

KNOWLEDGE TO COPE WITH AND ABILITY OF FISHER FOLK TO ENDURE FISH SCARCITY AT SASSANDRA (SOUTHWESTERN CÔTE D'IVOIRE).

Abstract

Coping with fish scarcity is quite common worldwide; yet it takes knowledge and ability to get the appropriate ways fitting for endurance. The current study was carried out shortly before the fishing-closure measures that were set up by the Government three years past took effect for the third time in July 2025. A set of questions was used to gather information about working conditions of the professionals of the artisanal fishery of Sassandra (Southwestern Côte d'Ivoire). For that purpose, 155 interviewees (80 women and 75 men) were approached to get them answer some questions about type of fishery-related activity, fishers' stay at sea (frequency and number of days spent there), scarcity of fishery resources and the way people handled the situation. The results indicated that fishers and fishers' wives held a prominent position in the fishery's functioning, accounting for 47.10% and 34.84% of the interviewees, respectively. Regarding the causes of fish scarcity, a change in favourable fishing season was identified as the least cause (3.22% of the responses), while the existence of numerous fishing vessels was viewed as the prevailing one (according to 22.58% of respondents). For them to cope with fish scarcity, some fishers would have the convenience of spending more than 4 days at sea or reducing the number of fishing trips; which contrasts with the days of fish abundance when trips trended towards 6 times a week with fishers' stay not exceeding 2 days at sea.

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Introduction:-

Fishery resources are essential for the livelihood of millions of people worldwide, being crucial for the improvement of overall well-being and generally accounting for the primary source for protein intake for many of them. According to FAO (2010), in 2008, fish supplied more than 3 billion people with at least 15 percent of their average animal protein intake. Additionally, in some places in West Africa, fish consumption was well-documented. However, the level of consumption may vary across Nations and years. In Senegal, per capita fish consumption was believed to reach 30.8 Kg annually (Dione et al., 2005; Fall et al., 2017). In Ghana, per capita fish consumption was estimated 20-25 Kg on average (FAO, 2007). In Cabo Verde, per capita fish consumption was believed to reach 11.0 Kg in 2017, accounting for about 12 per cent of total animal proteins (FAO, 2020). In Côte d'Ivoire, per capita fish consumption was estimated 24.9 Kg annually, since 2020 (Anonymous, 2023). In fact, records of fish consumption truly do care little about the inconsistency of the resource. For fishery resources are subject to unpredictability as regard abundance by being likely to behave differently across the years. Still, there is much work to do on addressing the way people could afford to face fish scarcity as one of the challenging situations to overcome when seeking to meet requirements for food sufficiency, whether on local or regional scales. Talking about ways fisheries management should be successfully carried out, Jayiya et al. (2008) suggested fishers' behaviours and motivations be more clearly understood, recalling the critical role they play in ensuring sustainability of the resource. This certainly shows that if we are to fully grasp understanding of resources in their abundance or intricate relationships with ecological and environmental settings, then, we could consider the view of fisher folk, even fishers' behaviours and motivations as key tips to follow. For the days when fisheries were in a prominent growth phase characterized by possible geographic expansion with increased diversity of exploited species and developing fishing capacity coupled with greater production of capture fish are gone.

Concern over the status of marine fish stocks of Sassandra (Southwestern Côte d'Ivoire) has become a focal issue of discussion and management attempt during these recent years. For example, concerning the stock of *Sardinellas*, FAO (2019) warned about the sardinella resource of Côte d'Ivoire, saying that reaching collapse was at hand. And such warning was true for most other pelagic fishes that were also intensely exploited. For a warning to ensure the long-term prosperity and sustainability of fishery resources is not only of ecological significance but also of economic and social importance. The main objective of the study was to provide some insights as to how fisher folk performed their activities in such a context shaped by scarcity. In this regard, it was necessary to gather relevant evidence on working and living conditions of artisanal fishers at Sassandra, Southwestern Côte d'Ivoire. Therefore, the study was carried out on account of reducing fish abundance and specimens' size, two indicators of a fishery's performance whose variation fisher folk are naturally sensitive to and familiar with.

