THE BILLFISH FISHERY IN GHANA

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ABSTRACTS

This paper describes the history of the development of the gear and the billfish fishery of Ghana which began in about 1974, as well as its current operation. The gear, called "Nifa Nifa", was developed from an existing inshore drifting gill-net called "Kokore-bua" (gear for catching shad, Ethmalosa fimbriata. The development centred on using thicker twines, larger mesh sizes and increases in the depth and total length of the net. From the initial twine size of 210/6, mesh size of 3" and net size of 3 fathoms deep and 150 fathoms long the current twine sizes vary from 210/9 to 210/60, the mesh sizes range between 3 1/2" and 10" stretched, while the sizes of the net have gone up to 5 to 8 fathoms deep and 500 to 1000 fathoms long consisting of 10 to 20 units, each 50 fathoms long. The fishery is operated from large canoes (9 - 11 m long) propelled by one or two 40-horse power outboard motors. The crew is usually 4 - 7 men, the fishing ground may be inshore or, usually, it is along the edge of the continental shelf which varies in width from about 18 km to 80 km. A fishing trip begins in the mornings while effective fishing lasts from dusk to dawn; the fishermen return ashore the following day. The fishing takes place all year round. In addition to billfishes (sailfish, blue marlin, white marlin and swordfish) sharks and rays are caught. Sailfish is most abundant in the catches. A number of dangers are associated with the billfish fishery, the most important being that the canoes may be run over by ships; the canoes may also be blown away during heavy storms and/or by currents when the outboard motors break down at sea.

RESUME

Le présent document décrit l'évolution de l'engin et de la pêcherie d'istiophoridés du Ghana, qui a démarré vers 1974, ainsi que son activité actuelle. L'engin, dénommé "Nifa-nifa", a été élaboré à partir d'un filet maillant littoral existant, le "Kokore-bua" (engin pour la pêche à l'alose, Ethmalosa fimbriata. L'évolution comportait l'emploi de lignettes plus épaisses, des mailles plus grandes, et des dimensions plus amples de la longueur et de la profondeur totales du filet. Par rapport à l'épaisseur initiale de 210/6 de la lignette, des mailles de 3" et des dimensions du filet de 3 brasses de profondeur et 150 brasses de longueur, l'épaisseur actuelle de la lignette va de 210/9 à 210/60, les mailles mesurent de 3 1/2" à 10" (étirées), tandis que les dimensions du filet ont atteint de 5 à 8 brasses de profondeur et de 500 à 1.000 brasses de longueur formées de 10 à 20 unités de 50 brasses. La pêche est menée par de grandes pirogues (9-11 m) propulsées par un ou deux moteurs hors-bord de 40 CV. L'équipage se compose normalement de 4 à 7 membres, le lieu de pêche peut être sur le littoral ou, normalement, le long du rebord de la plateforme continentale, dont la largeur va de 18 km à 80 km. Une sortie commence le matin, alors que la pêche effective a lieu du coucher au lever du soleil; les pêcheurs retournent à terre le jour suivant. La pêche a lieu tout au long de l'année. Outre les poissons porte-épée (voilier, makaire bleu, makaire blanc et espadon), des requins et des raies sont également capturés. Le voilier prédomine dans les prises. La pêche aux poissons porte-épée présente un certain nombre de dangers, dont le plus grave est que la pirogue soit écrasée par un bateau; les pirogues peuvent également disparaître à cause des fortes tempêtes et/ou des courants en cas de panne du hors-bord en mer.

