood is cut away, the log being maneovered by the use of monkey jacks. In some case it may only be necessary to incline the canoe for this purpose, especially if it is small, in larger canoes the log is usually turned over, first being strengthened by jamming batons athwartships. The bow and stern are then roughly formed with the chain saw and the Asankruma. Finishing is supervised by the chief carver who uses only his eye and experience to decide the final form. It should be noted that the bottom is left overthick by 18-20 cm to allow for abrasion during hauling to the access road. This will be finally finished off at the beach or in some cases after dragging from the forest.

viii) When the canoe is completed the client and carver then negotiate the price. After agreement and payment had been made the carver has no more responsibility. It is up to the purchaser to arrange the tractor to extract the canoe

from the work site and to find transport to the coast. Any damage sustained after payment is supported by the client.

Despite the high degree of traditional skills involved in carving a ghanaian canoe and the quality of the craftsmanship achieved using the most basic of tools, the process is extremely wasteful in raw materials. In fact the actual wood used in carving a canoe is only about 10% of the felled timber if it is assumed that one large and one small canoe is carved from each tree. The other 90% of the tree is left to waste in the forest in the form of unused off-cuts and chippings.

5 THE WORKING ENVIRONMENT OF THE GHANAIAN CANOE FLEETS

5.1 Topography of Ghanaian Landing Sites

Before a replacement canoe can be designed the conditions under which the present fleet operate must be taken into consideration. It was thought at an early stage in the canoe replacement programme that the vessel to be replaced was confined to operating from ports or sheltered creeks and surf beaches. While designing a replacement vessel to fish from sheltered moorings would present few difficulties, the sea and landing conditions of surf beaches was recognized as being the major features which would influence any future design. In fact, extensive field work at the various landing sites along the Ghanaian coasts dispelled earlier preconceived ideas of the type of craft which had to be replaced. Contrary to earlier thought canoes are not operating only from sheltered landing sites and surf beaches but from a variety of landing sites presenting conditions which range from safe to extremely dangerous.

5.2 General description of Ghanaian landing sites

It was found that "classic" surf beaches composed entirely of sand, and surf beaten, occur unbroken only in the Western Region from New Town (Côte d'Ivoire border) to Axim, a distance of about 70 miles, and in the Greater Accra and Volta Regions from Prampram to Aflao (Togolese Border) about 80 miles. In fact, Prampram itself has a very dangerous landing site which must be entered through two channels in a wavecut platform. Open beach landing also occurs in the area west

of Accra from Chorkor to Kokrobite with lesser extents from Shama to Kafodzidzi and Kromantse. Lagoonal landing sites also exist at New Ningo, Kpone (seasonal) and Nyanyano. Typical classic surf beach topography is shown in maps No. 1 and 2 in large and small scale.

The remaining landing sites in the Western and Central Regions are characterized as being associated with exposed underlying geological formations, mainly upper Precambrian Quartzite shale and phyllite and upper Birimian metamorphosed lavas and pyroclastic rock. The selective erosion of these exposed geological formations, their orientation and sand transported by littoral drift gave rise to the variety of landing sites which can be identified. These sites can be in the form of depositional beaches behind headlands, such as at Moree and Senya Bereku, Map No. 3, and depositional beaches associated with low rock outcrops, Abuesi and Aboadze Map 4, natural coves with depostional pocket beaches such as Dixcove, and eroded embayments such as Axim Map 5. Many of the sites also exhibit an abrasion platform or a fragmented platform. These are particularly noticeable at Komenda and Cape Coast and to a lesser extent at Winneba and Axim Maps 6, 7, 8 and 5.

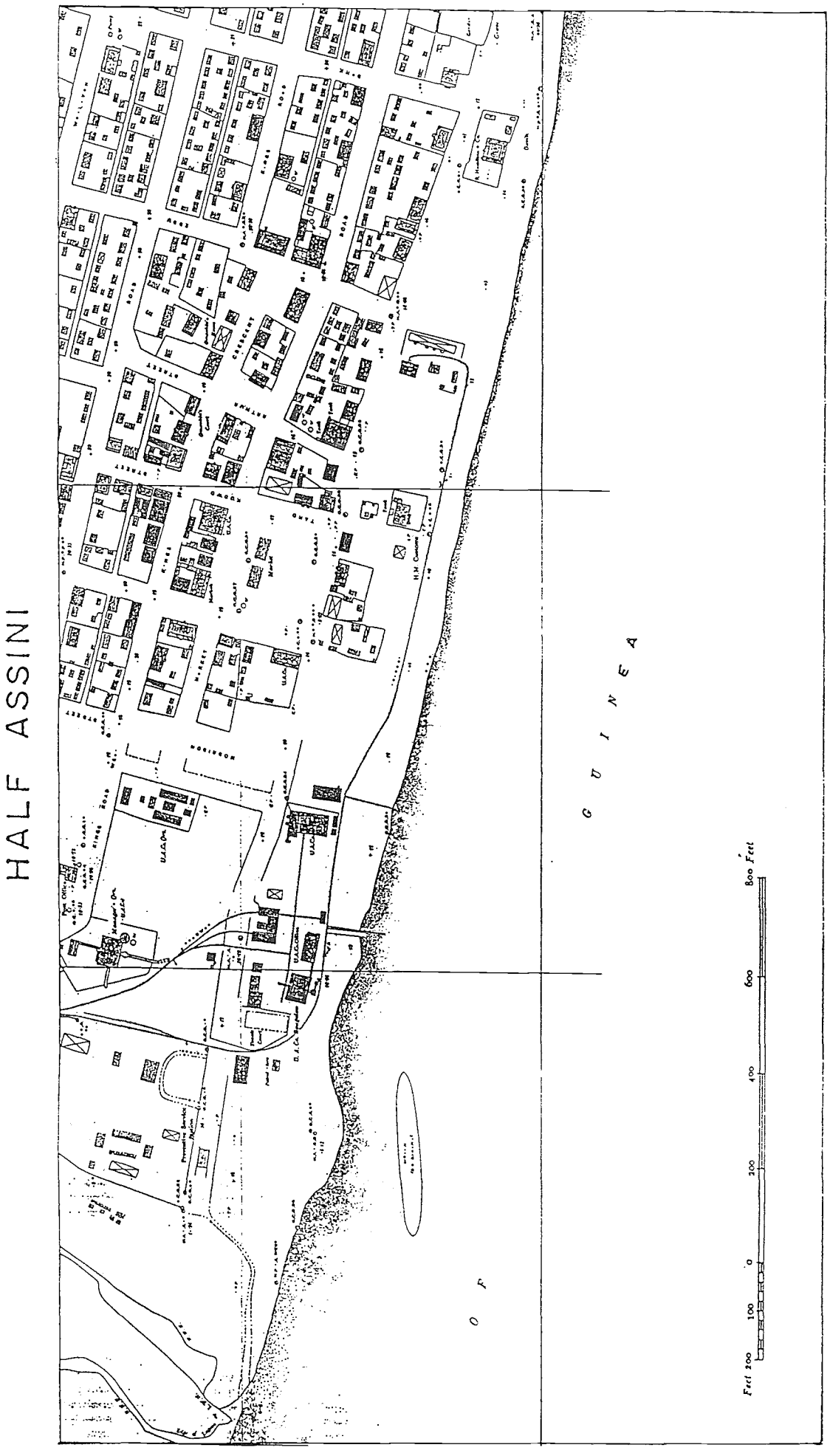
The landing beach at Komenda is particularly dangerous. Here vessels must approach the landing beach to the east and then turn broadside to the surf before negotiating a narrow gully in the rock platform which extends directly out from the landing site, Map 6. Apart from the intrinsic danger to life and property in crossing rock in heavy seas, the constricted nature of the approach causes numerous collisions between vessels trying to land at the same time.

Komenda is arguably the most dangerous landing site on the Ghanaian coast but virtually all landing sites with exposed rock present difficulties and poten-

tial damage to vessels attempting to land. Also although some of the beaches are to a certain extent protected by rock outcrops when the wind is from the S.W., line squalls which are frequently experienced at the start of and during the rains have always an easterly component, when these beaches become lee shores.

Despite the difficulties presented by these sites it is noteworthy that in the Western Region, of 481 canoes listed in the 1986 Ghana Canoe Frame Survey only 94 were located on "classic" landing beaches. Yet this type of coastline covered 70 miles of the Western Region, while beaches with exposed geology covered only 52 miles.

