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Characteristics and sociocultural impacts of small pelagic fishing by migrant fishers in Benin, West Africa

S Ahouansou Montcho^{1*}, KV Salako², FJ Chadare³, SC Gnansounou^{2,4}, Z Sohoun⁵, P Failler⁶, R Glèlè Kakaï² and AE Assogbadjo^{2,7}

¹ Ecole d'Aquaculture, Université Nationale d'Agriculture, Porto-Novo, Bénin

² Laboratoire de Biomathématiques et d'Estimations Forestières, Faculty of Agronomic Science, University of Abomey-Calavi, Cotonou, Benin

³ Laboratoire de Sciences et Technologie des Aliments et Bioressources et de Nutrition Humaine, Ecole des Sciences et Techniques de Conservation et de Transformation des Produits Agricoles (ESTCTPA), Université Nationale d'Agriculture (UNA), Benin

⁴ Centre for Coastal Management, Africa Centre of Excellence in Coastal Resilience (ACECoR), University of Cape Coast, Cape Coast, Ghana

⁵ Institut de Recherches Halieutiques et Océanologiques du Bénin (IRHOB), Cotonou, Bénin

⁶ Centre for Blue Governance, University of Portsmouth, United Kingdom

⁷ Laboratoire d'Ecologie Appliquée, Faculty of Agronomic Science, University of Abomey-Calavi, Benin

* Corresponding author, e-mail: s.ahouansoumontcho@gmail.com

Small pelagic fish species contribute substantially to the food security and livelihoods of local communities in developing countries. In West Africa, and particularly in Benin, small pelagic fisheries attract many migrant fishers who are key actors in the sector. This study assessed the characteristics and sociocultural impacts of the small pelagic fishery in Benin using qualitative approaches, including focus group discussions ($n = 9$), in-depth interviews ($n = 35$), a literature review, direct observations and secondary data. The findings showed that indigenous fishers from Benin and foreign fishers from Ghana are the two major groups of migrant fishers involved in small pelagic fishing in Benin. These fishers mostly use three categories of fishing gear: gillnets, seine nets, and hooks and lines. Over the period 2014–2018 the annual catch fluctuated between 1 123 and 2 040 tonnes, with the peak catch recorded in 2018, with a commercial value of €3 030 587. Apart from migrant fishers, fishmongers constitute another important pillar of the value chain. Conflicts among migrant fishers in the sector in Benin are related to landing fees and fishing gears. We discuss the urgent need to give attention to the sector through quantitative research and law enforcement to ensure its sustainability.

Keywords: coastal artisanal fishing, fishing gear, fishmongers, focus group discussions, Ghanaian fishers, small-scale fishing, value chain

Introduction

Fisheries play a significant role in providing food and job opportunities for millions of people around the world, particularly in sub-Saharan Africa (Tigchelaar et al. 2022). The global contribution of fisheries to poverty alleviation, hunger reduction and livelihood provision has been widely recognised (Okafor-Yarwood et al. 2022). For example, fisheries provide up to 9 million full- or part-time jobs worldwide (Wuyep et al. 2018). Fisheries also provide 22% of the protein intake in sub-Saharan Africa, particularly in West African households (Wuyep et al. 2018).

In West Africa, coastal artisanal fishing is mostly practised in Cape Verde, Nigeria, Benin, Togo, Ghana, Senegal, The Gambia, Côte d'Ivoire and Mauritania (Viridin et al. 2019). This is mainly attributable to the abundance of small pelagic species in the marine environments of these countries (Aheto et al. 2012). Small pelagic fish such as anchovy, sardinella, sardine, mackerel and herring together represent 35% of

the West African landings from all marine fisheries (Asiedu et al. 2021). The sector is mainly operated by migrant fishers (Overå 2005). Conflicts related to fishing rights and access to resources are common and compromise the sustainability of the migrant fishing sector (Pomeroy et al. 2007). The conflicts can be related to land use and land demand, cultural affiliations or decision-making rights (Duvail et al. 2012). For example, the migrant fishers in Senegal are deprived of decision-making rights and cannot be members of any local socio-professional organisation in their host communities. This sometimes results in considerable frustration and conflict, since migrant fishers are affected by any decision taken by members of the communities (Deme et al. 2020). Furthermore, conflicts associated with migrant fishers in the small-scale fisheries in the region are country-dependent and can also be influenced by the sociocultural attributes of both the migrant and indigenous communities (Binet and Failler 2010).

In Benin, information on conflicts associated with migrant fishers is not well documented. Although research about migrant fishers in small pelagic fisheries is relatively scarce in West Africa, efforts are being made to document the performance of the sector following the current unprecedented human disturbance to marine resources (March and Failler 2022). For example, both migrant and indigenous fishers of small pelagic fish in Ghana are reportedly involved in various illegal, unreported and unregulated (IUU) fishing practices, which include the use of chemicals and explosives (Darko et al. 2008), the use of petrol or diesel (Afoakwah et al. 2018), light fishing (Owusu 2019), trans-shipment, commonly known as saiko fishing (Akpalu and Eggert 2021), and the use of unauthorised mesh sizes (Okyere et al. 2020). Failler et al. (2020) documented the ethnic diversity of migrant fishers engaged in harvesting pelagic fish in West Africa, focusing on The Gambia, Guinea, Guinea-Bissau, Sierra Leone and Mauritania; their results indicated a variety of ethnic groups, including: the Fantes from Ghana; the Soussous and Foulas from Guinea; the Krus, Temnes and Vais from Sierra Leone; and the Leous and Wolofs from Senegal. While most West African coastal states are increasingly investigating the sector for subsequent management action, the activities of migrant fishers in the small pelagic fisheries in Benin remain poorly researched. A review of the existing literature on the subject showed a lack of systematic, comprehensive and empirical research focusing on the sector in Benin. However, such research would be important for informing national and subregional decision-making on the management measures to be taken to sustain the sector. Therefore, this study was conducted to: (i) investigate the actors, landings and monetary value of the migrant small pelagic fishing activities in Benin; (ii) document the fishing gears used by the migrant fishers and their impact on the sustainability of the sector; and (iii) assess the conflicts associated with migrant fishing activity in Benin.