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RESUMEN

Este documento describe la historia del desarrollo del arte y la pesquería de marlines de Ghana, iniciada aproximadamente en 1974, así como sus operaciones en la actualidad. El arte, llamado "Nifa Nifa", se creó partiendo de una red costera de enmalle y deriva, ya existente, denominada "Kokore-bua" (arte para capturar Ethmalosa fimbriata). Su desarrollo se centró en el uso de hilos más gruesos, una malla de red de mayor tamaño y en el incremento de la profundidad y longitud total de la red. Inicialmente, el hilo era de 210/6, la malla de la red de 3" y la red tenía 3 brazas de profundidad y 150 brazas de longitud, y actualmente el hilo varía entre 210/9 y 210/60, la malla de la red, entre 3 1/2" y 10", estirada, y los tamaños de la red han aumentado hasta 5 y 8 brazas de profundidad y 500 a 1000 brazas de longitud, consistiendo de 10 a 20 unidades de 50 brazas cada una. La pesquería opera con grandes canoas (9 a 11 m de largo) impulsadas por uno o dos motores fuera-borda de 40 CV. La dotación se compone normalmente de 4 a 7 hombres, el caladero puede estar en la costa o, normalmente, a lo largo de la plataforma continental, cuya amplitud varía entre 18 y 80 km. Los barcos salen por la mañana y la pesca efectiva tiene lugar desde el crepúsculo hasta el amanecer; los pescadores regresan a puerto al día siguiente. La pesca se efectúa durante todo el año. Además de marlines (pez vela, aguja azul, aguja blanca y pez espada) se capturan tiburones y rayas. La especie mas abundante en las capturas es el pez vela. La pesquería de marlines comporta algunos riesgos, siendo el más importante el choque de las canoas con barcos; estas canoas pueden también ser arrastradas en el curso de tormentas fuertes y/o por corrientes, cuando los motores fallan en la mar.

1. INTRODUCTION

A number of artisanal fisheries being operated by Ghanaian fishermen in Ghana are known to be indigenous to Ghana. Two of such fisheries are the "Poli" and the "Nifa-nifa" fisheries. The poli fishery exploits the inshore small pelagics such as the anchovy (*Engraulis encrasicolus*) and the young sardinellas (*Sardinella aurita* and *S.maderensis*). The nifa-nifa fishery exploits the offshore large pelagics such as billfishes, tunas and sharks. Doyi (1984) has given a short general description of the nifa-nifa gear and its fishery. However, since the gear and its fishery are unique to Ghana, it is considered appropriate to describe them in sufficient detail to the benefit of the artisanal tuna and billfish scientific community.

In this report, therefore, the history of the development of the gear and fishery have been described. Also described are the gear and the fishery in current practice using a number of fishing towns and villages in three coastal regions of Ghana as examples. The importance of the artisanal billfish fishery to a significant proportion of the artisanal fishermen has been highlighted. Also described are the dangers associated with the nifa-nifa fishery and prospects for this fishery in the future.

2. HISTORICAL DEVELOPMENT OF THE GEAR

The gear, nifa-nifa, was developed from an existing inshore drifting gill-net called "Kokore-bua" (gear for catching shad, *Ethmalosa fimbriata*) by artisanal fishermen. This development was initiated in about 1974 from a very important fishing village called Shama in the Western Region of Ghana (see Figure 1). It was initially called "Aforo" a local vernacular word in Fanti meaning "new" or "new style". Later, the name was changed to "nifa-nifa". The name "nifa-nifa" is also a local vernacular (Fanti) meaning "right-right". The name was given to the gear because it was in 1974 when Ghanaian vehicular traffic changed "to the right" side of the road (formerly it operated "on the left" side of the road). Later, the gear was adopted by fishermen from Dixcove and Axim fishing villages in the Western Region; then migrant fishermen to the Western Region from Kpone, Prampram and Ningo in the Greater Accra Region adopted it as well in the Greater-Accra Region in about the late seventies. Currently, the gear is in use in Apam and other fishing villages in the Central Region mainly by migrant fishermen from the Western Region, especially Shama. Thus, from Shama, the use of nifa-nifa spread westwards to Dixcove and Axim before it extended eastwards to the Central and Greater-Accra Regions.

