

An aerial photograph of a beach in Senegal. The beach is covered with large, dark fishing nets and a large number of people, some of whom are wearing colorful clothing. The water is a murky green color. In the top right corner, there is a circular inset showing a close-up of a building with a red circle around a window. The text "AT THE TIPPING POINT:" is written in large, bold, red letters across the top of the image.

AT THE TIPPING POINT:

How bottom trawling is precipitating the collapse of Senegal's artisanal fisheries



Protecting People and Planet

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EJF is committed to combating illegal, unreported, and unregulated (IUU) fishing as well as associated human rights abuses in the fishing sector.

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Our work to secure environmental justice aims to protect our global climate, ocean, forests and wildlife and defend basic human rights.

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Artisanal pirogues in Djiffer, a traditional fishing village in Senegal.

CONTENTS

Executive summary	2
1. Introduction	4
2. Methodology	5
3. Major trends in Senegal's fisheries sector	6
3.1 Socio-economic significance of Senegalese fisheries	6
3.2 Overfishing and fish populations decline	7
3.3 Rising exports and declining local market supply	9
4. The industrial fishing fleet and the bottom trawl industry	11
4.1 General characteristics of the industrial fleet	11
4.2 General characteristics of the bottom trawl fleet	11
4.3 Beneficial ownership and links to foreign entities	13
4.4 Foreign market drivers of the bottom trawl industry	14
4.5 Joint venture arrangements and transparency concerns	16
5. The crisis of the artisanal fishing sector	17
5.1 Declining catch	20
5.2 Impact on livelihoods and living conditions	21
5.3 Link to the migrant crisis	22
6. Environmental impacts of bottom trawling	23
6.1 High levels of bycatch, discarding and use of illegal nets	23
6.2 Impact on fish populations	24
6.3 Spatial distribution of trawling pressure	25
6.4 Assessment of carbon stock disturbance risk	26
6.5 Assessment of impacts on benthic macrofauna	26
7. Socio-economic impacts of bottom trawling	28
7.1 Competition between the artisanal sector and the bottom trawl industry	28
7.2 Incursions of bottom trawlers into the zone reserved for artisanal fishing	29
7.3 Destruction of pirogues and fishing gear	30
8. Conclusion and recommendations	33

Acronyms

AIS	Automatic identification system	DPSP	Direction de la protection et de la surveillance des pêches (Fisheries Protection and Surveillance Directorate)
ANSD	Agence nationale de la statistique et de la démographie (National Agency for Statistics and Demography)	EEZ	Exclusive economic zone
APRAPAM	Association pour la promotion et la responsabilisation des acteurs de la pêche artisanale maritime (Association for the Promotion and Accountability of Artisanal Marine Fisheries Stakeholders)	ECOWAS	Economic Community of West African States
CECAF	Fishery Committee for the Eastern Central Atlantic	FCFA	Franc de la communauté financière en Afrique
CRODT	Centre de recherches océanographiques de Dakar-Thiaroye (Oceanographic Research Centre of Dakar-Thiaroye)	GAIPES	Groupeement des armateurs et industriels de la pêche au Sénégal (Association of Shipowners and Fishing Industry in Senegal)
DITP	Direction des industries de transformation de la pêche (Seafood Processing Industries Directorate)	GFW	Global Fishing Watch
DPM	Direction des pêches maritimes (Marine Fisheries Directorate)	IEZ	Inshore exclusion zone
		IUU fishing	Illegal, unreported and unregulated fishing
		MPA	Marine protected area
		NM	Nautical miles
		SFPA	Sustainable fisheries partnership agreement
		UN FAO	Food and Agriculture Organization of the United Nations



Executive summary

The beachfront in the artisanal fishing village of Kayar, Senegal.

Artisanal fishing communities are the beating heart of Senegal's fisheries sector. They supply over 80% of the fish landed in the country, playing a critical role in ensuring food security in a nation where fish accounts for 40% of all consumed animal protein, and support the livelihoods of at least 169,000 people. Yet they are under threat from severe declines in fish populations, driven in part by overfishing by the bottom trawl industry.

This report documents the environmental and socio-economic impacts of bottom trawling in Senegal, drawing from interviews conducted with a range of stakeholders from artisanal fishing communities, industry, and government, as well as desk-based research and data analysis.

Senegal's bottom trawl fleet, one of the largest in West Africa with 99 licenced vessels in 2019, is mainly controlled by foreign actors in the EU and China through opaque joint venture arrangements that enable the plundering of Senegal's fisheries resources and the persistence of environmentally damaging fishing practices, to the detriment of local communities. The production from Senegal's bottom trawl industry almost exclusively supplies foreign markets mainly in the EU, while many Senegalese households struggle to buy fish from local markets for their personal consumption.

The bottom trawl fleet has expanded in recent years (12.5% increase in the number of active vessels between 2014 and 2018), despite being already at overcapacity, perpetuating unsustainable fishing practices and threatening to further degrade the marine environment. Trawlers routinely use nets with illegal mesh size, indiscriminately catching non-target species and juveniles, precipitating the decline of fish populations. Preliminary assessments by EJF suggest that trawlers also disturb a large volume of seabed sediment, putting benthic marine life at risk and potentially impacting Senegal's blue carbon stocks.

Environmentally damaging and unsustainable fishing by the bottom trawl fleet is compounding the crisis of the

artisanal fishing sector. With an artisanal fleet already at overcapacity, artisanal fishers have seen their catch decline dramatically and are forced to compete with the bottom trawl industry for dwindling resources and over fishing grounds. Illegal incursions of bottom trawlers into the area reserved for artisanal fishers are pervasive, exacerbating tensions, exposing artisanal fishers to high risks of collision with trawlers, and leading to the frequent destruction of fishing gear. Testimonies point to a systematic pattern of disregard on the part of trawlers for the life and property of artisanal fishers, with respondents reporting friends dying at sea as a result of a collision with a trawler, and being subjected to abuses such as scolding. As vessel markings are obfuscated to prevent identification, perpetrators are rarely apprehended and victims rarely receive adequate compensation.

Declining catches and frequent loss of property are in turn having severe impacts on the livelihood and living conditions of artisanal fishing communities, with repercussions for Senegal's population as a whole. Artisanal processors and small-scale fishmongers are struggling to buy fish because of dwindling supply and unfair competition from processing plants and the fishmeal industry in particular. The availability of fish protein for Senegalese households has declined dramatically within a decade, driving a stark increase in prices and putting the poorest at risk of being denied access to a critical food source.

Detailed recommendations are provided to the Senegalese government, states and businesses importing fish products from Senegal, states whose nationals are involved in Senegal's bottom trawl industry, and the European Commission, for how to mitigate the environmental and socio-economic impacts of bottom trawling in Senegal, and secure the livelihoods and food security of artisanal fishing communities. Recommendations highlight, in particular, the critical need for greater transparency in the management of Senegal's fisheries.

KEY FINDINGS:

The crisis of the artisanal fishing sector:



58% decrease in catch per pirogue between 2012 and 2019.



77% of respondents have seen their **income decrease** (compared to five years ago).



79% of respondents are having more **difficulty feeding their household** (compared to five years ago).



62% of respondents are experiencing **worse living conditions** in terms of housing, sanitation, and access to clean water (compared to five years ago).

The bottom trawl industry:



At least **29%** of **Senegalese-flagged vessels** linked to beneficial owners in the **EU** (23% Spain, 6% Italy); at least **20%** linked to beneficial owners in **China**.



82.5% of **export revenue** for products from the bottom trawl fleet is generated by the **EU** market (40% Spain, 34% Italy).

Environmental impacts of bottom trawling:



7 out of **10** key demersal fish populations **overexploited** in the past five years.



2 million tonnes of **blue carbon** estimated to be disturbed by trawling every year (preliminary assessment).

Socio-economic impacts of bottom trawling:



88% of fishers have often observed **bottom trawlers fishing in or around** their fishing grounds.



76% of fishers had **nets or lines** damaged by a trawler.

1. Introduction

Bottom trawling refers to the capture of species that live on, or in close proximity to the seafloor by dragging weighted nets or other structures along the seabed. Growing evidence suggests that this prolonged contact with the seafloor, coupled with high levels of bycatch as a result of bottom trawling's unselective nature, has significant adverse consequences for important marine ecosystems and the biodiversity that inhabits them.¹ The practice can also disturb significant quantities of carbon that is stored in seabed sediment, threatening to increase ocean acidification and potentially to worsen global climate breakdown.² Whilst it is broadly accepted that to varying degrees, all gear types come with ecological and socio-economic ramifications, the use of bottom trawls is increasingly recognised as the most harmful across all indicators.³

The use of bottom trawls occurs almost entirely within the exclusive economic zones (EEZ) of coastal countries, in relatively close proximity to land — with 20% of global trawling within EEZs happening within the 12 nautical miles (NM) closest to shore (territorial sea).⁴ This can often place industrial vessels in direct competition over fishing grounds and resources with small-scale coastal fishing communities, resulting in the destruction of fishing gear, loss of livelihoods, risks to life and conflict between the two parties.⁵

A significant bottom trawl industry exists throughout the West African region, made up in large part of distant-water fishing vessels. The catch of the Chinese distant-water bottom trawl fleet in the region, for example, has been estimated at around 2.35 million tonnes per annum (approximately 50% of the country's total distant-water catch), valued at over US\$5 billion.⁶ These fleets gain entry to coastal waters through access agreements (including bilateral intergovernmental agreements, or private government-operator agreements), or by adopting a local flag often obtained through the use of opaque corporate structures, joint ventures and front companies.⁷ EJF and other civil society organisations have documented extensive suspected and confirmed illegal, unreported and unregulated (IUU) fishing by trawl fleets in the region, including incursions into zones reserved for artisanal fisheries, the use of illegal nets, the capture of non-target species as well as human rights and labour abuses inflicted upon crew.⁸

West Africa is home to an estimated 6.7 million people who rely on small-scale marine fisheries for their food and livelihoods.⁹ Fish accounts for two thirds of

the animal protein consumed in the region.¹⁰ Fishing communities are increasingly suffering from poverty and socio-political marginalisation, with their livelihoods and food security under threat as a result of overfishing, IUU fishing, climate change and pollution.¹¹ The fact that bottom trawl fleets operate in such large numbers, and in such close proximity to these communities elicits an urgent need to further measure, document and ultimately mitigate their impacts.

Senegal, due to its geographical position, infrastructure and connectivity, is a major fishing nation in West Africa — with the port of Dakar being a hub of fish landings and exports serving markets across Africa, Europe, Asia and the US. A large and varied fleet operates in its waters, with industrial vessels targeting a range of pelagic and demersal species, as well as an artisanal fleet that operates across the region. The fishmeal and fish oil industry is also firmly established in Senegal, with large quantities of small pelagic fish captured and processed into agriculture and aquaculture feed for animals that are often ultimately consumed in higher-income countries.¹² The industry has had a significant negative impact on small-scale fishers — placing already overexploited fish populations under additional stress, as well as the despoliation of environments in close proximity to processing plants and the distortion of local fish supply chains.¹³

Small-scale fishing communities are a vital part of the country's economy and food production. The sector accounts for over 80% of all landings,¹⁴ with fish constituting approximately 40% of animal protein consumed in the country,¹⁵ historically providing an affordable and nutritionally dense food source for its citizens.¹⁶ These communities however find themselves bearing the brunt of negative impacts associated with Senegal's large bottom trawl industry.

Through the collection and analysis of both primary and secondary data, this report maps the scale of the Senegalese bottom trawl sector and documents its environmental and socio-economic impacts. Beyond this, it analyses the enablers and financial structures of the industry — including subsidies, private investments and access agreements. The above has been done with a view to improving national and international understanding of the impacts of bottom trawling, and to informing conservation and management measures aimed at mitigating the harmful externalities of the industry in Senegal and further afield.



Nautical chart of the waters surrounding Dakar and the Cap-Vert peninsula, Senegal.

2. Methodology

The findings of this report are informed primarily by stakeholder interviews conducted in Senegal between September 2022 and May 2023. EJF conducted structured interviews with artisanal fishers, artisanal fish processors, and mareyeurs (fishmongers) in the coastal communities of Kayar (n fishers = 10, n processors = 10, n mareyeurs = 7) and Fass Boye (n fishers = 7, n processors = 5), discussing themes surrounding conflict with bottom trawlers, changes in catch volumes and fishing practices, and changes in the market and supply chain for fish products, and asking respondents about changes in their livelihood and a range of socio-economic indicators. Semi-structured interviews were also conducted opportunistically with additional respondents from all groups.

EJF also interviewed crew who work, or have worked recently, on bottom trawlers (n = 14), discussing IUU fishing and interactions with artisanal fishers. Finally, EJF met with a range of stakeholders from government agencies, trade unions and other professional organisations (n = 30) in order to better understand the socio-economic and ecological impacts of bottom trawling within the national and regional context, and the main challenges faced by the authorities in regulating the activity and in monitoring and enforcing compliance. Interviews were conducted in French, Wolof and English, using interpreters where required, with free, prior and informed consent obtained from all participants. Where respondents granted permission for the interviews to be filmed, care was taken to ensure identities were strictly protected unless express consent was given otherwise.

In March 2023, EJF and the NGO Blue Ventures hosted a two-day workshop in Dakar, bringing together

various stakeholders of the Senegalese fishing industry including academics and researchers, civil society organisations, parliamentarians and other elected officials. The workshop provided an opportunity to exchange information and engender discussion between key actors on a number of issues that have ultimately informed the research in this report, including the socio-economic and environmental impacts of bottom trawling in Senegal and the broader West Africa region.

The findings from the interviews and workshop were complemented with desk-based research, including a review of the applicable legal framework, and a literature review conducted in both French and English, including official government publications and statistics, peer-reviewed academic publications, NGO reports, press articles, and other grey literature. Spatial data on apparent fishing effort obtained from Global Fishing Watch (GFW) were also analysed.¹⁷

It is noted that Senegal's fishing sector is characterised by a critical lack of transparency, including a lack of publicly available data on licenced vessels, vessel ownership, the conditions under which vessels operate and sanctions imposed for IUU fishing, as well as limited up-to-date national-level data on the status of key commercial species and on the condition of seabed habitats in the Senegalese EEZ. There are also significant unexplained gaps and inconsistencies in official landings data, suggesting that underreporting is a major issue. These data limitations hindered attempts to accurately and comprehensively characterise Senegal's bottom trawl industry and to assess its environmental and social impacts in the country. Recommendations are provided in **Section 8** to address the limitations identified.



A landing site in Kayar, a major hub of artisanal fishing in Senegal.