Materials and methods

Study area

The study was carried out in the coastal zone of Benin. The area is characterised by an equatorial climate with two rainy and two dry seasons, with a mean annual rainfall of 1 200 mm. The mean daily temperature is ~27 °C and relative humidity is 78–95% (Zanvo et al. 2021). Fishing represents the main activity of coastal dwellers in Benin; they are also engaged in other income-generating activities, such as salt production, petty trading, vegetable growing and mat fabrication (Gnansounou et al. 2021).

Information was gathered at nine landing sites along the coastal zone (Figure 1): Krake-plage landing beach in the municipality of Seme-Kpodji; Xwlacodji and the artisanal fishing harbour of Cotonou; Togbin landing beach in Abomey-Calavi; Djegbadji, Houakpe-Daho and Aido landing beaches in Ouidah and Gbeffa; and Ayiguinnou and Seko landing beaches in Grand-Popo. These sites are part of the most patronised landing sites in Benin, with various ethnic groups of fishers working together to supply seafood to local populations.

The most extensively represented sociocultural groups include the Xweda, Mina and Xwla. However, other ethnic groups of fishers are present in the municipality of Grand-Popo; these include the Watchi, Sahouè, Fon, Adja, Kotafon, and Aïzo, among others. The artisanal fishing harbour at Cotonou is the major seafood market in Benin. Its strategic position coupled with an established management system makes this site the most attractive in terms of facilities and infrastructure. It is managed by the Directorate of Halieutic Production (DHP), the agency of the Ministry of Fisheries responsible for halieutic production in Benin. As a result, road infrastructure, an ice-production unit, and other facilities required to capture, store and distribute fish are available on the site. In contrast, the remaining landing sites are managed by the local communities. These sites lack modern equipment such as proper roads and ice-production units.

Study design and data collection

The approach used to collect data for this study is summarised in Figure 2. Data were collected through a qualitative approach, drawing on multiple sources of information, including a literature review, direct observations, in-depth interviews, and focus group discussions. A qualitative approach is largely used in studies of migrant fishers involved in marine fisheries (Islam and Herbeck 2013) and is useful in developing convergent lines of inquiry (i.e. triangulation) to arrive at reliable findings suitable for appropriate policy recommendations (Freduah et al. 2017).

Literature review and secondary data

Internet-based sources such as Google Scholar, ResearchGate, Scopus, and the Web of Science were used, and other physical sources like libraries and information centres were visited. Key topics used for the literature review included expressions such as: 'migrant fishers in West Africa', 'migrant fisheries in Benin', 'conflicts associated with the migrant fisheries in Africa', and 'migrant fisheries in West Africa', among others. Also, secondary data on fish catches, species landed, and their economic value for the 5-year period 2014–2018 were obtained from the DHP to assess the annual landings and commercial value of the sector.

Fieldwork

Field interactions took place in the study communities from March to November in 2021. They started with direct observations in the selected communities to appraise the relationship between migrant fishers and the host communities. The research team visited all the selected communities daily over a period of about one month to understand how migrant fishers cooperate with the indigenous community members, the species that they land, and the extent to which they contribute to seafood provision and food security in Benin. Direct observations and preliminary information collected during the early stage of the research helped to frame the research questions and design the data-collection instruments. A total of nine focus group discussions (FGDs) involving 45 community members were organised in the selected communities

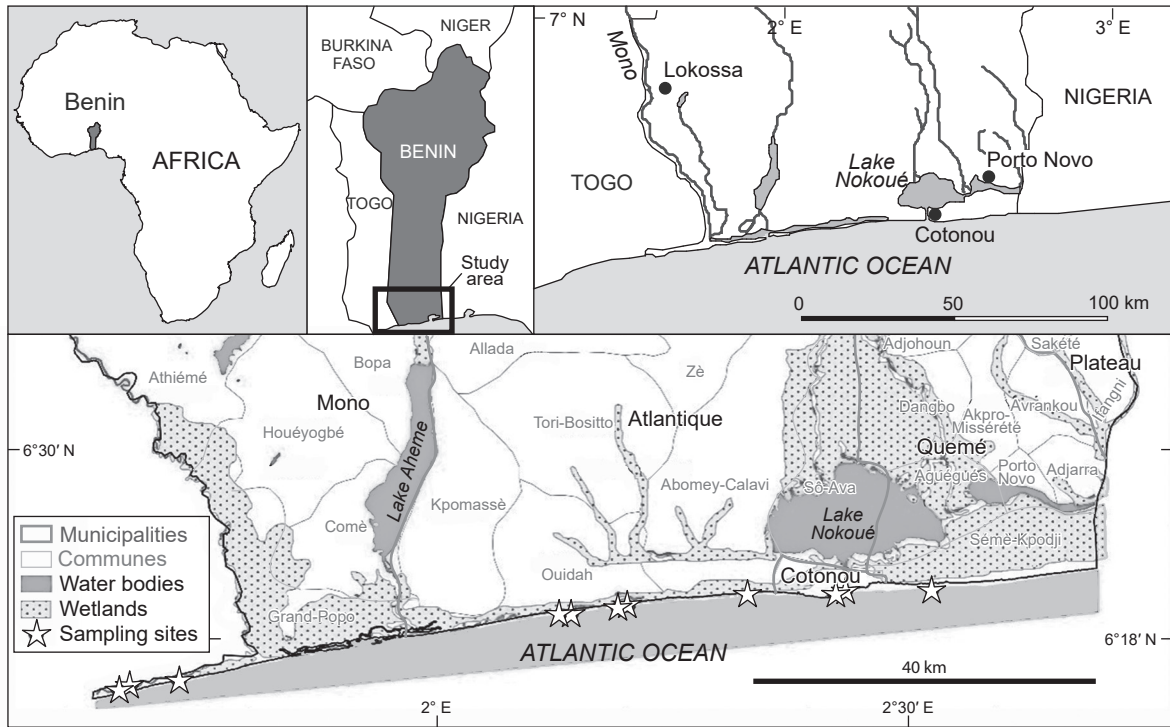


Figure 1: Map of the coastal zone of Benin showing the nine sampling locations for the study of the migrant fisher small pelagic fishery