3. DESCRIPTION OF THE GEAR

3.1 Western Region (Shama)

The drifting gill- net (Kokore-bua) from which the "nifa-nifa" was developed, was constructed with a 2 1/2" - 3" mesh (65-75 mm) of 210/3 twine; it was about 3 fathoms (5.4 m) deep and 150 fathoms (274.3 m) long. This net was easily damaged by species of *Caranx* and tunas. To strengthen this net in order to catch the *Caranx* species and the tunas, the first "nifa-nifa" was constructed with a thicker twine, namely, 210/6 twine size but with the same 3" mesh (75 mm) netting. It was also 3 fathoms deep and 150 fathoms in total length; the total length was made up of 3 units of 50 fathoms (91.4 m) long each.

Later the netting was changed to 210/9 twine size with 3 1/2" - 4" (90-100 mm) mesh size. Currently, the following twine and mesh sizes are in use in the Shama area:

Twine Size	Mesh size
210/9	3 1/2"-4" (90 - 100 mm)
210/12	4" (100 mm)
210/15	5" (125 mm)
210/18	5 1/2"-6" (140 - 150 mm)
210/21	6" (150 mm)
210/30	7" (175 mm)
210/36	8" (200 mm)
210/45	8"-9" (200-225 mm)
210/60	9"-10" (225-250 mm)

The sizes of nifa-nifa in current use in the Shama area vary from 5 - 8 fathoms (9.1 - 14.6 m) deep and 500 - 1000 fathoms (914.4 - 1828.8 m) long consisting of 10 to 20 units of 50 fathoms long each.

3.2 Central Region - (Apam)

The net was introduced to Apam in the Central Region by migrant fishermen from Shama. Thus, the gear in use in Apam is not significantly different from what is being used in the Western Region (Shama, Dixcove and Axim).

It is about 5 - 6 fathoms (9.1 - 11.0 m) deep and approximately 500 - 1000 fathoms (914.4 - 1828.8 m) long in units of 50 fathoms (91.4 m) long. The twine size varies between 210/15 and 210/60 but the most commonly used sizes are 210/30 and 210/36. The mesh sizes in use vary from 4" to 9" (100.0 - 225.0 mm).

3.3 Greater-Accra Region (Accra, Tema, Kpone and Prampram)

The nifa-nifa was introduced to Accra in the late seventies by migrant fishermen from Shama. It was quickly taken up by line fishermen from Tema, Kpone and Prampram to enhance the catching of the large surface fish species such as tunas, sailfish and sharks which they had, hitherto, been catching with a single hook and line.

The nets which are operated at Kpone and Prampram measure about 400 - 500 fathoms (731.5 - 914.4 m) long in units of about 50 fathoms (91.4 m) long and 6-7 fathoms (11.0-12.8 m) deep. The twine sizes range between 210/18 and 210/36 with mesh sizes varying from 4" to 9".

4. THE SPREAD OF NIFA-NIFA FISHERY TO OTHER AREAS EAST OF GREATER-ACCRA REGION

The net was introduced mostly by migrant fishermen from Kpone to other areas such as Keta in the Volta Region of Ghana, Lome in Togo, Cotonou in Benin and Port Harcourt in Nigeria.

5. THE FISHERY

The fishery is operated from large canoes (9 - 11 m long) propelled by one or two 40-horse power out-board motors. The crew is usually 4 - 7 men.

At sea, the units of the net are joined into one long piece and laid as such. The net is constructed in units in order to facilitate handling when transferring from shore to canoe and vice versa. The fishing ground is along the edge of the continental shelf, which varies in width from approximately 19 km off Tema in the Greater-Accra Region to about 80 km off Cape Coast and Elmina in the Central Region (see Figure 1). The fishing ground may also be inshore.

5.1 Shama

A trip starts from shore at about 0830 hours and setting begins at approximately 1830 hours about which time the canoe reaches the fishing grounds at the edge of the shelf. When the fishermen decide to fish nearer inshore, the fishing trip starts later than 0830 hours. The setting of the net takes approximately thirty minutes; the net drifts with the canoe. Hauling in starts at dawn and lasts for about an hour after which the fishermen return ashore. Landing periods extend from late mornings to late afternoons depending upon the distance from the shore to the fishing ground. When the returning canoes reach the anchorage in the evenings, they ought to wait there till the following morning. Because of the frequent occurrences of eddies in the surf area at Shama, it is forbidden for canoes to land in the dark. Thus canoes which land early in the morning must have spent the night at the anchorage.