Materials and Methods:-

Sampling procedure

Informal conversations were made with people working for the benefit of the marine artisanal fishery of Sassandra (Southwestern Côte d'Ivoire) to get them willingly take a survey. Therefore, a questionnaire was prepared for, adapting the questions to the way people could easily understand them. Questions were worded adopting easy spelling to facilitate people's comprehension of the subject. Respondents were selected randomly, without regard to age or gender. Additionally, we made sure that interviewees would be preferably any person who has knowledge of the fishery's functioning. Interviewees were asked following questions: (Q₁) What sort of fishery-related activity are you engaged in? (Q₂) How long have you been carrying out this type of activity? (Q₃) What are the main causes of scarcity of fishery resources? (Q₄) Do you spend many more days at sea searching for fish than you ever did in the past? (Q₅) How often do you go fishing at sea within a week? (Q₆) How many days do you spend at sea within a week? (Q₇) Have you ever opted to changing your job or leaving for a more promising place because of scarcity of fishery resources? (Q₈) Did some people among you quit their fishery-related activities because of fish scarcity? (Q₉) Is fishery resources' scarcity a cause for tensions between members of same communities within the fisher folk? (Q₁₀) How do you handle the situation of fish scarcity? (Q₁₁) What is your nationality? Answers were taken in note form as people were asked these questions, thereby avoiding them to be written down by the respondents, which made the interview progress smoothly.

Data processing

An Excel file enabled us to record all responses obtained from the interviewees. Total numbers were recorded for each and overall types of responses, making it easier for us to express them as percentages. Figures were mainly used to illustrate the data.

Results:-

Figure 1 shows the type of activities we can encounter within the fishery of Sassandra. Occupations among the fisher folk vary from fishers to retailers, including smoke-curing agents and wholesalers (Figure 1A). Each job or profession was associated with corresponding percentage. The higher the percentage, the higher the number of people who carry out such activity. For example, fishers were the most numerous (47.10% of respondents), even exceeding smoke-curing agents (32.90% of interviewees). Retailing and wholesaling were carried out by

men and women while fishing was mainly and still other job such as smoke-curing was appropriate for women (Figure 1A). Fishers and fishers' wives held a prominent position in the fishery's functioning as indicated by the greater percentages, 47.10% and 34.84%, respectively (Figure 1B).

Professionals working for the benefit of the marine artisanal fishery of Sassandra originate from several countries (Figure 2A). Among them, Ghanaians were the most numerous (63.23% of respondents), even exceeding Liberians (18.06% of respondents) and the Natives (Ivorians, 12.26% of respondents). According to the interviewees, the causes of fish scarcity are numerous (Figure 2B). However, people distinguish natural causes such as a change in favourable fishing season, rough sea and unfavourable tides from the other causes they believe originate from man, like the increasing number of fishing vessels and canoes as well as the greater number of players and disrespect for responsible fishing practices. In addition, some professionals admitted that they really have no ideas on the topic while others pointed to the fishing-closure regulations for playing a part in fish scarcity (Figure 2B).

Fisher folk exhibited an ability to cope with fish scarcity. Such quality could be associated with type of activity carried out (Figure 3A). For instance, fishers would occasionally search for new fishing sites or tend to modify the mesh size of their fishing nets. Some fishers (according to 21.94% of respondents, Figure 3A) would use both adaptive tactics at a time. Though some people admitted that they ignored the manner the issue of fish scarcity could be resolved, other people such as retailers resorted to selling the fish they bought from cold stores. In addition, 32.90% of the respondents confirmed that under perfect weather conditions, fishers would prolong their stay at sea, while 67.10% of the interviewees said otherwise (Figure 3B).

