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## Economic and social contribution of sedentary small pelagic fisheries in Guinea

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### Abstract

The objective of the article is to present the economic and social contribution of the sedentary sector of small coastal pelagics to the Guinean economy. Data on the profitability of fishing units and post-capture activities were obtained from the National Center for Fisheries Sciences of Boussoura (CNSHB) and following field surveys from January to December 2019 in the various fishing centers of the country. The results show that six Guinean ethnic groups exploit small coastal pelagics in the national EEZ: Soussou, Malinké, Baga, Peulh, Landouma, and Nalou). The first three ethnic groups largely dominate the sedentary sector of small pelagics and represent more than 90% of the players. The production of the sedentary sector is estimated on an annual average at 51,250 tons over the period 2014 – 2018 for a commercial value of 25 Million Euros. The production is dominated by two species in particular the Bonga and the Sardinella. Overall, in terms of added value, the sedentary sector of small pelagics generates on average 60 million euros distributed between the owners of the means of production, tide fishers, women processors, and the State. Over 40% of this added value is generated by the fishing segment. They are followed by the fish trade and artisanal processing with annual added values estimated at 19, 5 and 15, 6 Million Euros respectively. Despite this important contribution of the sedentary sector of small pelagics to the Guinean economy, the absence of high value-added processed products, investments in industrial training, and strategic orientations inhibit the economic potential of Guinea's fishing sector.

**Keywords:** Value chain, fishing, industry, small pelagic, economic, social

### 1. Introduction

Guinea has a maritime frontage on the Atlantic Ocean with an EEZ (Exclusive Economic Zone) which extends off a coastline approximately 300 km long (Lobry *et al.*, 2003) <sup>[15]</sup>. Thus, Guinean waters are home to significant resources linked to a marine environment relatively conducive to the development of fisheries (seasonal upwelling phenomena, river inputs) (Saraux *et al.*, 2019; Lobry *et al.*, 2003; Georges *et al.*, 2002) <sup>[18, 15]</sup>. The exploited resources include four groups with different bioecological characteristics and socio-economic importance. These are pelagic fish, coastal demersals, cephalopods, and shrimp. These resources are exploited by both artisanal fisheries (national and migrant) and industrial fisheries (national and foreign) (Failler *et al.*, 2021; FAO, 2014; ICTSD, 2013). However, pelagic fish are the most important species in the country in terms of production and commercial value. Over the 2014 – 2018 five-year period, the production of the sedentary Guinean small pelagics sector is estimated on an average at more than 51,250 tons per year. However, the added value generated by this sector is not known. To provide detailed and quantified arguments to governments and regional fishing organizations to improve the distribution chain, this study assesses the added value of the sedentary sector of small pelagics. Thus, the total added value generated annually by the sedentary sector of small pelagics is estimated at more than 60 million euro. The production segment generates more than 2/4 of this added value, followed by fish wholesaling and processing with 19, 5 and 15, 6 million euro per year. Reading the distribution of added value provides information on an essential production oriented towards consumption in the fresh and frozen states and a relatively low valorization. Thus, it appears necessary for Guinea's public policies to focus more on the artisanal and industrial valorization of products, especially in a context of overexploitation of

resources. Public authorities and development partners will have to support this process with technological innovations.

The objective of the article is to present the economic and social contribution of the sedentary sector of small coastal pelagics to the Guinean economy. Data on the production of the sedentary sector of small pelagics, prices per kilogram of species from 2014 to 2018 were taken from the CNSHB database. The calculation of the added values of the different segments required having the operating accounts of the different segments and intermediate. This information was obtained following field surveys with fishermen, fishmongers, and women processors in the various fishing site of the country.

This work is unprecedented and constitutes real added value for a better knowledge value of small pelagics in Guinea. The physical indicators of production, obeying the productivity logic, have often guided fisheries to the detriment of the measurement of economic activity which makes it possible to have a synthetic quantified representation. This quantified approach to the economy of small pelagics in Guinea also allows public decision-makers to have leverage for the management of fish pelagics stocks; beyond policies related to the productivity and conservation of resources.

The article is structured in four parts. In the first part, the context of the study is presented with a presentation of fishing in Guinea and the exploitation of pelagic fish. In the second part, the research method is explained. In the third part, the results of the research are presented, in particular the marketing of catches from sedentary small pelagic sectors, and the added values of the fishing, processing, and fish trade segments. The fourth part deals with a discussion on the weakness of the added value of pelagics in Guinea. It concludes with public policy recommendations aimed at strengthening the added value of the processing segment and subsequently the sector's contribution to the national economy and to improving the livelihoods of actors.

## 2. Research Context

### 2.1 The fishing sector in Guinea

Fishing is an essential component of the Guinean economy. The ecology and ethology of species explain the different fishing strategies and tactics developed for the exploitation of fishery resources. Depending on the technological intensity, within Guinean fisheries, there is an artisanal sub-sector and an industrial sub-sector. Regarding the census of the pirogue park in 2016, artisanal maritime fishing operates in 234 landing stages distributed along the Guinean coast (MPAEM, 2016). The Guinean pirogue fleet is estimated at 7540 motorized boats at 45%. It was 6,025 fishing units in 2009 for a motorization rate of 21%. The prefectures of Boké and Boffa concentrate the most boats, followed closely by Conakry and Dubreka. Artisanal fishing activities are carried out using four types of canoes (Yoli, Gbankenyi, Salan, and Flimbote), of which the Salan accounts for 72.5% of the total (DNPM, 2018). About twenty fishing techniques have been identified and are grouped as follows: drifting gillnets (with ethmalose and demersal species), encircling gillnets (with mullet, ethmalose, and otolith), set/anchored gillnets (small, large, or very large mesh), rotating nets without a slide, raised or falling nets (*tête yèlè*, hawk), fixed gillnets and barrage nets, beach seines and lines and longlines.