3. Major trends in Senegal's fisheries sector

3.1 Socio-economic significance of Senegalese fisheries

Fisheries play an essential role in ensuring food security in Senegal,¹⁸ historically providing as much as 68% of energy intake of animal origin for local households,¹⁹ and sustaining an average per capita consumption of fish products of 29 kg per year.²⁰ Small pelagics in particular, which make up 75% of fish products consumed in Senegal,²¹ are an important source of omega 3 and other unsaturated fatty acids and essential micronutrients.²²

According to government reports, in 2019 small-scale fisheries directly employed 75,369 fishers.²³ An additional 45,250 and 47,500 jobs were estimated to be related to the mareyage and artisanal processing sectors, respectively, as well as 800 jobs in carpentry,

maintenance and repairs,²⁴ which would put the total number of jobs related to the artisanal sector at at least 169,000,²⁵ or about 3.2% of Senegal's workforce.²⁶ However this does not include the many people employed in ancillary jobs outside these sectors, for which no reliable estimates are available. According to outdated government statistics, the total number of jobs directly or indirectly linked to the fisheries sector (including the industrial sector) may amount to as many as 600,000.²⁷ With close to 60 different types of job linked to the artisanal fisheries sector,²⁸ small-scale fisheries play a key role in supporting the informal sector, which remains the main driver of Senegal's economy, generating 44% of national value added.²⁹

The total contribution of the fisheries sector to Senegal's economy and its evolution over time are difficult to assess based on available official statistics. For

2013–2014, the only period for which comprehensive disaggregated data could be found, Senegal’s fisheries and related activities were estimated to have generated a total value added of 262 billion FCFA (US\$530 million) across the value chain (including production, processing, commercialisation, and related activities such as transport, packaging, boat and gear maintenance, and fuel sales),³⁰ which would amount to 2.7% of Senegal’s GDP for the year 2014 (1.3% including production only).³¹ Most of the economic value is generated by artisanal fisheries, with over 84% of the value added in the sector.³²

The contribution of fisheries to Senegal’s economy has been slowly declining over the past decade, down from 1.8% of GDP in 2012 to 1.1% in 2021 (production only), a decrease attributed in part to the overexploitation and decline of fish populations,³³ and compounded by the impact of the covid-19 pandemic.³⁴

3.2 Overfishing and fish populations decline

According to government reports, landings from Senegal’s fisheries have been steadily increasing over the last decade, from a total of 418,886 tonnes in 2010 up to 533,479 tonnes in 2019.³⁵ While artisanal fisheries make up the bulk of landings (82.4% on average), the recent increase in landings appears to be in part attributable to the industrial fleet: reported landings from the artisanal fleet remained fairly stable between 2010 and 2019, but landings from industrial vessels under the Senegalese flag increased from less than 40,000 tonnes up to a maximum of over 118,000 tonnes in 2018, with bottom

trawling representing on average 71.4% of landings over the same period (**Figure 1**).³⁶

There is reason to believe these figures significantly underestimate the fishing pressure actually exerted on fish populations. Landings data published by the government do not take into account discards, and have been found to significantly underreport actual catches, by as much as 60%.³⁷ Indeed the EU’s 2019 evaluation of the Protocol to the EU-Senegal sustainable fisheries partnership agreement (SFPA) highlighted the lack of availability of adequate scientific data on bycatch or discards of the deep-sea demersal trawl fleet, which has precluded assessment of the broader ecosystem impacts of the fishery.³⁸ Significant unexplained discrepancies noted by EJF between export and landings data also suggest that landings are underreported in official government data (**Box 1**).

Decades of overfishing have exerted tremendous pressure over Senegal’s fish populations. Coastal demersal fisheries in particular have long been at overcapacity: according to a 2014 assessment, the capacity of the industrial coastal demersal fleet had been exceeding sustainable catch levels by 51% on average over extended periods of time.³⁹ Models based on reconstructed catch data suggest that 57% of the fish populations exploited in Senegal are in a state of collapse (**Figure 2**).⁴⁰

Coastal small pelagics (sardinella, horse mackerel, bonga shad), which are a vital resource for artisanal fisheries, are in a situation of overexploitation in the Senegambia zone,⁴¹ as are the majority of assessed demersal fish populations targeted by the bottom trawl fleet (see **Section 6.2**).

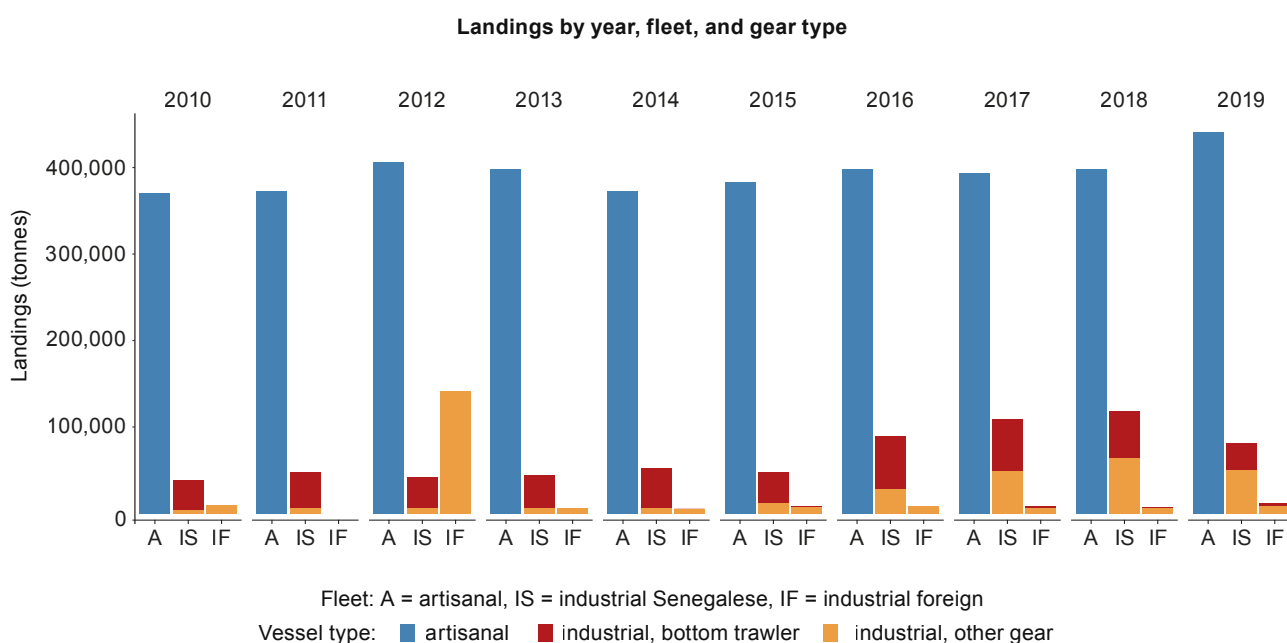


Figure 1: Annual landings for the period 2010–2019, by fleet and vessel type (source: DPM).

Exploitation status of fish populations in Senegalese EEZ

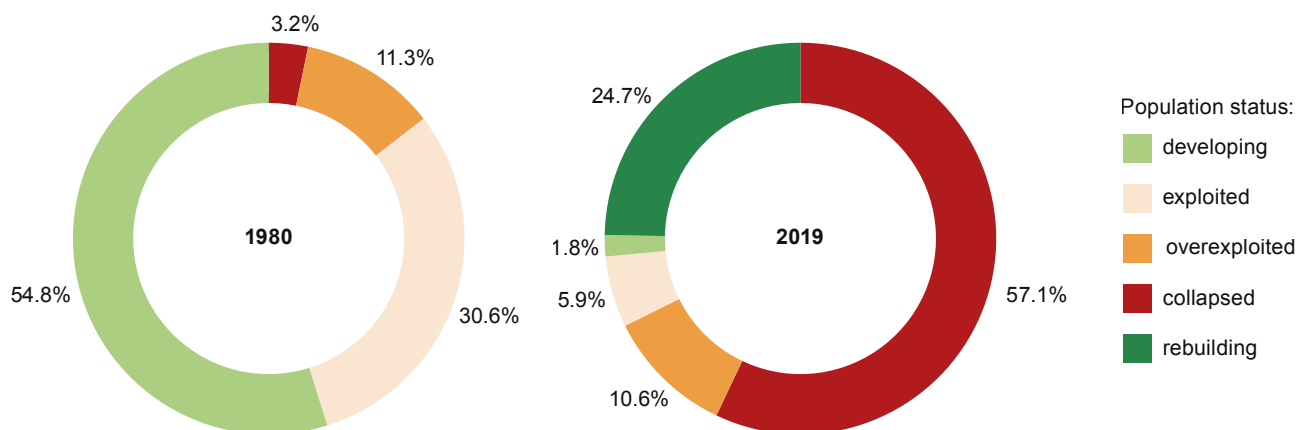


Figure 2: Change in estimated exploitation status of Senegal’s fish populations (n = 191) between 1980 and 2019. Population status: developing (catches ≤ 50% of peak and year is pre-peak, or year of peak is final year of the time series); exploited (catches ≥ 50% of peak catches); overexploited (catches between 50% and 10% of peak and year is post-peak); collapsed (catches < 10% of peak and year is post-peak); and rebuilding (catches between 10% and 50% of peak and year is after post-peak minimum) (source: Sea Around Us).

Box 1: Discrepancies and suspected underreporting in official landings data

According to official export data, in 2019 a total of 263,415 tonnes of frozen seafood products were exported from Senegal.⁴² Exported fish comes in part from industrial fisheries, and in part from artisanal fisheries. In 2019, the total production of industrial fisheries was reported at 92,875 tonnes, and 54,783 tonnes of fish landed by artisanal fisheries were reported to have been sold to industrial plants for processing and export.⁴³ Assuming that all of the production of industrial fisheries was exported, the total volume of landed fish to be exported would have amounted to a maximum of $92,875 + 54,783 = 147,658$ tonnes — which is 115,757 tonnes less than the reported export volume. This 56% discrepancy cannot be explained by the marginal change in volume typically incurred during processing,⁴⁴ which suggests one or a combination of the following: (i) the volume of landings from the industrial fleet is much larger than reported; (ii) the fraction of landings from artisanal fisheries sold to industrial processing plants for export is much larger than reported; or (iii) the export volume is much smaller than reported.

Further to EJF’s request for clarification, the Senegalese Marine Fisheries Directorate (DPM) stated that the observed discrepancy could be explained in part by an error in reporting for the Thiès region miscategorising artisanal fisheries landings destined for industrial processing and export.⁴⁵ Based on 2019 data, this would represent an additional 55,000 tonnes (approx.) of fish, bringing the total volume of landed fish destined for export at about 200,000 tonnes, which still falls short of the reported export volume (263,415 tonnes). The remaining 60,000 tonnes (approx.) are unaccounted for and may come in part from unreported landings by the industrial fleet.

For a reconstruction of product flows within the Senegalese fisheries sector based on official government data, see **Figure 4**.



Trucks for fish transport at the landing site in Fass Boye, an artisanal fishing village in Senegal.

3.3 Rising exports and declining local market supply

The Senegalese fisheries sector, traditionally driven by the local consumption of small pelagics, has progressively been shifting towards an export-driven economy. Between 2008 and 2018, exports of fish products almost quadrupled, overtaking local consumption.⁴⁶ Fish products represent 11% of Senegal's total exports by value, the third most important commodity after gold and oil products.⁴⁷ According to government statistics, in 2021 Senegal exported 312,116 tonnes of fish products, generating 313 billion FCFA (US\$564 million) in export revenue.⁴⁸ A significant proportion of fisheries products are exported to other West African countries, with Côte d'Ivoire, Mali, Burkina Faso, and the Republic of Guinea together representing 63.8% of the total export volume in 2020 — in terms of value, however, the African market only represents 46.2% of exports, followed by the EU market (chiefly Spain, Italy, and France) at 29.6% and the Asian market (chiefly China, the Republic of Korea, and Viet Nam) at 13.5%.⁴⁹ Exports to West African countries mainly consist of low-value small pelagics,⁵⁰ while high-value species are mainly destined for the EU market (see **Box 3**).

Fishmeal represents a modest but rapidly increasing share of Senegal's exports of fish products, with a 42% increase in exports between 2019 and 2020,⁵¹ mainly supplying the Vietnamese market (5,769 tonnes in 2020 and 1,955 tonnes in 2021) and the Spanish market (2,890 tonnes in 2021 and 5,799 tonnes in 2022).⁵² As of 2022, six fishmeal production companies held export licences in Senegal.⁵³ Between 2010 and 2019, Senegal is estimated to have produced on average 13,000 tonnes of fishmeal per year.⁵⁴ Based on a conservative 4.5 fishmeal reduction ratio (ratio between the input of raw material and the output of transformed products),⁵⁵ this represents on

average 58,500 tonnes of raw material (fresh fish and fish waste). While the exact proportion of fresh fish used for fishmeal production has yet to be quantified, it is generally accepted that small pelagics (round and flat sardinella, bonga shad) are the main source of raw material used in Senegal's fishmeal production.⁵⁶ This could represent up to 24% of landings of sardinella and bonga shad from artisanal fisheries.⁵⁷

As a result of declining fish populations, rapidly increasing exports, and rising demand from the fishmeal industry, the volume of fish products available on the local market has been steadily declining. Some species and products used in traditional dishes like *thiof* (white grouper) and *yeet* (fermented sea snail) have become harder to find on local markets and have begun to disappear from Senegalese cuisine.⁵⁸ It is estimated that between 2008 and 2018, the per capita availability of fish protein for Senegalese households declined by 47%,⁵⁹ and in 2017 the Senegalese domestic fish market was projected to experience a supply shortfall of between 117,000 and 146,000 tonnes of fish in the early 2020s.⁶⁰ This in turn has driven a stark increase in prices, affecting not only the finer and traditionally more expensive demersal species, which have now become virtually inaccessible for the majority of the population, but also small pelagics, putting the poorest at risk of being denied access to a critical food source.⁶¹ These trends have been confirmed by interviews conducted by EJF in fishing communities (see **Section 5.2**).

“All the fish production of these boats under joint ventures is exported to their countries of origin, and as such, they don't contribute to the fight against food insecurity. This aspect is worrying.”

Chérif Younouss Ndiaye, Vice President of APRAPAM⁶²

Box 2: Legal framework of Senegal's fisheries

The exploitation and management of Senegal's fisheries are regulated by the Marine Fisheries Code, established by the Law no. 2015-18 of 13 July 2015.⁶³ The law and its implementing regulation⁶⁴ define the conditions under which national and foreign vessels are allowed to fish in Senegalese waters, provide for the establishment of marine protected areas (MPAs), and contain measures to combat illegal fishing.

To operate under the Senegalese flag, a fishing vessel must either be owned for at least 50% by a Senegalese national or a national of a member state of the Economic Community of West African States (ECOWAS), or belong entirely to a company whose head office is in Senegal and is under the control of a Senegalese national or of an ECOWAS member state national.⁶⁵ Foreign vessels may be granted the right to fish in Senegalese waters in accordance with the provisions of bilateral or multilateral access agreements, or in the framework of a chartering contract in partnership with a Senegalese company.⁶⁶ Like all Senegalese companies, fishing companies registered in Senegal are required to keep a beneficial ownership register with information about individuals owning, directly or indirectly, at least 25% of shares or voting rights or otherwise exercising effective control over the company, and to declare beneficial owners to the tax authorities.⁶⁷ Beneficial ownership registers are not accessible to the public.⁶⁸

As a general rule, fishing in Senegal's waters requires the obtention of a fishing licence issued by the Minister of Fisheries and Maritime Economy (*Ministre des Pêches et de l'Économie maritime*).⁶⁹ Different regulatory regimes apply to artisanal and industrial fishing vessels. Artisanal fishing vessels are defined as 'undecked vessels using means of capture that are not mechanically controlled and whose sole means of conservation is ice or salt',⁷⁰ and industrial vessels are defined as vessels that do not fall under the definition of artisanal vessels.⁷¹ A fishing permit is required for artisanal vessels,⁷² but artisanal fishing permits are not limited to particular fishing zones, gear type, or target species,⁷³ allowing artisanal vessels to fish anywhere in Senegal's waters (notwithstanding fishing restrictions in MPAs).