Figure 4 shows working conditions of fishers and years of experience of overall people working for the benefit of the marine artisanal fishery of Sassandra. Year range of experience was quite extended, being 5 to 50 years and above (Figure 4A). Specifically, people with 5-20 years of experience were the most numerous (52.90% of respondents). Additionally, people with less than 5 years of experience (9.03% of respondents) were slightly more numerous than those with more than 45 years of experience (5.16% of respondents). The desire to supply people with fish normally moved fishers to go fishing at sea several times a week (Figure 4B). However, by this time of fish scarcity, some fishers (23.08%) went fishing once or twice a week while other fishers (49.04%) went fishing at sea 3 or 4 times a week. Both situations conflict with days of fish abundance in the past, when fishers enthusiastically went fishing 5 to 6 times a week as 27.88% of fishers nowadays do (Figure 4B). In addition, Figure 4C shows that number of days spent at sea within a week generally ranged from 1 to 4, although it may sometimes exceed 4 days. Overall, according to 62.50% of the interviewees, most fishers customarily spent 1 day fishing at sea before they returned home while 7.69% of the responses obtained indicated that few fishers would prolong their stay there (Figure 4C).

Responses associated with (Q₇), (Q₈), and (Q₉) indicated that some fishers (60% of respondents), smoke-curing agents (20.95% of respondents), wholesalers (7.62% of respondents), and retailers (2.86% of respondents) acknowledged that fishery resources' scarcity occasionally aroused tensions between members of same communities. And fishers' wives (34.29% of respondents) confirmed that. However, some other interviewees (4.76% of fishers and 2.86% of fishers' wives) stated that those tensions were not that serious because there was always some way out for peaceful solutions. True, fish scarcity could be a sound reason for people to change their jobs

or to leave for a more promising place. For people were temporarily left without jobs, especially when fishing-closure measures took effect. Instead, fisher folk believed the situation could improve for the better, as 16.19% of smoke-curing agents, 24.76% of fishers and 28.57% of fishers' wives did. Moreover, 40% of fishers and 10.48% of fishers' wives admitted that it takes patience to endure fish scarcity, adding that no hope was yet lost. Additionally, 20.95% of smoke-curing agents, 61.91% of fishers, and 29.52% of fishers' wives believed that fish scarcity could not serve as pretext for quitting their fishery-related activities or searching for any promising way out, saying that they view it as a passing situation that can be resolved.

Discussion:-

Several activities can be encountered within the marine artisanal fishery of Sassandra, which offers people the opportunity to get a fishery-related occupation. To this extent, that fishery could be considered as a job provider (Document COMHAFAT, 2014; Bahou et al., 2022), just as other fisheries worldwide are (FAO, 2011; Bjorndal et al., 2014). Bahou et al. (2022) noted that the interconnectivity of these types of fishery-related activities is meant to maintain the perfect functioning of that fishery. Overall, occupations relate to fishing, fish handling, processing and fish vending. Yet, predominance of each type of player depends on factors such as time, availability of players and period of interview. According to Bahou et al. (2022), fishers and fishers' wives are at the heart of the artisanal fishery of Sassandra, which makes them potentially more numerous as a result. Almost all activities carried out are generally prone to gender-oriented view, especially the ones associated with fishing, fish vending, handling and fish processing. As a result, most men were exclusively fishers and they would scarcely be inclined to carry out post harvesting tasks, which were appropriate for women (Bahou, 2024).

Across West Africa and the entire African continent, few fisheries can perform well relying solely on natives, without migrant fishers' contribution; and the marine artisanal fishery of Côte d'Ivoire is no exception. In fact, settlement of most migrant fishers in Côte d'Ivoire, of whom Ghanaians, Liberians, even Senegalese, occurred in the early nineteenth century, prior to the days of political independence, because of no large-scale yet migratory-like settlements of seasonal importance along the Ivorian coast (Gruvel, 1913; Chauveau et al., 2000; Bahou et al., 2022). Especially, former Ghanaian fishers benefitted from former colonial authorities' backing, as they granted them exclusive access to the sea as regard fishing and permitted them to establish the first close-knit fishing community of Ghanaian origin at Sassandrain 1893 (De Surgy, 1965; Delaunay, 1995; Élakoua, 2013; Bahou et al., 2022). In addition, numerous causes of fish scarcity were mentioned by the interviewees. Overall, some causes people referred to were the ones that occurred naturally, yet temporarily within a short period of time. Besides these, the other causes were the ones for which the current fishing-closure measures have been set up. For as UNEP (2014) rightly said, overfishing and stock depletion often occur when management and rulership are insufficient. In general, these latter causes are the ones likely to seriously damage the ecosystem's functioning.

