

# Accident at Sea Cases: A Dispute Resolution Through Arbitration Between Artisanal and Industrial or Merchant Vessels in Ghana

Charles Teye<sup>1\*</sup>, Francis Kofi Ewusie Nunoo<sup>2</sup> and Patrick Kwabena Ofori-Danson<sup>2</sup>

<sup>1</sup>Ministry of Fisheries and Aquaculture Development, Accra, Ghana

<sup>2</sup>Department of Marine and Fisheries Sciences, University of Ghana, Accra, Ghana

## Abstract

Where there are multiple users of fisheries resources, conflicts often occur that need careful management. Usually, industrial or merchant vessels destroy fishing gears of artisanal vessels (canoes) by accident in Ghanaian coastal waters. Sometimes, industrial vessels are said to consciously destroy fishing gears of competing artisanal vessels. One outstanding cause of conflicts/disputes occurs when industrial vessels, having a passage or in the process of fishing within the Inshore Exclusive Zone (IEZ) or 6 nautical miles from ashore, destroy artisanal vessels' fishing gears. Majority of incidents were either never reported or reported but lacks evidence. Disputes are most times informally settled amicably whenever there is mutual agreement (herein referred to as "gentleman agreement"). In this study, the total number of accident at sea cases reported from 1993 to 1996 and 2017 to 2019 is evaluated. Eighty-eight (88) cases involving canoe and inshore (7), canoe and trawler (51), canoe and tuna vessel (21), canoe and merchant vessel (8) and lastly, inshore and trawler (1) were successfully settled by the arbitration committee in Tema, Ghana from 2005 to 2020. A total amount of two hundred and thirty-seven thousand six hundred and eleven Ghana cedis (GH ₵237,611) [GH ₵1 = US \$0.17; 3 May, 2021] was paid by the defaulters as compensation to the victims. To enforce the fisheries laws, all artisanal vessels using illegal/unapproved gears do not get compensated whenever their gears get destroyed. There is the need for all stakeholders in the fishing industry i.e. artisanal, inshore, industrial as well as merchant vessels to strictly adhere to safety protocols or preventive measures in fish resource exploitation while at sea in addition to lessons taken from cases of incidents at sea. Payment of compensations to affected persons must be expedited in the shortest possible time to enable them bounce back to business.

**Keywords:** Conflict; Accidental; Compensation; Destruction of equipment; Fishing vessel; Merchant vessel

## Introduction

Globally, conflicts over marine resources do occur in fisheries involving different fisher groups [1]. With the actions of a particular fishery seeking to undermine that of another making it seemingly less efficient, the resultant effect will be conflict arising. Conflicts occur among artisanal fishers and between small-scale fishers and industrial ones in the Exclusive Economic Zone (EEZ). Fishers operating with the same fishing gear quite often encounter incidence of conflicts among themselves. This becomes very intense where there is over capacity, thus, too many vessels chasing few fishes. The "struggle for fish at sea" is a common phenomenon that exists among fishers and this could lead to fishing net entanglement either by accident or deliberately [2] indicated that, "conflicts at sea amongst canoe fishermen mainly arise due to struggling for the same stock of fish, fishing within limited areas causing collisions, running into nets of others or casting of nets over others, poor visibility often on foggy days, improper markings on nettings, lack of adequate training for coxwains in maritime operation, lack of enforcement of fisheries laws and regulations".

Conflicts may not always necessarily be violent or destructive [3]. Causes of accidents at sea could be attributed to human factors, technical factors or external factors. According to fishery conflicts can be categorized under four [4] broad headings namely: fishery jurisdiction (property rights, government role, inter-government conflicts); management mechanisms (fishery management plans, enforcement conflicts, fishers/government interactions); internal allocation ('gear wars' conflicts, user group conflicts, fishers and processors) and External allocation (domestic and foreign fisheries, fishers and aquaculture, the fishery and competing aquatic uses). In explaining what causes these conflicts to emerge [5] reiterated four major issues such as demographic change, natural resource

competition, developmental pressures and structural injustices.