Industrial vessels are required to hold one of four general licence types (coastal demersal, deep-sea demersal, coastal pelagic, and offshore pelagic), with different options based on gear type and target species.⁷⁴ No industrial coastal fishing licence allows fishing within 6 NM of the coastal baseline, creating a de facto inshore exclusion zone (IEZ) reserved for artisanal fisheries; from the Cap-Vert peninsula to the Gambian border, the IEZ extends to 7 NM from the baseline.⁷⁵ Bottom trawling beyond the IEZ is regulated through a zoning system based on licence type, target species, and vessel size class. In the coastal demersal fleet, as a general rule smaller vessels may fish closer to shore than larger vessels, and shrimpers are allowed to fish closer to shore than vessels of a similar size class targeting

finfish and cephalopods.⁷⁶ For the deep-sea demersal fleet, fishing is allowed only in specifically delineated zones, regardless of vessel size.⁷⁷ Licence fees are proportional to the vessel's declared gross register tonnage.⁷⁸

Measures for the conservation and management of fish populations must be adopted by regulation.⁷⁹ The Marine Fisheries Code's implementing regulation contains norms regulating authorised gear types for both artisanal and industrial vessels⁸⁰ and minimum catch sizes and weight by species,⁸¹ as well as very limited rules for bycatch quotas for bottom trawlers.⁸² According to a former government source, ministerial orders required to define bycatch quotas have never been adopted. Bottom trawling is prohibited during annual biological rest periods established by ministerial orders for a duration of one month, typically in June–July for deep-sea/offshore fisheries,⁸³ and in October–November for coastal fisheries.⁸⁴ Fishing is entirely prohibited in the high-traffic area immediately to the southwest of Dakar port.⁸⁵ In addition, a total of 12 MPAs have been established,⁸⁶ three of which (Saint-Louis, Gorée, Sangomar) extend beyond the limits of the IEZ into areas where bottom trawling is generally allowed under Senegalese law. However no formal restrictions on industrial fishing in MPAs appear to have been enacted.

Fishing without a licence constitutes an offence punishable by a fine of between 500 million and 1 billion FCFA (US\$830,000–1.66 million) for foreign vessels,⁸⁷ and between 40 million and 50 million FCFA (US\$66,500–83,200) for Senegalese vessels. Fishing with prohibited gear or during prohibited periods or in prohibited zones, is punishable by a fine of between 20 and 30 million FCFA (US\$33,300–50,000).⁸⁸ The use of nets with an unauthorised mesh size, the capture, landing, and sale of fish under the prescribed sizes, as well as the damaging of fishing gear or vessels belonging to others, is punishable by a fine of between 5 and 8 million FCFA (US\$8,300–13,300).⁸⁹ Lower fines apply when the offender is an artisanal vessel.⁹⁰ Additional penalties include the forfeiture of catches and of unlawful gear types or illegally modified gear.⁹¹ In case of reoffending, applicable penalties are doubled and all the catch and gear may be seized.⁹² In case of serious infringements or of fraudulent registration of a foreign vessel under the Senegalese flag, the Senegalese nationality of a vessel may be withdrawn.⁹³

Compliance with fishing regulations is monitored and enforced by the fisheries ministry's Fisheries Protection and Surveillance Directorate (*Direction de la protection et de la surveillance des pêches*, DPSP), whose jurisdiction covers both the industrial and the artisanal fishing fleets.⁹⁴ Monitoring is carried out through maritime and aerial surveillance patrols, port checks and vessel inspections, and by observers embarked on industrial vessels.⁹⁵ Notably, the presence of an observer is required aboard foreign vessels but is not mandatory for Senegalese vessels.⁹⁶ All industrial vessels operating in Senegalese waters are required to transmit VMS data,⁹⁷ but transmission of AIS signals is not mandatory.



Bottom trawlers moored in Dakar, Senegal.

4. The industrial fishing fleet and the bottom trawl industry

4.1 General characteristics of the industrial fleet

According to government reports, in 2019 a total of 197 industrial vessels were licenced to fish in Senegal.⁹⁸ During that year, 129 vessels were active, including 110 under the Senegalese flag.⁹⁹ Vessels registered under the Senegalese flag include ‘Senegalised’ vessels, i.e. vessels formally owned by a Senegalese company but effectively controlled by foreign investors via a joint venture with the Senegalese entity (*société mixte de pêche*; for a description of the legal framework regulating the fisheries sector in Senegal, see **Box 2**). Joint ventures have become a common vehicle for foreign fleets to operate in West African waters outside the framework of access agreements, and have been heavily criticised for their opacity and impact on artisanal fisheries.¹⁰⁰ For an analysis of beneficial ownership of the bottom trawl fleet, see **Section 4.3**.

Senegalese vessels are responsible for the bulk of landings from the industrial fleet, with 83.3% of reported landings

on average between 2010 and 2019. Landings from the national industrial fleet have been increasing steadily over the last decade from less than 40,000 tonnes in 2010 up to a maximum of over 118,000 tonnes in 2018 (**Figure 1**).¹⁰¹ In 2019, industrial vessels operating under the Senegalese flag landed a total of 81,375 tonnes of fish valued at 70.4 billion FCFA (US\$120 million), representing 15% and 26% of the total national production by volume and commercial value, respectively.¹⁰² Most of the production of the industrial fleet is exported, with only a fraction destined for the local market.¹⁰³

4.2 General characteristics of the bottom trawl fleet

Senegal is host to one of the largest bottom trawl fleets in West Africa. While Senegalese fisheries are characterised by their opacity, with key information on vessel identities, licencing, and activities remaining unpublished, information about Senegal’s bottom trawl fleet could be obtained from a 2019 document accessible to stakeholders

listing vessels licenced to operate in Senegal's EEZ. This document lists a total of 99 bottom trawlers registered under the Senegalese flag and an additional 3 vessels operating under the Spanish flag (the latter being licenced to trawl for hake under the EU's SFPA with Senegal).¹⁰⁴

Bottom trawlers make up the large majority of the industrial fleet (with an average of 95 active vessels during the period 2015–2019), and are responsible for the largest share of landings from the industrial fleet (56.2% of reported landings on average in 2015–2019), with an average of 48,300 tonnes of fish per year over the same period (Figure 3).¹⁰⁵

Bottom trawlers authorised to fish in Senegalese waters hold either deep-sea or coastal demersal licences. Deep-sea demersal trawlers usually operate further from shore and target species such as deep-sea shrimp and hake, and coastal demersal trawlers operate closer to shore and target species such as coastal shrimp, octopus and cuttlefish.¹⁰⁶ As of 2019, where licence type could be ascertained, there were 72 vessels holding coastal demersal licences, and 27 holding deep-sea demersal licences (see Table 1 for a breakdown by licence type and top species in landings).

The trend for the coastal demersal fleet is worrisome. While fleet size (and, with it, fishing effort and landings) had been progressively decreasing after an all-time high in 1999, down to 59 vessels in 2011,¹⁰⁷ the number of active vessels has been increasing again in recent years, with 74 vessels in 2017 and 76 vessels in 2018¹⁰⁸ — despite the conclusion of a 2014 assessment which found that the coastal demersal fleet was at overcapacity.¹⁰⁹ Moreover, the recent increase in the number of active coastal demersal trawlers suggests that the freeze on

the issuance of new coastal demersal fishing licences, enacted by the Senegalese government in 2006,¹¹⁰ may not have been consistently implemented. This calls for more transparency and an urgent and substantial reduction in the number of coastal demersal licences, pending a comprehensive updated assessment of the maximum number of vessels that is compatible with the sustainable management of the fishery.

Due to the overcapacity of the coastal demersal fleet, the deep-sea trawl fishery represents one of the only remaining opportunities for development of the sector and has accordingly expanded in recent years,¹¹¹ with 32 active vessels in 2019.¹¹² The deep-sea trawl sector is dominated by joint venture companies backed by Spanish capital.¹¹³



Bottom trawlers at the port of Dakar, Senegal.

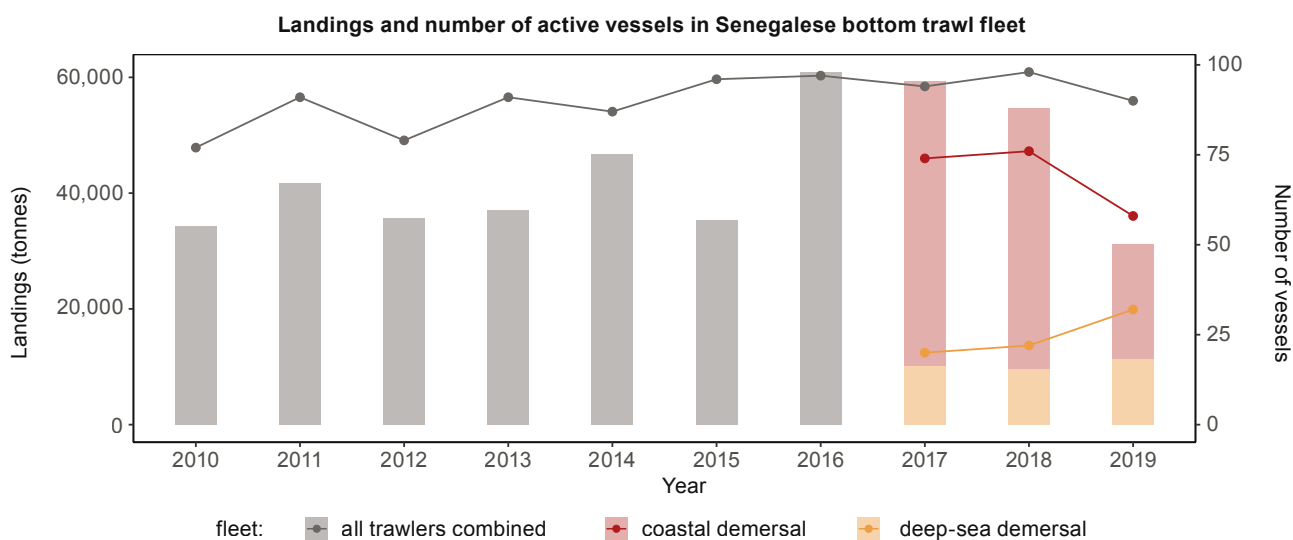


Figure 3: Landings (bars) and number of active vessels (points and line) by fleet type for Senegalese-flagged vessels for the period 2010–2019 (source: DPM). Disaggregated data for the coastal demersal and deep-sea demersal fleets are only available from 2017. Note that the reported number of active vessels does not necessarily correspond to the number of licenced vessels.

Table 1: Number of bottom trawlers active in Senegalese waters in 2019, by licence type, with corresponding share of landings from the bottom trawl fleet, and top species by landing volume (source: DPM). Note that the number of active vessels reported in official government publications does not necessarily correspond to the number of licenced vessels.

Licence	Licence option (target species)	No. of vessels	Share of total bottom trawl landings	Top species in landings
Vessels under Senegalese flag				
Coastal demersal	Finfish and cephalopods	34	40.8%	Atlantic horse mackerel (<i>Trachurus trachurus</i>)*
				Common octopus (<i>Octopus vulgaris</i>)
				West African goatfish (<i>Pseudupeneus prayensis</i>)
	Shrimp	24	18.1%	Southern pink shrimp (<i>Penaeus notialis</i>)
				Senegalese tonguesole (<i>Cynoglossus senegalensis</i>)
				Common octopus (<i>Octopus vulgaris</i>)
Deep-sea demersal	Shrimp	16	10.2%	Deep-water rose shrimp (<i>Parapenaeus longirostris</i>)
				Hake
	Benguela hake (<i>Merluccius polli</i>)			
	Other finfish	8	14.2%	Lesser African threadfin (<i>Galeoides decadactylus</i>)
				Smoothmouth sea catfish (<i>Arius heudelotii</i>)
	Vessels under foreign flag			
Deep-sea demersal	Hake	3	8.1%	Senegalese hake (<i>Merluccius senegalensis</i>)
				Benguela hake (<i>Merluccius polli</i>)

Note: * Despite being a pelagic species, the Atlantic horse mackerel is often caught by bottom trawlers as it spends most of the day aggregated close to the seabed.¹¹⁴

4.3 Beneficial ownership and links to foreign entities

While almost all (99 out of 102) bottom trawlers licenced to fish in 2019 were flagged to Senegal, analysis by EJF indicates that at least 52% of these vessels are actually controlled by foreign beneficial owners, with the top four nationalities for beneficial ownership being Spanish (23% of vessels), Senegalese (23%), Chinese (20%), and Italian (6%). As beneficial ownership could not be ascertained for 25% of vessels, this ranking may not reflect the exact distribution of foreign interests in the Senegalese bottom trawl fleet.

Opaque corporate structures such as the joint venture schemes employed in Senegal, coupled with a lack of transparency in coastal and flag state fisheries governance, can make tracing the beneficial owners of fishing operations difficult. However EJF's analysis

of the beneficial ownership of trawlers licenced to fish in Senegal in 2019 suggests that a number of large international fishing corporations have played, and may continue to play, a role in the Senegalese trawl industry. For example, the Chinese National Fisheries Corp. (CNFC), China's state-owned fishing company, was found to own at least four trawlers ('SOLEIL 11', 'SOLEIL 12', 'SOLEIL 51' and 'SOLEIL 61'), and the vertically integrated Spanish firm Armadora Pereira owned at least six trawlers ('AMINE', 'BOROM DARADJI', 'KANBAL II', 'KANBAL III', 'LAGHEM 1', 'SOKONE') through a joint venture operated under the name 'SOPERKA'. CNFC has been accused of widespread and repeated IUU fishing activities in West Africa, including underreporting of their fleet's tonnage in Senegal between 2000 and 2014.¹¹⁵ A recent 'experimental' shrimp fishing licence obtained by Soperka vessels in Liberia was also under close scrutiny as regards its compliance with Liberian laws, and its sustainability.¹¹⁶



A Spanish bottom trawler at the port of Dakar, Senegal.

4.4 Foreign market drivers of the bottom trawl industry

In 2019, Senegal reported the export of 36,300 tonnes of demersal fish, cephalopods (cuttlefish, octopus and squid), shrimps and prawns, according to data in FAO FishStat.¹¹⁷ While it is not known what proportion of these exports originate from the industrial bottom trawl fleet as opposed to the artisanal sector, in view of 2019 landings data it would seem that the large majority if not the totality of landings of the bottom trawl fleet were destined for export in that year.¹¹⁸ The EU is the leading destination for exports of fishery products targeted by the bottom trawl fleet — see **Box 3** for further information.

In 2022, 77 Senegalese-flagged demersal trawlers were authorised to export seafood products to the EU.¹¹⁹ This included at least 48 coastal demersal trawlers (comprising 23 finfish and cephalopod trawlers and 25 shrimp trawlers), and 19 deep-sea demersal trawlers (comprising 17 shrimp trawlers and 2 finfish trawlers).¹²⁰ Senegalese corporation Sopasen has the largest fleet of vessels with authorisation to export to the EU (18 vessels in 2022, all coastal demersal trawlers).