Ability to cope with fish scarcity varies according to corporations. Behaviours of fisher folk were the expression of such ability as a response to a common concern. Though separate, all the responses of the professionals were meant to collectively illustrate the way the fishery's functioning was kept forward. Especially, fishers being at the heart of the fishery's functioning (Bahou et al., 2022), they tended to reduce or prolong their stay at sea, striving to keep the fishery function at its best and to provide customers with fish, depending on fish availability.

Yet, the responses obtained from the interviewees revealed opposite views on the subject. The truth is there are two groups of fishers when it comes to the gear types that are currently in use. Fishers targeting pelagic fish usually used gillnets while the other fishers who targeted bottom-dwelling species generally used long lines (hooks). Of the two groups, only the latter tended to prolong their stay at sea because they customarily kept sufficient ice onboard their canoes to keep the fish fresh during their stay. In fact, it can take up to six days before fishers get the desired quantity of fish, which is the main reason why they would prolong their stay under perfect weather conditions. These assertions are in line with statement by Mounia et al. (2024) showing a common characteristic of artisanal fisheries exhibited by the fishery in the central Atlantic coast of Morocco, as they told of fishers' use of methods that vary according to the time of year and species occurrence. Furthermore, utilization of more than a unique gear type was sometimes profitable for substantial increase of the catch in terms of quality and quantity. Specifically, as Soe et al. (2022) put it, a gillnet's ability to capture species correlates with its mesh size. As a result, gillnets with large mesh size tend to be more efficient in capturing large individuals, while smaller fish would be successfully caught in gillnets with smaller mesh size (Wan Azimi et al., 2025). Awareness of that was certainly the reason why fishers would occasionally change their fishing nets' dimensions.

Year range of experience was extended because people working for the benefit of that fishery included both teenagers and adults, even the elderly. In addition, players with 5-20 years of experience were the most numerous because they included the most active people. Those with less than 5 years of experience were generally the ones who served their apprenticeship at the side of people with more than 45 years of experience. In any event, there were few people with higher years of experience because they were generally less active, due to age. We believe that fish scarcity determined the frequency to which fishers would go fishing at sea. Depending on perfect weather conditions, fishers reduced or prolonged their stay, either because the ice they had in store inside their canoes enabled them to be fitted for so doing or to optimize the catch when the desired quantity was yet attained.

So, why would the fisher folk hold themselves back from leaving or quitting their fishery-related activities despite the current circumstances caused by fish scarcity? Well, answers lie in the commonly held opinion about such activities. Fishing and fishery-related activities are of major economic, social, and societal importance to overall communities living in Côte d'Ivoire and beyond. For instance, a study by Bahou (2022) shed light on marketing and the route to be followed by a large quantity of smoked fish when these were to leave Sassandra for retail trade as fish exports to neighboring countries. In fact, the economy of the fisher folk is heavily dependent on fishing and fishery-related activities that account for more than half of their revenue and provide substantial employment as well as income and livelihood.

Conclusion:-

This study showed how people working for the benefit of the marine artisanal fishery of Sassandra displayed appropriate reactions while facing fish scarcity. Overall, reactions were corporation specific. Especially, fishers adapted their tactics to fish availability using fishing methods that vary according to species occurrence and time of year or modifying fishing gears' dimensions. Fishers would also consider reducing or increasing the frequency to which they go fishing at sea and they would occasionally reduce or prolong their stay there. And most

importantly, the views of fisher folk should not be disregarded, since they are key tips to consider for possible fisheries management perspective.