Fisheries in Ghana is a predominant occupation. Fish is harvested from the marine waters, inland waters (mainly the Volta lake) and aquaculture. Fisheries provides employment to about 10% of the Ghanaian populace, supplies 60% of domestic animal protein and contributes 1.5% to Gross Domestic Products (GDP) accordingly. The contribution to the GDP, however, has reduced to 0.9% in 2019 indicated that per capital fish consumption in Ghana is 25 kg per annum and 22.4% of household food expenditure comes from fish. With varied fishing type and gears used by the fishing vessels, there is the likelihood of conflicts or disputes ensuing over user rights. Whereas the artisanal vessels in Ghana do not make any direct financial contribution to the Fisheries Commission due to the open access system of operation, the industrial vessels, per the Fisheries Act 625 of 2002 need to secure a fishing license before proceeding to fish. The open access has no accountability whatsoever and this can lead to the "tragedy of the commons" as described.

In Ghana, government subsidies, like the premix fuel, outboard motors, fishing inputs aimed at relieving the fisher folks rather created more opportunity and avenue for influx of new artisanal vessels operating in the Inshore Exclusive Zone (IEZ). When internal resources are poorly allocated, it triggers conflicts or fishery disputes among the

**\*Corresponding author:** Charles Teye, Ministry of Fisheries and Aquaculture Development, Accra, Ghana, Tel: +233 240233362, E-mail: [teyecharles@yahoo.com](mailto:teyecharles@yahoo.com)

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users [6] indicated that the industrial vessels extract resources with relative efficiency due to the high technologies they employ to take the available resources which leave the small-scale fishers with very little at their disposal. There will be intensified tensions among different group of fishers should institutions not recognize these conflicts, could not manage it or are simply not concerned with the challenges of the deprived group of fishers reported that incursions by trawlers into the artisanal fisheries reserved zones mostly at night leading to fishing gear loses/destructions, canoe damages and sometimes loss of precious lives is noted as one of the most common infractions.

A major cause of conflict between artisanal fishers and industrial vessels is the running over of the fishing gear (net) of the formal by the latter. Accordingly more than 60% of fishermen's complaints of accident at sea cases points out to fishing gear destruction. This study, therefore, objectively brings to light the conflicts/disputes that occurred between the industrial and artisanal fishers and the compensations paid by the defaulters to the affected vessels through the arbitration committee that deliberated on accident at sea cases in Ghanaian waters at Tema from 2005 to 2020.

## Materials and Methods

### Study area

The Inshore Exclusive Zone (IEZ) of Ghana (Figure 1) is a zone below 30 meters fishing depth or six (6) nautical miles from ashore. This is a reserved zone for the artisanal fishery. The coastline of Ghana covers four regions namely: Volta, Greater Accra, Central and Western. It is about 550km with 200nm Exclusive Economic Zone (EEZ) and 24,300 km<sup>2</sup> continental shelf area.

### Types of vessels

There are three different types of fishing vessels operating in Ghanaian waters. These are the artisanal, the semi-industrial (inshore) and the industrial vessels. Merchant vessels also patronize Tema harbour to offload cargo or load cargo for export.

**Artisanal vessels:** Artisanal vessels fishing activities is the most important fisheries sector in Ghana [7]. These dug-out canoes are either carved out of 'Wawa' *Triplochiton scleroxylon* or 'onyina' *Ceiba petandra* log of wood. They have size ranges between 3 and 18 meters long and a width of 0.5 to 1.8 meters, subject to the target fishery. They go for short fishing trips, mostly overnight and close to the shore and contribute 70 to 80% of fish catch landed from Ghanaian waters. This

fishing activity is undertaken in all the twenty-six coastal districts comprising of a total of 302 landing sites located in 186 fishing villages. Based on the 2016 canoe frame survey conducted along the coast of Ghana (the latest), a total of 11,583 canoes were recorded constituting 3,346 pursing nets (Poli/Watsa), 1,052 Ali nets, 1,344-line canoes, 3,729 set net canoes, 1,084 Beach seine canoes, 836 Drift nets and 192 "one man" canoes.

**Inshore vessels:** Inshore vessels are local vessels that are built with wood. It has a length of within 8 to 37 meters with an in-board diesel engine of a hoarse power between 90 and 400. These vessels operate from seven (7) landing sites (Tema, Apam, Mumford, Elmina, Sekondi, Takoradi and Axim) and contributes 5% to the fish catch in Ghanaian waters. The vessels could be used for purse seining during the upwelling seasons as well as trawling when the season is off [8].