Products from these vessels can be linked to a number of major seafood wholesalers across the continent. For example, products from the Portuguese seafood

distributor ‘Mar Fresco’ (of whom CNFC purchased 51% of ownership in 2016)¹²¹ including whole frozen sole,¹²² as well as wild prawns sourced from Senegal,¹²³ can be found for sale on various online supermarkets. Elsewhere, ‘Sysco France’, a producer and distributor of seafood aimed at professional catering have reported via the ‘Ocean Disclosure Project’ that they source seafood caught by bottom trawlers from Senegal, namely tonguesole (*Cynoglossus* spp.) and cuttlefish (*Sepia* spp.).¹²⁴

Bottom trawling in Senegal is thus driven, at least in part, by demand for seafood products from key markets such as the EU. Senegal benefits from a preferential trade regime with the EU, under which its exports, including fisheries products, are provided with duty-free and quota-free access to the EU market.¹²⁵ The country’s bottom trawl industry is further enabled by a favourable business environment, with industrial fishing companies enjoying a number of tax incentives and benefits. Companies exporting at least 80% of their production benefit from a 50% deduction on taxable income¹²⁶ and may apply to be granted the status of free export company (*entreprise franche d’exportation*) to benefit from a reduced tax rate and various tax exemptions.¹²⁷ In addition, investments in production capacity are rewarded with tax credits.¹²⁸ In 2018, Senegal’s industrial fishing sector benefited from an estimated total of US\$173.5 million in direct and indirect government subsidies.¹²⁹

Box 3: Destination of catches from the Senegalese bottom trawl fleet: the importance of the EU market

The EU is the leading destination for fisheries products caught by Senegal's industrial bottom trawl fleet, including demersal fish, cephalopods, shrimps and prawns.¹³⁰

- In 2021, Senegal exported 21,569 tonnes of demersal fish, cephalopods (octopus, cuttlefish and squid), shrimps and prawns to the EU, with a value of US\$166.7 million, equating to 48% of Senegal's total exports of these commodities by weight and 82.5% by value.¹³¹ Spain was responsible for the largest share of exports destined for the EU, importing 10,499 tonnes (48.7% of the EU total, valued at US\$80.0 million), followed by Italy, which imported 8,613 tonnes (39.9% of the EU total, valued at US\$69.5 million). Portugal, France and Greece each accounted for 4.4%, 3.8% and 2.8% of the EU total, respectively. Other important destination markets for these commodities in 2021 were Guinea (23.1% by volume, 3.1% by value), Côte d'Ivoire (19.3% by volume, 5.2% by value), China (3.7% by volume, 1.8% by value) and Japan (2.1% by volume, 3.6% by value).
- In 2021, Senegal exported 15,015 tonnes of cephalopods (octopus, cuttlefish and squid) to the EU, with a value of US\$122.6 million, equating to 91.2% of Senegal's total exports of these commodities by weight and 92.3% by value.¹³² Italy was responsible for the largest share of exports destined for the EU, importing 8,055 tonnes (53.6% of the EU total, valued at US\$68.3 million), followed by Spain, which imported 5,678 tonnes (37.8% of the EU total, valued at US\$44.8 million). Portugal, Greece and France each accounted for 4.0%, 2.8% and 1.6% of the EU total, respectively. Japan was also an important destination market for cephalopod exports from Senegal (5.4% by volume, 5.3% by value), with China (1.4% by volume, 0.4% by value) and the Republic of Korea (0.7% by volume, 0.9% by value) importing smaller quantities.
- In 2021, Senegal exported 4,074 tonnes of fresh and frozen shrimps and prawns to the EU, with a value of US\$37.3 million, equating to 88.5% of Senegal's total exports of these commodities by weight and 88.9% by value.¹³³ The vast majority of shrimp and prawn exports from Senegal to the EU were destined for Spain (3,616 tonnes or 88.8% of the 2022 total), with smaller quantities imported by France (233 tonnes, 5.7%) and Greece (171 tonnes, 4.2%). The UK was also an important destination market for shrimp and prawn exports from Senegal, accounting for 4.5% of export volume and 4.4% of value in 2021.
- As regards hake, in 2021 Senegal reported exports totalling 3,915 tonnes, with a value of US\$4.5 million.¹³⁴ These are assumed to originate primarily from the Senegalese-flagged trawl fleet, as exports from Spanish-flagged vessels should appear in the trade data as exports from Spain. The majority of Senegal's hake exports in 2021 were destined for other West African countries, including Côte d'Ivoire (86.8%), with smaller quantities exported to Cameroon, Benin and Togo (a combined total of 3.8%). Senegal exported 371 tonnes of hake to Spain in 2021, representing 9.5% of the total.

To note that the EU is also a key destination for products from Senegal's tuna sector. In 2021, Senegal exported 4,952 tonnes of unprocessed and processed tuna from Senegal, with a value of US\$13 million, equating to 14.0% of Senegal's total exports of these commodities by weight and 23.4% by value.¹³⁵ The EU was the second most importer of these commodities from Senegal behind Côte d'Ivoire, according to exporter-reported data in UN Comtrade.

4.5 Joint venture arrangements and transparency concerns

The critical lack of transparency in fisheries management in Senegal has contributed to the overexploitation of the country's fisheries resources, including by the trawl industry.¹³⁶ Concerns have been expressed regarding opaque practices in the management of industrial fishing vessels, including the number of licences issued, the list of authorised vessels, the conditions of access to fishery resources, the process for allocating fishing licences, resource access agreements and protocols, information on licence fees collected, the status of the fish resources, and the entity mandated to issue licences, quotas, species and seasonal fishing restrictions.¹³⁷ Similar issues have been reported with respect to decision-making and granting of new licences for processing plants, especially foreign-owned plants, and the regulation thereof, which has contributed to their proliferation in recent years.¹³⁸ While Senegal's President initiated the process of joining the Fisheries Transparency Initiative (FiTI) through a public commitment in February 2016, the process has stalled, with no progress in completing the remaining sign-up steps.¹³⁹

In 2020, the Ministry of Fisheries and Maritime Economy received applications for 39 new licences for deep-sea trawlers targeting hake,¹⁴⁰ in spite of the overexploited status of hake resources in the country. The applications — submitted by joint venture companies alleged to be effectively controlled by Chinese nationals/corporations — were strongly contested by national fishing associations GAIPES and APRAPAM as contrary to Senegal's commitments to sustainable fisheries management and good governance.¹⁴¹ The media subsequently reported that several licences had been issued, despite government assurances to the contrary.¹⁴² GAIPES levied further criticisms at the Ministry for allocating licences to Chinese-owned demersal trawlers in 2018/19 for a licence category that does not exist in Senegalese law ('Deep-sea fishing trawler option finfish and cephalopods').¹⁴³

“Our governments often over-license nationalised (foreign-owned companies) and foreign industrial fishing. Yet coastal communities and civil society must be informed about licence applications, and must be consulted before new licences are awarded.”

Gaoussou Gueye, president of CAOPA¹⁴⁴

The dominance of joint venture fishing companies in the Senegalese trawl industry — where Senegalese nationals hold the majority share capital but effective control lies with foreign entities — is considered a major driver of overexploitation of fisheries resources in the country,

and is reflective of a broader lack of transparency across all aspects of the industry. Provisions for joint venture arrangements have been abused to allow foreign entities to gain access to Senegalese fisheries resources via domestic vessels, in the absence (or outside the framework) of official bilateral access agreements between Senegal and the vessels' true country of nationality.¹⁴⁵ Senegal's National Office against Fraud and Corruption found that the fisheries ministry had been issuing fishing licences to deep-sea trawlers, as well as 'fishing licence promises' to vessels whose registration was pending, without a legal basis in national law.¹⁴⁶

“Today, mixed companies participate in the overexploitation of the resource. It is visible. This aggravates the scarcity of the resource in our country. At the level of joint ventures, we found that everything is exported. So there is no added value. We have seen a lot of processing units closed because they have no more products to process.”

Fish processor, Dakar¹⁴⁷

“Nowadays, it is the national industrial fleet that is behind the fisheries problems. It is an organised plundering of the marine resources... Most of our industrial fishing companies are just front companies for foreign operators; the only national thing they have is the Senegalese flag.”

Representative of the National Fishing Observers Union in Senegal¹⁴⁸

Senegalese-flagged vessels owned by joint venture companies have been further accused of engaging in fraudulent and illegal practices, such as falsification of catch documentation, illegal trans-shipment, evasion of sanctions and illegal fish landings, among others.¹⁴⁹ For a discussion of illegal fishing by the trawl fleet, see **Sections 6.1 and 7.2.**

According to the EU's 2019 evaluation of the Protocol to the EU-Senegal SFPAs, EU hake trawlers operating under the SFPAs are subject to additional conditions that do not apply to Senegalese deep-sea trawl vessels operating under joint venture agreements, including a bycatch quota, an additional biological rest period, catches capped by a total allowable catch (TAC) and mandatory embarkation of observers on vessels.¹⁵⁰ By allowing vessels controlled by foreign entities to operate under its flag, Senegal effectively offers more favourable conditions than those laid down in the EU-Senegal SFPAs to other fleets present in its waters whose vessels have the same characteristics and target the same species.¹⁵¹



The beachfront in Kayar, an artisanal fishing hub known for its hook-and-line pirogues in Senegal.

5. The crisis of the artisanal fishing sector

Artisanal fisheries are the beating heart of the Senegalese fishing sector, supplying over 80% of the fish landed in the country¹⁵² and helping ensure food security for Senegalese households. They form the basis of a dynamic value chain supporting the local market for fish products as well as exports to foreign markets (**Box 4**). However the artisanal fisheries sector is facing an unprecedented crisis due to a steady decline in catches and rising operational costs. This crisis is threatening the livelihoods of a large number of people who depend on artisanal fisheries, as well as the benefits the artisanal sector provides for Senegal's economy (see **Section 3.1**).

The artisanal fishing fleet mainly targets small pelagics traditionally consumed locally, such as sardinella, chub and horse mackerel, and bonga shad, which on average make up 67% of landings in volume and represent 25% of the total market value generated by artisanal fisheries.¹⁵³ However, faced with declining catches and rising operational costs, an increasing number of artisanal fishers are targeting valuable demersal species in high demand for exports, such as octopus, cuttlefish, sole, and largehead hairtail.¹⁵⁴ This puts artisanal fishers in direct competition with the bottom trawl industry (see **Section 7.1**).

Box 4: The artisanal fisheries value chain

Key actors of the artisanal fisheries value chain include *mareyeurs* (wholesale fishmongers), artisanal fish processors, and industrial processing facilities. In 2019, 57% of landings from small-scale fisheries were bought by *mareyeurs*, 30% were acquired directly by artisanal processors, and 13% were sold directly to local consumers.¹⁵⁵ An overview of the Senegalese fisheries sector, with a reconstruction of product flows, is provided in **Figure 4**.

Mareyage

Mareyeurs are wholesale traders and distributors involved in the purchase, transport, and sale of fish products,¹⁵⁶ supplying inland markets and industrial processing plants across the country. They play an important role in financing artisanal fishing activities through cash advances or by funding the purchase of fishing gear. *Mareyeurs* have to hold one of four different licence types: fisher-*mareyeurs* (who may only sell their own catch), micro-*mareyeurs* (small-scale traders), *mareyeurs*, and export *mareyeurs* (who have the right to export fish products).¹⁵⁷ Export *mareyeurs* may not directly purchase fish from artisanal fishers and are required to use other licenced *mareyeurs* as suppliers.¹⁵⁸ Most *mareyeurs* are independent, self-employed professionals or small businesses, but some are directly employed or financed by industrial processing companies.¹⁵⁹ In 2022, 1,601 *mareyeurs* were registered in Senegal.¹⁶⁰

Artisanal processing

Artisanal processors (traditionally women) produce a range of fish products, including *ketiak* (braised, salted and dried sardinella), *metorah* (smoked and dried fish), *guedj* (fermented and dried fish), *tambadjang* (salted and dried bonga shad or sardinella), *sali* (salted and dried fish), and *yeet* (fermented sea snail).¹⁶¹ *Ketiakh* remains the most common product, representing 55% of the total volume of processed fish products in 2019, followed by *metorah* and *guedj*.¹⁶² 59% of fish products produced by the artisanal sector are exported.¹⁶³ According to the latest available census, close to 7,500 artisanal processors are active in Senegal, 96% of whom are women.¹⁶⁴

Relationship with the industrial processing sector and the export market

In a context of rising demand for exported fish products, processing plants established in the vicinity of artisanal fishing hubs such as Kayar and Saint Louis have been capturing an ever-increasing share of landings from small-scale fisheries, reshaping local supply chains and markets (see **Section 3.3**). In 2019, at least 54,783 tonnes of fish were sold by *mareyeurs* to processing plants, representing 23.5% of the fish bought from artisanal fisheries.¹⁶⁵ Industrial processing includes the conditioning (freezing) and packaging of fresh fish, as well as the production of transformed fish products (canned fish, fishmeal and fish oil), almost exclusively for the export market. A total of 135 registered companies are currently licenced to export fish products from Senegal, including six fishmeal production companies.¹⁶⁶

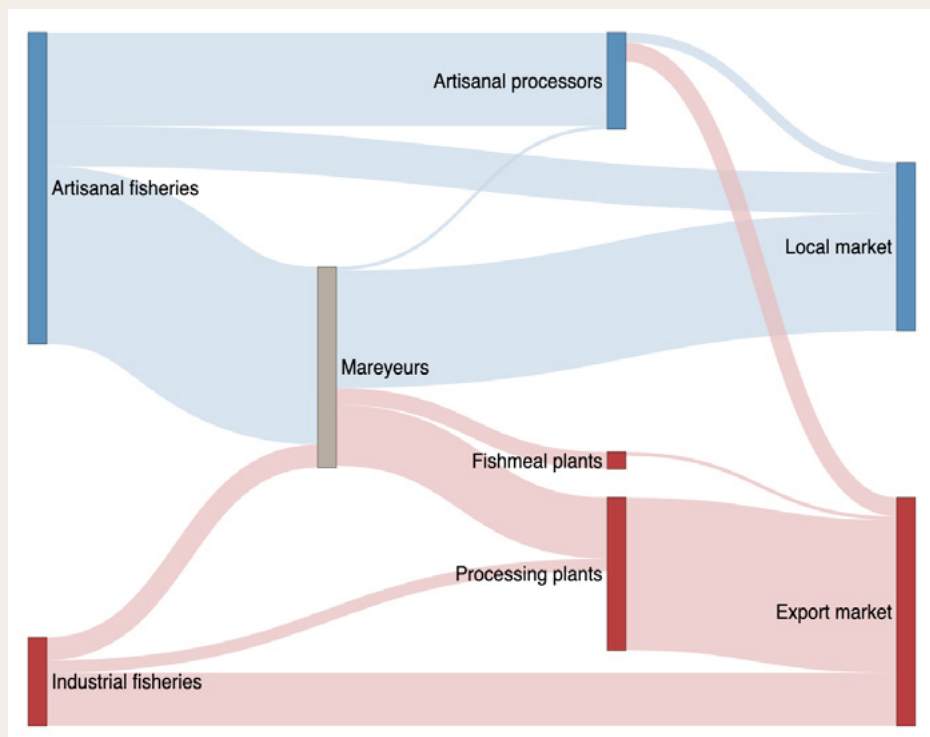


Figure 4: Circulation of fish products in the Senegalese fisheries sector from landings to end market. Link thickness is proportional to volume in tonnes; blue refers to flows supplying the local market, and red refers to flows supplying the export market (sources: DPM data 2019; DITP data 2019 and 2020; stakeholder interviews). Product flows were reconstructed based on available data and stakeholder interviews but estimated volumes may not reflect true values, as data sources are lacunary and often contain unexplained inconsistencies. In particular, the substantial discrepancy between supply and output for processing plants suggests that landings may be significantly underreported (see **Box 1**).



Mareyeurs are preparing to load a fish cargo in Fass Boye, Senegal.