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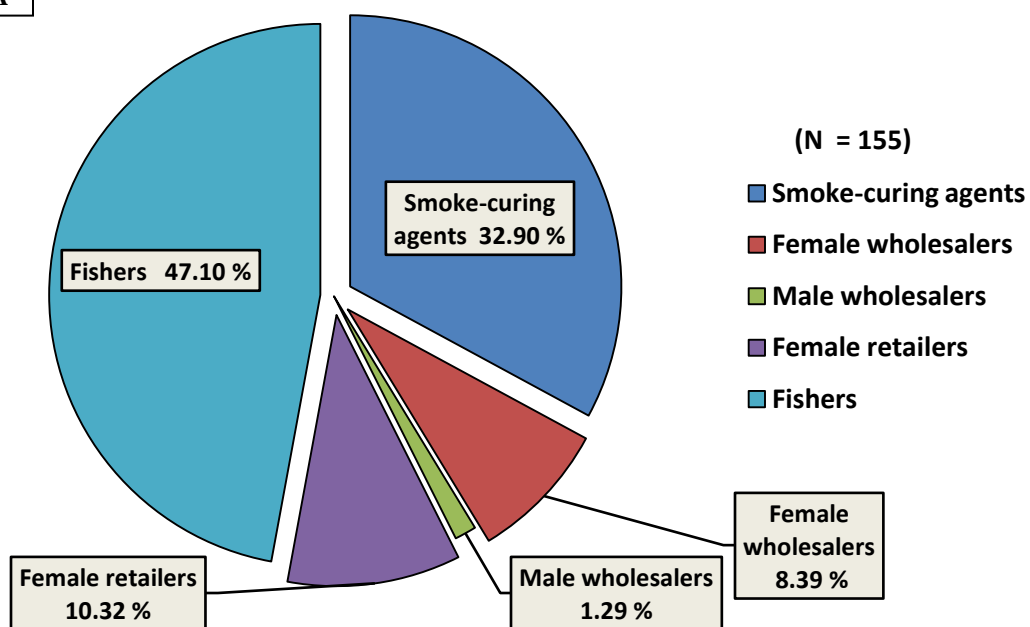
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FIGURES AND FIGER LEGENDS

A



B

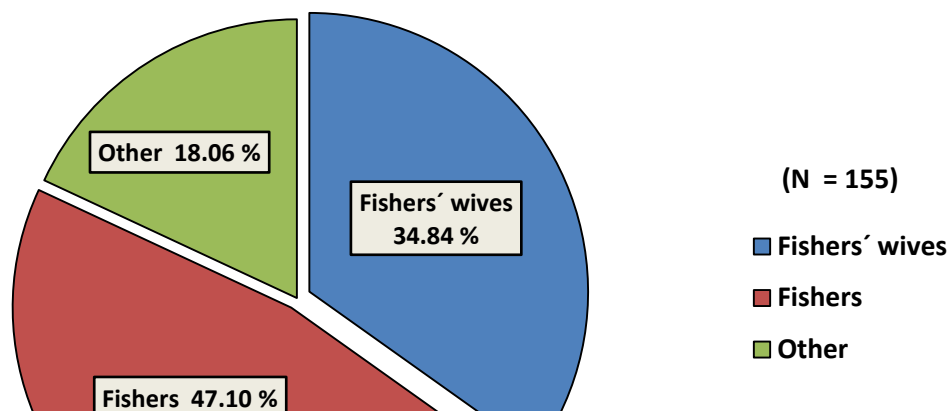


Figure 1: Breakdown of respondents according to type of activity in which they were engaged (A) and Predominance of fishers and their wives in the total percentage (B)