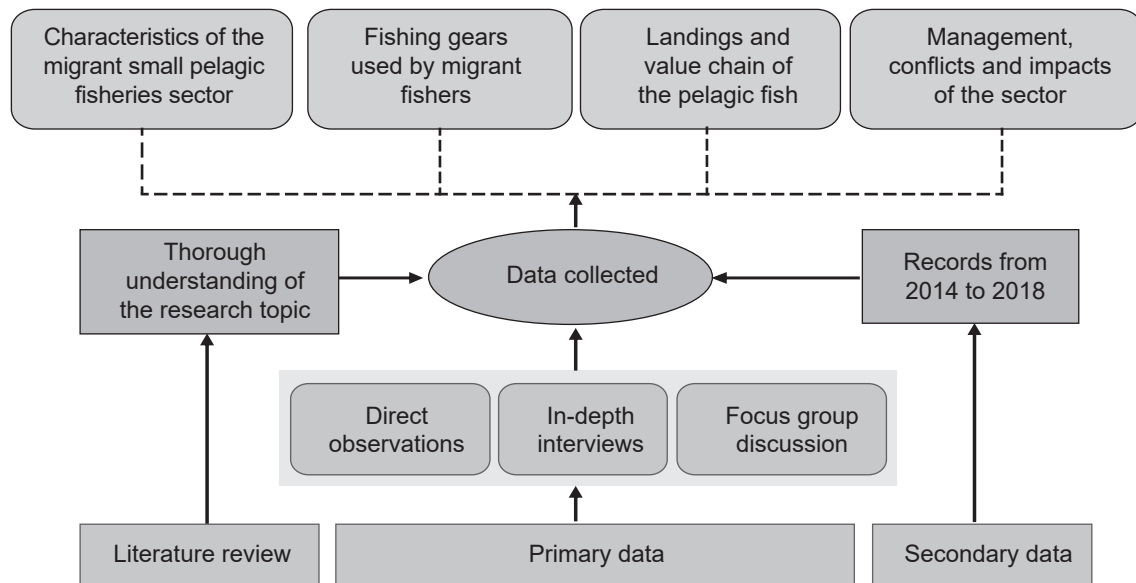


Figure 2: Flowchart of the methodological approach used to conduct the study of the migrant fisher small pelagic fishery in Benin, West Africa

(i.e. one FGD per community) (Table 1). FGD participants included indigenous and foreign fishers, fishmongers, and members of fishing-related local associations in the study communities. They were identified with the help of the local and traditional authorities during the reconnaissance survey through purposive and snowball-sampling techniques (Sagoe et al. 2021). Discussions lasted between 45 and

60 minutes in each community and were facilitated by the head of each study community. Key topics discussed during the FGD included the positive and negative impacts of migrant fishers' activities along the coast of Benin, the involvement of the local authorities in the management of conflicts associated with the presence of migrant fishers in Benin, the diversity and flow of caught fish supplied by

Table 1: Participants engaged for the study of migrant fishers in the small pelagic fishery in Benin, West Africa

Approach	Informant categories	Number interviewed
In-depth interviews (35 informants)	Fishmongers	20
	Chief fishers	10
	Government officials	3
	Leaders of fishery associations	2
Focus group discussions (45 participants)	Migrant fishers	9
	Indigenous fishers	18
	Fishmongers	9
	Community members	3
	Local authorities	6

the migrant fishers, and implications of the sector for the attainment of food security and sustainable development in Benin. In-depth interviews were also conducted to crosscheck and validate the information collected during the FGDs and to gather more-comprehensive data. Key informants who participated in the in-depth interviews were also selected based on purposive and snowball-sampling procedures; they included 20 fishmongers, 10 chief fishers, and 5 government officials or leaders of fishery associations (Table 1).

Data analysis

Primary data were analysed following standard methods of qualitative data analysis. Informants' narratives that match with the purposes of the study were retrieved from the dataset obtained from the field for understanding and content validity (Abdul-Kareem et al. 2021). The process of data analysis included listening, transcribing, encoding and identification of the relevant information that best addressed the objectives of the study. Information recorded in the field was thereafter augmented with handwritten notes to ensure that all collected information was considered for data analysis, following the approach of Gnansounou et al. (2022). Coded information was used together with information retrieved from the literature to characterise the migrant fishers in the small pelagic fishery in the study communities. Secondary data obtained from the DHP were tabulated, and descriptive statistics such as mean and standard error were used to summarise trends. The data analysis was organised in five parts. The first part described the structure of the migrant fisher small pelagic fishery and focused on the actors, their country of origin, their sociocultural groups, and their representation (numerically) among fishers in this sector, and the fishing periods in the year. The second part summarised the diversity of fishing gears and the period of the year (season) when the gear is used by the migrant fishers in Benin. The third part presented the volume and monetary value of landings of small pelagic fish, both collectively and by species or species group, and also described the flow of small pelagic fish among local actors and those outside Benin. The fourth part focused on access to the fish resources and the existing local management measures. The fifth part described conflicts as well as