Apart from these unimproved landing sites there are four constructed harbours at Tema, Elmina, Sekondi and Takoradi Maps 9 and 10. Another natural harbour occurs at Apam on the Apabaka Lagoon in the Central Region, and shelter is available at Shama on the Pra River but here the entrance can be dangerous. Of the constructed ports only Tema and Elmina are used by canoes. Commercial craft are denied use of the facilities at Sekondi which are naval property. At Takoradi, although no restrictions are placed on fishing vessels, harbour dues are levied which fishermen will not pay. At Takoradi and Sekondi however there are sheltered landing sites in the lee of the port installations. These are used by canoes and inshore vessels at Sekondi, and by inshore vessels at Takoradi. Unfortunately, at Takoradi the main market site is across the bay on an exposed lee shore, yet canoes and inshore vessels land their catches here because previously when transporting catches from the sheltered westerly beach to the market site, about 1 mile, too many thefts occurred. However, when landing at this site with an onshore wind, it is too dangerous to beach a canoe and fish must be transported in small transport canoes from the fishing canoes lying off at anchor. Capsizes here are very common.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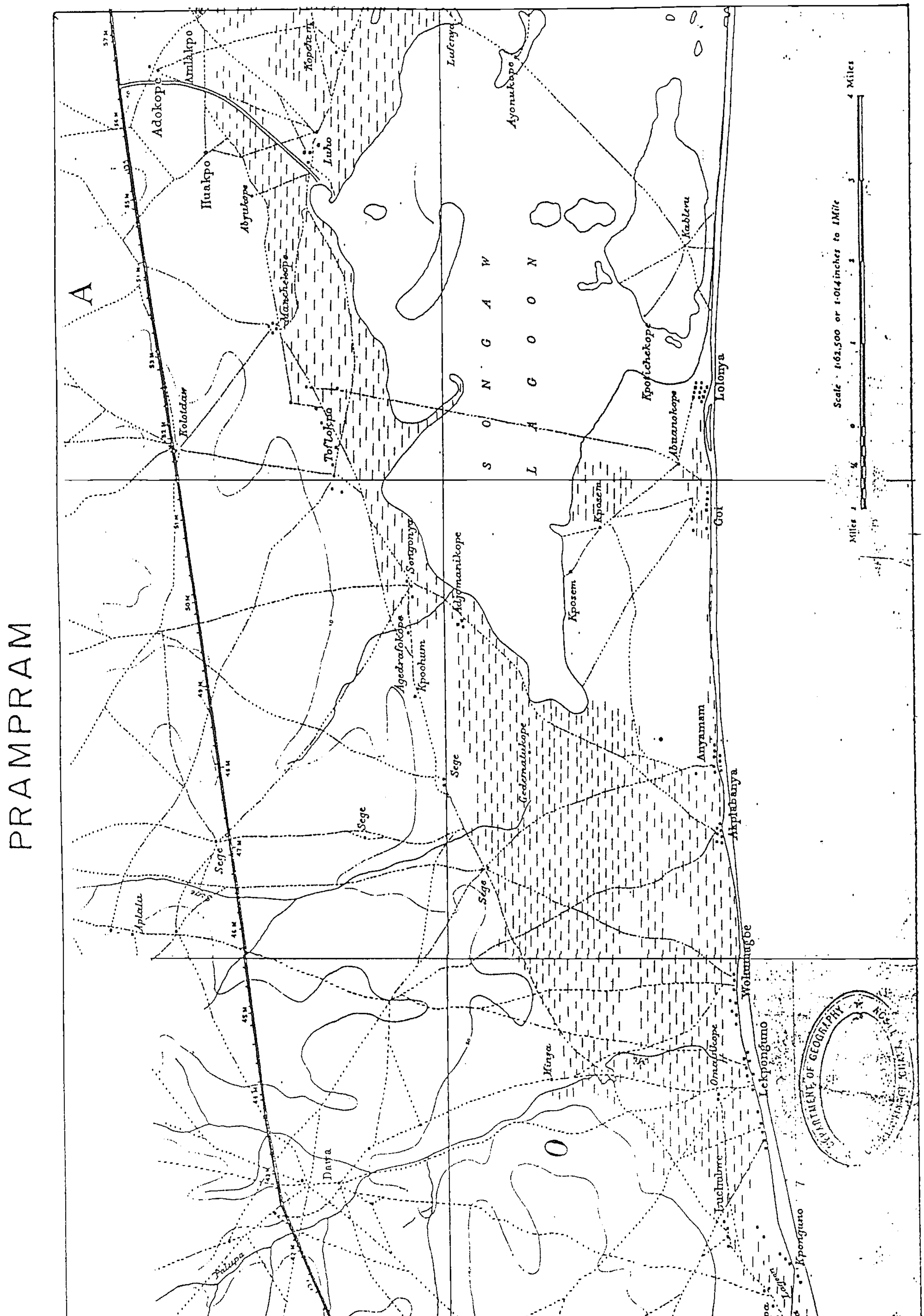
G U I N E A
O F
Feet 100 0 100 200 400 600 800 Feet


PRAMPRAM
A
S O N G A W
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Adokope
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Lolonya
Goi
Kposem
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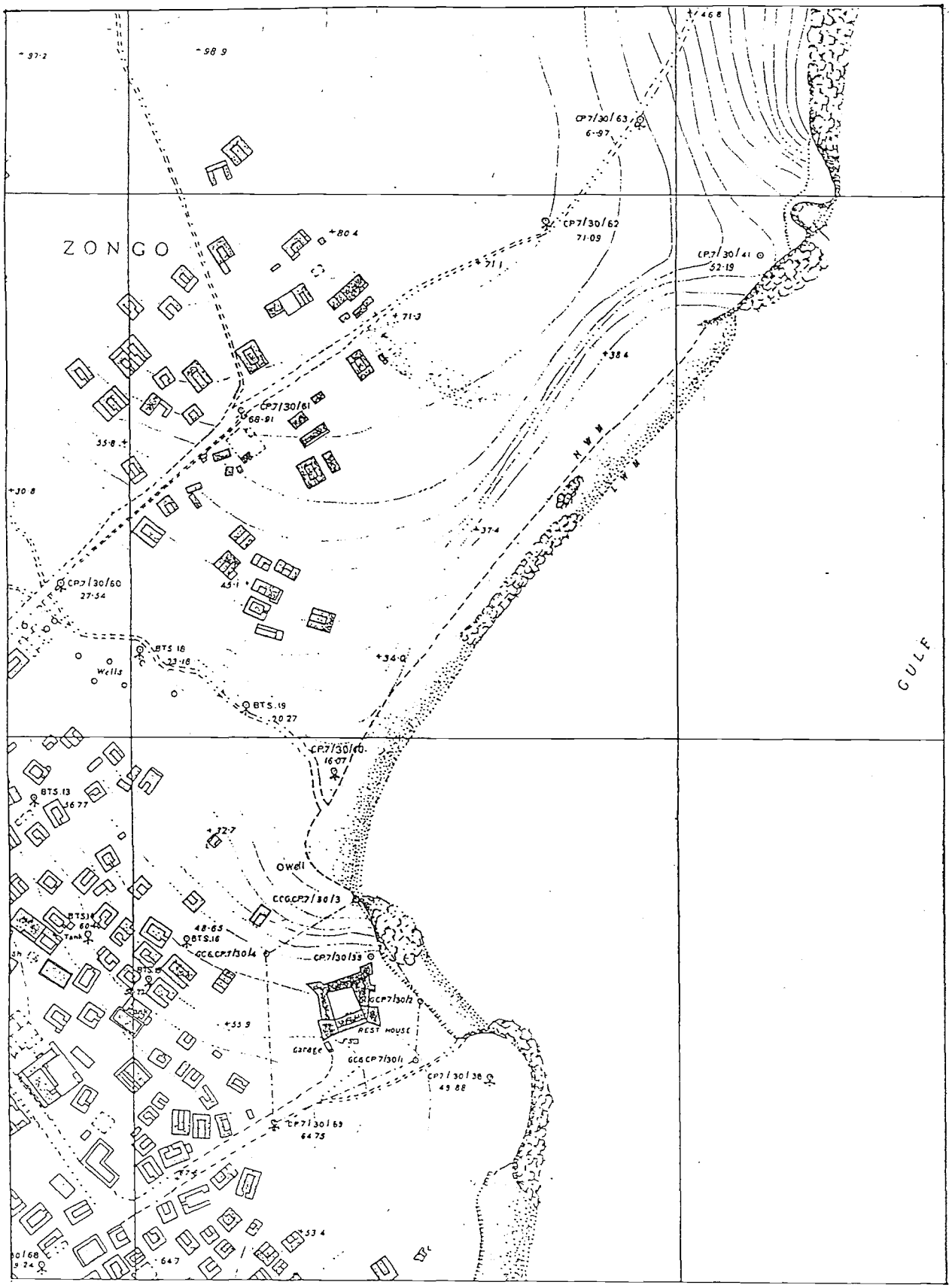
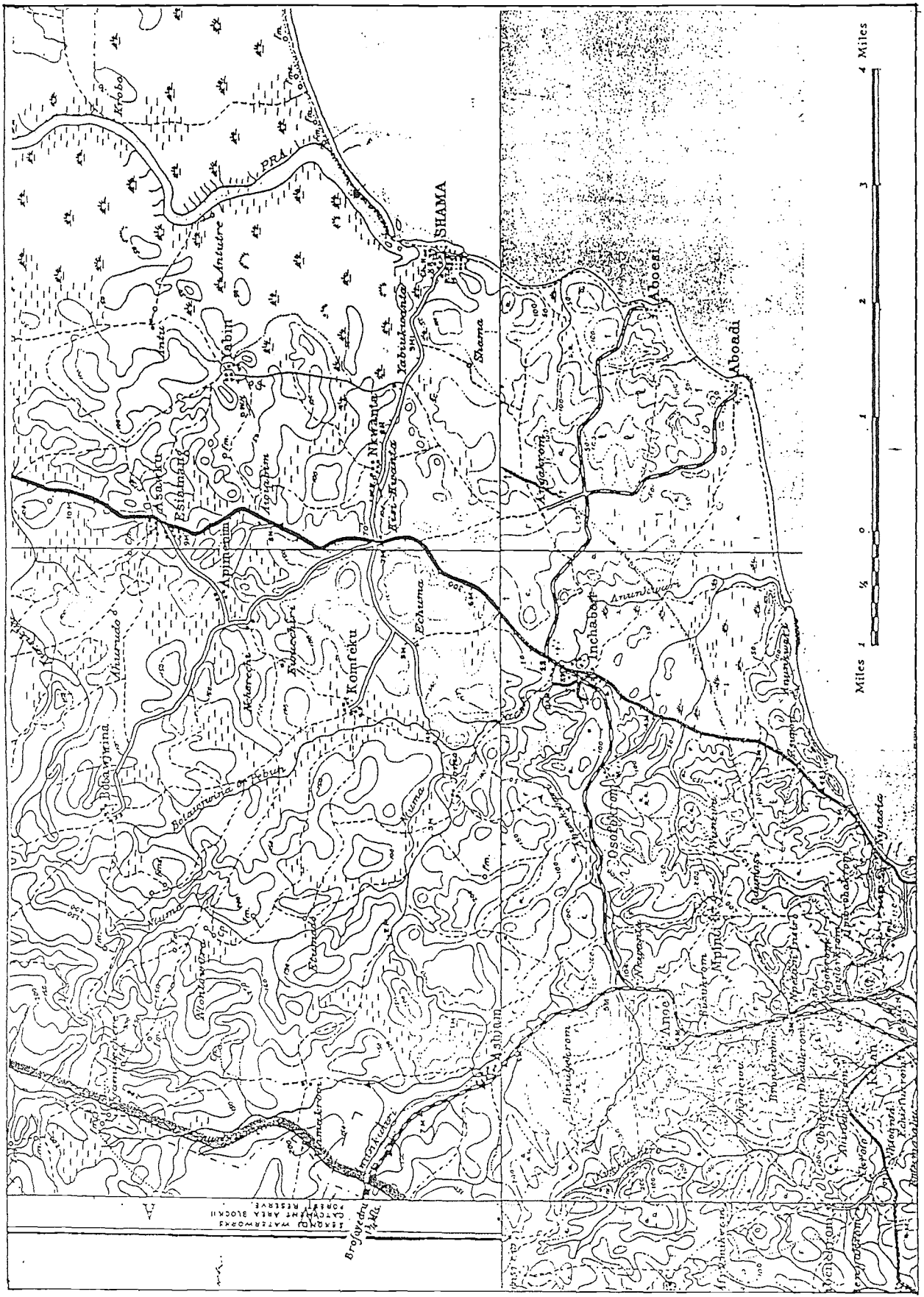
Wokumagbe
Lekpongunu
Kpongunu
Dawa
Kinga
Sege
Aplalu
Kpoohum
Songonya
Adjomanikope
Manchekope
Kpotchekope
Abuanokope
Luchubre
Scale 1:62,500 or 1.014 inches to 1 Mile
Miles
4 Miles
DEPARTMENT OF GEOGRAPHY