Industrial exploitation systems are characterized by the heterogeneity of the fleet and the coexistence of several nationalities adopting different exploitation strategies (Chavance *et al.*, 1998; Chavance *et al.*, 1994)<sup>[3, 4]</sup>. In 2020, there were 90 industrial vessels, including 47 cephalopod-fish-demersal trawlers, 3 pelagic fish trawlers, 2 shrimp boats, and 39 tuna seiners. Only 7 boats (4 cephalopod-fish-demersal and 3 pelagic fish trawlers) are under Guinean status. The other 84 boats fly foreign flags, including 41 Chinese, 24 Spanish, 10 French, 4 Senegalese, 2 Korean, 2 Dutch, and 1 Belizean.

The different sub-sectors of Guinean fisheries supply the local and external markets. Placed on the market, the catches are valued in different forms; fresh distribution (fish wholesaling), artisanal processing, whole freezing (Diallo *et al.*, 2001).

### 2.2 The valorization of small pelagics in Guinea

Small pelagics largely dominate the fish catches in Guinea. Much of the national production of coastal pelagic is marketed whole, fresh or frozen. There is, however, an artisanal fish processing sector where smoked products are predominant, ahead of salted-dried products and shark fins. Handicraft processing fulfills a very important social and economic function. The vast majority of it employs women. Approximately 40% of artisanal fishing landings go to this segment of the value chain.

The main types of pelagic fish products sold on the Guinean market are poison landed by artisanal fishing (*sardinella*, Bonga Shad, Mullet, Barracuda, *Carrax* spp, *Chloroscombrus*, *Chrysurus*, and Minor tunas) (fresh/frozen or smoked), frozen pelagic fish landed by Guinean industrial fishing, the landing obligations of foreign vessels based in Guinea, pelagic fish imported by fish wholesalers and smoked fish imported from the -region particularly of Senegal.

The products of artisanal fishing are distributed by several agents. Fresh fish is marketed by traders and smoked fish by smokers.

The products of industrial fishing are marketed on the national market according to two circuits, including the frozen pelagic circuit and the circuit of consignment companies (fresh and frozen). The frozen pelagic circuit is provided by companies with storage capacity in the country's large urban centers.

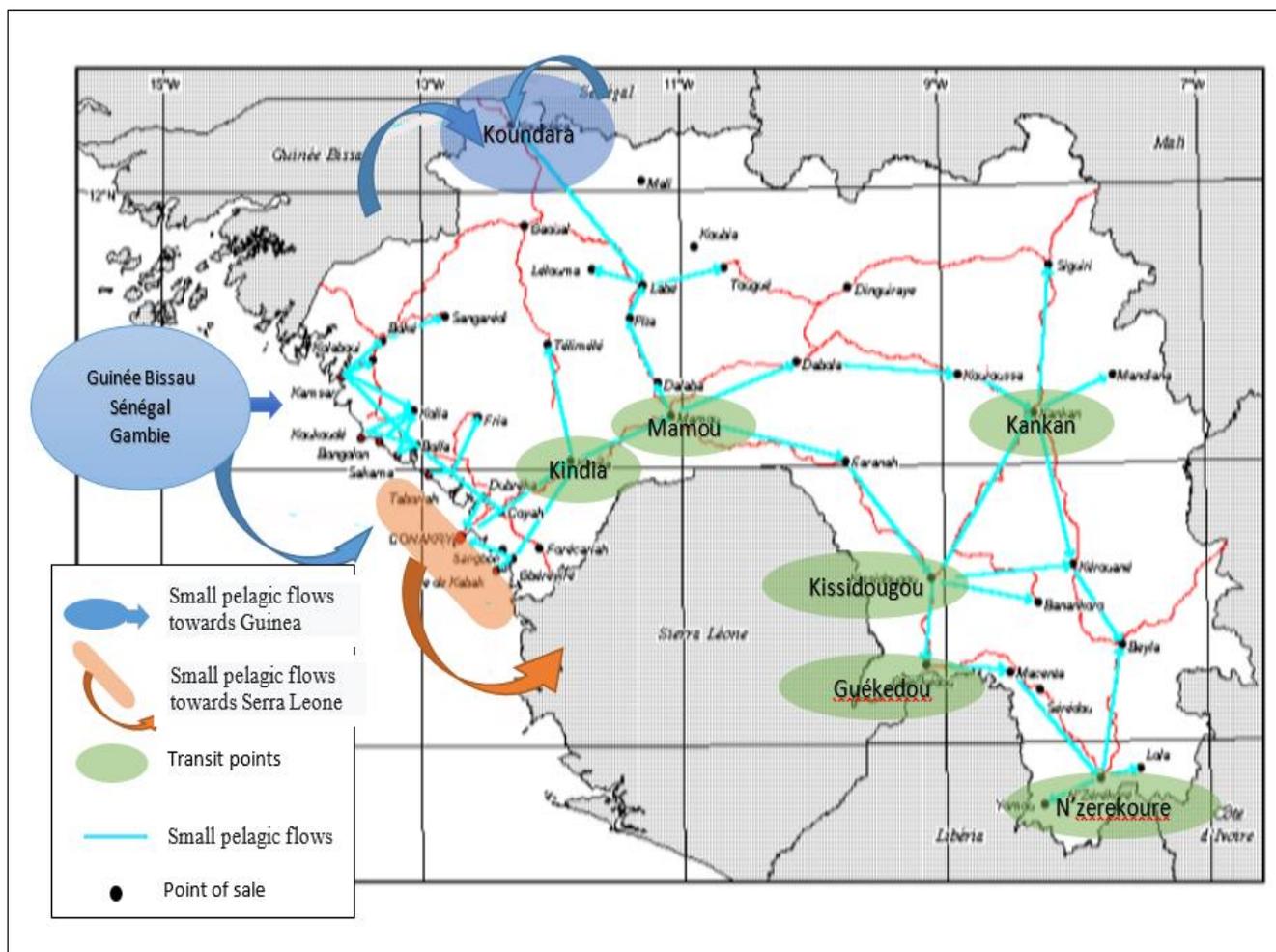
Various means of transport are used to market fish products (fresh, frozen, smoked). They range from canoes to motorcycles, including refrigerated trucks, taxis, and minibuses.