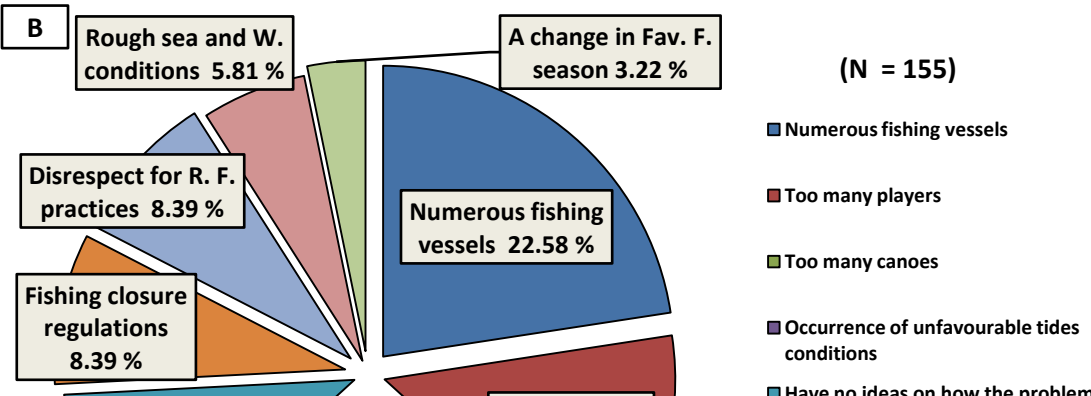
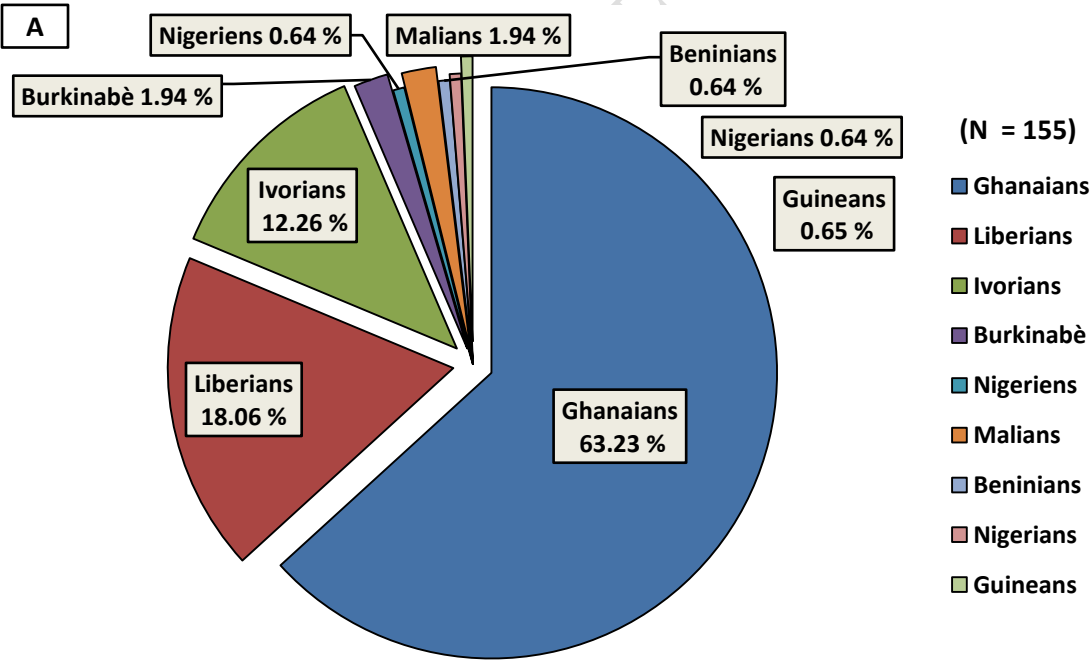


Figure 2: Breakdown of the professionals working for the benefit of the marine artisanal fishery of Sassandra according to nationality (A) and Responses of the professionals regarding the causes of fish scarcity (B)