Table 2: Sociodemographic characteristics of migrant fishers in the small pelagic fishery in Benin, West Africa, as revealed by focus group discussions and in-depth interviews

Country of origin	Sociocultural groups	Status
Ghana	Ada, Ewe, Fante	Most represented
Benin	Xwla, Xweda, Toffin, Fon	Most represented
Togo	Mina	Less represented
Nigeria	Yoruba	Less represented

some positive and negative impacts of the presence of migrant fishers in Benin's coastal fishing community

Results

Structure of the migrant fisher small pelagic fishery in Benin: profile of actors and fishing periods

As part of the study objectives, we explored the actors involved in migrant fisher activities in the small-scale fisheries in Benin. Two categories of fishers were identified in the sector: indigenous migrant fishers and foreign fishers. Here, the term 'indigenous migrant fishers' refers to Beninese fishers who originate either from the coast or from remote inland areas; they fish along the entire coast, moving from one community to another, and also travel to other central and western African countries like Ghana, Cameroon, Gabon, Nigeria or Togo to harvest small pelagic fish. Indigenous migrant fishers in Benin are to be differentiated from local fishers, who are also Beninese fishers active in small-scale fisheries but who never travel and who always fish for small pelagics within a specific area. The term 'foreign fishers' represents those coming from Ghana, Togo or Nigeria and who are fishing in Benin; however, Beninese and Ghanaians are dominant. Table 2 summarises their sociodemographic characteristics. The informants revealed that the sector reaches its maximal production between July and September, corresponding to the rainy season, whereas the lowest performance is recorded between January and March, which corresponds to the dry season.

Diversity of fishing gears and their seasonal use by migrant fishers in Benin

Diversity of fishing gears

Three types of fishing gears were recorded in the study communities (Figure 3): seine nets, gillnets, and hooks and lines. Encircling seines, locally known as *witchi* or *watcha*, and beach seines, called *aguinnin*, were the two types of seine nets mostly used by indigenous fishers in the sector in Benin. The identified gillnets included drifting gillnets, which comprised the exocet gillnet (*avion dô*) and the sardinella gillnet (*mahundo*), and bottom-set gillnets, which include large-mesh nets (*tohounga*) and small-mesh nets (*soovi*). The technique of using hooks and lines is mostly known as *akpohoun* in Benin; informants reported it as the most-practised fishing technique by Ghanaian migrant fishers.

Seasonal use of fishing gears

Table 3 summarises the seasonal use of the various fishing gears. All gears are highly active from July to December,

with a slight difference in the period of use. The exocet gillnet is less active from February to April and in August, active in January and from May to July, and highly active from September to December; in contrast, the sardinella gillnet is highly active during three months in the year, particularly July, August, and October. The small-mesh bottom-set gillnet is active from February to August and in December, highly active in October and November, and less active in January, whereas the large-mesh bottom-set gillnet is less active from January to April, active from May to August, and highly active from September to December. Hooks and lines are mostly used in July and August but are less employed from January to June as well as in September, November and December. Seine nets are generally less used when compared with the other fishing gears. Beach seines are highly active just for one month (October), whereas encircling seines are highly active for two months (July and September).

Landings and monetary value of the pelagic fish

The annual landings and commercial value of the landed species, from 2014 to 2018, are summarised in Table 4.

The annual catch and the commercial value fluctuated between 1 123 (SE 22) and 2 040 (SE 34) tonnes, and between approximately €1 679 954 (SE 25 920) and €3 030 587 (SE 67 068), respectively. The highest catch and highest commercial value were recorded in 2018. The top-five species in terms of catch were *Euthynnus alletteratus*, *Cypselurus* spp., *Scomberomorus tritor*, *Caranx* spp. and *Sphyraena guachancho*. Species caught in the lowest quantities were *Balistes* spp., *Cephalacanthus volitans*, *Ethmalosa fimbriata*, *Myliobatis* sp. and *Muraena* spp. The top-five species in terms of value were *Scomberomorus tritor*, *Caranx* spp., *Cypselurus* spp., *Euthynnus alletteratus* and *Sardinella* spp., in that order (Table 4).

Figure 4 illustrates the value chain of the small pelagic fish species harvested by migrant fishers, based on information gathered from the in-depth interviews and FGDs. Indigenous fishmongers constitute an essential part of the value chain. Data from the DHP indicated that they supply ~68.66% of the landings to consumers in the country, whereas ~4.67% reaches foreign markets, mostly

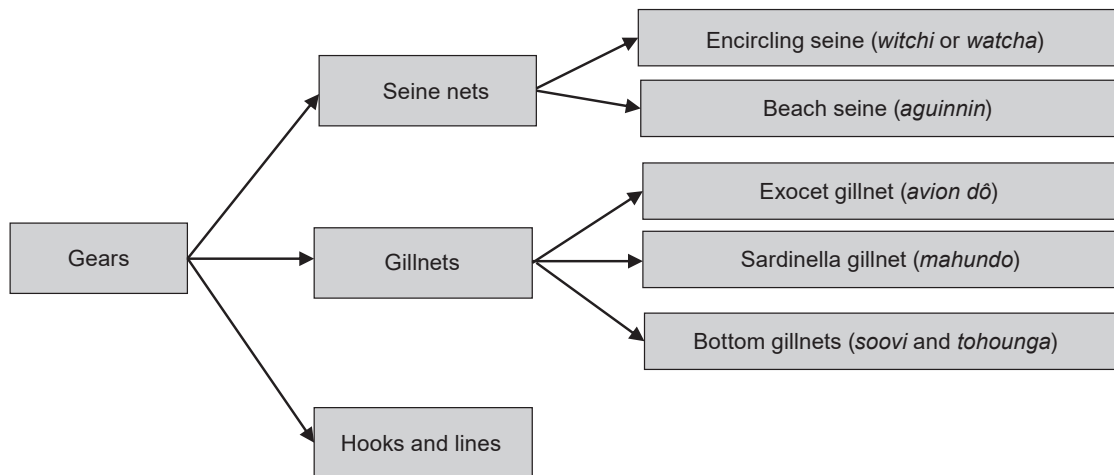


Figure 3: Types of gears used by migrant fishers in the small pelagic fishery in Benin, as explained in focus group discussions and in-depth interviews (local names are given in parentheses)