## 3. Materials and Methods

### 3.1 Study area

The Republic of Guinea has 300 km of maritime coastline with a continental shelf covering an area of 47,000 km<sup>2</sup> (Domain *et al.*, 1993). There are four types of fishery resources in Guinea, namely: demersal fish, cephalopod, shrimp, and pelagic resources. Many migrant fishermen from neighboring countries of Guinea (Sierra Leone, Senegal, Guinea Bissau, and Mali) and the West African sub-region (Ghana) participate in fishing and the development of these fishery resources. Fishery products are transported within countries by road in a frozen or smoked format as shown in

Fig 1.



**Fig 1:** Map showing the location of the study area and commercial routes of small coastal pelagics

Small pelagics fishing is carried out along the Guinean coastline with a high concentration of fishermen in the following landing sites:

- Khounyi, Matakang and Konimodiah to the south, in the prefecture of Forécariah.
- Taboriah, Koukoudé, Bongolon et Kindiadi in the center of the country, in the prefecture of Boffa.
- Katchek, Kamsar, Katfoura et Kanfarandé in the north, in the prefecture of Boké.
- Boulbinet, Dixinn port 3, Bonfi, and Kaporo in the special zone of Conakry.

In the special zone of Conakry, the fishermen generally operate in the same fishing areas as those in the south and center. Other fishermen move along the coast depending on the abundance of small coastal pelagics from one area to another. Five areas of internal migration of sedentary small pelagic coastal fishermen have been identified. The first is located in Forécariah and welcomes sedentary fishermen coming from Conakry mainly during the good fishing season. These evolve from the landing stages of Matakang, Khounyi, and Konimodiah. The second is located in the Boffa area, especially in the Kindiadi, Taboriah, Bongolon, Tounyifilidi, Koukoudé, and Kondéyiré landing stages. The third is situated in Kamsar in the prefecture of Boké. The fourth is in Kanfarandé and Katchek bordering Guinea-Bissau. Finally, the fifth is the special zone of Conakry, at Bonfi, Boulbinet, Dixinn Port 3, and Kaporo landing stages.

### 3.2 Data collection

Data were extracted from the Boussoua National Center for Fisheries Sciences (CNSHB) census database (CNSHB, 1985-2020), the fishing and post-capture monitoring systems activities, and the socio-economic surveys carried out within the framework of the GREPPAO project. They were: type of fishing activity, operating costs, sea trips costs, processing, marketing, operating costs, purchase price, sale price, conservation costs, transport costs, taxes, and acquisition costs of operating units. Information relating to fees and access rights to fishery resources (artisanal and industrial maritime fisheries) was obtained from the National Directorate of Maritime Fisheries (DNPM). Information on the conditions of access to fishery resources and exploitable quotas were taken from the various development and management plans for fisheries in Guinea.

### 3.3 Data processing: calculation of the value chain

The calculation of added value concerns three segments (fishing, fishmongering, artisanal processing). The added value derived from fishing activities (AVF) is calculated by the gross landed (GL) less the average operating costs of the fishing units which contributed to the landing (OCF).

$$GL = \text{Average quantity landed} \times \text{Average price of fish landed}$$

$$OCF = \text{Total costs}^1 \times (\text{number of pirogues}) \times (\text{Average number of trips/month}) \times 12$$

<sup>1</sup> The expenses cover fuel, food, maintenance, repairs, ice and bait.

$$AVF = GL - OCF$$

The added value of the fish trade segment is calculated as follows

$$AVFT = \text{Gross fishmonger value (GFV)} - \text{Total production costs (Pc)}$$

GFV represents 60% of the quantity of fish landed. Production costs were obtained by calculating the production cost per kilogram of fish sold (transport + ice + taxes). In addition, this cost is multiplied by the quantities of fish sold.