Nifa-nifa operation takes place all year round in Shama. Catches are mainly sailfish from December to April with peaks in January and February. The landings are mainly sharks and tunas during the major coastal upwelling season, namely, July, August and September.

Sharing of proceeds from a year of operation is done during the Easter holidays.

5.2 Dixcove:

The fishery in Dixcove is done mainly by migrant fishermen from Shama; some fishery is done from other villages close to Dixcove. These are Busua, Butre and Akwadae.

Between November and May, the catch is mainly sailfish with peak catch, usually, in November; sharks and tunas are exploited all year round.

Just as in Shama, the sharing of proceeds from one year of operation is done during the Easter holidays.

5.3 Axim

The operation of the nifa-nifa fishery in Axim is the same as it is practised in Shama. The fishermen are largely migrants from Shama, Dixcove and Moree.

At Axim, the nifa-nifa net is also called "Mpataku-boa" where the twine is thick (210/36 - 210/60) and the mesh is large (7"-10"). Such nets usually target sharks and sailfish. The net is called "Borso" when it is made with small twine size (210/9 - 210/21) and mesh sizes of 4" - 5" (102.0 - 127.0 mm) suitable for catching tunas, mackerel (*Scomberomorus* spp) and *Caranx* spp.

Recently, the nets are so constructed that generally all the types mentioned are present in one unit or the other of the several units which make up one long unit when laid at sea.

Usually 3 to 4 trips are made in one week.

5.4 Apam

The billfish fishery in Apam is operated largely by migrant fishermen from Shama, some migrant fishermen from Kpone and very small number of indigenous 'Apam fishermen. The manner of operation of the fishery is, therefore, the same as in Shama.

The main season for the nifa-nifa fishery is the period August - November when the catch consists, essentially, of sharks, rays and tunas; the peak period is in September. Three trips per week are made. Sharing of the proceeds takes place yearly during Easter. These migrant fishermen from Shama return to Shama to fish for sailfish during the period December - February.

5.5 Tema and Kpone

The fishery is practised mainly from Tema and Kpone. A recent innovation is the attachment of hooks and line to the lead-line of the net for catching large fishes such as sharks and rays. A trip starts between noon and 3.00 p.m. depending upon the location of the fishing ground where a particular crew wishes to fish. As usual net setting starts at about sunset (6.00 p.m). Net retrieval begins at about 5.30 a.m. the following day.

The operation takes place all year round with a peak period between the end of July and the end of September (the period of the major upwelling); fishing is poor during April to June. The common species of fish caught are the tunas, sharks and rays; sailfish is rare.

Sharing of proceeds from the operation is done weekly.

6. OWNERSHIP OF THE GEAR AND SHARING OF PROCEEDS

The net, canoe and outboard motor may be owned by one man, a family or by several people.

The cost of fuel and mending twine is deducted from the sale of the catch. The rest of the proceeds is divided equally into two - one half goes to the owner or owners of the net, canoe and outboard motors while the other half is shared equally among the crew.

7. DANGERS ASSOCIATED WITH THE BILLFISH FISHERY

(a) Where the fishing grounds for the billfish fishery are quite inshore these may be the same as the hook and line canoe fishery which spends two to three nights on the grounds. It is, therefore, quite common that the drifting "nifa-nifa" gill-nets get entangled with the anchor ropes of the hook and line canoes resulting in quite a serious damage to the nets and loss of substantial catch.

(b) As a result of inadequate light markers for the drifting nets and canoes, or foggy weather, ships run over the canoes and nets at night with consequential loss of lives, nets and canoes.

(c) The drifting nets and canoes may be blown away seawards or in any other direction during heavy storms and or by currents when the outboard motors break down at sea.

(d) In some cases, excessive weights of large fishes such as sharks, rays and swordfish cause total or partial loss of net.