SENYA BERAKU

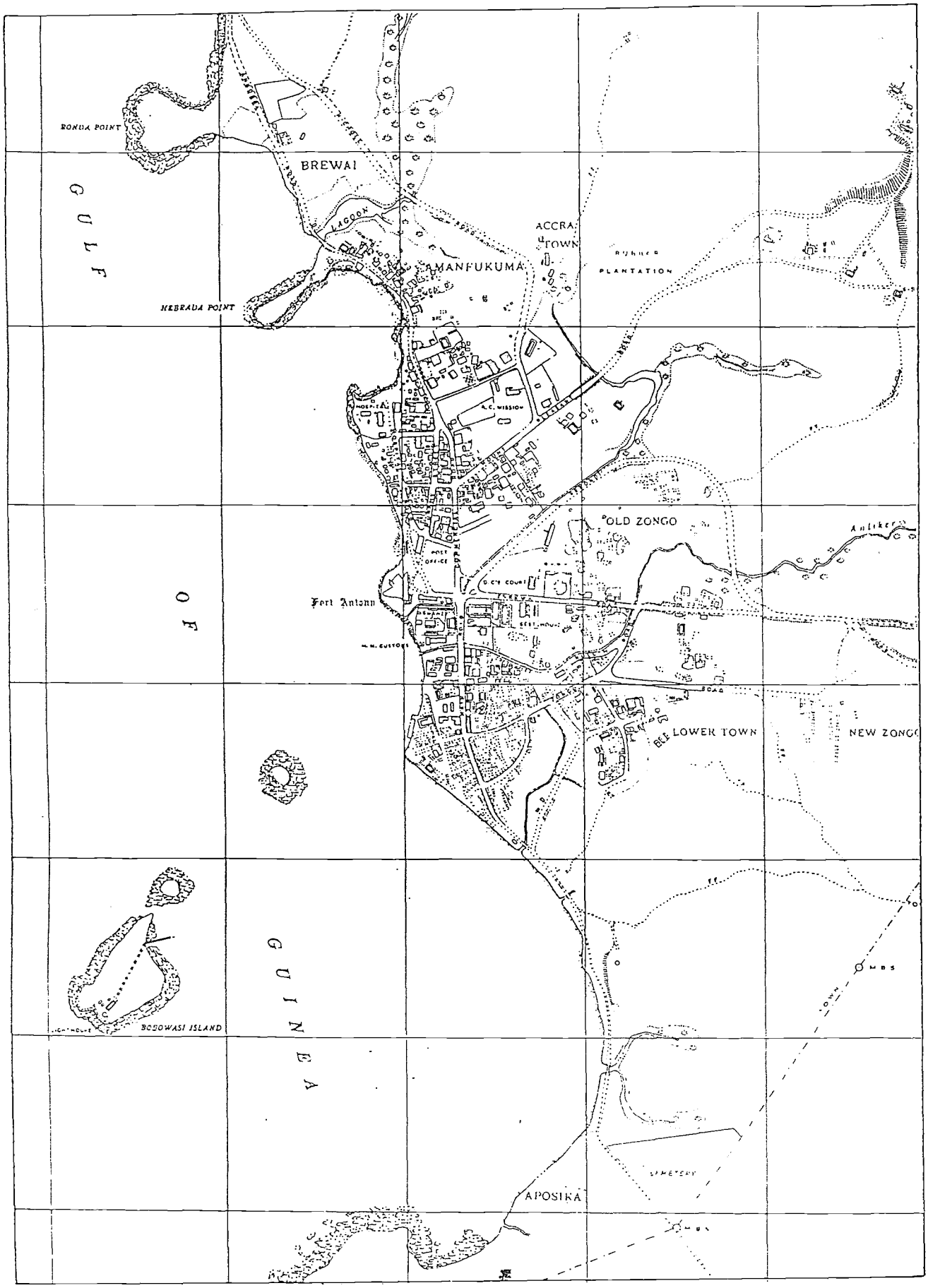


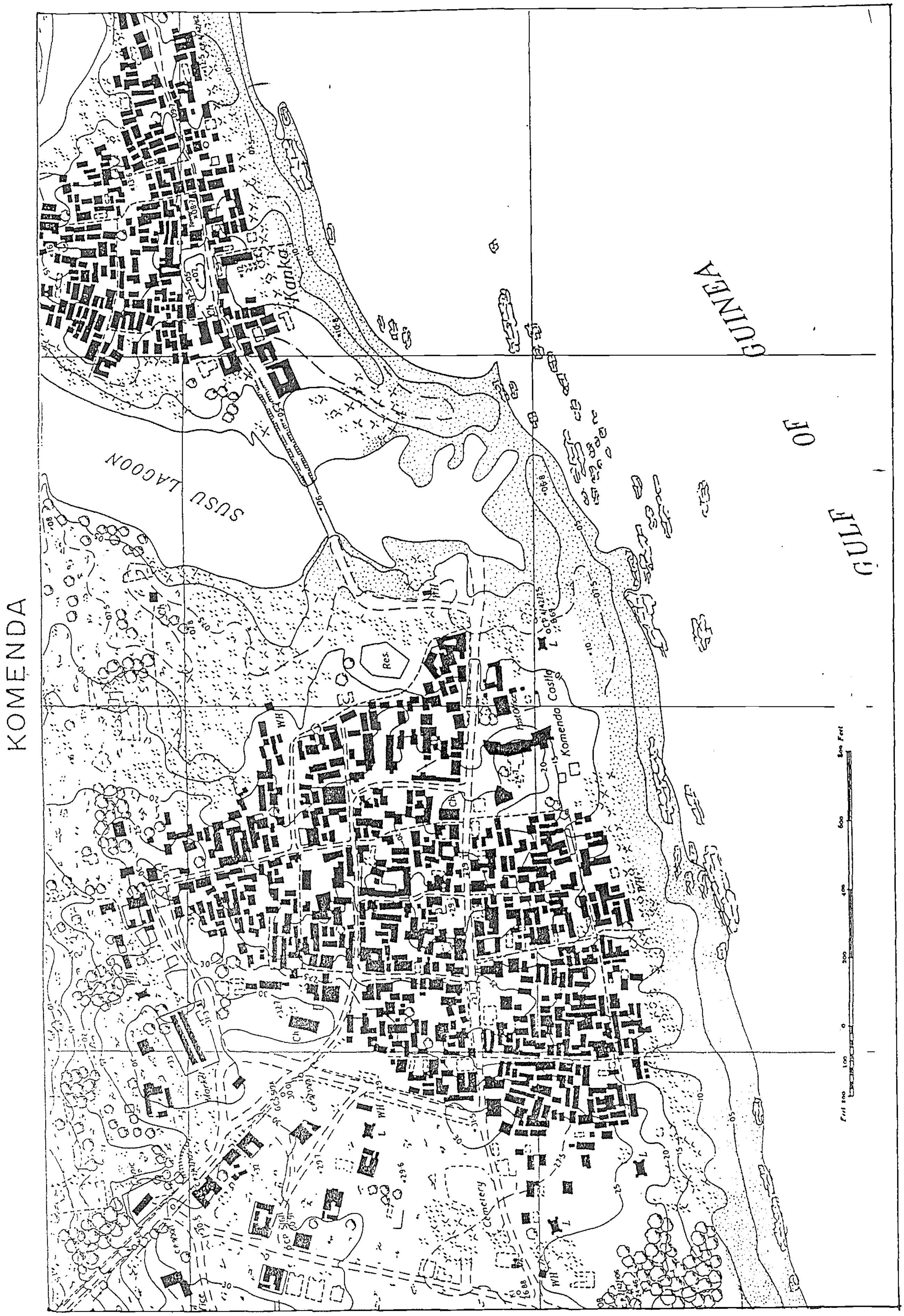
Feet 200 100 0 200 400 600 800 Feet

SHAMA, ABOESI, ABOADI

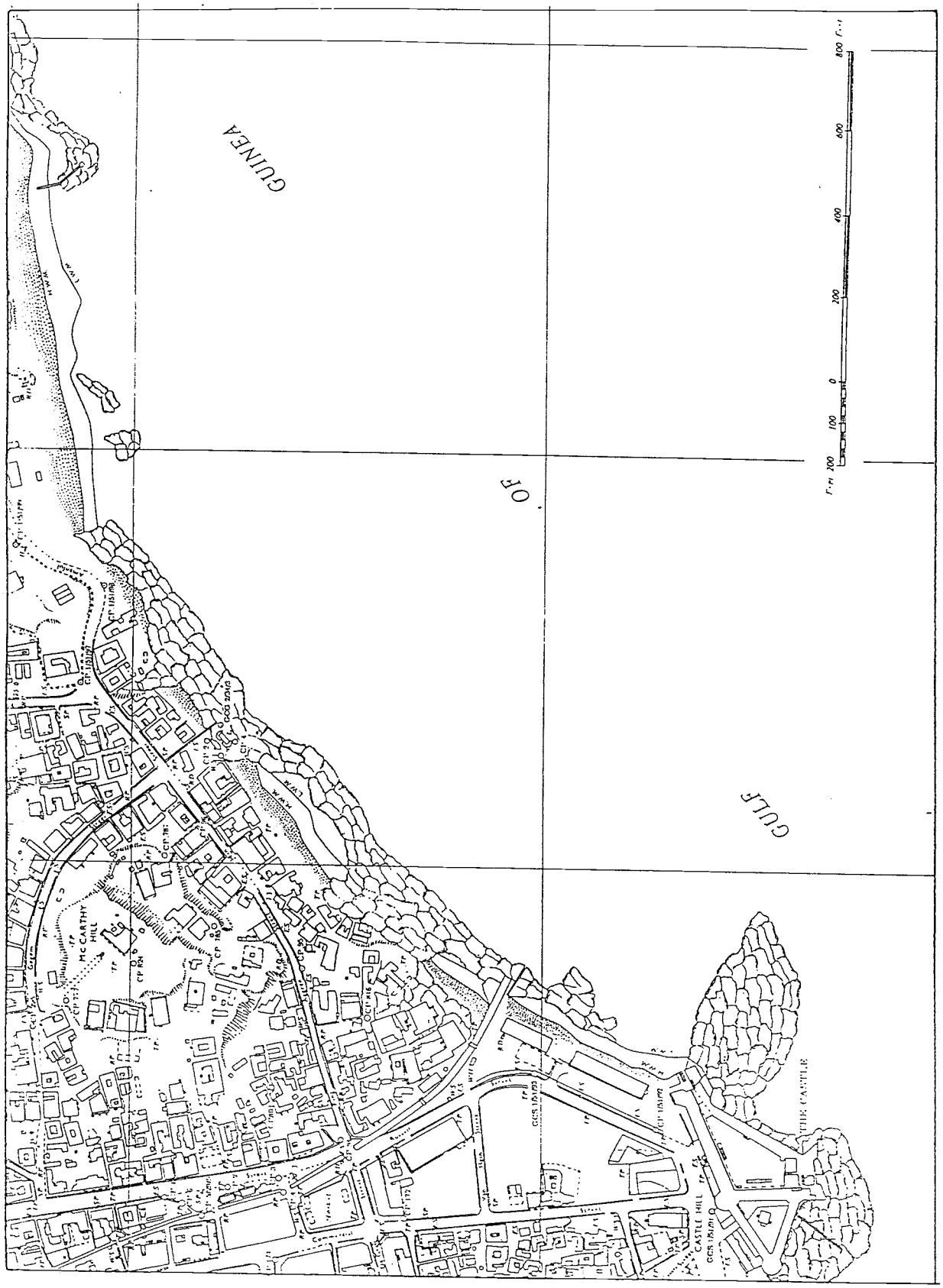


AXIM

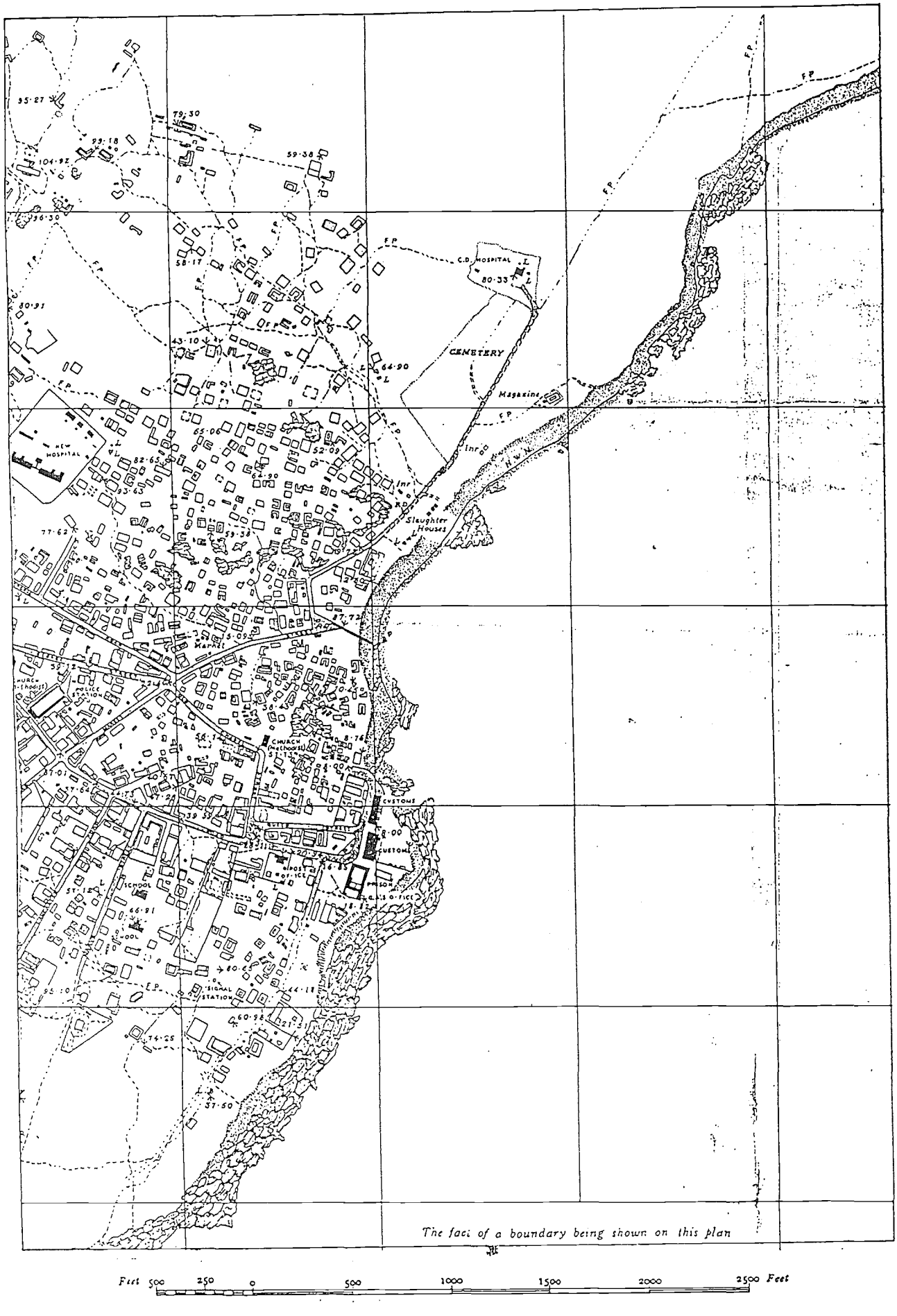

RONDA POINT
BREWAI
LAGOON
GULF
ACCRA TOWN
RUBBER PLANTATION
MANFUKUMA
NEBRADA POINT
HOSPITAL
A.C. MISSION
POST OFFICE
OLD ZONGO
Fort Antonn
H.M. CUSTOMS
OF
BOSOWASI ISLAND
LOWER TOWN
NEW ZONGO
GUINEA
CEMETERY
APOSIKA
Feet 500 250 0 500 1000 1500 2000 Feet