5.1 Declining catch

The artisanal sector is facing a severe crisis due to declining catches. While according to official government reports the combined landings of artisanal fisheries remained fairly stable during the period 2010–2019, at an average of 393,000 tonnes of fish per year and with a record high of 440,603 tonnes of fish in 2019,¹⁶⁷ independent estimates conducted by the CRODT suggest that landings have in fact been much higher and decreasing in recent years, from 563,369 tonnes in 2012 down to 445,406 tonnes in 2019.¹⁶⁸ Moreover, aggregated data are masking a substantial decline in average catch per fishing unit (pirogue), driven by a significant increase in the number of active pirogues: between 2012 and 2019, landings per pirogue declined by over 58% (**Figure 5**). According to government data, the number of active pirogues has increased by almost 50% from 8,674 in 2010 up to 12,864 in 2019,¹⁶⁹ and independent estimates suggest that the total number of active pirogues could be as high as 16,512.¹⁷⁰ While the registration of new pirogues was suspended in an attempt to limit the growth of the artisanal fleet,¹⁷¹ artisanal fisheries have long been considered at overcapacity.¹⁷²

The continuous decline in catches experienced by artisanal fishers has been confirmed by interviews conducted by EJF in fishing communities. Artisanal fishers reported substantial declines in catches over the past five years: 76.5% of respondents reported catching ‘a lot less’ or ‘less’ fish during the dry season (*noor*) compared to five years ago, and 65% reported having ‘very often’ or ‘often’ returned from a trip without any

catch during the last dry season. This trend is worse during the wet season (*nawet*), with 88% of respondents reporting catching less fish, and 70.5% reporting having often returned from a trip without any catch. The percentage of respondents reporting a decline in catches was higher for fishers who target demersal species, with 80% and 93% of respondents reporting catching less fish during the dry season and the wet season, respectively.

Landings per fishing unit and number of active pirogues in artisanal fishing fleet

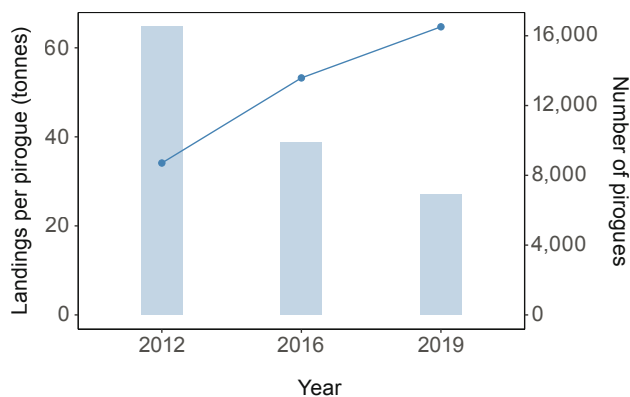


Figure 5: Landings per pirogue (bars) and number of active pirogues (points and line) in artisanal fisheries for the years 2012, 2016, and 2019 (source: CRODT).

Dwindling fish populations are also pushing fishers to travel further, spend more time and face higher risks at sea in search of a catch. 88% of respondents declared having had to change fishing grounds in recent years,



Artisanal fishers landing horse mackerel in Fass Boye, Senegal.

with fish population declines and conflict with industrial vessels being the most commonly cited reasons for doing so. 94% of respondents also indicated spending more time at sea.

In the face of depleting resources, artisanal fishers are also knowingly using indiscriminate fishing practices, such as encircling gillnets with a smaller mesh size, in an attempt to fish whatever they can before resources are exhausted.¹⁷³

“This situation, exacerbated by competition with industrial fishing, is leading to a virtual race to the bottom to see who can get the remaining fish first, by whatever means.”

USAID¹⁷⁴

The dramatic decline in fish populations, compounded by the negative environmental and socio-economic impacts of bottom trawling (see **Sections 6 and 7**), presents a serious threat to the livelihood and traditional way of life of artisanal fishing communities, with impacts felt across the entire value chain of artisanal fisheries.

5.2 Impact on livelihoods and living conditions

The decline of fish populations is having severe impacts on the livelihoods of artisanal fishing communities. Fishers are not only catching less fish, but also facing higher operational costs, as they have to spend more time at sea to access a dwindling resource, resulting in fishing expeditions becoming less and less profitable. 65% of fishers interviewed by EJF reported earning less today than five years ago (**Figure 6**), 94% reported facing higher operational expenses, and 53% reported that fishing expeditions that generated a net profit were less frequent. Some fishers reported earning more, but this was due to the sharp increase in the price of certain species that are in high demand but come in low supply due to depleting populations.

65% of fishers interviewed by EJF reported earning less today than five years ago.



A small-scale fishmonger is putting ice on freshly landed fish in Fass Boye, Senegal.

“The vessels [trawlers] have ruined it for us. I remember when the fishers would go out to sea in the morning and by 9 am, would land with lots of fish — but today the situation has completely changed.”

Artisanal fish processor, Fass Boye

The increase in the price of fish is primarily impacting the poorest artisanal processors and micro-mareyeurs, who lack the financial resources to buy enough fish to make a living. The volume of fish products produced by artisanal processors has been steadily declining over the past decade.¹⁷⁵ Artisanal processors have been facing increasing difficulties in gaining access to freshly landed fish, as a result of declining fish populations and direct competition with mareyeurs and the industrial processing sector.¹⁷⁶ Artisanal processors interviewed by EJF were unanimous in reporting that there was ‘a lot less’ fish available for purchase in landings from the artisanal fishing fleet compared to five years ago, regardless of season. The lack of access to raw material

(fish) was the difficulty most commonly identified by respondents. Many respondents also indicated that they lacked the financial resources to compete with mareyeurs, especially those supplying industrial processing plants. In the absence of adequate fish supplies from artisanal fisheries, some respondents occasionally had no choice but to purchase fish from the industrial port of Dakar, at a much higher price.

“We pray that one day, industrial vessels will leave and let our fishers bring back enough fish for us to be able to work again.”

Artisanal fish processor, Fass Boye

Mareyeurs are also impacted: 57% reported a decrease in their income, and this proportion was higher for micro-mareyeurs (75%). Notably, one mareyeur who reported that their income had increased indicated that they were able to take advantage of evolving supply and demand to increase their margins. The lack of adequate financial resources to purchase fish was the difficulty most commonly identified by mareyeurs.

In addition to a loss of income, artisanal fishing communities are facing deteriorating living conditions: 65% of fishers, 86% of artisanal processors, and 100% of mareyeurs reported having more difficulty feeding their household; 88% of fishers, 93% of artisanal processors, and 100% of mareyeurs reported having less fish available for consumption; and 59% of fishers, 53% of artisanal processors, and 86% of mareyeurs reported experiencing worse living conditions in terms of housing, sanitation, and access to clean water (**Figure 6**).

5.3 Link to the migrant crisis

In the face of depleting fish populations, decreasing income, deteriorating living conditions, and limited government support and opportunities for transition, an increasing number of Senegalese fishers, mainly young men, are compelled to migrate overseas, with the Spanish Canary Islands being the most common destination due to their proximity to the West African coast.¹⁷⁷ According to the Spanish Interior Ministry, in 2021–2022 a total of ca. 38,000 migrants reached the Canary Islands by boat,¹⁷⁸ while the International Organization for Migration expressed concerns over an increase in the number of deaths and disappearances at sea among migrants trying to reach the islands.¹⁷⁹

65% of fishers, 86% of artisanal processors, and 100% of mareyeurs reported having more difficulty feeding their household.

“Yesterday I was told that a friend, it’s a little brother actually, took a boat to emigrate and this kind of situation [overfishing by trawlers] is one of the causes . . . If the sea has fish, we will be staying here . . . If everything was normal, we would work as we used to but with these boats [trawlers], they take all the fish.”

Artisanal fisher, Fass Boye

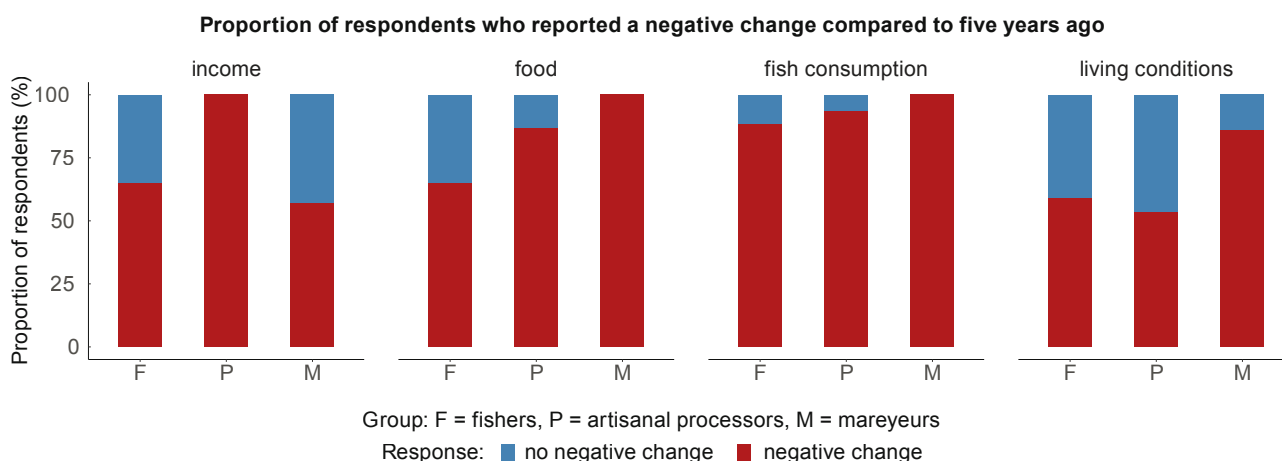


Figure 6: Proportion of respondents (*n* fishers = 17, *n* processors = 15, *n* mareyeurs = 7) who reported a negative change in their current situation compared to five years ago, in terms of income, availability of adequate food for the household, availability of fish for consumption for the household, and living conditions (housing, sanitation, access to clean water).

6. Environmental impacts of bottom trawling

While the environmental impacts of bottom trawling in Senegal are poorly studied and documented, testimonies from crew and fishers, as well as an analysis of available datasets, suggest that the Senegalese bottom trawl fleet may be having a significant environmental footprint. High levels of bycatch combined with intense fishing pressure have contributed to the overexploitation and decline of demersal fish populations. Moreover, a preliminary assessment conducted by EJF suggests that trawling of the seabed may be disturbing a large volume of sediment, threatening benthic marine life and potentially impacting Senegal's blue carbon stocks.

6.1 High levels of bycatch, discarding and use of illegal nets

The unselective nature of bottom trawling as a fishing method means it is associated with high levels of bycatch, i.e. non-target fish that are economically undesirable either due to their size, quality or species. Despite the fact that bycatch is often fit for human consumption and/or belonging to species that are of local and regional importance, it is commonplace that it is simply dumped overboard in large volumes, further exacerbating the

pressures associated with overexploitation of fisheries resources. Bottom trawling is said to produce the highest rates of discarding across all gears,¹⁸⁰ with a global average of 21.8% of catches.¹⁸¹ Discards by the Senegalese bottom trawl fleet have been estimated to account for as much as 38% of catches.¹⁸² Globally, bottom trawling is estimated to account for 46% of annual discards in marine fisheries, or around 4.2 million tonnes.¹⁸³

A number of crew interviewed for this report claimed that the discarding of fish in large quantities would happen regularly, because fish was deemed too small or damaged by the nets, or because crew simply had insufficient time to sort them ahead of the next haul of fish being pulled in. One crew member stated the following:

“It happens. We’ve caught fish in certain areas, fish that may be reproducing that we weren’t allowed to catch. They end up in the nets but they’re not fish that are useful to us because they’re too small . . . if we bring them back to the quay we have problems, so we send them back to the sea because we don’t need them. It’s unfortunate.”

Crew member, industrial trawler



Freshly landed Cunene horse mackerel (*Trachurus trecae*) in Senegal.

Another crew member similarly stated that either fish being damaged, or a lack of time to process fish, led to large amounts of discarding:

“Sometimes it happens that the fish are numerous . . . by the time they bring up the nets, the fish are damaged. So we throw them back into the sea. The nets are huge, so when they are thrown into an area with a lot of fish, the sailors will not have time to process them all.”

Crew member, industrial trawler

Artisanal fishers had also witnessed industrial trawlers discarding fish whilst at sea, which corroborates the testimony of the industrial crew. One fisher based in Fass Boye stated:

“Yes, it's [industrial discarding of fish] frequently seen. If a vessel has a tonne of fish, it'll reject around three quarters. It's them who are pillaging the resource. . . Many times, they reject the fish just like that. First, they sort out the fish, then they open the door and let the fish fall into the sea.”

Artisanal fisher, Fass Boye

As has been reported on trawlers elsewhere in the region,¹⁸⁴ a number of crew members stated that on vessels they had worked on, issues of bycatch and discarding are worsened by the illegal practice of tampering with existing trawl nets to reduce the mesh-size,¹⁸⁵ or using

nets that do not meet regulations in order to reduce trawl selectivity. Whilst Senegalese fisheries law provides such a minimum mesh size, trawler crew suggest that this would often be circumvented:

“Usually, if we throw the nets away for two to three days without catching any fish, that's when we replace the nets [with illegal ones]. We reinforce the strings so that if the mesh closes all the fish can't get out, even the small ones.”

Crew member, industrial trawler

Some crew members even stated that illegal nets would be hidden, so that in the case of an inspection they would not be noticed by authorities at port or at sea:

“We keep them on the ship, but we hide them. We find an old gas oil or water tank, and that's where we put them in and close them off.”

Crew member, industrial trawler

6.2 Impact on fish populations

Demersal fish populations exploited by the bottom trawl industry in Senegalese waters are facing significant pressure. It is estimated that abundance indices and biomass for ten key demersal fish populations have respectively declined by as much as 72% and 63% since exploitation began.¹⁸⁶ Seven out of ten assessed demersal fish populations have been considered overexploited in the past five years (**Table 2**).¹⁸⁷

While other factors, such as fishing from the artisanal fleet, as well as ecological and biophysical factors, can also contribute to the observed population dynamics, it is clear that the large-scale exploitation of demersal resources by the bottom trawl fleet has been having a major impact on Senegal's marine life. Unfortunately, no population assessments are available for the species caught by trawlers as bycatch, which represent a substantial fraction of organisms impacted by bottom trawling.

“[Bottom trawlers] are devastating. They ravage everything in their path, whether large or small fish. And they get rid of the smaller fish because they can't use them.”

Artisanal fisher, Fass Boye



Bottom trawlers at the port of Dakar, Senegal.

Table 2: Estimated population status of key species for coastal and deep-sea demersal fisheries (source: CECAF).

Species	Population status		
	2017	2019	2022*
Coastal demersal fisheries			
White grouper (<i>Epinephelus aeneus</i>)	overexploited	overexploited	overexploited
Bluespotted seabream (<i>Pagrus caeruleostictus</i>)	fully exploited	overexploited	not fully exploited
Cuttlefish (<i>Sepia</i> spp.)	not assessed	overexploited	not fully exploited
Sea catfish (<i>Arius</i> spp.)	fully to overexploited	not assessed	not assessed
Red pandora (<i>Pagelus bellottii</i>)	fully exploited	fully exploited	fully exploited
Common octopus (<i>Octopus vulgaris</i>)	not assessed	fully exploited	overexploited
Southern pink shrimp (<i>Penaeus notialis</i>)	fully exploited	fully exploited	fully exploited
Large-eye dentex (<i>Dentex macrophthalmus</i>)	not fully exploited	not fully exploited	not fully exploited
Deep-sea demersal fisheries			
Black hake (<i>Merluccius senegalensis</i> and <i>M. polli</i>)	fully exploited	overexploited	overexploited
Deep-water rose shrimp (<i>Parapenaeus longirostris</i>)	overexploited	overexploited	not fully exploited

Note: * Assessment not yet finalised.¹⁸⁸

6.3 Spatial distribution of trawling pressure

To investigate the spatial dimension of the environmental impacts of bottom trawling, EJJ used the swept area ratio (SAR, total area swept by trawl gear over a one-year period divided by the total seabed area) as an indicator of fishing pressure.