The added value of the processing artisanal is calculated as follows

$$AVPA = \text{Gross value of artisanal processed products} - \text{Total production cost}$$

AVPA represents more than 85% of the landings of the

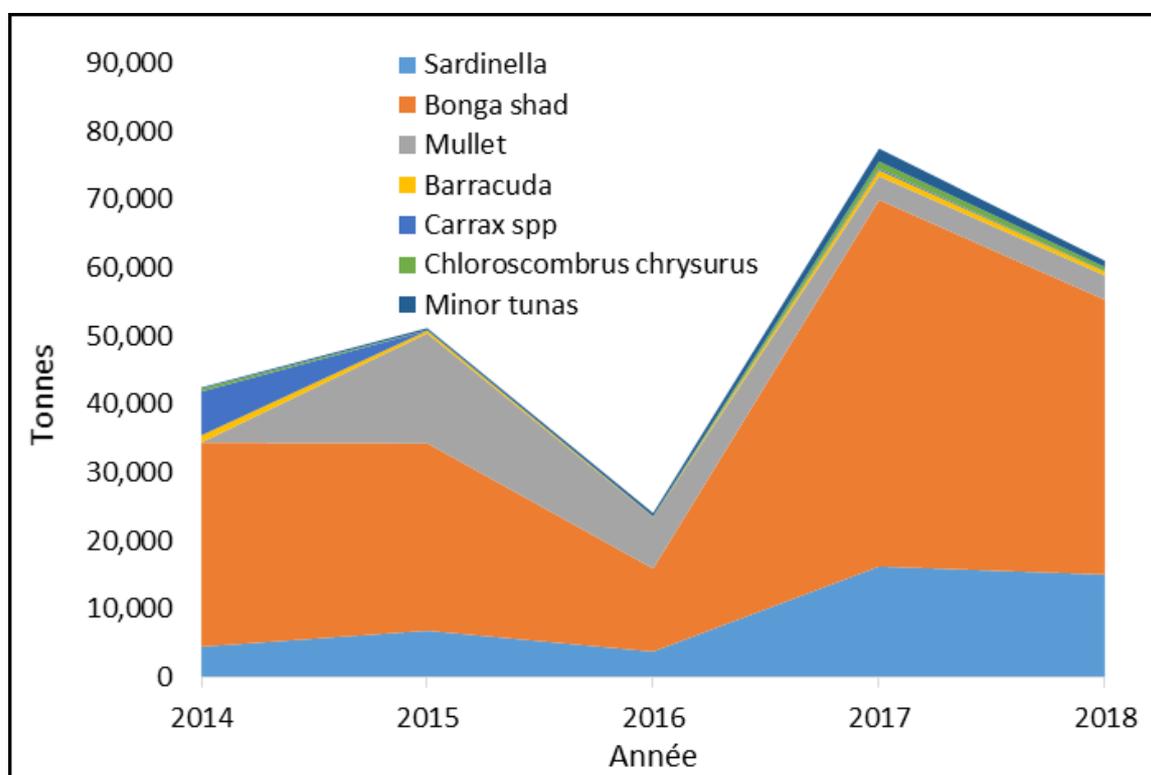
sedentary sector of small pelagics. The gross value is obtained by multiplying the quantity processed by the average price per kilogram in the market. The results are subtracted from the costs of production. The production costs of artisanal processing obtained by adding salt + wood + transport + packaging + self-consumption + taxes. Next, the live weight / processed product conversion ratio is applied. This made it possible to have the net quantity of processed products obtained from the 45,000 tons on average by the processing segment.

## 4. Results

### 4.1 Sedentary fishing industry for small pelagics

#### 4.1.1 Volume and values of catches from 2014 to 2018

The catches of the sedentary pelagic fish sector experienced an upward trend over the period 2014 - 2018, going from 42,500 tons to over 61,000 tons. The weakest year was recorded in 2016 with 24,000 tons produced. It was followed by a record peak in 2017 with just under 77,500 tons produced (Fig 2).



**Fig 2:** Volumes (tons) of catches from the sedentary small pelagics sector (2014 – 2018)

The average annual production from 2014 to 2018 is 51,250 tons. It is dominated by the landing of Bonga Shad with an annual average of 32,689 tons, followed by *sardinella* with 9,313 tons. All other species have low landings with less than 4,000 tons per year (Fig 2).

The commercial value of pelagic fish fluctuated positively over the period 2014-2018 from 21, 4 million euros to more than 30,8 million euros (Fig 3). The year 2017 presents the highest commercial value with more than 37, 4 million euros.