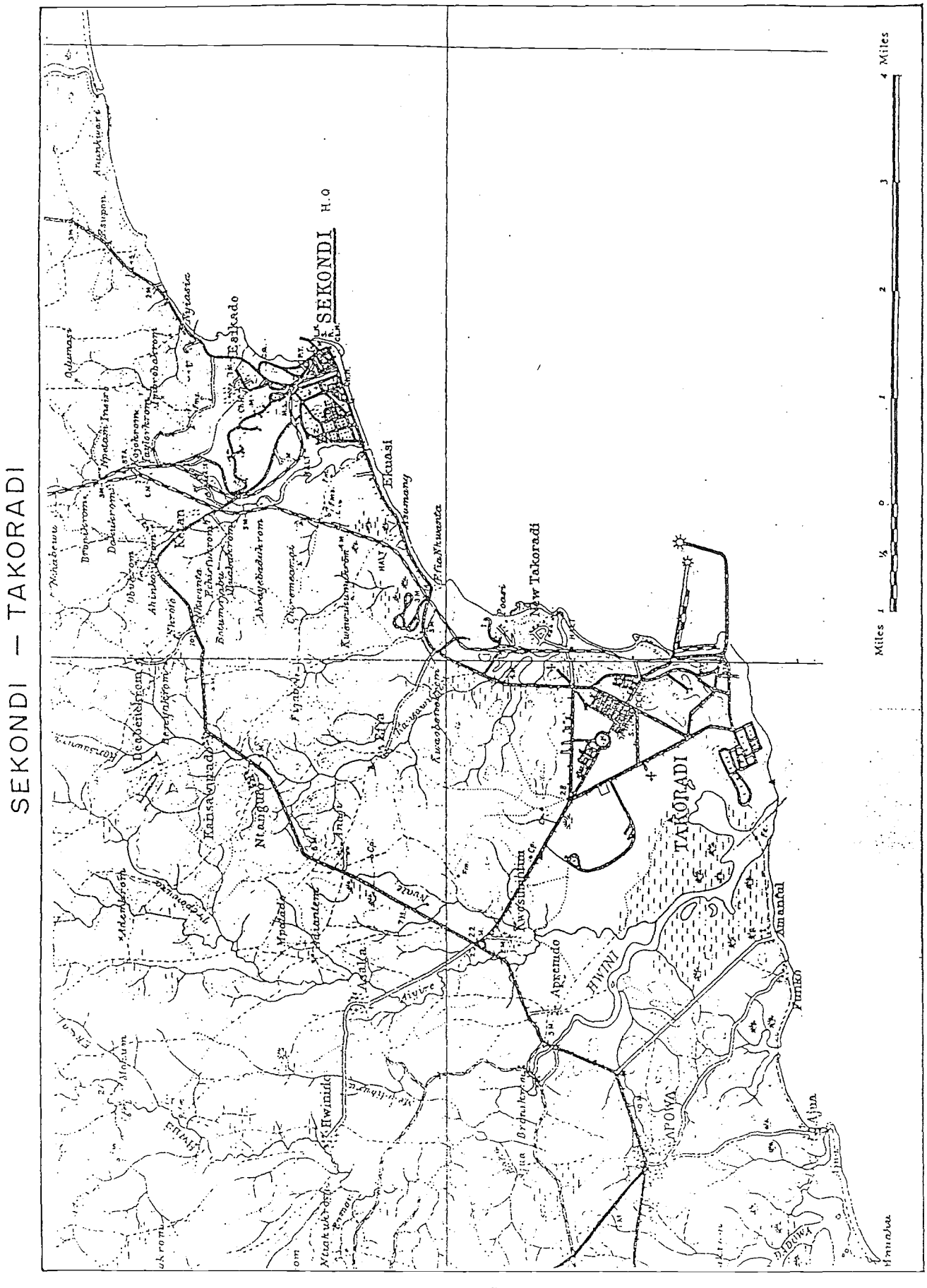

KOMENDA
SUSU LAGOON
GULF OF GUINEA
Kanka
Komenda Castle
Res.
Cemetery

CAPE COAST

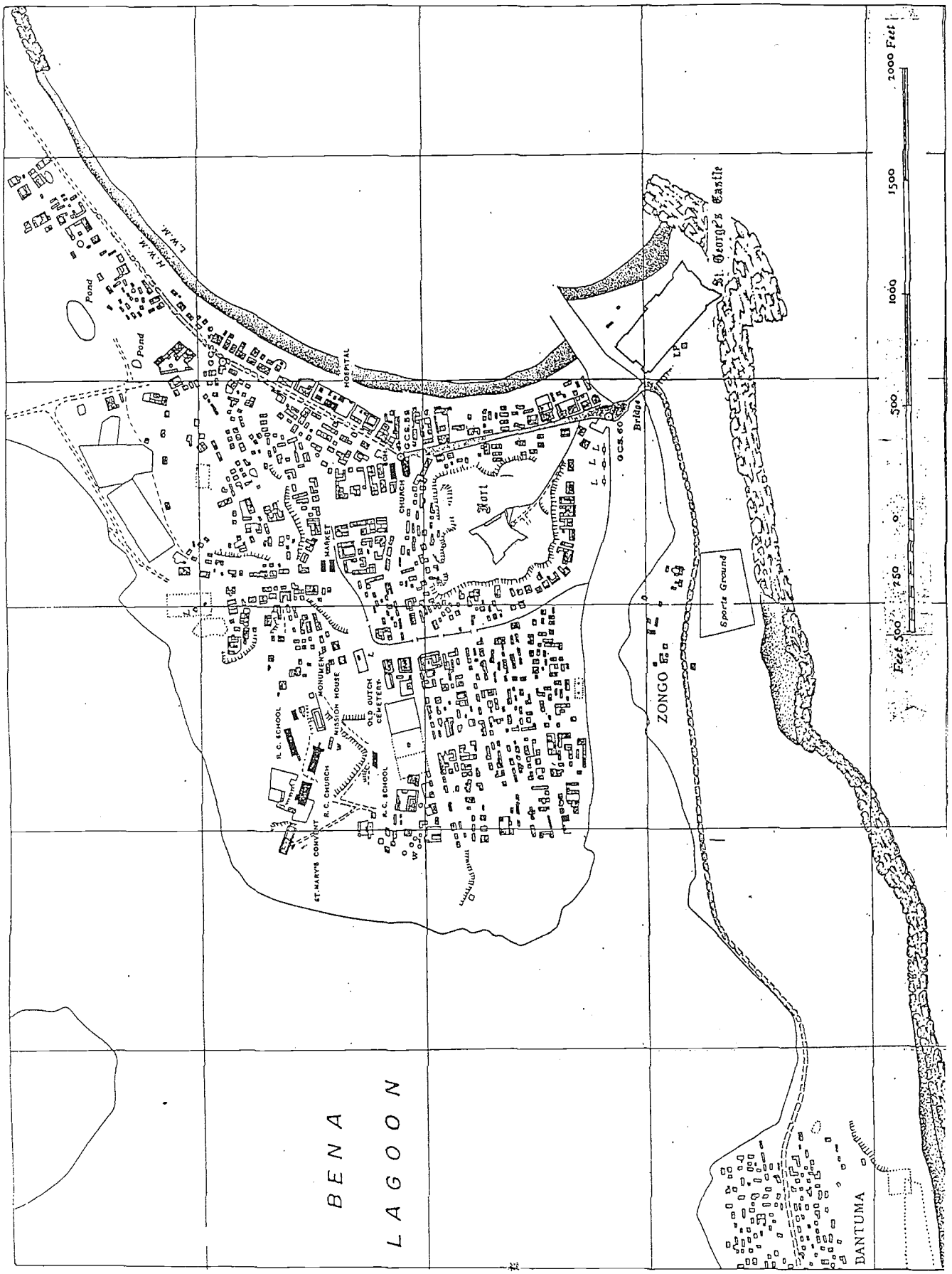


WINNEBA


C.D. HOSPITAL
CEMETERY
Magazine
Slaughter Houses
CUSTOMS
SIGNAL STATION
The fact of a boundary being shown on this plan
Feet 500 250 0 500 1000 1500 2000 2500 Feet


SEKONDI — TAKORADI
SEKONDI H.Q
Eikwasi
New Takoradi
TAKORADI
Amanful
Miles
4 Miles

MAP 10


ELMINA
BENA
LAGOON
ZONGO
BANTUMA
Fort
St. George's Castle
Sports Ground
HOSPITAL
MARKET
CHURCH
MONUMENT
MISSION HOUSE
OLD DUTCH CEMETERY
R. C. SCHOOL
R. C. CHURCH
ST. MARY'S CONVENT
Pond
Bridge
Feet 500 250 0
1000 Feet
500
1000
1500
2000

5.3 Port Development in Ghana

The possibility of constructing additional fishing harbours in Ghana was examined in 1987 by Sir William Halcrow and Partners in association with Fisheries Development Limited. Ten sites were studied and of these it was concluded that Elmina and Sekondi were the most favoured locations. The Ghana Ports and Harbors Authority however see no possibility of any new construction being undertaken either at those two sites or elsewhere in the foreseeable future. The only construction on-going which affects the canoe fleet are improvements at Tema port, which includes the erection of a covered fish market, the extension of a wooden pier for net mending and the possible dredging of the canoe basin.

5.4 Classification of Ghanaian Canoe Landing Sites

As an aid to description, an attempt was made to classify the main beach landing sites according to their characteristics. These characteristics headed under Protection Factors, Beach Composition, and Potential Danger Factors was alphabetically coded to avoid lengthy description and to have a standardised system for comparison. Inevitably in some cases the assessment of characteristics is subjective. Nevertheless the system as it stands gives a reasonably standard classification of the conditions at each landing site.

Some explanation may be needed for interpretation of the coding system.

a) Protection Factors

In some cases beaches can exhibit varying degrees of safety. For example, at Lighthouse beach (Accra) the western end of the landing site is partially sheltered by an old jetty while the eastern end has much less protection from the prevailing winds and indeed vessels beached here are often damaged by wave action. This beach is thus classified under 'Protection Factors' C;O. Similarly there may be a combination of protective factors such as at Axim which has five landing sites, all with some, but often limited protection, from either headlands or offshore islets, thus the classification is I;H. It should be noted that the classification "Beaches with some shelter from Rock Spurs" refers to rocky projections offering some protection to a sandy beach lying in the lee.

b) Beach Composition

Here the classification attempts to describe the nature of the surface upon which canoes must be beached. This indicates the nature of wear upon a canoe, thus "Sand with Rock Spurs" SRS is in fact a repretition of RS under "Protection Factors", but here there is the possibility of abrasion to the sides and gunwales of the canoes. Similarly the classification SWP and SFWP signify the presence of a wave-cut plaform or a fragmented wave-cut platform indicating possbile rapid bottom wear.

c) Potential Danger Factors

Here the classification is self evident but RD would be used on any beach classified under "Protection Factors" as RS or under "Beach Composition" as SRS; this is because although these features can give protection, under certain weather conditions they become hazardous.

Classification Code for Ghanaian Landing Beaches

a) Protection Factors	Symbol
1) Open beach with no protection	O
2) Beaches with some shelter from rock spurs	RS
3) Beaches with some shelter from head lands	H
4) Beaches with some shelter from islets or rockbars	I
5) Beaches with acess from estuaries or lagoons	E
6) Beaches with natural but not perfect shelter	N
7) Beaches sheltered by constructions	C
8) Constructed ports	P

b) Beach Composition	
1) Pure sand	S
2) Sand with rock spurs	SRS

INDIVIDUAL BEACH CHARACTERISTICS

Western Region

Village	No of Local APW Canoes(1)	Protection Factors	Beach Composition	Potential Danger Factors
Half Assini	40	O	S	HS;SC
Bonyere		O	S	HS;SC
Axim	81	I;H	SRS;SWP;SFWP	RD;AW
Dixcove	15	N	S;WP	RD
Busua	1	H	S	AW
Butre	2	H	S	AW
Takoradi (1))	10	C	S	AW
Takoradi (2))		O	S	AW;HS;SC
Sekondi	25	C	S	L-O
Aboadze	70	S;I	SRS	HS;RD;AW
Aboase	178	S;I	SRS	HS;RD;AW
Shama (1)	15	E	S	SC;HS
Shama (2)	35	S	SFWP	HS;RD;AW

Central Region

Komenda	60	S	SRS;SWP	HS;RD;AW
Elmina	30	P;E	SILTING	L-O
Cape Coast	50	RS;O	SFWP	RD;HS
Moree (1))	120	O	S	HS;AW
Moree (2))		RS;H	SRS	RD;HS
Moree (3))		RS	SRS	RD;HS
Biriwa	70	RS	SRS	RD;HS;AW
Kromantze	40	O	S	HS
Ankaful	60	O	S	HS
Otuam	48	RS	SRS	HS
Gomoa Dago	55	H	S	HS;AW
Mumford (1))	20	H	S	HS;AW
Mumford (2))		H;S	SRS;SWP	RD;HS;AW
Apam	50	N	S	L
Winneba	200	S	SRS;SFWP	RD;AW
Senya Bereku	150	H	S	HS;AW

Greater Accra Region

Bortianor	100	O	S	HS;AW;SC
Chokor	245	O	S	HS;AW;SC
Lighthouse	218	C;O	S	HS;AW
Osu	130	H;O	S	HS
Teshie	200	H	S	HS
Tema	235	P		O
Prampram	61	O	SFWP	RD;HS
Kporgnya	12	O	S	HS
Lekpogunor	50	O	S	HS
Akplabanya	97	O	S	HS

(1) These figures are based on interviews with chief fishermen cross-checked by reference to the 1986 Canoe Census Survey and replies to a survey carried out by the Regional fisheries officers. The figures do not include canoes which have migrated.

3)	Sand with wave cut platform	SWP
4)	Sand with fragmented wave cut platform	SFWP

c) Potential Danger Factors

1)	High surf	HS
2)	Rock Damage	RD
3)	Strong currents	SC
4)	Adverse winds (eg. line squalls)	AW
5)	Limited danger	L
6)	Sheltered port	O

5.5 Beach Conditions and Fleet size

From the descriptive table of beach characteristics it can be seen that although as might be expected, large fleets are associated with sheltered landing sites, fleet size does not correlate inversely with the potential danger factors which are present. Large fleets are found at several landing sites which give only minimal protection and which can be dangerous in heavy sea conditions. Senya Bereku for example has a fleet of 150 vessels, yet is subject to heavy surf and is a lee shore when a line squall occurs and is considered a dangerous landing site by fishermen even from Prampram which has a very dangerous exposed reef across the landing site. Similarly, at Winneba rock damage and line squalls cause damage and yet the fleet numbers 200. Apam and Sekondi and even Elmina on the other hand, all offering a high degree of shelter have only between 25 and 50

APW canoes in their local fleets. These figures are however augmented considerably by migrating canoes operating at these sites during the season. Similarly Dixcove which has natural shelter has only a local fleet of 15 large canoes, again this number increases during the Drift gill net season in October-November. The smallest fleet on the table occur at Busua and Butre. Both of these beaches are well protected from the prevailing S.W. wind and are much better landing sites than others in their near vicinity such as Axim and Half Assini which have local fleets of 81 and 40 vessels respectively.

From information supplied by fishermen and fishery officers the simple explanation for the seeming anomalous situation of dangerous beaches having large local fleets is because of the ability of the market to absorb potential landings. The situation at Takoradi concerning landing close to the market site has been described above. But the presence of a market also explains large concentrations of canoes between Teshie and Bortianor in the Greater Accra Region.

The importance of a good market in the utilisation of a landing site is further discussed in the following section.