Mean SAR for the period 2018–2022 was calculated within 0.01-degree cells (ca. 1.22 km²) following Amoroso et al. (2018)¹⁸⁹ as the product of trawling time (apparent fishing hours obtained from GFW), towing speed (assumed to be a constant 3 knots¹⁹⁰), and dimensions of gear components in contact with the seabed (door spread or the width of the mouth of the net). Simulations were run with a 25-m and 50-m gear width based on reported technical specifications for otter trawls.¹⁹¹

Trawling intensity was highest along the steep continental slopes of the northern coast (*Grande Côte*), particularly around the Kayar trench, with a maximum SAR of 31.7/63.4 (for 25-m and 50-m gear width, respectively), compared to a mean SAR across the trawled area of 1.28/2.55 (**Figure 7**). This high mean SAR value suggests that fishing by the bottom trawl fleet in Senegalese waters is unsustainable: in their study of bottom trawl fishing footprints for 24 regions, Amoroso et al. (2018) found that when regional SAR was greater than 0.25, fishing mortality was greater than FMSY (the level of fishing pressure that gives maximum sustainable yield) for 85% of fish populations.¹⁹² This conclusion is consistent with the status assessments of Senegal’s demersal fish populations, which conclude that the majority of the key commercial species targeted by the industrial bottom trawl fleet are overexploited (see **Table 2**).

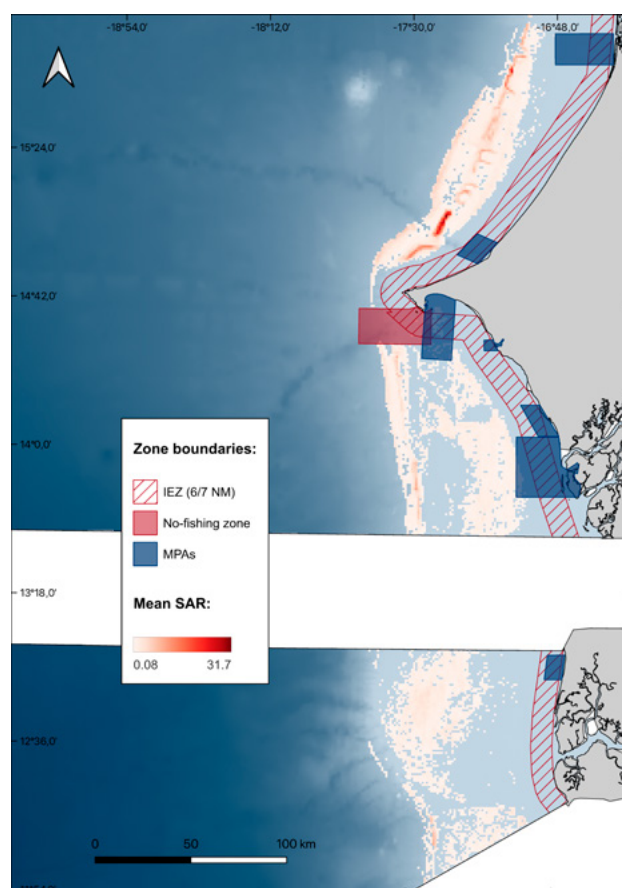


Figure 7: Intensity of fishing pressure (mean annual SAR) by bottom trawlers in Senegal’s coastal waters for the period 2018–2022 (source: apparent fishing effort from GFW; MPAs from World Database on Protected Areas).

EJF estimates that bottom trawling in the Senegalese EEZ may disturb on average between 480 and 960 million m³ of seabed sediment every year, with potential impacts on carbon stocks and benthic biodiversity.

Based on the total swept area across the entirety of the trawled seabed, and assuming a gear penetration depth of 2.4 cm,¹⁹³ EJF estimates that bottom trawling in the Senegalese EEZ may disturb on average between 480 and 960 million m³ of seabed sediment every year,¹⁹⁴ with potential impacts on carbon stocks and benthic biodiversity.

6.4 Assessment of carbon stock disturbance risk

The estimated volume of disturbed carbon within each cell was calculated as the product of the proportion of trawled seabed (SAR), the surface area of a cell, and estimated carbon density in the disturbed sediment, assuming a gear penetration depth of 2.4 cm¹⁹⁵ and a uniform distribution of carbon through the sediment layer.¹⁹⁶ Cells with a SAR > 1 were reclassified to SAR = 1 to minimise the uncertainty stemming from the repeated disturbance of sediment from the same seabed area.¹⁹⁷

The mean total annual volume of seabed carbon susceptible to disturbance over the period 2018–2022 in the trawled area was estimated at 1.98–2.21 million tonnes of carbon — as much carbon as is stored in 68,200–76,200 ha of Senegal's forests.¹⁹⁸ An unknown fraction of that disturbed carbon may be remineralised due principally to microbial activity, increasing the amount of CO₂ dissolved in seawater.¹⁹⁹ Reports of IEZ incursions by bottom trawlers are concerning, as the risk of organic carbon remineralisation appears to be substantially higher in coastal areas, where the organic carbon stored in the sediment tends to be more reactive.²⁰⁰ An increase in the concentration of dissolved inorganic carbon is in turn likely to accelerate ocean acidification (with negative effects on growth and reproduction for a wide range of marine organisms),²⁰¹ reduce the buffering capacity of the ocean, and potentially add to the build-up of atmospheric CO₂, with yet unquantified consequences for the Earth's climate.²⁰²

To highlight areas exposed to a higher risk of carbon stock disturbance, EJF calculated a risk index as the

product of the mean SAR over the period 2018–2022 and estimated seabed sediment carbon content (all variables were standardised and weighted equally).

The predicted risk of sediment carbon stock disturbance was highest on the heavily trawled and carbon-rich continental slopes of the northern coast (*Grande Côte*) (**Figure 8.a**).

Further research is urgently needed to build on this preliminary risk assessment and ascertain the scale and magnitude of the impact caused by bottom trawling on blue carbon stocks.

The mean total annual volume of seabed carbon susceptible to disturbance by trawling over the period 2018–2022 in the trawled area was estimated at 1.98–2.21 million tonnes of carbon — as much carbon as is stored in 68,200–76,200 ha of Senegal's forests.

6.5 Assessment of impacts on benthic macrofauna

To highlight areas exposed to a higher risk of negative impacts on biodiversity, EJF calculated a community disturbance risk index for benthic macrofaunal invertebrate communities. As the impact of bottom trawling on benthic macrofauna abundance is believed to increase with particle grain size,²⁰³ the risk of community disturbance was calculated as the product of the mean SAR over the period 2018–2022 and an index of community sensitivity to disturbance inferred from sediment type (all variables were standardised and weighted equally).

The clay and muddy fine sand sediments on the continental slope of the northern coast are the most heavily trawled, but some trawling also takes place off the coast of Casamance on the continental shelf over coarser sandy sediments, where benthic communities may be more sensitive to disturbance (**Figure 8.b**). Fishers are also reporting that bottom trawlers are damaging rocky reefs known to be used as spawning grounds and nurseries for juvenile marine species.²⁰⁴

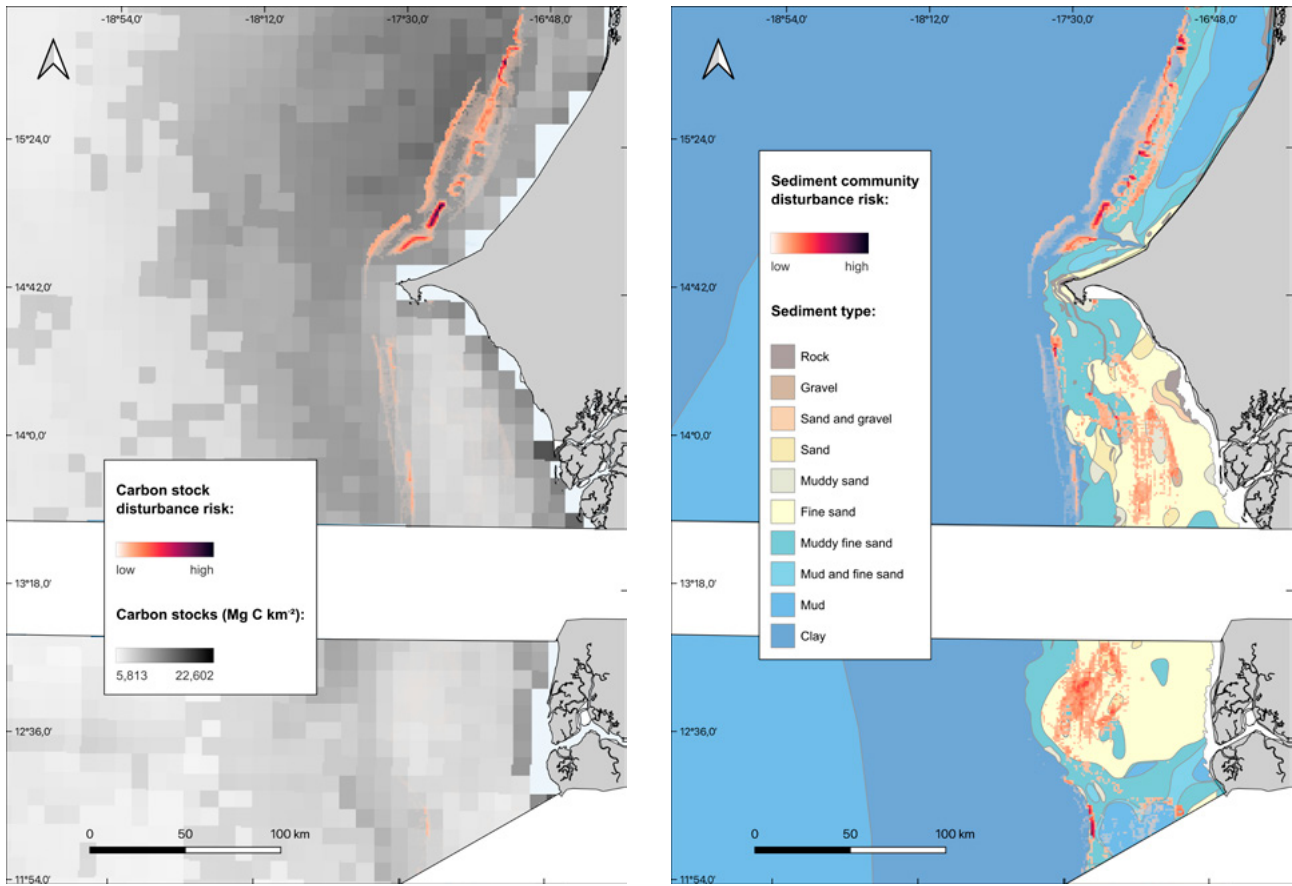


Figure 8: Predicted spatial distribution of bottom trawling impacts in Senegal's coastal waters: predicted risk of disturbance of sediment carbon stocks (a), and predicted risk of negative impacts on benthic macrofauna abundance inferred from sediment type (b). Risk was estimated based on trawling pressure (SAR) and relevant environmental variables. Mean SAR was filtered ($SAR \geq 1$) to visualise high-risk areas only (sources: sediment carbon content data from Atwood et al. (2020);²⁰⁵ seabed sediment class layer from SHOM²⁰⁶).





Artisanal processors at their stall near the landing site in Fass Boye, Senegal.

7. Socio-economic impacts of bottom trawling

The unsustainable level of fishing pressure exerted by the Senegalese bottom trawl fleet and its continuous disregard for fishing regulations, and the resulting decline of fish populations, have intensified the competition over resources with small-scale fisheries, compounding the ongoing crisis of the artisanal fishing sector, and further threatening the livelihood of artisanal fishing communities. Competition over resources and fishing grounds has also exacerbated tensions, exposing fishers to high risks of collision with trawlers and other abuses inflicted at sea by the crew of trawlers, often with total impunity.

7.1 Competition between the artisanal sector and the bottom trawl industry

According to census data, in 2019 between 11,675 and 12,679 pirogues were equipped with gear used to catch demersal species (hook and lines, set longlines, set gillnets, bottom drift gillnets, trammel nets, and traps), with hook and line and set gillnets being the most commonly used gear types across the entire artisanal fleet.²⁰⁷ Based on the average crew size for each relevant gear type,²⁰⁸ it can be estimated that a total of about 50,000 fishers are targeting demersal species — which represents two thirds of Senegal's active fisher population.²⁰⁹

This puts artisanal fishers in direct competition with the bottom trawl industry, at several levels: competition over fish stocks (direct competition for demersal species

targeted by both fisheries, and indirect competition for species caught by trawlers as bycatch), spatial competition over fishing grounds, and competition over market share, in particular for the export market.²¹⁰ An analysis of landings data shows that the ten demersal species most commonly caught by artisanal fishers, representing on average over 30% of the total market value of landings from artisanal fisheries, make up on average 25% of landings from the Senegalese coastal demersal trawl fleet, and another 3% of landings from the deep-sea demersal trawl fleet (**Table 3**). The impact of bottom trawling on fish populations targeted by artisanal fishers is probably much higher when accounting for bycatch and discards (see **Section 6.1**).

The ten demersal species most commonly caught by artisanal fishers, representing on average over 30% of the total market value of landings from artisanal fisheries, make up on average 25% of landings from the Senegalese coastal demersal trawl fleet, and another 3% of landings from the deep-sea demersal trawl fleet.

Table 3: Overlap between artisanal and industrial demersal fisheries, showing the ten species (demersal and benthopelagic) most commonly caught by artisanal fisheries in 2017–2019, with corresponding mean share of total market value generated by artisanal fisheries, and mean share of landings from the coastal and deep-sea demersal trawl fleets (source: DPM).

Artisanal fishing fleet			Bottom trawlers, coastal demersal fleet	Bottom trawlers, deep-sea demersal fleet
Top species in landings	Mean proportion of landings (%)	Mean proportion of total commercial value (%)	Mean proportion of landings (%)	Mean proportion of landings (%)
Smoothmouth sea catfish (<i>Arius heudelotii</i>)	2.36	2.82	2.10	2.48
Largehead hairtail (<i>Trichiurus lepturus</i>)	1.73	4.12	0.90	0.02
Common octopus (<i>Octopus vulgaris</i>)	1.48	7.97	4.83	0.14
Bigeye grunt (<i>Brachydeuterus auritus</i>)	1.48	1.40	4.59	0.05
Soles (<i>Cynoglossus</i> spp.)	1.27	3.12	5.05	0.31
Bastard grunt (<i>Pomadasy incisus</i>)	1.23	2.46	1.36	0.02
Red pandora (<i>Pagellus bellottii</i>)	1.11	1.98	3.29	–
African neptune volute (<i>Cymbium pepo</i>)	1.10	1.00	0.16	–
Common cuttlefish (<i>Sepia officinalis</i>)	1.00	4.66	2.51	0.02
Banana mullet (<i>Mugil bananensis</i>)	0.90	1.70	0.13	–
TOTAL (%) =	13.66	31.23	24.92	3.03

7.2 Incursions of bottom trawlers into the zone reserved for artisanal fishing

Artisanal fishers and bottom trawlers also compete spatially over fishing grounds. The overwhelming majority of fishers interviewed by EJF (88%) reported that they had ‘very often’ or ‘often’ observed bottom trawlers fishing in or around their fishing grounds over the past year, and 94% reported that encounters with bottom trawlers had become ‘a lot more frequent’ or ‘more frequent’ compared to five years ago. This includes observations made within 6 NM of the coast, where bottom trawling is prohibited under Senegalese law. This is in spite of vessels presumably being covered by VMS, and is supported by AIS data on apparent trawler fishing effort within the IEZ during the period 2015–2022, which showed fishing hours by foreign vessels within the IEZ reached almost 1,000 hours in 2017 and for Senegalese vessels exceeded 750 hours annually in 2019 and 2020 (Figure 9).