Table 3: Seasonal use of the recorded fishing gears in the migrant fisher small pelagic fishery in Benin, as revealed by focus group discussions and in-depth interviews

Fishing gear	Local name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gillnets —													
Exocet gillnet	<i>Avion dô</i>	Less active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Sardinella gillnet	<i>Mahundo</i>	Less active	Less active	Less active	Less active	Less active	Less active	Active	Active	Active	Active	Active	Active
Bottom-set small-mesh gillnet	<i>Soovi</i>	Less active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Bottom-set large-mesh gillnet	<i>Tohounga</i>	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active
Hooks and lines —													
Hooks and lines	<i>Akpohoun</i>	Less active	Less active	Less active	Less active	Less active	Less active	Active	Active	Active	Active	Active	Active
Seine nets —													
Beach seine	<i>Aguinnin</i>	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active
Encircling seine	<i>Watcha</i>	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active	Less active

Legend: Less active (light blue), Active (medium blue), Highly active (dark blue)

Table 4: Annual landings (tonnes) and monetary value (€) of fish caught in the migrant fisher small pelagic fishery in Benin, West Africa, from 2014 to 2018 (source: Directorate of Halieutic Production, Benin)

Species	2014			2015			2016			2017			2018		
	Landings	Value	Landings	Value	Landings	Value	Landings	Value	Landings	Value	Landings	Value	Landings	Value	
<i>Ablennes hians</i>	11.80	18 023	12.94	19 757	11.16	17 039	7.03	10 736	15.32	23 385					
<i>Alectis alexandrinus</i>	2.95	6 753	3.08	7 054	2.94	6 726	2.13	4 886	4.28	9 798					
<i>Balistes</i> spp.	0.13	33	–	–	0.27	66	1.11	271	1.19	291					
<i>Caranx</i> spp.	179.71	411 543	185.72	425 317	180.97	414 439	129.49	296 531	261.89	599 759					
<i>Cephalacanthus volitans</i>	0.08	36	0.09	41	0.07	33	–	0	0.06	27					
<i>Chloroscombrus chrysurus</i>	14.14	6 478	9.42	4 315	19.35	8 861	25.53	11 695	38.23	17 508					
<i>Coryphaena equiselis</i>	13.67	10 433	13.98	10 670	13.91	10 616	11.44	8 734	21.43	16 359					
<i>Cypselurus</i> spp.	255.43	311 979	248.99	304 106	271.96	332 163	210.90	257 587	407.84	498 125					
<i>Ethmalosa fimbriata</i>	0.01	20	0.00	6	0.02	36	0.03	39	0.04	63					
<i>Euthynnus alletteratus</i>	216.50	165 266	217.58	166 091	224.08	171 052	331.64	253 160	474.17	361 959					
<i>Hemiramphus</i> spp.	30.06	18 355	11.97	7 311	49.02	29 936	4.04	2 467	43.79	26 739					
<i>Ilisha africana</i>	76.79	35 173	76.02	34 817	80.62	36 927	47.94	21 958	108.15	49 534					
<i>Myliobatis</i> sp.	0.31	153	0.24	118	0.39	193	0.04	22	0.36	178					
<i>Muraena</i> spp.	0.61	928	–	–	1.23	1 876	–	–	1.01	1 540					
<i>Sardinella</i> spp.	55.08	84 092	82.02	125 225	30.82	47 048	10.19	15 560	34.22	52 247					
<i>Scomberomorus tritor</i>	223.67	682 951	231.37	706 467	225.03	687 110	233.25	712 212	388.86	1 187 358					
<i>Sphyraena guachancho</i>	107.54	65 676	112.49	68 699	106.98	65 329	73.41	44 830	152.07	92 867					
<i>Thunnus</i> spp.	47.52	36 278	63.52	48 490	33.71	25 731	11.82	9 022	38.02	29 022					
<i>Trichiurus lepturus</i>	3.17	2 900	2.32	2 123	4.12	3 778	4.91	4 498	7.68	7 038					
Mixed species	25.40	34 900	21.37	29 369	30.37	41 725	18.74	25 746	41.33	56 788					
Total (standard error)	1 264 (19)	1 891 969 (29 533)	1 293 (19)	1 959 974 (31 825)	1 287 (19)	1 900 684 (31 146)	1 123 (22)	1 679 954 (25 920)	2 040 (34)	3 030 587 (67 068)					