Interestingly it can be noted that many landing sites either with a large local fleet or with large seasonal migratory fleets are associated with the presence of a castle or a castle was formerly in existence but is now ruined. Several examples can be cited such as Senya Bereku, Shama, Cape Coast, Elmina, Axim. Although conjecture it may be the fact that local fishing industries developed and were encouraged at these sites during the slaving period. Fish in abundance in the local coastal seas would have provided a cheap and plentiful supply of protein for feeding slaves (Cape Coast alone could incarcerate 1200 slaves at any one time) either awaiting shipment or on the passage across the Atlantic. Garrisons in the

castles would also have needed protein and in the absence of well developed livestock rearing, capable of providing sufficient animal protein on a regular and dependable basis, the most logical and easily available source would have been from fish landings.

It may be the case then that the important fishing beaches today are in fact a relic of the past but through inertia and despite difficult landing conditions have retained their strong association with fishing and fish marketing.

5.6 Migration patterns in the Ghanaian canoe fleet

Complicating the already difficult task of designing an alternative craft to the present dug-out canoe is the strong migratory tendencies in the Ghanaian canoe fleet. If canoes operated exclusively from specific sites, to replace those operating from ports and sheltered creeks would present few problems, and would perhaps allow a partial solution to the problem allowing time to test and design vessels suitable for more extreme conditions. The high degree of migration in the canoe fleet would however prevent this stepped approach as canoes working or based at a port may within a few days be operating on an exposed or rocky beach. Any alternative to the dug-out canoe must therefore consider the changing environment in which these canoes operate and a replacement vessel capable of withstanding the most extreme environment must be the objective if dramatic socioeconomic changes in population distribution and marketing are to be avoided in the communities which depend on the present dug-out.

Migration flows can be either short term, seasonal movements in response to the geographical occurrence of fish, or longer term permanent or semi-permanent movements to bases providing better marketing and/or better landing facili-

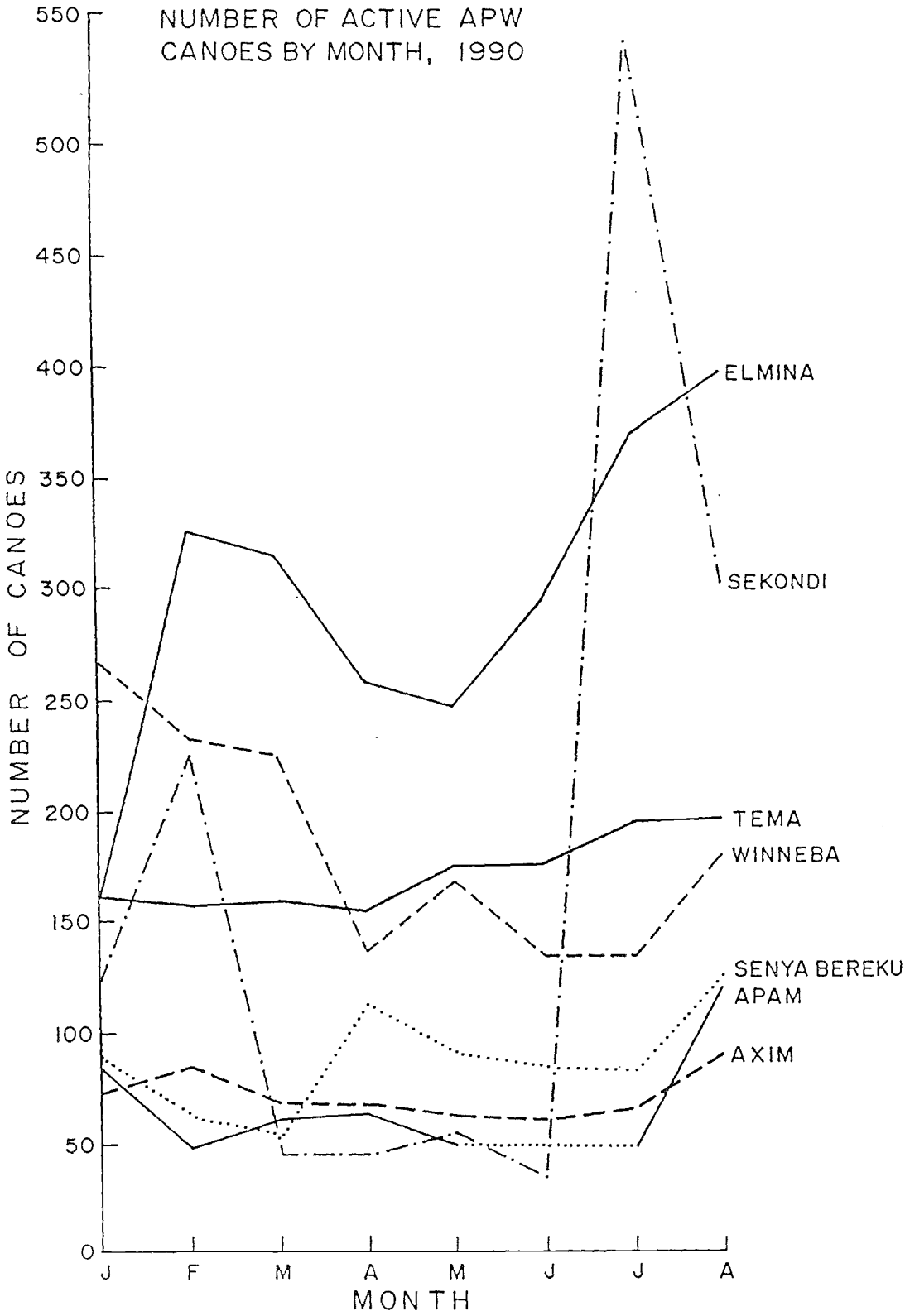
ties. Outward migration to neighboring countries and farther is also a feature of the Ghanaian canoe fishery.

The following discussion will concentrate on short term seasonal migration as it is the conditions in which the present dug-out canoe operates in Ghana which is of interest in defining the characteristics of a replacement craft.

Short term migration is usually as a response to the appearance of fish shoals in specific areas and often these flows entail considerable numbers of canoes. The Fishery Research and Utilisation Branch (FRUB) at Tema supplied data on the active canoes at selected landing sites for the first eight months of 1990 in order to quantify the amplitude of migration. The methodology is to record all active canoes at each site on the first fishing holiday of each month, ie. when no canoes are at sea. Figure 5.1 has been prepared using the FRUB data on active APW canoes for seven of the most important landing sites. Two definite periods of influx can be identified, between january and march, and june and august. These periods correspond to the major upwelling season which ocurrs between june and september and the minor upwelling between december and february.

The most striking variation in absolute fleet size are shown at Elmina and Sekondi . At Elmina the fleet using the port varies from a lower figure of 162 in january to 396 in august, while a more dramatic increase in canoe numbers is shown at Sekondi which increased from 36 in june to 544 in july.

Figure 5.1


NUMBER OF ACTIVE APW
CANOES BY MONTH, 1990
NUMBER OF CANOES
550
500
450
400
350
300
250
200
150
100
50
0
J
F
M
A
M
J
J
A
MONTH
ELMINA
SEKONDI
TEMA
WINNEBA
SENYA BEREKU
APAM
AXIM

From the Beach Classification table ... both of these sites have minimal danger factors. Also both are main marketing centres, where in periods of heavy landings fishermen have the possibility of disposing of their catches albeit at low prices. These two factors therefore virtually predestine these landing sites to be heavily frequented.

More interesting are the migration flows at the other sites. Neither Senya Bereku, Axim nor Winneba can be considered safe beaches, and yet at Senya Bereku the fleet varies between 53 canoes in march and 125 in august. At Winneba the variation is even greater with a low of 132 in april and a peak of 256 in june. Apam on the other hand which is a safe and easy landing site has a peak fleet in august of only 120 APW canoes operating. If the main consideration for migration was safety then it would be logical to conclude that Tema - the single port in the country which possesses a specific canoe basin (apart from Elmina) would show the greatest influx of migratory craft. In fact while Tema has a consistently high number of APW canoes operating, the fleet varies little in total numbers with a peak of 189 in august and 154 in february. It must be mentioned here however that canoes from nearby villages do land at Tema during the season but return to their home landing beaches daily. Nevertheless, the fact remains that Tema despite its safe landing and marketing and other facilities does not attract significant numbers of migratory canoes.

More detail on canoe movements within Ghana is given in tables 5.1 and 5.2. Both tables are compiled from answers given by chief fishermen to a questionnaire survey carried out by the different regional fisheries officers. Table 5.1 shows the destination of canoes out - migrating rom the village/landing beaches numbered 1-44 while table 5.2 shows the origin of canoes migrating into the village/landing beaches.

From the table it can be seen that most of the short-term migration is over relatively limited distances and often within the same region. Also virtually every landing site is both an origin and a destination for migrant canoes, irrespective of the condition of the landing facility. In fact at only five villages, was poor or dangerous landing conditions given as a reason for migrating elsewhere (coded F and G in tables). Predominantly the reasons for movement were either to follow fish movements (coded A and B) or for economic reasons (coded C to E).

REASONS FOR FISHING ELSEWHERE

A - For good/better catches/follow fish movement.
B - Follow herring movement.
C - Prompt payment/spot cash.
D - Increase savings.
E - Better Market
F - Access to easier/better landing facilities.
G - Because of rough nature of sea/tides in locality.
H - Because of availability of ice.
I - To buy fishing inputs.