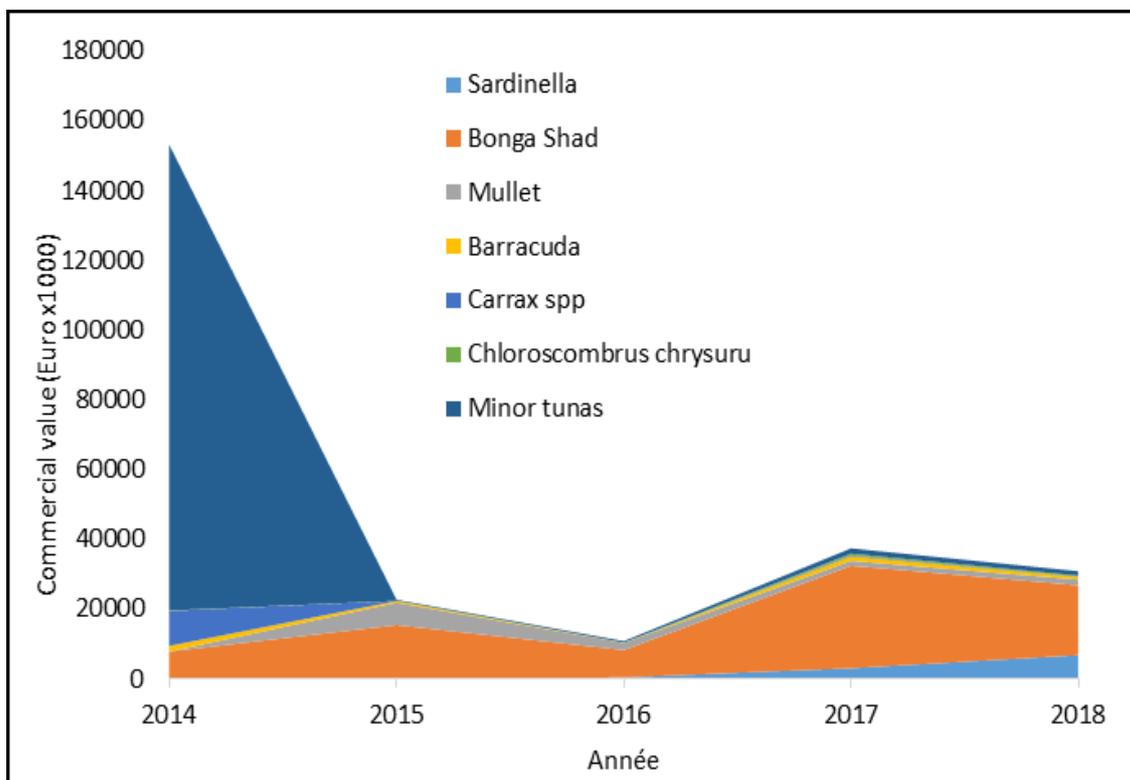


Fig 3: Values (Euro) of catches from the sedentary sector of small pelagics (2014 – 2018)

With an average annual production of more than 32,680 tons, the commercial value of Bonga Shad is estimated annually at more than 7 million euros over the period 2014 – 2018 (Fig 3). The average commercial value of *sardinella* over the same period is estimated at 1,2 million euros for an average production of 15,000 tons. For all other pelagic species landed by the sedentary sector, the commercial value did not exceed 1 million euros (Fig 3).

#### 4.1.2 Fishing units

The fleet of the sedentary small pelagic fishing sector consists of the following types of fishing units: flimbote with encircling gillnet for bonga, flimbote with rotating net, gbankenyi with drifting gillnet, gbankenyi with encircling gillnet for bong, gbankenyi with encircling mullet gillnet, gbankenyi with fixed gillnet, salan with drifting gillnet, salan with encircling gillnet for bonga, salan with encircling gillnet for mullet, salan with fixed gillnet.