**Industrial vessels:** Industrial vessels are trawlers, shrimpers or tuna purse seiners and tuna pole and lines. These vessels are large with the hull built abroad with a steel. Their in-board diesel engines have 30-200 horsepower and operate beyond 30 metres zone with a 50-75 meters fishing depth. Ghana fitted Vessel Monitoring System (VMS) and Automatic Identification System (AIS) on all her industrial vessels. Industrial vessels land 20% of the total fish catch from Ghanaian waters at the Tema Fishing Harbour and Albert Bosomtwe Fishing Harbour in Takoradi.

**Merchant vessels:** These are cargo or passenger ships used for transporting people, goods or crude oil on the ocean worldwide. It comes in different sizes and shapes with AIS for navigational purposes. They patronize Tema harbour with imported goods and carry in return goods for export.

### Data collection

Quantitative data on accident at sea cases recorded from 1993 to 1996 and 2017 to 2019 were evaluated. Eighty-eight (88) cases taken from the archives of the cases settled by the arbitration committee in Tema and duly compensated from 2005 to 2020 were compiled. These cases are formal complaints filed by artisanal vessels whose fishing equipment were destroyed by industrial or merchant vessels during fishing expedition. Most of these accidents were as a result of the industrial vessels either attempting to fish in the IEZ, which is illegal, or having a passage to fishing grounds or returning to port. Passive gears, when set, are marked with colorful buoys that are visible to other vessels for navigation purposes. Should another vessel, being artisanal

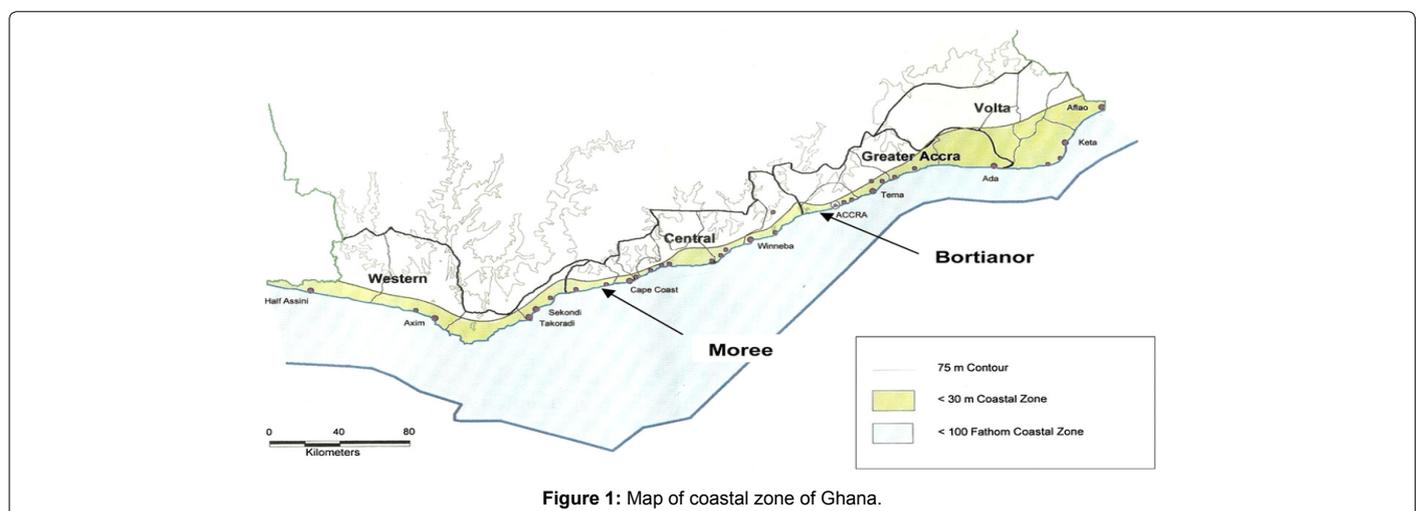


Figure 1: Map of coastal zone of Ghana.

or industrial, ignores the signal of the set net and passes through it thereby destroying the fishing equipment, the sailors on board of the vessel whose net has been destroyed do take evidence in the form of a picture or otherwise of the vessel clearly showing the name or fisheries registered number, where and when the incident happened among others [9].