TABLE 5.1 - SHORT TERM OUTMIGRATION PATTERN WITHIN GHANA

VILLAGE DATA						CANOE FLEET COMPOSITION						OUTMIGRATION PATTERN APW AND LN CANOES AWAY 0-6 MONTHS						
												APW			LN			
S/NO. QUEST.	REGION	VILLAGE	BEACH	MAIN ETHNIC GROUP	OTHER ETHNIC GROUP	APW	BS	SN	LN	DGN	OMC	NO. OF CANOES	DESTINATION	SEASON	NO. OF CANOES	DESTINATION	SEASON	REASON
1	Western	Half Assini	Fanti Line	Fante	-	40	-	-	-	-	-	15	New Town	Aug-Sept	-	-	-	A
2	Western	Half Assini	Ewe Line	Ewe	-	-	5	-	-	-	-	Nil	-	-	Nil	-	-	-
3	Western	Axim	Anto Apewosika	Fante	-	2	-	3	-	2	-	2	Elmina	May-June	-	-	-	-
4	Western	Adisi-Axim	Fante Line	Fante	Effutu	14	-	-	1	20	10	8	Elmina	Oct-Nov	Nil	-	-	A
					Nzima							4	Sekondi-Takoradi	Oct-Nov	-	-	-	
5	Western	Axim	Apewosika Anhweado	Fante	Effutu	49	-	20	-	10	-	6	Sekondi-Takoradi	Jul-Sept	Nil	-	-	B
												40	Elmina	Jul-Sept	Nil	-	-	
												4	Half Assini	June-Oct	Nil	-	-	
6	Western	Axim-Adisi	Boatase	Ga-Adangbe	Nzima	16	-	3	1	2	4	4	Elmina	May-June	Nil	-	-	A
					Fante							3	Sekondi-Takoradi	May-June	Nil	-	-	
												3	Dixcove	Sept-Dec	Nil	-	-	
7	Western	Dix cove	Lower Dixcove	Fante	Ahanta	15	-	10	-	32	20	5	Sekondi	Feb-Aug	Nil	-	-	A, C
												4	Elmina	Feb-Aug	-	-	-	
												3	Cape Coast	Feb-Aug	-	-	-	
8	Western	New Takoradi	New Takoradi	Fante	-	10	-	5	-	-	-	Nil	-	-	Nil	-	-	-
9	Western	Sekondi	Sekondi	Fanti	Ga	25	-	5	10	-	-	2	Abuasi	June-Sept	2	Apam	Feb-Nov	A
												2	Aboadze	June-Sept	Nil	-	-	
												1	Axim	June-Sept	-	-	-	
10	Western	Aboade	Bronibima	Fante	-	85	-	39	-	-	-	20	Apam	Aug-Sept	Nil	-	-	A, D
												30	Dixcove	Aug-Sept	-	-	-	
												12	Axim	July-Sept	-	-	-	
11	Western	Abuesi	Compound	Fante	Effutu	162	-	6	-	-	-	7	Apam	July-Sept	Nil	-	-	A
												3	Axim	July-Sept	-	-	-	
12	Western	Shama	Bentsir	Fante	Ahanta	35	-	82	-	120	-	2	Sekondi	July-Oct	Nil	-	-	C
13	Western	Shama	Apo	Fante	-	15	26	57	-	134	-	2	Apam	July-Dec	Nil	-	-	C, D
												3	Sekondi	May-Sept	-	-	-	
												3	Axim	Apr-Oct	-	-	-	
14	Central	Komenda	Akatakyi	Fante	-	60	1	24	-	64	-	Nil	-	-	Nil	-	-	-

VILLAGE DATA						CANOE FLEET COMPOSITION						OUTMIGRATION PATTERN APW AND LN CANOES AWAY 0-6 MONTHS						
												APW			LN			
S/NO. QUEST.	REGION	VILLAGE	BEACH	MAIN ETHNIC GROUP	OTHER ETHNIC GROUP	APW	BS	SN	LN	DGN	OMC	NO. OF CANOES	DESTINATION	SEASON	NO. OF CANOES	DESTINATION	SEASON	REASON
15	Central	Elmina	Elmina	Fante	Ga	200	8	100	100	-	30	30	Sekondi	May-Jan	Nil	-	-	C, B, D
												40	Apam	May-Jan	-	-	-	
												15	New Takoradi	May-Jan	-	-	-	
16	Central	Ankaful	Ankaful	Fante	-	60	3	30	6	16	60	3	Otuam	Aug-Oct	-	-	-	A, E
												3	Senya	Aug-Oct	-	-	-	
												8	Winneba	Aug-Oct	-	-	-	
17	Central	Moree	Moree	Fante	Ewe	120	3	50	-	-	-	Nil	-	-	Nil	-	-	-
18	Central	Winneba	Winneba	Effutu	Ewe	300	24	25	150	-	2	30	Elmina	June-Oct	4	Senya Beraku	Jan-Apr	A,C,F
					Ga Adangbe							25	Apam	Oct-Mar	5	Apam	Jan-Apr	
												20	Nyanyano	Jan-Apr	-	-	-	
19	Central	Apam	Apam	Fante	-	50	1	30	80	9	-	12	Sekondi	July-Aug	Nil	-	-	
													Elmina	July-Aug				D
20	Central	Mumford	Mumford	Fante	Ewe	20	4	11	30	-	7	4	Elmina	July-Aug	Nil	-	-	A, F
													Nyesia	July-Aug				
													Sekondi	July-Aug				
21	Central	Otuam	Otuam	Fante	Ewe	48	10	10	-	-	1	46	Apam	Feb-Mar	Nil	-	-	A,F,G
													Winneba	Feb-Mar				
													Accra	Feb-Mar				
													Elmina	Aug-Sept				
													Takoradi	Aug-Sept				
													Shama	Aug-Sept				
													Abuesi	Aug-Sept				
													Axim	Aug-Sept				

VILLAGE DATA						CANOE FLEET COMPOSITION						OUTMIGRATION PATTERN APW AND LN CANOES AWAY 0-6 MONTHS						
												APW			LN			
S/NO. QUEST.	REGION	VILLAGE	BEACH	MAIN ETHNIC GROUP	OTHER ETHNIC GROUP	APW	BS	SN	LN	DGN	OMC	NO. OF CANOES	DESTINATION	SEASON	NO. OF CANOES	DESTINATION	SEASON	REASON
22	Central	Dago	Dago	Fante	-	55	-	50	2	-	-	55	Tema	Feb-Apr	Nil	-	-	A, D
													Fetteh	Feb-Apr				
													Senya Beraku	Feb-Apr				
													Winneba	July-Sept				
													Apam	July-Sept				
													Kromantse	July-Sept				
													Abandze	July-Sept				
23	Central	Senya Beraku	Senya Beraku	Senya	Effutu	150	4	35	100	-	3	20	Tema	Sept-Oct	40	Fettey	August	A, E
												15	Elmina	June-Jul	20	Nyanyano	August	-
24	Central	Cape Coast	Cape Coast	Fante	-	50	20	45	7	-	-	6	Elmina	Jan-Apr	Nil	-	-	-
												6	Sekondi	Jan-Feb				
												5	Abuesi	Jan-Feb				
25	Central	Kromantse	Kromantse	Fante	-	40	-	5	6	-	-	1	Elmina	Nov-Feb	Nil	-	-	E
26	Central	Biriwa	Biriwa	Fante	-	70	-	40	3	-	15	3	Shama	Jan-Feb	Nil	-	-	A, E
												6	Elmina	December				
27	Volta	Atorkor	Atorkor	Ewe	Adangbe	-	-	8	-	-	-	Nil	-	-	Nil	-	-	-
28	Volta	Woe	Woe Lighthouse	Ewe	-	-	23	-	-	-	-	Nil	-	-	-	-	-	-
29	Volta	Vodza	Vodza	Ewe	-	27	-	-	-	-	-	Nil	-	-	-	-	-	-
30	Volta	Adzido	Adzido	Ewe	-	7	-	-	-	-	-	Nil	-	-	-	-	-	-
31	Volta	Abutiakope	Abutiakope	Ewe	Ga Adangbe	5	24	3	-	5	-	Nil	-	-	-	-	-	-
32	Volta	Denu	Denu	Ewe	Adangbe	4	2	-	-	-	-	Nil	-	-	-	-	-	-
33	Volta	Adina	Adina	Ewe	-	8	32	-	-	-	-	Nil	-	-	-	-	-	-
34	Volta	Agavedzi	Agavedzi	Ewe	-	4	15	-	-	-	-	Nil	-	-	-	-	-	-
35	Volta	Hedzranano	Hedzranano	Ewe	-	5	7	-	-	-	-	Nil	-	-	Nil	-	-	-
36	GL Accra	Chorkor	Chorkor	Ga	-	21	-	-	-	-	-	4	Nyanyano	Mar-Jun	Nil	-	-	A
												8	Senya	Mar-Jun				
												6	Apam	Mar-Jun				

VILLAGE DATA						CANOE FLEET COMPOSITION						OUTMIGRATION PATTERN APW AND LN CANOES AWAY 0-6 MONTHS						
												APW			LN			
S/NO. QUEST.	REGION	VILLAGE	BEACH	MAIN ETHNIC GROUP	OTHER ETHNIC GROUP	APW	BS	SN	LN	DGN	OMC	NO. OF CANOES	DESTINATION	SEASON	NO. OF CANOES	DESTINATION	SEASON	REASON
37	Gt. Accra	Anwiam	Anwiam	Ga Adangbe	-	15	-	13	6	-	20	-	-	-	Tema	Sporadic	H, A	
38	Gt. Accra	Kpone	Odinyoma	-		27	-	4	36	24	-	16	Apam	Sporadic	26	Sekondi	Sporadic	A, H
			Sega									Sporadic	Lome					I
			Laloinaa															
39	Gt. Accra	Old Ningo	Old Ningo	Ga Adangbe	-	45	3	-	-	2	-	20	Lome	Oct-Dec	Nil	-	-	A, I
													Nyanyano					
													Apam					
													Axim					
													Keta					
40	Gt. Accra	Teshie	Sangona	Ga	Fante	153	3	12	-	-	6	8-10	Biriwa	Jul-Sept	-	-	-	B
													Moree					
													Cape Coast					
41	Gt. Accra	Gbese (Accra)	Lighthouse	Ga	Fante	-	-	-	-	-	-	5	Apam	Jun-Jul	No Info.	Salipond	-	B, F
													Winneba			Cape Coast	-	
																Sekondi	-	
42	Gt. Accra	Chorkor	Chorkor	-	-	36	-	-	-	-	-	4-6	Winneba	Feb-Aug	-	-	-	A
													Senya Beraku					
												15	Nyanyano					F
												15	Tema	Aug-Sept				
43	Gt. Accra	Goi	Goi	Ga Adangbe	-	37	-	5	21	-	15	20	Lome	Jun-Dec	-	-	-	I, E
44	Gt. Accra	Akplabanya	Akplabanya	Ga Adangbe	-	97	2	-	-	-	-	20	Tema	Aug-Dec				E
													Winneba					
												40	Lome	Aug-Dec				I