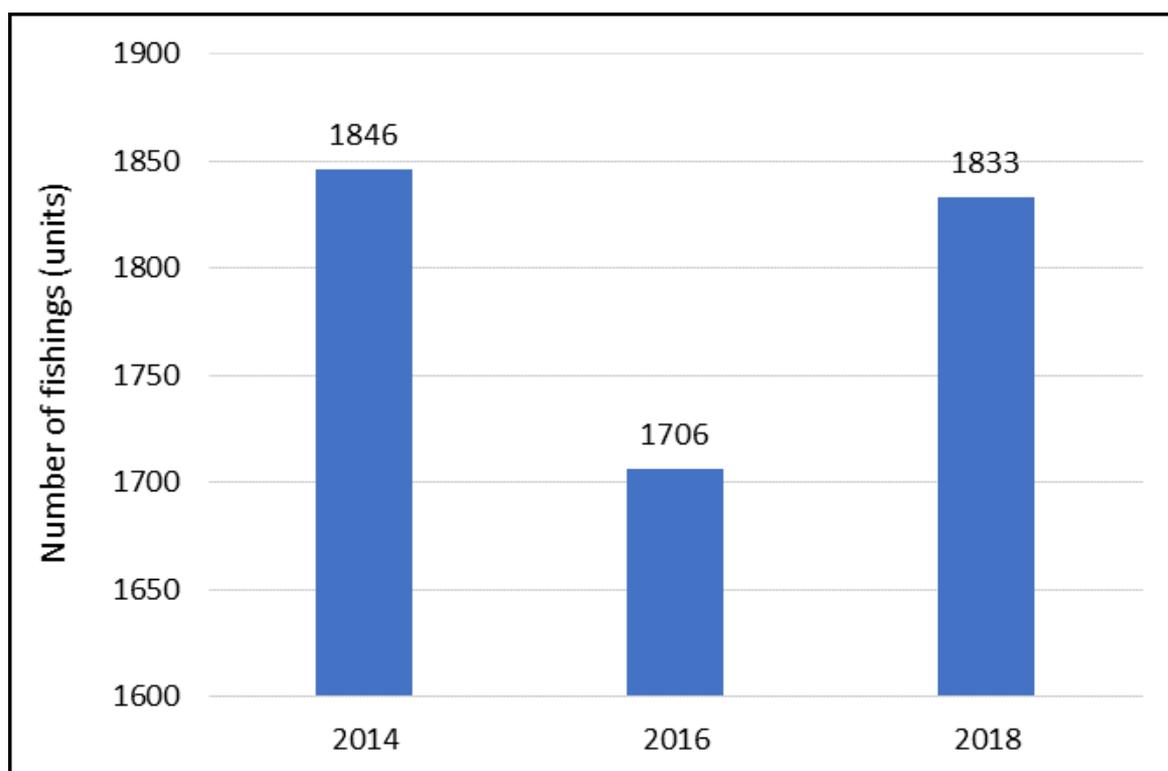
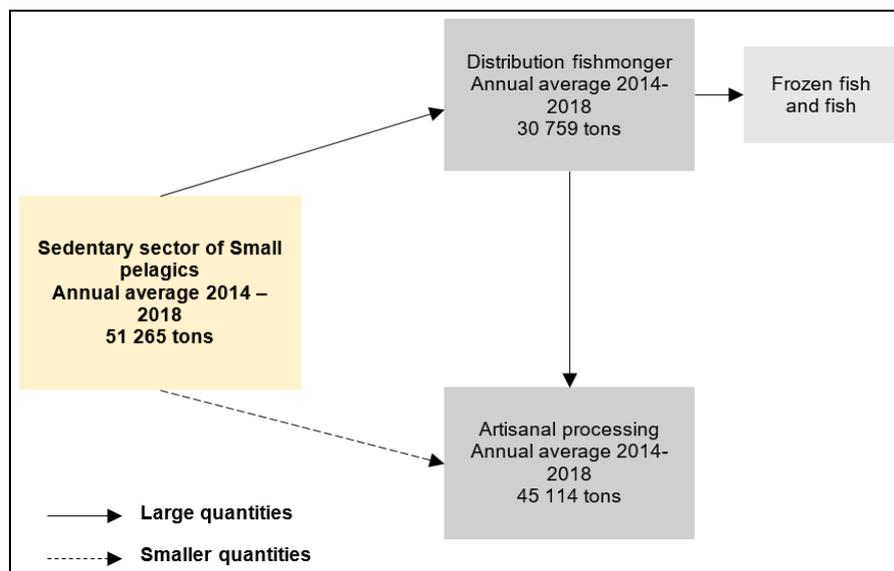


Fig 4: Fishing units targeting pelagic in Guinea

The total number of the fleet increased from 1,846 fishing units in 2014 to 1,706 in 2016, then goes up to 1,832 in 2018 (Fig 4). The decrease in the total number of the fleet between 2014 and 2016 is due, among others, to the decrease in numbers (i) of the flimbote type canoes using the rotating net, (ii) of all the fishing units using the type canoes. Gbankenyi and (iii) Salan type canoes employing drift gillnet. The increase in the total number of the fleet from 2016 to 2018 is linked, in particular, linked to the increase in the number of (i) fishing units using flimbote-type canoes and (ii) Salan-type canoes with circling gillnet for bonga.

### 4.1.3 Marketing of catches

The average annual production of sedentary small pelagics sectors is 51,265 tons. This production is made available to the fish trade segment for the marketing of fish. The fish distribution segment received an average of over 30,500 tons of fish (Source: Field investigation Fig 5). This quantity of fish is distributed mainly in fresh on the local market and a small quantity in frozen. It supplies a large quantity, i.e. 50% to the artisanal processing market (Source: Field investigation



Source: Field investigation

Fig 5: Distribution on the market of the production of the sedentary sector of small pelagics

This processing segment also receives pelagic fish from the production segment without the intermediary of tide collectors. On an annual average, women processors receive more of the most important part of the production of the sedentary sector of small pelagics with more than 45,000 tons (Source: Field investigation Fig 5).

## 4.2 Analysis of sedentary sectors

### 4.2.1 Economic analysis

The economic analysis focuses on the creation of added value for each segment of the value chain; on the areas for improvement linked to the creation of this added value and its distribution in the different segments of the value chain. Gross

value added corresponds to the difference between the income from the activity (sales value) and intermediate consumption (inputs necessary for the production of goods and services). For annual landings, the average over the period 2014-2018 was considered. The intermediate consumptions of each segment of the value chain are taken from the results of profitability surveys of fishing units and periodically post-catch activities conducted at the CNSHB. The socio-economic survey of small pelagic coastal fishermen of the GREPPAO project also made it possible to improve existing data on fishermen, fishmongers, and processors to identify the costs of their activities.

Table 1: Calculation of the added value of the fishing segment all taxes included

Average landings (t) 2014-2018	Average 2014-2018 : 51 265 tons
Average landed fish price	6 747 GNF
Gross value of production	Landing x average price (51 265 x1000 x 6 747) / 10000 = 34 588 648.3 €
Operating costs of the fishing units that contributed to the landings	Fuel, maintenance and repairs, food, Ice, bait:235 787 + (5000 exit tax)
	Number of canoes: 2113
	Number of trips per month: 16
	Number of month: 12
	Total cost = ((235 787+5000) x 2113 x 16 x 12)/10000 = 9 768 632.3 €
Added value from fishing activities	Gross value – Operation cost : 34 588 648.3 - 9 768 632.3 = 24 820 016 € (TTC)

For 51,265 tons of small pelagics landed annually by sedentary units, the value generated is 24.8 million euros.