Figure 9: Apparent fishing effort by bottom trawlers in the IEZ

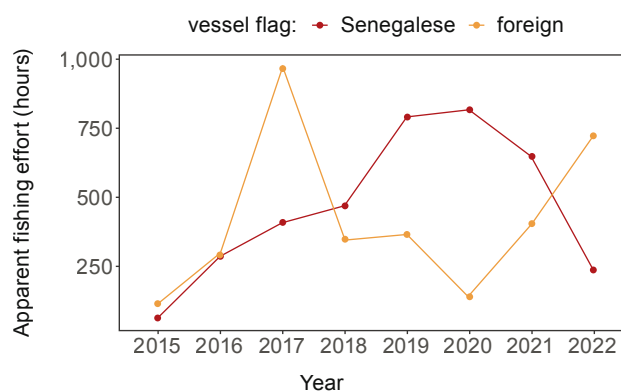


Figure 9: Apparent fishing effort by trawlers within the IEZ (6/7 NM from the coast) for the period 2015–2022, for vessels under Senegalese flag and foreign vessels, based on AIS data (source: GFW).

Although Senegal publishes some aggregated data on fisheries law enforcement, data on sanctions imposed for violations of fishing regulations are not made available to the public, therefore it was not possible to ascertain whether IEZ incursions by industrial vessels have been the subject of prosecutions by the Senegalese authorities. According to a government source, maximum fines applicable for offences committed by Senegalese-flagged vessels are too low to have a deterrent effect.

Competition over resources and fishing grounds is in turn exposing artisanal fishers to high risks of collision with trawlers and leading to the frequent destruction of fishing gear, threatening the livelihood of artisanal fishing communities and exacerbating tensions. 59% of fishers interviewed by EJF reported having been involved in an altercation with the crew of a bottom trawler.

“Sometimes it's very tense — they don't fight as such, but they shout at each other. That's because most of the time when the ships damage [the fishers'] nets, [the trawlers] just leave without stopping because the captain doesn't want to pay. He doesn't want the company to blame him. So when the captain damages their nets and sort of runs away, that's what makes them angry.”

Crew member, industrial trawler

According to testimony from industrial crew and artisanal fishers, competition and conflict between trawlers and pirogues are intensified as a result of trawlers illegally entering the area reserved for the artisanal fleet, with one crew member stating that trawlers would get so close to shore 'that you can see houses'. The same crew member indicated these incursions would happen when vessels were struggling to find fish within legal fishing zones:

“Sometimes it's when we go into deep water and we don't find any fish that we decide to approach the beach. When we get to the beach, after casting the net once or twice, sometimes we manage to get some small fish.”

Crew member, industrial trawler

When asked whether he thought the captain knew that it was prohibited to go within these zones, the crew member stated that 'He knows it very well, he knows that these are prohibited areas. But when we tell him, he says there is no problem'. Trawler crew suggested that vessels opted to fish within the IEZ at night, sometimes with their lights and satellite transponder off, so as to avoid detection from authorities:

The overwhelming majority of fishers interviewed by EJF (88%) reported that they had 'very often' or 'often' observed bottom trawlers fishing in or around their fishing grounds over the past year.

“They [captains] turn off the lights every time they enter the forbidden areas. They also turn off the lights when they destroy other pirogues and have to flee.”

Crew member, industrial trawler

Coastal fishers corroborate the details given by the industrial crew, stating that they see the vessels who come close to shore at night switching off their lights and covering their markings.

“They [industrial vessels] wait until night to go up to 4 or 5 km close to the shore and catch the fish. They flee towards dawn at around 7am. During the night, they turn on a torch and switch off their lamps. Because they're stealing.”

Artisanal fisher, Fass Boye

“They come in the night . . . they come here because they steal. Very often, they are there from around 9pm until 5am in the morning and then they escape . . . when they approach the zone, they cover the boat number . . . they cover it with something that resembles plastic.”

Artisanal fisher, Fass Boye

7.3 Destruction of pirogues and fishing gear

The intentional damaging of fishing gear or vessels belonging to others constitutes a serious offence under Senegalese law.²¹¹ Yet incidents involving collisions at sea and the destruction of fishing gear by trawlers appear pervasive, indicating a systematic pattern of disregard on the part of trawlers for the life and property

of artisanal fishers. 76.5% of respondents reported having had fishing gear (nets or lines) damaged or destroyed by a trawler, 17.6% reported having been personally involved in a collision with a trawler, and 59% had witnessed a collision with a trawler involving another pirogue. Respondents described how trawlers systematically fail to heed warning calls from fishers and to change course, forcing pirogues to move out of the way and abandon their nets and lines. The risk of collision is particularly high at night, when trawlers are reported to switch off their lights to avoid detection while fishing outside their legal fishing zone (see **Section 7.2** and **Box 5**).

76.5% of respondents reported having had fishing gear (nets or lines) damaged or destroyed by a trawler.

According to respondents, offenders are rarely identified and apprehended, so victims rarely receive compensation. Victims occasionally receive relief funds from the government, but the amount granted is insufficient to replace or repair damaged property and does not cover lost income. 85% of the fishers who had suffered damage to their property declared not having received adequate compensation (partial compensation or no compensation at all) for damaged property. According to official government statistics, 23 cases of destruction of artisanal fishing gear by bottom trawlers were recorded in 2021, for a total value of damaged property estimated at 71.5 million FCFA (US\$129,000), giving rise to 45 million FCFA (US\$81,000) in reparations.²¹² However, the true number of incidents and total damage are probably much higher due to underreporting. A number of respondents indicated not knowing how to report damaged gear, while other respondents who had filed a report with the DPSP said they did not hear back from the authorities and never received compensation for lost property. The number of deaths attributable to accidents involving trawlers is unknown, but according to government statistics 104 artisanal fishers died or were reported missing after an accident at sea in 2021.²¹³



Pirogues anchored inside the zone reserved for artisanal fishing off the Fass Boye beach, Senegal.

Box 5: Fatal collisions, destruction of property, and physical abuse by trawlers engaging in illegal fishing

The destruction of nets and pirogues can come at high costs for small-scale fishers, who reported having to spend days, weeks or even months onshore trying to mend nets and gather the financial backing to return to sea — all the while missing out on the fish they would normally catch, and the money they would make from fishing expeditions.

Sometimes the costs are higher still: EJF heard of instances in which fishers were severely injured or even lost their lives as a result of collisions with trawlers. One fisherman told EJF of a collision between his family's pirogue and a trawler that tragically killed four apprentice fishers, all of whom were staying in his house. Despite not being present on the pirogue at the time, the fisher spoke of the guilt he felt as a result of this accident and his sense of responsibility for those who lost their lives:

“They were fishers that came [from] elsewhere to work upon my responsibility. You know there is nothing harder than someone putting their children upon your responsibility for work and then you get a call that informs you that four died tragically. It is so hard. We lived a very hard year. It was very challenging, it was very traumatising.”

Another incident reported by respondents from Fass Boye and covered by local news²¹⁴ involved destruction on an unprecedented scale. On the night of 10 December 2019, the villagers witnessed a fleet of three large industrial trawlers dragging their nets within a short distance of the beach, despite the presence of numerous pirogues anchored in the area. Respondents described how one trawler caught a pirogue in its trawl, winched it on board to untangle the trawl, and threw it back into the water while keeping the nets and motor. When villagers drove towards the vessels in their pirogues in an attempt to mitigate the damage and recover their property, two trawlers fled the scene, and the crew of the remaining trawler threw boiling water at the villagers, injuring one respondent. The name and markings of the vessel were covered by a tarp to prevent identification. Eight pirogues as well as motors and nets were damaged or lost, for a total damage to property estimated at over 20 million FCFA (US\$34,000). A respondent who lost a pirogue that night says he used to own a purse seine and employ a crew of 30 — now, he can only afford to maintain a small pirogue with a reduced crew. The vessel and perpetrators were never identified.

More recently, overnight on 19 May 2023, and further north around Lompoul-sur-Mer where EJF supports participatory surveillance, a fishing trawler reportedly destroyed the fishing gear and pirogues of several artisanal fishers.²¹⁵ The fishers stopped the vessel and reported the case to the local authorities, but the fundamental tools of their livelihood have been destroyed.

8. Conclusion and recommendations

With increasing severity, coastal fishing communities in West Africa face a multitude of stressors threatening their livelihoods — including the impacts of overfishing, IUU fishing, pollution, and global heating. The poverty and precarity inflicted upon these communities, so often by wealthier foreign actors and as a result of global systems far beyond their control, is having devastating effects on wellbeing, food security and health. Research is increasingly indicating that the bottom trawl industry can both directly and indirectly contribute to all of these stressors. Furthermore, the close spatial proximity of many bottom trawl vessels means that small-scale fishers often find themselves in direct competition with large industrial trawlers for fishing grounds.

This report has sought to better illuminate the dynamics of the bottom trawl sector in Senegal, collating both primary and secondary data to provide a holistic view that depicts as accurately as possible the socio-economic and environmental implications of the sector. The bottom trawl industry is of course not entirely responsible for all of the ills that befall Senegal's coastal fishers and the health of the ocean — the presence of the fishmeal industry, overcapacity of the artisanal fleet, and decades of political and economic marginalisation are amongst the many factors that contribute — however the findings of this report make it clear that the industry plays no small part in the crisis of the artisanal sector, decimating marine ecosystems and the livelihoods of those who rely upon them. The bottom trawl industry is responsible for the frequent destruction of nets, imposing huge costs on artisanal fishers, for the discarding of large quantities of fish, contributing to the overexploitation of a number of important demersal fish populations, and for disturbing carbon stored in the seabed sediment, threatening to compound ocean acidification and to affect the ocean's ability to regulate the climate.

The true extent of the damage being caused by bottom trawling, and the identity of the corporations responsible, however, are obscured by the lack of transparency in Senegalese fisheries management, and in the global fishing industry more broadly. The 'Senegalisation' of almost the entire fleet, coupled with the ubiquitous use of joint ventures and a lack of public information on which vessels are licenced to fish in the country's waters, blurs understandings of who is ultimately profiting from the

industry and who should be accountable for mitigating the damage it causes. Moreover, there is a clear deficit of accurate and current data on, amongst other things, vulnerable habitats, fish populations and fishing effort across both the industrial and artisanal fleets.

It can be concluded from available information and through the investigations conducted for this report, that the EU and EU nationals are significant stakeholders within Senegal's bottom trawl industry — both in terms of capital investment into fishing operations and as a destination for seafood caught in Senegalese waters. This places an onus on the EU to ensure the legality and sustainability of trawling operations in Senegalese waters. Furthermore, it highlights the need to explore mechanisms to close loopholes through which EU nationals can enjoy the spoils of overexploited and unsustainable fisheries in contradiction to the sustainability ambitions of the EU's policies.

There also exists a significant Chinese presence within the industry, illustrative of the sharp and significant increase of Chinese on- and offshore investment in West African fisheries.²¹⁶ The region has been found to be a hotspot of the world's largest distant-water fleet,²¹⁷ and globally China's rhetorics of sustainability have often failed to reconcile with the unsustainable and sometimes illegal activities of its vessels.²¹⁸ The opacity of Senegal's fisheries sector provides an effective cloak for these behaviours, and the limited understanding of which Chinese vessels are operating in the country, and how, poses a threat to the health of Senegal's marine ecosystems.

In order to curtail the damage being done by the bottom trawl industry in Senegal, and to protect the country's coastal dwellers from spiralling poverty and hardship, there is much work to be done. This must start with dramatically improving transparency in fisheries management, and obtaining and sharing the requisite data so stakeholders can better gauge which interventions are required, and when. Difficult questions of cost and benefit distribution must also be addressed: Who is benefiting from the industry? How many lives would improve should the industry be subjected to stricter regulation or even phased out? What are the costs of continuing to host such a large number of bottom trawlers, and to whom? What might a 'just' transition away from bottom trawling look like in Senegal?

Recommendations

To the Senegalese government:

Prevent and mitigate environmental impacts

- Conduct an assessment of the maximum number of trawlers compatible with the sustainable management of demersal fisheries in line with the best available science on the status of fish populations. Pending the results of such assessment and as a matter of urgency, substantially reduce the number of licences granted for bottom trawling in accordance with the precautionary principle.
- Ensure that the number of licences is also commensurate with available monitoring, control and surveillance capacity and resources.
- Monitor and ensure compliance with the ban on the issuance of new coastal demersal fishing licences.
- Adopt and enforce species-specific bycatch regulations as required under the Decree no. 2016-1804 of 22 November 2016 implementing the Marine Fisheries Code. Enforce compliance with net restrictions and conduct a gear audit for trawl vessels with a view to informing improvements in net selectivity to reduce bycatch.
- Adopt and enforce a formal ban on bottom trawling in MPAs.
- Conduct further research into the impact of bottom trawling on habitats and ecosystems within the Senegalese EEZ with a view to identifying and effectively protecting sensitive areas, including through the establishment of MPAs.

Improve transparency

- Improve transparency in the management of the trawl fleet, and in fisheries management more broadly. The Global Fisheries Transparency Coalition outlines ten transparency principles in the [Global Charter for Fisheries Transparency](#) that are suitable for every country and can be immediately adopted.²¹⁹ The priority for the Senegalese government should be to publish organised and up-to-date lists of vessels authorised to fish in Senegalese waters, including information on licence type and beneficial ownership, to improve the quality and accessibility of catch and landings data, and to mandate IMO numbers for all eligible vessels flying the Senegalese

flag. In addition, fishing companies should be subject to the obligations set out in the Decree no. 2020-791 of 19 March 2020 pertaining to the beneficial ownership register.

- Complete the process to become a Fisheries Transparency Initiative (FiTI) candidate country, following the public commitment made by the President of the Republic of Senegal, in February 2016, during the 1st FiTI International Conference in Nouakchott, Mauritania.
- Investigate joint venture arrangements in the Senegalese trawl sector to ensure arrangements are bona fide. Reform the conditions for the granting of Senegalese nationality under the Maritime Code to introduce *inter alia* stricter and more transparent evidentiary requirements (e.g., concerning beneficial ownership and repatriation of profits) to ensure that joint venture provisions are not abused to allow foreign operators to effectively access Senegalese fisheries resources under preferential arrangements via the local flag with limited to no participation or involvement of local actors. Such actions should be aimed at identifying arrangements that are contrary to Article 91 of UNCLOS which requires existence of a genuine link between a vessel and its flag state, and thereby at preventing Senegal from becoming a flag of convenience.

Improve monitoring, control and surveillance, and provide for effective and dissuasive sanctions for IUU fishing

- Improve surveillance to monitor compliance with applicable regulations, in particular by ensuring full coverage of the trawler fleet by observers and rolling out on-board CCTV and other remote electronic monitoring techniques to supplement the observer programme. Increase at-sea and in-port vessel inspections for the trawl fleet.
- Amend the Marine Fisheries Code in line with relevant international legal instruments and best practices to, *inter alia*, increase the maximum fine for fishing offences and, more broadly, ensure that investigations and proceedings are carried out expeditiously and sanctions applicable in respect of violations are adequate in severity to be effective in securing compliance and to discourage violations wherever they occur and deprive offenders of the benefits accruing from their illegal activities.

Protect and promote artisanal fisheries

- Expand the IEZ reserved for artisanal fishing activities to better reflect current patterns of fishing activity by the artisanal fleet. Ensure that the boundary of the IEZ is fully enforced and incursions are punished with effective, proportionate and dissuasive sanctions.
- Provide for effective remedies for victims of damage caused at sea by industrial fishing vessels, including adequate compensation.
- Ensure the meaningful and effective participation of small-scale fishing communities in the negotiation of industrial fishing licences and foreign access agreements.
- Prioritise implementation of measures to improve sustainable fisheries management and secure access for small-scale fishers and fish workers to fisheries resources and markets.
- Undertake extensive studies of coastal livelihoods to develop a nuanced understanding of the multiple and interacting vulnerabilities that communities are facing with a view to reducing precarity and devising alternative or supplementary livelihood options where necessary. Ensure that such studies are conducted in a truly participatory manner, making every effort to be inclusive of marginalised groups within communities, including women and the elderly.