An accurate information assists the committee to identify the defaulted vessel and write to officially invite them for an arbitration. Currently, Environmental Justice Foundation (EJF), a non-governmental organization (NGO), has developed an ‘app’ known as ‘DASE’ (locally translated as ‘EVIDENCE’ in Fante; a Ghanaian native language). This ‘app’ when installed on android smartphones of the fishermen allows them to: report on illegal activities at sea, gather evidence for compensation claims of damaged canoes or fishing gears and to submit a geotagged photo or optional video in a few clicks. Tracking data from the VMS or AIS on-board the defaulted vessel is checked to confirm the location or path of the defaulted vessel in cases where there is a denial of responsibility by the defaulted vessel.

The arbitration committee consist of the Regional Director of Fisheries, Senior Fisheries officer, fishing gear expert (gear technologist), Chief fisherman of affected canoe, secretary and other authorities as and when their services or expertise is required. The affected vessel makes an official report to the committee through the fisheries officer and the chief fisherman in his community. An estimate of the cost of the equipment destroyed (mostly fishing gear) is then prepared and submitted to be perused by the gear expert on the committee who validates or make amendments after an initial assessment of the equipment destroyed. On the set date for arbitration, owners or representation from the two factions get invited. They deliberate and negotiate on the total estimate of the damage presented under the moderation of the committee until an amicable agreement is reached. Two-thirds (2/3) of the total amount agreed upon is paid by the defaulter whilst the victim bears one-third (1/3) as a sign of commitment considering the fact that most incidents are caused by accident. Date for payment of the compensation by the defaulter is fixed and the arbitration committee, with a final binding decision just like the law court, serves as a mediator until the payment is made appropriately (sometimes it takes a longer period) [10].

## Results

A total number of eighty-eight (88) accident at sea cases involving canoe and inshore, canoe and trawler, canoe and tuna vessel, canoe and merchant vessel and lastly, inshore and trawler (Table 1) were successfully settled by the arbitration committee in Tema, Ghana from 2005 to 2020. An amount of two hundred and thirty-seven thousand six hundred and eleven Ghana cedis (GH ₵237,611) [GH ₵1=US \$0.17; 3 May, 2021] was paid by the defaulters as compensation to the victims. This amount comprises of three thousand seven hundred Ghana cedis (GH ₵3,700) (2%) for seven (7) cases involving canoe and inshore; one hundred and twenty-seven thousand two hundred and fifty-five Ghana cedis (GH ₵127,255) (53%) for fifty-one (51) cases of canoe and trawlers; seventy-three thousand one hundred and sixty-five Ghana cedis (GH ₵73,165) (31%) for twenty-one (21) canoe and tuna vessel cases. The rest consist of eight (8) cases of canoe and merchant vessels attracting a compensation of thirty thousand nine hundred and ninety-one Ghana cedis (GH ₵30,991) (13%) and finally a compensation of an amount of two thousand five hundred Ghana cedis (GH ₵2,500) (1%) for one case between an inshore and a trawler [11].

Table 2 is a tabulation of the total number of cases officially reported to the arbitration committee during the specified years. The highest cases between canoe and inshore was sixteen (16) in 1995 whilst the lowest was five (5) in 1996. Considering canoe and industrial, 1995 recorded the highest cases being twelve (12) whilst both 1993 and 1996 had eight (8) cases each being the lowest. Canoe and merchant had twenty (20) cases in 1994 as the highest with five (5) cases in 1996 as the lowest. Between the inshores, four (4) cases were reported in 1993. This is the highest with the subsequent years; 1994, 1995, 1996 recording one (1) case each. Inshore and industrial had two (2) cases in 1993 as the highest but both 1995 and 1996 had no cases reported. Canoe and others (like buoys) had two (2) cases being the highest in both 1993 and 1994 but no case recorded in 1996. The inshore and merchant recorded only one (1) case in 1995. An analysis of the reported cases according to (2) shows that 80% of the cases in 1993 were due to collisions that led to damaging of nets. Twenty per cent (20%) of the cases were resolved and compensation in the form of cash paid after a lengthy period to the affected party. For 1994, 82% of the cases were due to collisions leading to damage of nets. However, only 11% of cases were solved. Cases recorded in 1995 had 78% of the cases being as a result of collisions.