Thus, the added value per kilogram of pelagic fish is 0.48 euro (Table1).

**Table 2:** Calculation of the added value of the fish trade segment

• Annual landings (t)	• Average 2014-2018 : 51 265 tons
• Percentage of fish landings (distribution of fresh fish) (%)	• 60%
• Quantity of fish landings (t)	• 30 759 tons
• Average selling price of fresh fish	• 6 747 /Kg
• Gross value of fish product	• Fish quantities x selling price of fresh fish: (30 759*1000*6747)/10000 = 20 753 097 €
• Production cost per kg of fish including the purchase of fish	• Consider purchased fish, ice cream, transport
• Total production cost	• Fishmonger tonnage x production cost per kg: (30 759*1000 * 400)/10000 = 1 230 360 €
• Added-value of fresh fish	• Gross value - total production costs: 20 753 097 - 1 230 360 = 19 522 737 €

The local fish wholesaler distributes nearly 30,760 tons of small pelagics on the local market, which corresponds to an

added value of 19.5 million euro. Reduced per kilogram, the added value is 0.63 euro per kilogram distributed (Table 2).

**Table 3:** Calculation of the added value of artisanal fish processing transformation

• Annual landings (t)	• Average 2014-2018 : 51 265 tons
• Percentage of landings processed by artisanal methods (%)	• 88%
• Quantity of landings processed by artisanal methods (tons)	• 45 114 t
• actor for converting live weight to artisanal processed product	• Coef =51% either a rate 1.98
• Quantity of artisanal processed fish	• (45 114 *51/100)=23 008 t
• Selling price of artisanal processed fish	• 8 170 GNF/kg
• Gross value of the product processed by traditional means	• (8 170 x 23 008*1000) /10000 = 18 797 034 €
• Production cost per kg of artisanal processed fish	• Consider purchased fish, transport, wood, salt, packaging, self-consumption, post-processing waste, medication, tax, etc... = 1 366 GNF/kg
• Total production cost	• Tonnage processed x cost of production au kg : (23 008 x 1000 x 1 366) /10000 =3 142 723 €
• Added-value of artisanal processed fish	• Gross value - total production costs: 18 797 034 – 3 142 723 = 15 654 311 €

Annually, the quantity of fish put on the processing market is estimated at 45,115 tons. The conversion of live weight into artisanal processed products brings down to an average of 23,000 tons of artisanal processed products available on the market. This volume generates an added value of 15.6 million euros, which corresponds to 0.68 euros per kilogram of the processed product (Table 3).

#### 4.2.2 Social analysis

Social analysis of the sedentary small pelagic fishing sector relates to job creation, food security, and economic growth.

Field surveys have shown that in 2019, in 2019, the small pelagic sedentary fishing sector created, a total of 13,574 direct jobs including 1,551 canoe owners, 7,218 fishermen, 2,565 fishmongers, and 2,240 in processing. If we consider that the transformation employs on average 3 persons who can intervene in the chain, then we will have 6,770 indirect jobs. If we also consider that the fish wholesaler employs an average of 4 persons in the chain, we will have 210,260 persons. As a result, 13,574 direct jobs and 16,980 indirect jobs are created by this sector, for a total of 30,554.

Small pelagic fisheries play an important role in the fight against poverty in West African coastal countries, in particular, because of their contribution to the food security of vulnerable segments of the population and their capacity to provide livelihoods to populations without big investments or substantial expertise. Small coastal pelagics are the most accessible source of animal protein for Guinean populations with low purchasing power in terms of cost and quantity. The per capita small pelagic fish consumption between 2014 and 2018 was 12 kg (rapport consummation 2019). Therefore, they are a major component of guinea's policy for food

security and the fight against malnutrition.

As a direct and indirect job creation in production sites, the sedentary fishing sector for small pelagics contributes to the growth of actors' incomes. From the analysis of the value chain of this sector, it occurs that nearly 60 million euros are realized on average from 2014 to 2018. In 2019, the average monthly income per owner of large canoes is estimated at 2,123 euro, 210 euros for fishermen, 355 euros for fishmongers, and 488 euros for processors.

#### 5. Discussion

The fight against poverty has become a central axis of government policy in Guinea (Guinea, 2009; Sall, 2010) <sup>[19]</sup>. Guinean fishing plays a key role in the poverty reduction policy, in particular because of its contribution to the food security of the poor sections of the population (Failler and Doumbouya, 2021) <sup>[8]</sup>. It also contributes to the national GDP through the added value generated and to the budgetary revenues of the State.

On poverty reduction, small pelagics landed in Guinea play a key role. With more than 60 million euros of the added value generated on average annually, the sedentary sector of small pelagics is a source of employment for thousands of Guineans. For the direct players in this sector (fishermen, fish tellers and women processors), incomes vary on average between 300 and 2000 euros per month. Thus, if we take the example of fishermen involved in this sector, their monthly income is higher than the guaranteed minimum inter-professional wage (SMIG) of 36 euros. Compared to other branches of economic activity (administration, education, health, agriculture, and livestock), some players in the pelagic sector have a much higher monthly remuneration. Their

incomes are higher than those of these socio-professional categories. In addition, the sedentary sector of small pelagics allows women processors to have access to the raw material. The importance of the female component in sectors such as artisanal processing, which is almost exclusively reserved for them in Guinea, is a favorable factor for poverty reduction policies. Indeed, through their activities, women bring additional income to the family and help alleviate the rigors of poverty (Sall, 2010; Chambers, 2004) <sup>[19, 2]</sup>. During the field surveys, it was confirmed that in many situations, these women alone bear the family responsibilities. Beyond this contribution to job creation, the sedentary sector of small pelagics contributes to the nutritional security of Guinean populations.