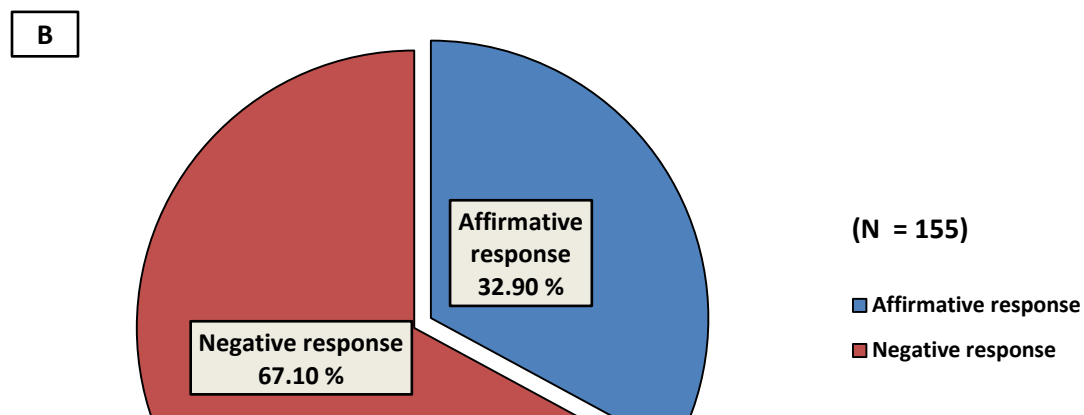
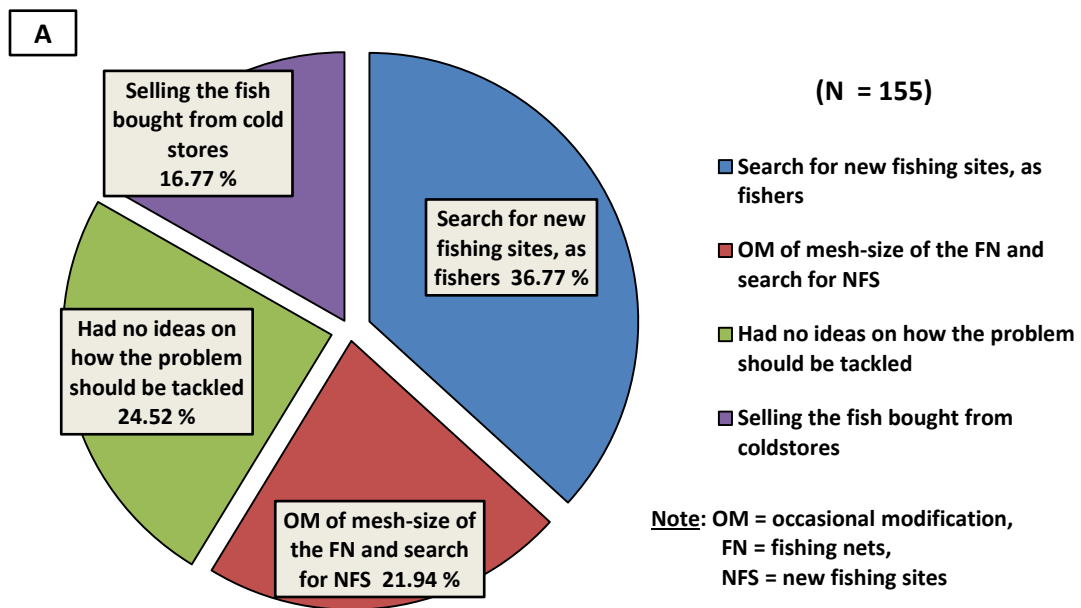
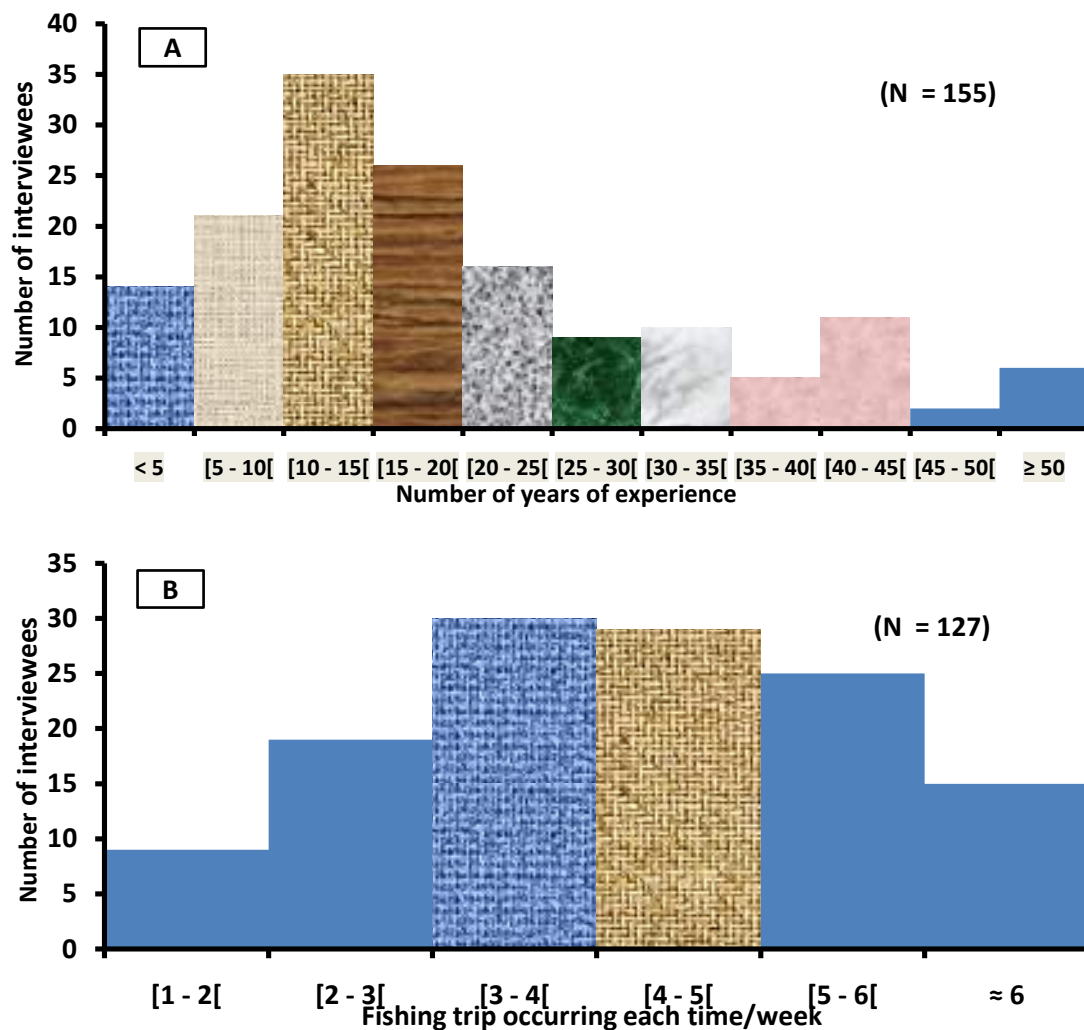