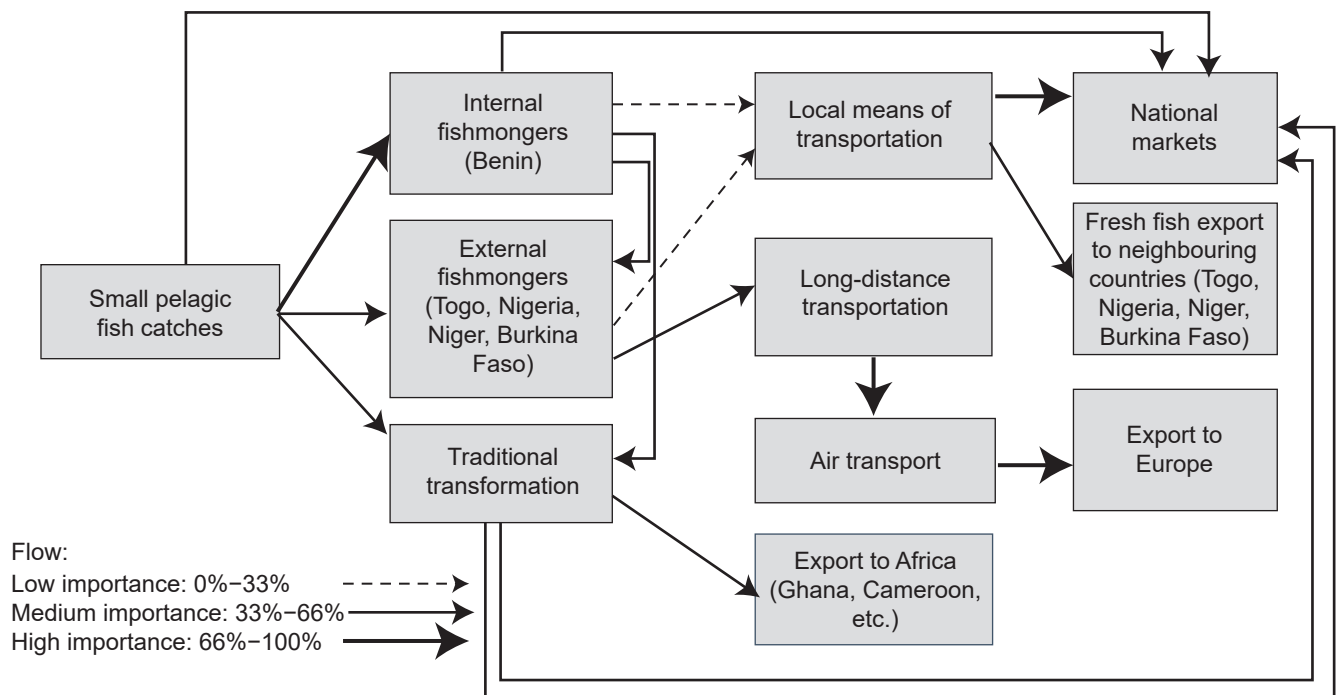


Figure 4: Flow of small pelagic fish catches among actors in the sector in Benin, based on focus group discussions and in-depth interviews. Each percentage range indicates the proportion of the landings that follows a particular route

in Togo, Nigeria, Niger, Burkina Faso, Cameroon and Ghana. Fishmongers sell fish directly to fish processors. They also freeze part of the catch and sell it to consumers, and some fish is reportedly processed by smoking, salting, and drying or by frying and then made available to the local population. Fishmongers use local means of transportation, such as commercial motorcycle riders (known as *zemidjan* in Benin), tricycles or vehicles, depending on the distance to the point of sale. The country also exports processed small pelagic fish to Europe by air.

Access to the resource, and local and traditional fisheries regulation and management

Access to the resource

Access to artisanal marine fishing is free for both indigenous and foreign fishers in Benin. However, decree No. 018-335 of 25 July 2018¹ compels fishers to pay some petty taxes to the local association at their landing site. This varies from €0.23 to €1.53, depending on the fishing gear used. Upon arrival in Benin, foreign migrant fishers reportedly introduce themselves to the president or the vice president of the National Union of Artisanal Marine Fishermen and Allied of Benin. They register their canoes as well as their fishing gears with the municipality (Figure 5) before starting to fish.

¹Decree No. 018-335 defines the basis to practice fishing activities in Benin. It bans the use of unsustainable fishing techniques and encourages fishers to contribute to the development of their localities through the payment of petty taxes depending on the type of gear used. The decree can be downloaded at <https://sgg.gouv.bj/doc/decret-2018-335/download>.

Local and traditional regulation and management of fishing

The activities of migrant fishers in the small pelagic fishery in Benin are governed by customary laws laid down by the Xwla and Xweda, the two dominant sociocultural groups among the indigenous fishers along the coast of Benin. These groups perform sacrifices and traditional ceremonies to pay tribute to certain deities, such as *Mamiwata*, *Sakpata*, *Hèviosso* and *Avlékété*, which purportedly govern the marine environment. As a result, a holiday with a ban on all fishing activities has been established approximately weekly. The name and frequency of the holiday varies depending on the locality. Between Sifato (Cotonou) and Djegbadji (Ouidah) it occurs every 8 days and is called *zogbodo-daho*; between Degoue (Ouidah) and Ayiguinnou (Grand-Popo) it is called *glatin* and occurs every 4 days; between Seko (Grand-Popo) and Agoue (Grand-Popo) it is called *glatin* or *kouda* and is held every Wednesday. Closure of fishing activities also occurs on national Voodoo Day (10 January every year) and following the death of a priest or a chief fisher, and is likewise imposed on foreign fishers. The violation of these traditional regulations attracts sanctions such as a ban from fishing for a given period.

Migrant fishers and conflicts

Conflict related to landing fees

Indigenous migrant fishers and foreigner fishers are taxed the same. The indigenous migrant fishers considered this to be 'unfair' because they believed that foreign fishers make money in Benin but then use it to develop their own countries.

Conflicts related to fishing gears

Conflicts between indigenous and foreign migrant fishers also occurred in connection with fishing techniques. Informants



Figure 5: A registered Ghanaian artisanal canoe in the artisanal fishing harbour of Cotonou, Benin, West Africa

explained that Ghanaian fishers who use encircling seines frequently encroach on the fishing areas of indigenous fishers; furthermore, they supposedly harvest more fish than the indigenous fishers since they use larger nets and more-sophisticated equipment. This often results in serious fights and the disputes are generally brought ashore and resolved by either the local authorities or the leaders of fishery-related local associations. Similar situations also happen among exocet gillnet and beach-seine users. The informants reported that, in the night, foreign fishers would invade fishing areas demarcated by indigenous migrant fishers and then harvest their fish, resulting in conflict. Regarding mesh sizes, the respondents reported that local fishers are encouraged by the local authorities to use large-mesh nets, whereas foreigners use both small- and large-mesh nets and capture both small and large fish species, a situation leading to further discontent and quarrelling among fishers.