Over the period 2014 - 2018 small pelagics are the most consumed species, with 12 kilograms per individual per year. Thus, pelagic fish are the main source of animal protein. This is justified by its accessibility to the poor sections of the population. For example, ethmalose is offered at 0.80 euros per kilogram and sardinella at 0.50 euros. The consumption of chicken, beef, or mutton requires a fairly high purchasing power, which explains why for a large part of the population; fish is the only source of protein of animal origin (Tallec and Kébé, 2006) <sup>[21]</sup>. Unlike other products that generate animal protein, field surveys have shown that food bans are relatively rare for fish products. In addition, the sedentary sector of small pelagics contributes to the national economy through the added value generated.

The contribution of this added value to improving the livelihoods of fishing stakeholders, nutritional security, and the economy is threatened at all levels of the distribution chain of sedentary pelagic fish. The main factors that threaten the sustainability of coastal fishing for small pelagics are the use of small-mesh fishing gear (samako which means "to collect everything"), the weakness of surveillance in estuaries which encourage bad fishing practices with the incursion of industrial fishing boats, strong fishing pressure on certain species of small coastal pelagics which are exploited or overexploited. Regarding fish processing, the main threat factors are linked to the low level of production, the gradual decline in supply in quantities, and the insufficient means of preservation. Marketing is also threatened by the drop in supply and losses due to the conservation of smoked fish. In other words, the main threats to fishing activities are at the post-harvest level. The DEPF (2008) has shown in Morocco that at the level of marketing, the main constraints are linked to the lack of marketing infrastructure in fishing (storage, market structuring). This affects the quality of the product, prevents its traceability, and promotes the development of informal marketing channels detrimental to the protection of the resource. These constraints are also present in Guinea and strongly influence the improvement of the wealth of the different segments. Finally, the poor state of the roads and the insufficient means of conservation and transport of fresh and smoked products impact the added value of fishery products (Dème *et al.*, 2018).

Public policies for the management of pelagic fish stocks should, as a priority, focus on valuing and optimizing the profit that can be derived throughout the value chain of coastal pelagics. It is no longer a question of producing more (by increasing fishing capacity) or of continuously putting low added value frozen fish on the African market, but of making the most of the quantities of fish landed. The approach will initially consist of improving the sanitary

standards of the fishing industry, both upstream and downstream. Bringing upstream in the industry to standards particularly concerns the conditions for keeping catches on board vessels but also artisanal fishing units due to their strong involvement in Guinean exports of fishery products. For downstream, fish preservation and processing establishments will be the most concerned (production units, fish sales areas, and means used for handling and transporting fishery products). Guinea can adopt Senegal's strategy, which consisted in upgrading 8 disembarkation centers out of the 200 distributed along the coast. These 8 centers are the only ones authorized to transit artisanal fishing products intended for export. The potential benefits to be derived from these developments are of several types, including the reconquest of export approval to countries of the European Union whose market is very solvent and very profitable, better food safety and security for consumers Guineans with the improvement of the sanitary environment of the landing areas and the products, the reduction of the risks of contamination of the products and the losses after catches, and finally, the increase in the incomes of the fishermen, the use of the improved insulated boxes significantly decreases ice consumption.

## 6. Conclusion

The interest of this work was to assess the added value generated for the sedentary sector of small pelagics in Guinea. Thus over the period 2014 – 2018, the sector considered generated an average annual added value of 60 million euros. This global added value is distributed as follows: 24.8 million euros from production, 19.5 million generated by local fishmongers, and 15.6 million by artisanal processing. Thus, the sedentary sector of small pelagics contributes significantly to the country's economy. It is also shown that the sector is a supporting device for the nutritional security of the country. Pelagic fish are the main source of animal protein. In terms of jobs too, the pelagic sedentary sector contributes with 30,000 direct jobs created. Thus, the direct means of existence of thousands of Guineans depend on this sector. Despite this significant economic and social contribution, the added value generated by the sedentary sector of small pelagics seems relatively low. This is due to several factors, notably the importance of post-harvest losses, the absence of storage, conservation, and ice-making infrastructure for quality fish, and the absence of fish processing industries. These are all limits that hinder the development of a high added value of the different segments of small pelagic fisheries.

The promotion of fishery products and the upgrading of sanitary standards to the fishing industry are the two levers on which public policies should be oriented. The development of resources will allow for significant added value without additional pressure on highly threatened resources. This will require large investments in artisanal, but above all industrial, processing chains. As for bringing the fishing industry up to sanitary standards, this is an international requirement. Such measures will drastically reduce post-catch losses and improve product quality and open up to highly profitable European markets. These two combined systems (enhancement and improvement of quality) would guarantee high-end products with high added value. Ultimately, they will contribute significantly to increasing the contribution of the fishing sector to the Guinean economy and to improving the livelihoods of fishing stakeholders.

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