No.	Accident at sea cases	Number of cases	Percentages of cases	Compensations paid (GH₵)	Percentages of payment
1.	Canoe and inshore	7	8%	3,700	2%
2.	Canoe and trawler	51	58%	127,255	53%
3.	Canoe and tuna vessel	21	24%	73,165	31%
4.	Canoe and merchant vessel	8	9%	30,991	13%
5.	Inshore and trawler	1	1%	2,500	1%
<b>Total</b>		<b>88</b>	<b>100%</b>	<b>237,611</b>	<b>100%</b>

**Table 1:** Summary of the compensations paid by defaulted vessels to affected vessels from 2005 to 2020.

Number of conflicts reported	1993	1994	1995	1996
Canoe and Inshore	10	10	16	5
Canoe and Industrial	8	11	12	8
Canoe and merchant	17	20	12	5
Inshore and Inshore	4	1	1	1
Inshore and Industrial	2	1	0	0
Canoe and others (buoys etc.)	2	2	1	0
Inshore and merchant	0	0	1	0
<b>Total</b>	<b>43</b>	<b>45</b>	<b>43</b>	<b>19</b>

**Table 2:** Total number of reported accident at sea cases (1993 to 1996).

Year	Number of cases received	Number of cases resolved	Number of cases under investigation	Cases dismissed for lack of evidence
2017	13	9	1	3
2018	18	14	2	2
2019	16	13	2	1
<b>Total</b>	<b>47</b>	<b>36</b>	<b>5</b>	<b>6</b>

**Table 3:** Total number of reported accident at sea cases (2017 to 2019).

Only five (5) cases were solved with compensation paid. Seventy-five per cent (75%) of cases recorded in 1996 were due to collisions between industrial and merchant vessels with only six (6) cases solved.

According to (Table 3), thirteen (13) cases were recorded in the year 2017 out of which nine (9) got resolved. One (1) case was under investigation whereas three (3) cases were dismissed for lack of evidence. In 2018, nine (9) of the eighteen (18) cases reported were resolved. Cases under investigation were two (2) and another two (2) cases were dismissed due to lack of evidence. For the year 2019, sixteen (16) cases that were recorded had thirteen (13) of them resolved. Out of the remaining three (3) cases, two (2) were under investigations whilst the remaining one (1) got dismissed for lack of evidence. Comparing the number of cases reported in 2017 and 2018, the number of cases in 2017 got increased by five (5) in 2018. However, 2019 recorded a decrease of two (2) cases in number as compared to 2018 [12].

## Discussion

Available worldwide statistics points out the dangers involved in the fishing industry. Fishing is a very hard and dangerous occupation. Fishermen are prone to mistakes when they become tired, due to inadequate sleep or rest. Disputes as a result of accident at sea cases are sometimes informally settled amicably whenever there is mutual agreement (herein referred to as “gentleman agreement”). In this case one artisanal fisher (the leader) most times boards the industrial vessel and hold a discussion concerning the destroyed fishing gear. The industrial vessel upon agreeing to take responsibility, then compensate the artisanal fisher with fish catch or cash. In cases where the defaulted vessel bolts away or an agreement is not reached between the defaulted vessel and the affected vessel (which mostly happens), the latter files a complaint to the arbitration committee of the Fisheries Commission with substantial evidence. These informal and formal processes are the two ways of resolving equipment destruction disputes in the fishing sector in Ghana.

Although industrial vessels may see artificial fishermen whilst they are working on a fishing ground, their gears which could cover one or two kilometres may not be visible especially when left dormant at sea overnight with no flags or buoys that easily identify them. The eighty-eight (88) cases settled formally in this study is a gross underestimate of the total cases of accident at sea within the period under study given that majority of incidents are never reported, reported but lacks evidence or settled amicably through “gentleman agreement” as mentioned earlier. This confirms the reportage by who indicated that collision that resulted in gear destruction forms 80% of the forty-three (43) accident at sea cases recorded at Tema in the Greater Accra Region that was arbitrated in 1993 with only 20% of the cases settled and duly compensated with cash. Also, the records in 2017 to 2019 indicated a number of cases still under investigations and those dismissed as a result of lack of evidence. If industrial vessels illegally entering into the IEZ damage fishing equipment of the artisanal vessels without repercussions from fisheries authorities, it breeds hostility between the two factions.

The artisanal vessels have very low investment needs as compared to the large and deep-sea industrial vessels that may receive funding from venture capital and government subsidy. Most fishing communities do not adhere to the sections of the prohibiting the use of some illegal fishing equipment due to lack of inadequate funds or capacity to carry out enforcement of the law by the Fisheries Enforcement Unit (FEU) of the Fisheries Commission through patrolling the sea and the beaches. In order to enforce the fisheries law on the use of prohibited fishing equipment like the monofilament net or light fishing, all canoes using such gears or illegal equipment do not get compensated whenever they had their gears destroyed by industrial vessels. This monofilament net decomposes slowly, easily get lost at sea thereby killing large quantities of fishes (“ghost fishing”) or get entangled with propellers of industrial/merchant vessels which can cause havoc. “Ghost fishing” as indicated in is dependent on the gear type, environmental conditions in terms of currents, depth and location.