Presence of migrant fishers in Benin: positive and negative impacts

There are certain impacts associated with the presence of migrant fishers along the coast of Benin. The information we collected enabled categorisation of the impacts into either positive or negative.

Positive impacts

Prior to the arrival of foreign fishers in Benin, indigenous migrant fishers generally consisted of families or small groups (3–5 people per group). The introduction of beach-seining and other fishing techniques into Benin by foreign migrants led to development of the industry, which

gradually became an important job provider, employing up to 80 people per team. The presence of foreign fishers has also reportedly promoted mixed marriages and cultural diversity, since many Xwla and Xweda informants from Benin said they were married to Ada, Ewe or Fanti from Ghana. The informants also reported cordial relationships among fishers, fishmongers and fish processors, irrespective of their country of origin.

Negative impacts

The adoption of new fishing techniques by Benin's indigenous migrant fishers has led to their massive relocation to less-exploited upwelling zones, such as along the coasts of Liberia, Cameroon, Gabon and Congo. This has resulted in the depopulation of Benin's coastal communities, which exacerbates the impoverishment of villages along the coast in Benin.

Discussion

This study assessed the characteristics and sociocultural impacts of the migrant fisher small pelagic fishery in Benin. In particular, the study: (i) describes the structure of this fishery; (ii) presents the diversity of fishing gears and their seasonal use by migrant fishers; (iii) assesses the volumes of landings of pelagic fishes and their monetary value, for the period 2014–2018; (iv) examines access to the fish resources and the existing local and traditional management measures; and (v) documents conflicts among migrant fishers, as well as positive and negative impacts of the presence of foreign fishers in Benin.

Origins of the migrant fishers and cultural diversity in Benin's small pelagic fishery

Small pelagic fish are one of the most-consumed seafoods in Benin (Sohou et al. 2012). The large presence of Ghanaians in the marine fisheries of Benin, especially in the small pelagics sector, can be attributed to the decline in the marine resources of their own country. Ghana is one of the fastest-rising West African countries in terms of marine fishing (Nunoo et al. 2015). However, dwindling marine resources as a result of climate change and anthropogenic factors, including overexploitation, has resulted in large-scale migration of Ghanaian small pelagic fishers across West Africa (Nunoo et al. 2015), which explains their presence in Benin. Overâ (2005) also reported an extensive migration of Ghanaian small pelagic fishers, particularly members of the Fantes, Gas and Ewes, across the West African subregion, including Benin, Nigeria, Senegal and Mauritania, over the preceding decade. That author associated this with demographic growth that has led to dwindling catches in the country, threatening the activity of most small-scale pelagic fishers, particularly those without alternative livelihoods. The predominance of indigenous fishers among migrant fishers in the small pelagic fishery may be a result of the influence of Ghanaian fishers on their Beninese counterparts. Previously, Beninese marine fishers undertook subsistence fishing to provide food for their families (Pliya 1989). However, the arrival of the first Ghanaian small-scale marine fishers in the country in 1920, with larger fishing canoes and professional fishing gears, resulted in a sort of revolution in the sector, including participation by coastal dwellers not previously engaged in fishing (Gbaguidi 2001). However, most Beninese migrant fishers belong to the Xwla and Xweda ethnic groups, which were previously documented as the major sociocultural groups in the coastal fishing sector in Benin (Gnansounou et al. 2021).

Actors and value chain of the sector

Most of the small pelagic fish consumed in Benin is provided by small-scale migrant fishers, particularly Ghanaians. This is likely linked to their experience and the sophisticated fishing equipment and fishing gears used, enabling them to remain offshore for an extended period, and catch more fish than the indigenous fishers. According to the informants, Nigerian and Togolese migrant fishers apply less fishing effort than their Beninese and Ghanaian counterparts because the former are fewer in number and use inferior equipment; moreover, they do not operate throughout the year and hence are considered seasonal. This corroborates the findings of Failler et al. (2020), who reported no Nigerian and Togolese among the migrant fishers active within the Sub-Regional Fisheries Commission of West Africa, which was established in 1985 and represents an intergovernmental organisation for fisheries cooperation that includes five West African countries (i.e. Cape Verde, The Gambia, Guinea Bissau, Mauritania and Senegal). Apart from the migrant fishers, fishmongers play a pivotal role in sustaining the sector in Benin. They supply more than half of the catch of small pelagic fish to local consumers in Benin, thereby promoting food security and wellbeing in the country. This is similar to the findings of Duffy-Tumas (2012), who reported that

most of the small pelagic fish caught by migrant fishers in Ivorian waters is sold and consumed in Côte d'Ivoire. However, fishmongers revealed heavy post-harvest losses, driven mainly by inadequate ice-block production and equipment to preserve the product, as well as the poor transportation system that characterises the sector. Indeed, the post-harvest losses in the small pelagic fish industry in Benin is not novel in the West African context, but has been previously reported in Ghana (Gyan et al. 2020), Senegal (Ward et al. 2019) and Côte d'Ivoire (Duffy-Tumas 2012). In Benin, one way to mitigate post-harvest loss is by smoking the unsold fish. This is carried out by fish processors, who are largely supplied by fishmongers. Small pelagic fish are also dried in Benin, likewise to avert post-harvest losses. The resulting product, known as *lanhouin*, is widely consumed across the country and is exported to other African countries, such as Cameroon and Ghana, owing to its high nutritional value (Anihouvi et al. 2018).