8. DISCUSSION

There are no significant differences in twine size, mesh size, depth and length of the units of the gear described in all the three coastal regions. It is only in the Greater-Accra Region where the total length of the gear is shorter - it varies between 400 and 500 fathoms in the Greater- Accra Region while it ranges from 500 to 1000 fathoms in the Western and Central Regions. The reason for this difference in total length is not clear. But there is this observation that owing to the growing unprofitability of the

nifa-nifa fishery, especially in the Greater-Accra Region, fishermen are becoming less committed to the fishery, which is therefore becoming less popular. When nets are badly damaged, the fishermen cannot replace the total size because of the high cost of the netting and its accessories. In this case, whatever is left is repaired and rigged as a shorter net.

The ranges in twine and mesh sizes (section 3.1) used in the nifa-nifa fishery are quite wide. There is no information on the efficiency of the gears. However, considering the dexterity with which the artisanal fishermen operate, one would think that the fishermen will most likely avoid twine and mesh sizes which are not efficient in billfish exploitation, as was demonstrated in the historical development of the gear (section 3.1). This, being so, one would like to consider that all the ranges mentioned in section 3.1 are satisfactory in billfish exploitation, and that fishermen choose any sizes within the ranges in accordance with their availability on the market.

Furthermore, there have not been significant changes in the development and construction of the gear at the different centres since its innovation in the late seventies. In addition, the manner of operation - time of fishing (overnight), shooting and hauling of net - has not changed. These characteristics (similar twine and mesh size ranges, construction, manner of operation) make it possible (gear-wise) to compare catch landings at the different landing centres, and over the years.

From the description of the fishery presented, it is quite clear that dangers associated with the fishery may, if not alleviated, harm the future of the industry.

One of such dangers is the canoes and nets being run over at night, or foggy weather, for lack of adequate light markers resulting in the loss of lives and/or gear. As at present, there is no solution in sight. The light markers should be imported from abroad by a private company, so that they are made locally available for the artisanal fishermen to purchase them. This is not being done and there is no indication, at present, that this is going to be done in the near future.

The other very important danger is the breakdown of the outboard motor which is used to propel the canoe, while at sea. This problem is solvable. The fishermen who can afford, always carry a second outboard motor for use when one breaks down at sea. Other fishermen who cannot afford to own a second outboard motor, carry the traditional sail for use in case the outboard motor breaks down. The fishermen find the outboard motor too expensive to own a second one. Moreover, because of the long distance between shore and the fishing ground, the outboard motor is subjected to long and continuous use resulting in a faster rate of wear and tear and so its useful, trouble - free life span of usually two and a half years is shortened giving rise to replacements within comparatively short intervals of time.

Despite its declining trend, the billfish fishery provides a means of livelihood almost all year round for a significant proportion of the artisanal fishermen along the coast. Such fishermen are engaged full time on the fishery and are determined to maintain it. Thus, the fishermen have recently innovated an improvement on the gear. They attach hooks and lines to the lead-line of the nifa-nifa gear so that these hooks catch large fishes such as sharks and rays (section 5.5) which are dispersed below the lead-line. It has been observed that quite reasonable catches are made from this innovation. However, these special hooks are not available on the market, thus limiting its wide use.

Other factors which need consideration for the future of the fishery are the availability and exorbitant prices of inputs such as outboard motors, fuel, the right type of nettings and net light markers (flickers) to ward off ocean going ships from the laid-up nets. Because of their long use (long distance from shore to the fishing ground), the outboard motors have a shortened life span. This necessitates frequent purchases of outboard motors which are too expensive for the artisanal fishermen. These factors have led to decline of the fishery in many areas. However, in the Western Region, especially in Shama the nifa-nifa is the most popular fishing gear used (Koranteng, 1990).

9. SUMMARY

1. The drifting gill-net,locally called nifa-nifa for catching the billfish, was developed from an existing inshore drifting gill-net called "Kokorebua" (meaning gear for catching shad, *Ethmalosa fimbriata*) by artisanal fishermen.

2. The nifa-nifa varies from 5-8 fathoms (9.1 - 14.6 m) deep and 500 - 100 fathoms (914.4 - 182.8 m) long consisting of 10 to 20 units of 50 fathoms long each. At sea, the units are joined into one long piece and laid as such.