For merchant vessels, the destruction of gears of artisanal vessels easily happen when the vessel is on autopilot since the vessel doesn’t have sufficient room to manoeuvre or a very limited probability to manoeuvre. Some of these canoes could equally be at the “blindside” of the huge merchant vessel considering the size of the artisanal vessel. Some artisanal vessels only carry oil lamps in the night or stay in the dark without any lamp making it difficult for the merchant vessel to identify it in time. In this study, 13% of the compensation was paid to eight (8) affected canoes. This could probably be attributed to the fact that such merchant vessels were arriving in Tema harbour with imported cargo or exiting harbour with export cargo. The ship agents ashore play vital roles in liaising between the captain of the vessel and the affected vessel and ensures that due compensation is paid should a merchant vessel depart from the harbour before a complaint is officially made to the arbitration committee in charge of accident at sea cases. The fishers then loose when these vessels refuse to own up and be responsible for the damage caused [13].

Industrial trawlers (towed or dragged fishing gears) provide more than 50% of the total worldwide annual landed fish catch in marine fishing areas. All registered trawlers are Ghanaian owned. However, indicated that the real beneficial or owners of these vessels are Chinese with their Ghanaian counterparts fronting for them to meet licensing requirement. The implications of pair-trawling on the destruction of fishing gears of canoes prior to its ban in Ghanaian waters in 2007 cannot be overlooked. The trawl vessels had the highest incident of destruction of fishing equipment of the canoes cases leading to the highest compensation paid (53%). This is because a sudden halt or sharp turn in the case of trawl vessels that drag nets behind them, could be hazardous to the vessels and their crew on board leading to damages that may be very costly to repair. Secondly, some of these industrial trawlers are known of notoriously intruding and trawling in the inshore waters reserved for the artisanal fisheries thereby catching juveniles of the small pelagic fishes in the IEZ, freeze them and sell it off as by-catch to canoes at sea; an act considered illegal by the fisheries law. During this process, the trawlers collide with and destroy the fishing gears of the artisanal vessels.

The fines imposed on the perpetrators or the compensations paid to the affected vessels are not deterrent enough to scare away perpetual or habitual culprits. Only one (1) case was recorded between an inshore vessel and a trawler. Inshore vessels are also restricted to the IEZ. They either trawl or engage in purse seining unlike the set net canoes so the probability or the rate of collision or net destruction is far lower as seen in this study. Since both the inshore vessels and the artisanal vessels operate in the IEZ, there is the likelihood that they run into each other occasionally (especially during trawling by the inshore vessels) causing harm to the artisanal vessel itself or its set net. In this instance, seven (7) cases were recorded and duly compensated [14].

Tuna vessels target the large pelagic fishes unlike the artisanal vessels that aim at the small pelagic fishes. Tuna pole and line, however, uses live small pelagic fish (mostly anchovy) as bait on the hooks to catch the tuna and for that matter they are permitted by the Fisheries Commission to catch these fishes at certain locations in the IEZ. This was confirmed by who indicated that sardinellas (50%) and anchovy (50%) were used as live bait since 1962 when commercial tuna fishing began in Ghana. The tuna pole and line, whose success is centred on the total dependency on the availability of small pelagic fish to be used as bait, subsequently in the 1970s were left with no choice than to solely depend on anchovy (100%) as bait as a result of the collapse of the sardinella fisheries or decline in sardinella catches in the waters of Ghana in 1973.

In the course of searching for baits, collisions do occur between them and artificial vessels (canoes) resulting in the destruction of the fishing equipment of the canoes especially the fishing gear (set net). Also, the tuna purse seine vessels that use Fish Aggregated Devices (FADs) to fish could trace and follow their FADs with aggregated fish (tuna) that have drifted to the IEZ. In doing so, set nets of artisanal vessels could get entangled and destroyed in the process. Comparing the tuna vessels and the trawlers, it is evident that the rate at which tuna and artisanal vessel cases happened is below that of the trawling vessels. Most fishermen of the artisanal vessels refuse or are reluctant to wear life jacket whilst at sea with the excuse that it is too bulky and uncomfortable or unsuitable for the nature of work they do. Others complain of the high cost of the life jackets. The life jacket is a protective gear and needs to be worn to save a life in cases where an industrial or a merchant vessel runs over the artisanal vessel at sea with the crew on-board or the canoe capsizes [15].