TABLE 5.2 - SHORT TERM INMIGRATION PATTERN WITHIN GHANA

VILLAGE DATA						CANOE FLEET COMPOSITION						IMMIGRATION PATTERN APW AND LN CANOES AWAY 0-6 MONTHS				
S/NO. QUEST.	REGION	VILLAGE	BEACH	MAIN ETHNIC GROUP	OTHER ETHNIC GROUP	APW	BS	SN	LN	DGN	OMC	NO. OF CANOES	ORIGIN	ETHNIC GROUP	SEASON	REASON
1	Western	Half Assini	Fanti Line	Fante	-	40		-	-	-	-	6	Axim	Fante	-	A
												3	New Takoradi	Fante	-	
												3	Shama	Fante	-	
2	Western	Half Assini	Ewe Line	Ewe	-		5		-	-	-	-	-	-	-	-
3	Western	Axim	Anto Apewosika	Fante	-	2		3	-	2	-	-	-	-	-	-
4	Western	Adisi-Axim	Fante Line	Fante	Effutu	14	-	-	1	20	10	4	Abuesi	Fante	-	A
					Nzima							2	Moree	Fante	-	A
5	Western	Axim	Apewosika	Fante	Effutu	49	-	20	-	10	-	5	Elmina	-	Jul-Oct	A
			Anhweado									8	Abuasi	-	Jul-Oct	A
												3	Komenda	-	Jul-Oct	A
6	Western	Axim-Adisi	Boatase	Ga-Adangbe	Nzima	16	-	3	1	2	4	10	Elmina	Fante		B
					Effutu							15	Abuesi	Fante		B
												3	Shama	Fante		B
7	Western	Dix cove	Lower Dixcove	Fante	Ahanta	15	-	10	-	32	20	26	Abuesi	Fante		A, C
												28	Aboadze	Fante		A, C
8	Western	New Takoradi	New Takoradi	Fante	-	10	-	5	-	-	-	5	Moree	Fante		C, E
9	Western	Sekondi	Sekondi	Fanti	Ga	25	-	5	10	-	-	8	Apam	Fante		C, E
												6	Accra	Ga		C, E
10	Western	Aboade	Bronibima	Fante	-	85	-	39	-	-	-	6	Abandze	Fante		A, E
												3	Axim	Fante		A, E
11	Western	Abuesi	Compound	Fante	Effutu	162	-	6	-	-	-	5	Sekondi	Fante		E
12	Western	Shama	Bentsir	Fante	Ahanta	82	-	82	-	120	-	-	-	-		-
13	Western	Shama	Apo	Fante	-	15	26	57	-	134	-	20	Birriwa	Fante		A, E
14	Central	Komenda	Akatakyi	Fante	-	60	1	24	-	64	-	-	-	-		-

VILLAGE DATA						CANOE FLEET COMPOSITION						INMIGRATION PATTERN APW AND LN CANOES AWAY 0-6 MONTHS				
S/NO. QUEST.	REGION	VILLAGE	BEACH	MAIN ETHNIC GROUP	OTHER ETHNIC GROUP	APW	BS	SN	LN	DGN	OMC	NO. OF CANOES	ORIGIN	ETHNIC GROUP	SEASON	REASON
15	Central	Elmina	Elmina	Fante	Ga	200	8	100	100	-	30	30	Apam	Fante		B
												40	Moree	Fante		B
												10	Accra	Ga		B
												30	Biriwa	Fante		B
16	Central	Ankaful	Ankaful	Fante	-	60	3	30	6	16	60	3	Winneba	Effutu		-
												5	Tema	Ga		-
17	Central	Moree	Moree	Fante	Ewe	120	3	50	-	-	-	-	-	-		-
18	Central	Winneba	Winneba	Effutu	Ewe	300	24	25	150	-	2	10	Fetteh	Fante		A, E
					Ga Adangbe							15	Senya Beraku	Senya		A, E
19	Central	Apam	Apam	Fante	-	50	1	30	80	9	-	40	Winneba	Fante		A
													Nyanyano			
												35	Moree			
													Biriwa			
20	Central	Mumford	Mumford	Fante	Ewe	20	4	11	30	-	7	10	Dago, Otuam	Fante		A
													Winneba			A
													Komenda, Moree			
													Biriwa, Kromantse			
21	Central	Otuam	Otuam	Fante	Ewe	48	10	10	-	-	1	Nil	-	-	-	-
22	Central	Dago	Dago	Fante	-	55	-	50	2	-	-	10	Fetteh, Apam	Fante	-	
													Senya Beraku			
													Winneba			
													Abandze			
23	Central	Senya Beraku	Senya Beraku	Senya	Effutu	150	4	35	100	-	3	4	Winneba	Effutu	-	A
24	Central	Cape Coast	Cape Coast	Fante	-	50	20	45	7	-	-	-	-	-	-	-
25	Central	Kromantse	Kromantse	Fante	-	40	-	5	6	-	-	-	-	-	-	-
26	Central	Biriwa	Biriwa	Fante	-	70	-	40	3	-	15	-	-	-	-	-

VILLAGE DATA						CANOE FLEET COMPOSITION						INMIGRATION PATTERN APW AND LN CANOES AWAY 0-6 MONTHS				
S/NO. QUEST.	REGION	VILLAGE	BEACH	MAIN ETHNIC GROUP	OTHER ETHNIC GROUP	APW	BS	SN	LN	DGN	OMC	NO. OF CANOES	ORIGIN	ETHNIC GROUP	SEASON	REASON
27	Volta	Atorkor	Atorkor	Ewe	Adangbe	-	-	8	-	-	-	-	-	-	-	-
28	Volta	Woe	Woe Lighthouse	Ewe	-	-	23	-	-	-	-	-	-	-	-	-
29	Volta	Vodza	Vodza	Ewe	-	27	-	-	-	-	-	2	Kedze	Ewe		G, F
30	Volta	Adzido	Adzido	Ewe	-	7	-	-	-	-	-	-	-	-	-	-
31	Volta	Abutiakope	Abutiakope	Ewe	Ga Adangbe	5	24	3	-	5	-	4	Ada Foah	Ada		
32	Volta	Denu	Denu	Ewe	Adangbe	4	2	-	-	-	-	5	Ningo	Ga Adangbe	-	G
33	Volta	Adina	Adina	Ewe	-	8	32	-	-	-	-	2	Ada	Adangbes	-	-
34	Volta	Agavedzi	Agavedzi	Ewe	-	4	15	-	-	-	-	-	-	-	-	-
35	Volta	Hedzranano	Hedzranano	Ewe	-	5	7	-	-	-	-	-	-	-	-	-
36	Gt. Accra	Chorkor	Chorkor	Ga	-	21	-	-	-	-	-	-	-	-	-	-
37	Gt. Accra	Anwiam	Anwiam	Ga Adangbe	-	15	-	13	6	-	20	4-5	Kpong	-	-	A
38	Gt. Accra	Kpone	Odinyoma	-		27	-	4	36	24	-	10	Ada	-	-	A
			Sega													
			Lalojnaa													
39	Gt. Accra	Old Ningo	Old Ningo	Ga Adangbe	-	45	3	-	-	2	-	-	Prampram		Oct-Dec	E
													Ada			
													Akplabanya			
													Keta-Denu			
40	Gt. Accra	Teshie	Sangona	Ga	Fante	153	3	12	-	-	6	20-30	Biriwa	Fante	Sept/Oct-Dec	B
													Apam			
													Winneba			
41	Gt. Accra	Gbese (Accra)	Lighthouse	Ga	Fante	-	-	-	-	-	-	20	Apam	Fante	1-2 months	B
													Winneba			
													Apam	Fante	1-2 months	
42	Gt. Accra	Chorkor	Chorkor	-	-	36	-	-	-	-	-	-	-	-	-	-
43	Gt. Accra	Goi	Goi	Ga Adangbe	-	37	-	5	21	-	15	-	-	-	-	-
44	Gt. Accra	Akplabanya	Akplabanya	Ga Adangbe	-	97	2	-	-	-	-	-	-	-	-	-

6 SUMMARY AND CONCLUSION

1) The forest resources in Ghana are being exploited at or near their renewable ceiling with some of the most desirable species likely to be exhausted within the next 20-30 years. The only species which approximates to sustained yield is Wawa (*Triplochilon scleroxylon*). This species is also the most heavily exploited, representing 32% of forest extraction. It is the large specimens of this species, those in excess of 165cm diametre, which are in demand for canoe carving.

2) Forestry policies in force in the recent past in Ghana have been designed expressly to eliminate these large trees because of their susceptibility to heart-rot, fungal attacks and other defects. These policies have been partially effective.

3) It is now estimated that in both the reserved and unreserved forest areas, a total of 30,000 of these large wawa trees suitable for canoe carving remain. It is not possible to quantify the proportion in each area but at the moment the unreserved forest zone is the most heavily exploited by canoe carvers. As the stock outside the reserves is depleted more reliance for supplies will fall on the reserved forest.

4) The recently introduced 40 year felling cycle will effectively preserve a buffer stock of large wawa trees in the reserved forest areas suitable for canoe carving. These will not be available to canoe carvers except in limited annual amounts. Even if all the 30,000 trees were in the forest reserves and were made available exclusively to carvers, under the 40 year felling cycle theoretically only a supply of around 750 trees over 165cm in diametre would be extracted annually.

5) From analysis of the total annual demand for Ghanaian canoes in the sub-region it is estimated that to sustain the fleet at its present level and with its present composition would require 750-1000 trees per year, when it is considered that 25% of these large trees on felling may be defective. The 750 trees theoretically available will similarly be reduced to 562, which will be insufficient for annual replacement even using the higher 8.7 years average life span of a canoe.

6) The growing scarcity of wawa trees for canoe carving has been recognized by carvers and fishermen for some time. Over the last 15-20 years there has been a marked shift in the locus of canoe carving from the Eastern Region to the Ashanti and Brong Ahafo regions, and now carvers are operating at near the limits of distribution of Triplochiton scleroxylon. It is impossible to predict the time frame within which scarcity of supply of suitable logs will pose a serious constraint to the sustainability of the Ghanaian canoe in the sub-region but essentially what is now a problem will gradually become a crisis.

7) To replace a dug-out canoe operating from a port or sheltered landing site with a suitable alternative would not present a major difficulty. As it is there are many canoes which are based at sheltered landing beaches.But the Ghanaian artisanal fishing industry is characterised by strong migration flows, either outside the country on a semi-permanent basis or along the Ghanaian coast in seasonal movements, according to fishing grounds and location of markets. These migrations require canoes to land in a variety of conditions from ports to rock strewn beaches. In order to avoid serious socio-economic dislocations in the coastal communities dependent on fishing and fish marketing, any replacement craft must be capable of beaching under the most extreme conditions likely to be encountered.

8) The present larger A.P.W. canoes have reached a technical ceiling in their development. Their beam is restricted by the diametre of logs which can be found - a maximum of 2 metres, and their length by the strength characteristics of the timber utilised. Only limited advances in gear and techniques are therefore possible by continuing dependence on the dug-out canoe. Modernisation and development of the sub-regional artisanal fishing industry will therefore be restricted. The situation will become more acute when the larger canoes can no longer be carved due to a scarcity of suitable trees. In fact the industry may regress by being forced to use smaller craft if a suitable and acceptable replacement is not found.

9) Economically the dug-out canoe represents a waste of resources, with around 90% of the timber used being left in the forest in the form of off-cuts and chippings. At current prices a large A.P.W. hull in the forest is valued at 700,000 - 800,000 C. If the same volume of timber were to be converted this would yield around 60m3 of sawn timber, assuming a conversion rate of 50%. This timber on the local market would be valued at around 2m C and for export at 5m C.

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