3. The fishery is operated from large canoes varying in length from 9 to 11 metres and propelled by an outboard motor of 40 horse power.

4. The fishing ground is along the edge of the continental shelf as well as inshore.

5. A fishing trip may take about 24 hours or more or less.

6. There are dangers associated with the nifa-nifa fishery which result in quite a serious damage to the nets and loss of substantial catch including loss of canoes and lives.

7. Factors such as unavailability and exorbitant prices of inputs which include outboard motors, right type of nettings and net light markers (flickers) have led to the decline of the fishery in many areas.

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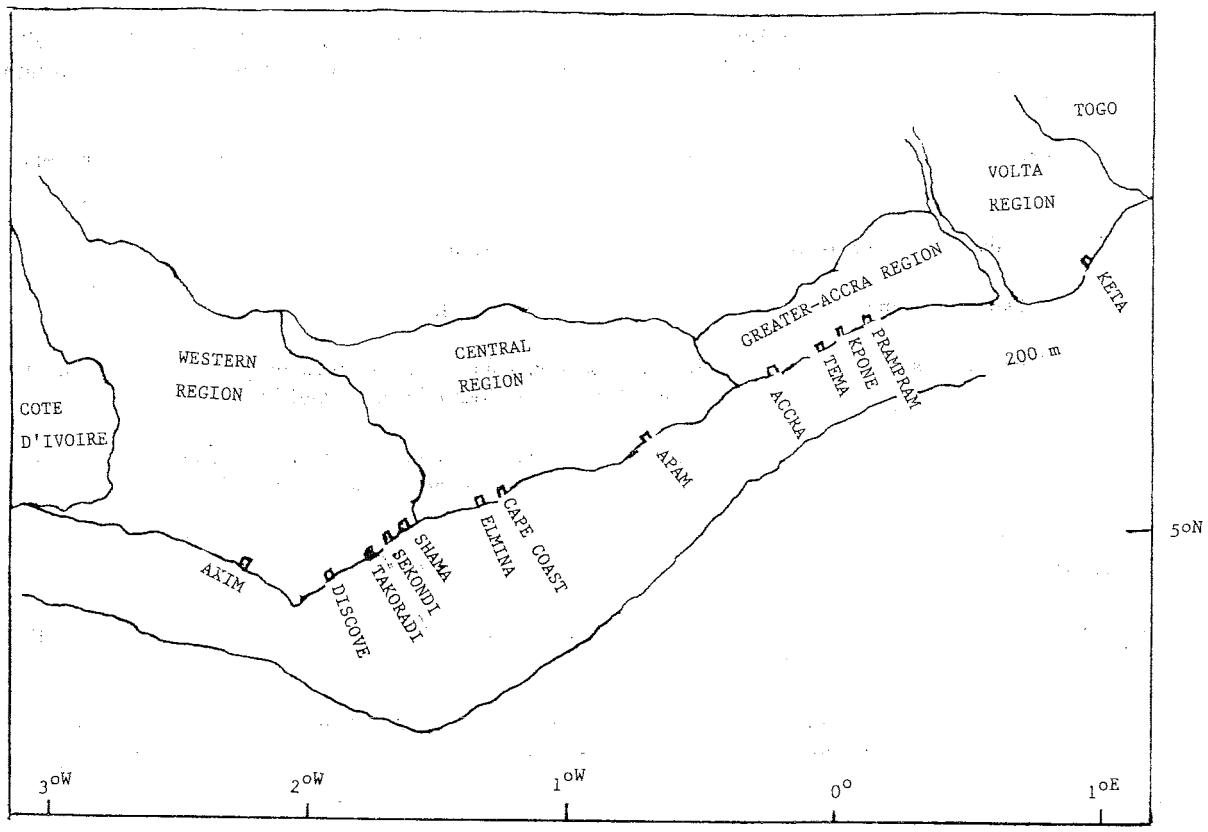

Figure 1. Coastline and continental shelf of Ghana.