Fishing gears used by migrant fishers in Benin and their implication in small pelagic fish depletion

The small pelagic fishery sector in Benin has access to a significant and valuable resource of fish, in the opinion of the participating migrant fishers. The beach seines, gillnets and hooks and lines currently used by small-scale migrant fishers in Benin are techniques that originated from Ghana (Afoakwah et al. 2018). Informants stated that, recently, there have been large numbers of migrant fishers operating in Benin with very little return. Asiedu et al. (2021) have documented the gradual collapse of small pelagic fisheries in West Africa, using Ghana as a case study. Those authors attributed the poor performance of the sector to destructive fishing practices, IUU fishing, the overcapacity of fishing fleets, population growth and climate change. In Benin, the dwindling catch of small pelagic fish has led to an increase in the use of nets with very small mesh sizes. However, this has serious implications for the sustainability of the pelagic fisheries and for coastal ecosystems (Gyan et al. 2020).

Local management of the small pelagic fishery and impacts of foreign migrant fishers in Benin

There is a large body of legislation that governs marine and freshwater fisheries in Benin. While these legal instruments can be easily accessed, there is a dearth of information about the traditional laws that regulate the fishing industry in Benin. A major challenge for management authorities is the incorporation of the wishes of local populations into legal instruments. The attempt made by this study to document the local management regime and the traditional rules that regulate the small-scale migrant fisheries sector in Benin shows a large influence of the Xwla and Xweda over the other sociocultural groups. Their customary laws are respected by all migrant fishers, whether indigenous or foreign. This may be as a result of the status of these two sociocultural groups, as they were the first to occupy the coast of Benin (Gbaguidi 2001) and represent over 50% of the coastal population (Gnansounou et al. 2021).

The rest day imposed by local management regimes on migrant fishers is applied inconsistently along the coast, which has consequences ranging from resource

overexploitation to conflict among migrant fishers. Nonetheless, conflict within the sector is predominantly related to fishing gears. Purnomo et al. (2019) emphasised that increasing conflicts among users of a natural resource reflects the scarcity of that particular resource. The presence of foreign small pelagic fishers in Benin is associated with both positive and negative impacts. Informants attributed the development of the sector in Benin to Ghanaian fishers who are extensively represented along the coast of the country. They further revealed the occurrence of mixed marriages among Beninese coastal dwellers and Ghanaian fishers. This information concurs with Brettell (2002) who cited the enhancement of cultural diversity and mixed-marriage promotion as some of the benefits of migration.

Management and policy implications

Findings from this study showed that the migrant small pelagic sector of Benin is dominated by Ghanaian and Beninese fishers. Many authors in Ghana have raised a concern about a spike in environmentally unfriendly fishing activities in Ghana over the last decade. Light fishing, for example, has become prevalent in Ghana (Nunoo et al. 2015; Afoakwah et al. 2018; Asiedu et al. 2021). Therefore, there is a need to assess the fishing techniques used by migrant fishers in Benin. This will reveal whether measures are needed to curtail or contain any illegal fishing activity. Research should also focus on stock assessments of small pelagic fishes to ensure their sustainability.

Accounts from informants portray a state of overfishing resulting from overcapacity and an increase in the number of fishers. Hence, it is important to promote some alternative livelihoods, such as aquaculture development, snail-rearing or beekeeping. This will ultimately help to limit the pressure on the small pelagics resource, and partially address the rampant demand for fish in the country. The use of nets with small mesh sizes by the migrant fishers constitutes an infringement of the provisions made by law No. 2014-19 as it pertains to fisheries and aquaculture in Benin. The law bans the use of such nets and any other unauthorised fishing equipment. Enforcement measures aimed at eradicating the use of unauthorised fishing gears in the marine environment in Benin must therefore be put in place, particularly in the small pelagic sector. Migrant fishers should also be sensitised to the dangers posed by small mesh sizes, both to the marine resources and to their own livelihoods. Stakeholders associated with small pelagic fisheries in West Africa also need to develop a subregional agreement that regulates the sector. This will facilitate the integration of foreign migrant fishers in their host communities and help prevent conflicts that arise between indigenous and foreign fishers. There remains a scarcity of data concerning the small pelagic fishery in Benin. The lack of long-term records on landings of small pelagic fish compromises analyses for purposes of policy recommendation. It is necessary to equip the DHP with human and financial resources to enable the recording of long-term data from the small pelagic sector at all the landing beaches of the country. Also, roads along the coast need to be maintained to facilitate the flow of harvested fish to avoid post-harvest losses.

Conclusions

The small pelagic fishery plays a pivotal role in job provision, seafood delivery and food security in Benin. The sector is mainly sustained by migrant fishers who come from diverse places. This study sought to understand the sociocultural impacts of migrant fishers operating in Benin. It showed that the migrant fisher small pelagic fishery in Benin is dominated by Ghanaians and Beninese. Three categories of fishing gear are commonly used in the sector: gillnets, hooks and lines, and seine nets. Indigenous fishmongers constitute an essential part of the value chain of small pelagic fish in Benin, as they supply the major part of the fishers' landings to consumers both locally and abroad. The sector is affected, however, by conflicts that arise among fishers because of landing fees and the fishing gears used. This study provides baseline information for conducting further research on migrant fishers in Benin, and also provides data useful for understanding and enhancing the migrant fisheries sector along the coast of West Africa.

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ORCID

Achille Ephrem Assogbadjo: <https://orcid.org/0000-0001-5985-8800>
 Flora Josiane Chadare: <https://orcid.org/0000-0002-4715-9575>
 Pierre Failler: <https://orcid.org/0000-0002-9225-9399>
 Setondé Gnansounou: <https://orcid.org/0000-0001-6077-9130>
 Romain Glele Kakai: <https://orcid.org/0000-0002-6965-4331>
 Kolawolé Valère Salako: <https://orcid.org/0000-0002-7817-3687>
 Zacharie Sohou: <https://orcid.org/0000-0003-3314-3481>

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