Figure 3: Ability of the professionals to cope with changes relating to fish scarcity at Sassandra (A) and Opinions of the interviewees about whether fishers would extend their stay at sea or not, depending on weatherconditions (B)



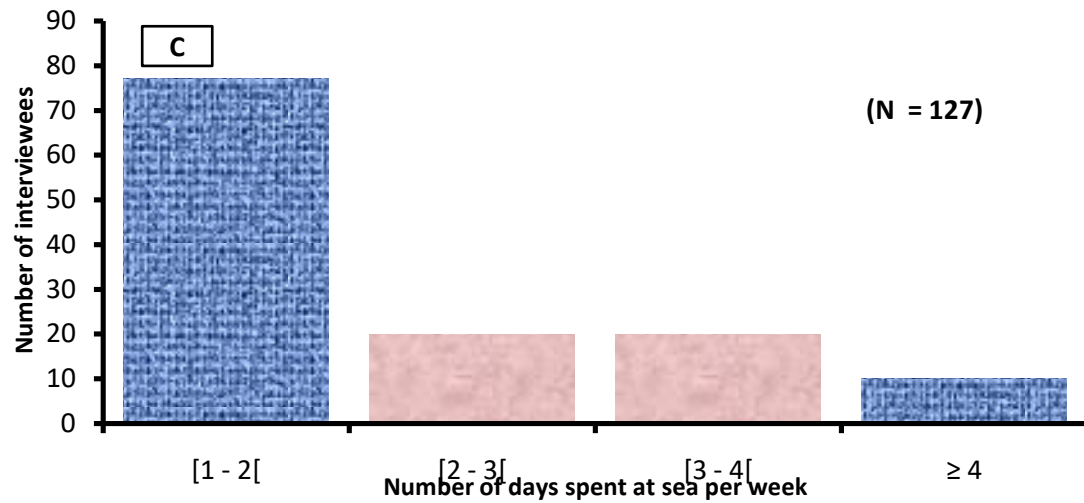


Figure 4: Year of experience of the professionals working for the benefit of the marine artisanal fishery of Sassandra (A), How often fishers would go fishing at sea within a week (B), and Number of days spent at sea, depending on weather conditions (C)