## Conclusion

All stakeholders in the fishing industry i.e. artisanal, inshore, industrial as well as merchant vessels must strictly adhere to safety protocols or preventive measures while at sea. Fishermen, especially those in artisanal vessels, must adopt a more safety conscious culture like the wearing of life jackets while at sea. They must be made aware of all measures put in place to ensure that they enjoy their rights and also stay safe at sea. When developing safety measures, fishermen need to be consulted because these measures can only be effective if they are implemented based on fishermen's perception on the measures as indicated. The national fisheries laws and regulations must be enforced to the letter. Trained or qualified surveyors need to survey fishing

vessels thoroughly before issuing licenses and safety certificates to the vessels.

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## Author's Contribution

Charles Teye has designed the study, executed the study, taken part in analysing the data, supported in documenting the article, drawing the conclusion, principal investigator. Francis K.E. Nunoo has designed the study, supported in documenting the article, drawing the conclusion and Supervision.

Patrick Ofori-Danson has designed the study, supported in documenting the article, drawing the conclusion and Supervision.

## Conflicts of Interest

We have no conflicts of interest to disclose.

## References

1. Pomeroy R, Parks J, Pollnac R, Campso T, Genio E, et al. (2007) Fish wars: Conflict and collaboration in fisheries management in Southeast Asia. *Marine Policy* 31: 645-66.
2. Bennett E, Neiland A, Anang E, Bannerman P, Atiq Rahman A, et al. (2001) Towards a better understanding of conflict management in tropical fisheries: evidence from Ghana, Bangladesh and the Caribbean. *Marine Policy* 25: 365-76.
3. Mensah JV, Antwi BK (2002) Problems of artisanal marine fishermen in Ghana: The way ahead. *Singap J Trop Geogr* 23: 217-235.
4. Hardin G (1968) 'The tragedy of the commons'. *Sci* 162: 1243-248.
5. Pomeroy RS, Pido MD (1995) Initiatives towards fisheries co-management in the Philippines: the case of San Miguel Bay. *Marine Policy* 19: 213-26.
6. Amador K, Bannerman P, Quartey R, Ashong R (2006) Ghana Canoe Frame Survey. Accra: Marine Fisheries Research Division Technical Paper 43.
7. Lawson ET, Gordon C, Schluchter W (2012) The dynamics of poverty-environment linkages in the coastal zone of Ghana. *Ocean & Coastal Management* 67: 30-38.
8. Nunoo FKE, Asiedu B, Olauson J, Intsif G (2015) Achieving sustainable fisheries management: A critical look at traditional fisheries management in the marine artisanal fisheries of Ghana, West Africa. *J Ener Nat Res Management* 2: 15-23.
9. Dovlo E, Amador K, Nkrumah B (2016) Ghana Canoe Frame Survey. Accra: Marine Fisheries Research Division Technical Paper 81.
10. Teye C, Nunoo FKE, Ofori-Danson PK (2020) An assessment of observer deployment on industrial trawlers in Ghana. *Regional Studies in Marine Science* 39: 101474.
11. Mac Donnell LJ (1988) Natural resources dispute resolution: An overview. *Natural Resources J* 28: 7-19.
12. Linka J, Segal B, Casarini LM (2019) Abandoned, lost or otherwise discarded fishing gear in Brazil: A review. *Perspectives in ecological and conservation* 17: 1-8.
13. Pauly D, Belhabib D, Blomeyer R, Cheung WWL, Cisneros-Montemayor AM (2013) China's distant-water fisheries in the 21<sup>st</sup> century. *Fish and Fisheries* 15: 474-488.
14. Thorvaldsen T, Kaustell K, Mattila T, Hovdanum A, Christiansen J (2018) What works? Results of a Nordic survey on fishers' perceptions of safety measures. *Marine Policy* 95: 95-101.
15. Troadec JP, Garcia S (1980) The fish resources of the Eastern Central Atlantic. Part one: the resources of the Gulf of Guinea from Angola to Mauritania. FAO, Rome, FAO Fisheries Technical Paper 186: 166.