Restructure fisheries management

- In light of the negative externalities of the bottom trawl industry, as well as the limited and concentrated nature of the benefits derived, consider ending subsidies and other commercial incentives, including tax breaks, for the bottom trawl industry in Senegal and providing support to operators for a fair transition to more sustainable activities.
- Ensure that national fisheries are structured in such a way as to support local communities and national food security, in line with Senegal's national development plan (*Plan Sénégal émergent*). Redouble efforts to ensure down-stream values in the processing and marketing sectors are captured within the country to maximise its benefits.
- Actively promote and participate in the sustainable management of shared small pelagic and demersal fish populations in West Africa and, to that end, strive towards the establishment of a regional fisheries management organisation.

To EU member states, the European Commission and importers of fisheries products in the EU:

- Member states should increase scrutiny of catch certificates for fisheries imports stemming from Senegal into the EU market to ensure legal origin, in accordance with Articles 16 and 17 of Council Regulation (EC) no. 1005/2008 (EU IUU Regulation) — in particular Spain, Italy and Portugal, which receive fish products produced by Senegal's bottom trawl fleet.
- Member state governments should cooperate with the government of Senegal to identify participation of their nationals in Senegal's bottom trawl sector, and ensure appropriate action, including sanctions, is taken with respect to nationals found to have engaged in or supported IUU fishing, in accordance with Article 39(3) of the EU IUU Regulation. Information on vessels owned by EU nationals that have reflagged to Senegal should be submitted to the European Commission, in accordance with Article 40(4) of the EU IUU Regulation.
- In the context of its zero-tolerance approach towards IUU fishing, the European Commission is urged to reinforce scrutiny over the performance of Senegal in fighting this phenomenon and in addressing the illegal fishing practices described in this report. The European Commission should be prepared to use all tools foreseen under the EU IUU Regulation if it is demonstrated that Senegal has failed to discharge its duties under international law as flag, port, coastal or market state and to remedy this situation.
- The European Commission should bring, through the appropriate channels, IUU fishing risks to the attention of EU Member States, particularly those states that receive the majority of imports of fisheries products caught by Senegal's industrial bottom trawl fleet, requiring them to increase scrutiny of fisheries trade flows stemming from that sector.
- The European Commission is advised to ensure that any future renewed Protocol on the implementation of the EU-Senegal SFPA scrupulously meets the principles and objectives of Article 31 of the Common Fisheries Policy and incorporates strengthened and effectively implemented transparency, non-discrimination and human rights clauses.
- EU importers of fisheries products from Senegal's trawl sector are advised to scrutinise their supply chains to ensure that products are caught in accordance with applicable laws and regulations and that their sourcing policies are not driving overfishing and the destruction of marine ecosystems within Senegal's waters, to the detriment of artisanal fishing communities.

To the government of the People's Republic of China.²²⁰

- Cooperate with the government of Senegal where relevant to identify the beneficial ownership of vessels with a suspected link to Chinese entities and operating under the Senegalese flag, so as to ensure any violations of national or regional fisheries conservation and management measures are levied against the appropriate parties and proportionate to the size of the organisation.
- The Chinese relevant authorities should conduct a review of the Chinese-flagged and Chinese-owned fishing vessels operating in Senegal and ensure that they are duly registered by MARA as offshore fisheries projects, as required under Chinese law.
- Adopt minimum transparency requirements for distant-water fishing activities, including the development of a publicly accessible and searchable database of Chinese-owned distant water fishing vessels, including information on beneficial ownership.

To the governments and industry in other major markets for fisheries products from Senegal:

- Mandate the adoption of robust import control schemes that include all necessary key data elements and build on best practices to ensure seafood is legal and traceable throughout the supply chain.²²¹
- Where market states have import control schemes in place to address IUU fishing, governments are advised to increase scrutiny of imports of fisheries products from Senegal to ensure legal origin.
- Importers of fisheries products from Senegal's trawl sector are advised to scrutinise their supply chains to ensure that products are caught in accordance with applicable laws and regulations and that their sourcing policies are not driving overfishing and the destruction of marine ecosystems within Senegal's waters, to the detriment of artisanal fishing communities.

References

- Steadman, D., Thomas, J. B., Rivas Villanueva, V., Lewis, F. et al. (2021) *New perspectives on an old fishing practice: Scale, context and impacts of bottom trawling*, Blue Ventures, <https://oursharedseas.com/wp-content/uploads/2021/12/HI-RES-REPORT-%E2%80%98New-perspectives-on-an-old-fishing-practice.pdf>.
- See: Sala, E., Mayorga, J., Bradley, D., Cabral, R. B. et al. (2021) 'Protecting the global ocean for biodiversity, food and climate', *Nature*, 592, pp. 397–402, <https://doi.org/10.1038/s41586-021-03371-z>; Black, K., Smeaton, C., Turrell, W. & Austin, W. E. N. (2022) 'Assessing the potential vulnerability of sedimentary carbon stores to bottom trawling disturbance within the UK EEZ', *Frontiers in Marine Science*, 9, 892892, <https://doi.org/10.3389/fmars.2022.892892>; Smeaton, C. & Austin, W. E. N. (2022) 'Quality not quantity: Prioritizing the management of sedimentary organic matter across continental shelf seas', *Geophysical Research Letters*, 49, e2021GL097481, <https://doi.org/10.1029/2021GL097481>; Rociffé, S. & Leeney, R. H. (2021) *Research briefing: Bottom trawling and the climate crisis*, Blue Ventures, <https://blueventures.org/bottom-trawling-and-the-climate-crisis-research-briefing/>.
- See: WWF (2020) *A Sea under Pressure: Bottom Trawling Impacts in the Baltic*, https://wwfbalticprogramme.cdn.triggerfish.cloud/uploads/2022/11/15091225/wwf-baltic-a-sea-under-pressure_impacts-of-bottom-trawling-2020.pdf; and Steadman, D., Thomas, J. B., Rivas Villanueva, V., Lewis, F. et al. (2021) *New perspectives on an old fishing practice: Scale, context and impacts of bottom trawling*, Blue Ventures, <https://oursharedseas.com/wp-content/uploads/2021/12/HI-RES-REPORT-%E2%80%98New-perspectives-on-an-old-fishing-practice.pdf>.
- Steadman, D., Thomas, J. B., Rivas Villanueva, V., Lewis, F. et al. (2021) *New perspectives on an old fishing practice: Scale, context and impacts of bottom trawling*, Blue Ventures, <https://oursharedseas.com/wp-content/uploads/2021/12/HI-RES-REPORT-%E2%80%98New-perspectives-on-an-old-fishing-practice.pdf>.
- See: EJF (2021) *A human rights lens on the impacts of industrial illegal fishing and overfishing on the socio-economic rights of small-scale fishing communities in Ghana*, <https://ejf.org/reports/a-human-rights-lens-on-the-impacts-of-industrial-illegal-fishing-and-overfishing-on-the-socio-economic-rights-of-small-scale-fishing-communities-in-ghana>; and DuBois, C. & Zografos, C. (2012) 'Conflicts at sea between artisanal and industrial fishers: Inter-sectoral interactions and dispute resolution in Senegal', *Marine Policy*, 36, pp. 1211–1220, <https://doi.org/10.1016/j.marpol.2012.03.007>.
- Pauly, D., Belhabib, D., Blomeyer, R., Cheung, W. et al. (2014) 'China's distant-water fisheries in the 21st century', *Fish and Fisheries*, 15, pp. 474–488, <https://doi.org/10.1111/faf.12032>.
- EJF (2020) *Off the hook: How flags of convenience let illegal fishing go unpunished*, <https://ejf.org/reports/off-the-hook-how-flags-of-convenience-let-illegal-fishing-go-unpunished>; Stimson Center (2019) *Shining a Light: The Need for Transparency across Distant Water Fishing*, <https://www.stimson.org/wp-content/files/file-attachments/Stimson%20Distant%20Water%20Fishing%20Report.pdf>.
- See: EJF (2022) *On the precipice: Crime and corruption in Ghana's Chinese-owned trawler fleet*, <https://ejf.org/reports/on-the-precipice-crime-and-corruption-in-ghanas-chinese-owned-trawler-fleet>; and Greenpeace (2015) *Africa's fisheries' paradise at a crossroads: Investigating Chinese Companies' illegal fishing practices in West Africa*, <https://ibdigital.uib.es/greenstone/collect/cdz/index/assoc/gp0147.dir/gp0147.pdf>.
- Belhabib, D., Sumaila, U. R. & Pauly, D. (2015) 'Feeding the poor: contribution of West African fisheries to employment and food security', *Ocean Coastal Management*, 111, pp. 72–81, <https://doi.org/10.1016/j.ocecoaman.2015.04.010>.
- FAO (2020) 'Coastal Fisheries Initiative: Promoting sustainable fisheries in coastal areas', <https://www.fao.org/3/cb1210en/CB1210EN.pdf>.
- Cohen, P., Allison, E., Andrew, N., Cinner, J. et al. (2019) 'Securing a just space for small-scale fisheries in the blue economy', *Frontiers in Marine Science*, 6, 171, <https://doi.org/10.3389/fmars.2019.00171>.
- Changing Markets Foundation & Greenpeace Africa (2021) *Feeding a monster: How European aquaculture and animal feed industries are stealing food from West African communities*, <http://changingmarkets.org/wp-content/uploads/2021/05/Feeding-a-Monster-EN-low-res.pdf>.
- Ibid.
- Calculated from landings reports issued annually by the Senegalese government: DPM, *Résultats généraux des pêches maritimes* [on file with EJF].
- FAO (2021) *FAO Yearbook. Fishery and Aquaculture Statistics 2019*, <https://doi.org/10.4060/cb7874t>.
- Dème, B., Dème, M., & Failler, P. (2022) 'Small pelagic fish in Senegal: a multi-usage resource', *Marine Policy*, 141, 105083, <https://doi.org/10.1016/j.marpol.2022.105083>.
- Available at <https://globalfishingwatch.org/map>. Apparent fishing effort derived from AIS data may be overestimated due to false positives, and/or underestimated as GFW data sets may be lacunary (GFW data notably does not include activity by vessels that do not transmit AIS, for example if they switch off their transponder while engaging in illegal fishing).
- République du Sénégal (2018) *Plan Sénégal émergent, Plan d'actions prioritaires 2019–2023*, <https://www.sentresor.org/publication/plan-senegal-emergent-plan-dactions-prioritaires-2019-2023/>.
- ANSD (2015) *Situation économique et sociale du Sénégal en 2012 – Chapitre XII: Pêche maritime*, https://www.ansd.sn/sites/default/files/2023-03/12-peche-SESN2012_o.pdf.
- ANSD (2020) *Situation économique et sociale du Sénégal 2017–2018 – Chapitre XII: Pêche maritime*, https://www.ansd.sn/sites/default/files/2023-03/12-SES-2017-2018_Peche-aquaculture_o.pdf. However, the per capita fish supply has declined in recent years, down to about 19 kg; see FAO (2021) *FAO Yearbook. Fishery and Aquaculture Statistics 2019*, <https://doi.org/10.4060/cb7874t>.
- Dème, B. & Failler, P. (2022) 'Public policies to support artisanal fishing in Senegal: Between inconsistency and perverse effects', *Marine Policy*, 138, 105012, <https://doi.org/10.1016/j.marpol.2022.105012>.
- Mbaye, A. (2018) *Situation socioéconomique des petits pélagiques au Sénégal*, CRODT, http://intranet.isra.sn/aurifere/opac_css/docnum/IS200024.pdf.
- DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- Dème, M., Inejih, A. O. & Baldé, B. M. (2019) *Importance économique, sociale et écologique des petits pélagiques au Sénégal, en Mauritanie et en Guinée Bissau – Rapport d'étude, Partenariat Régional pour la Conservation de la Zone Côtière et Marine*, <https://mava-foundation.org/wp-content/uploads/2020/02/Rapport-detude-sur-la-valeur-des-petits-p%C3%A9lagiques-PRCM-201908-Web.pdf> (accessed 15 March 2023).
- A 2006 independent assessment estimated the total number of jobs directly related to the artisanal fisheries sector at 116,000; see WWF (2006) *L'évaluation des emplois dans les pêcheries artisanales maritimes sénégalaises*, <https://www.wfwamposite.wordpress.com/2011/12/18/evaluation-des-emplois-dans-les-pecheries-artisanales-maritimes-senegalaises/>.
- Based on an estimated labour force of 5,198,745 people according to 2022 World Bank data: The World Bank (n.d.) 'Data Bank - World Development Indicators', <https://databank.worldbank.org/source/world-development-indicators> (accessed 30 June 2023).
- Ministère de la Pêche et des Affaires maritimes (2013) *Conseil interministériel sur la pêche, document introductif*, <https://www.aprapam.org/images/migrate/2013/07/document-introductif-du-conseil-inter-ministeriel-sur-la-peche-version-final.pdf>.
- WWF (2006) *L'évaluation des emplois dans les pêcheries artisanales maritimes sénégalaises*, <https://www.wfwamposite.wordpress.com/2011/12/18/evaluation-des-emplois-dans-les-pecheries-artisanales-maritimes-senegalaises/>.
- ANSD (2022) *Comptes nationaux semi-définitifs de 2021 et définitifs de 2020*, <https://www.ansd.sn/Indicateur/produit-interieur-brut-annuel-base-2014>.
- ANSD (2015) *Élaboration du compte satellite de la pêche au Sénégal, Résultats provisoires*, <https://anads.ansd.sn/index.php/catalog/131>.
- Calculated from ANSD (2018) *Résultats des comptes nationaux rénovés 2016*, <https://www.ansd.sn/Indicateur/produit-interieur-brut-annuel-base-2014>.
- Calculated from ANSD (2015) *Élaboration du compte satellite de la pêche au Sénégal, Résultats provisoires*, <https://anads.ansd.sn/index.php/catalog/131>.
- See official publications of the ANSD, *Comptes nationaux définitifs*, for the years 2016 to 2021, online: <https://www.ansd.sn/Indicateur/produit-interieur-brut-annuel-base-2014>, and *Situation économique et sociale du Sénégal*, for the years 2006 to 2018, online: <https://www.ansd.sn/Indicateur/sesnchapitre-peche>. Disaggregated estimates for the extended fisheries value chain are not available.
- Ka, R. & Gueye, E. (2020) *La pêche artisanale face aux défis de la covid-19 au Sénégal*, Initiative prospective agricole et rurale, https://www.ipar.sn/IMG/pdf/rapport_final_peche_et_covid-19_vf.pdf.
- DPM, *Résultats généraux des pêches maritimes* for the years 2010 to 2019. Note that a fraction of reported landings come from outside the Senegalese EEZ.
- Ibid.
- Belhabib, D., Koutob, V., Sall, A., Lam, V. W. Y. et al. (2014) 'Fisheries catch misreporting and its implications: The case of Senegal', *Fisheries Research*, 151, pp. 1–11, <https://doi.org/10.1016/j.fishres.2013.12.006>. EJF also notes that independent estimates of landings from artisanal fisheries conducted by the CRODT are markedly higher than values reported in official government publications.
- European Commission, Directorate-General for Maritime Affairs and Fisheries (2019) *Évaluation rétrospective et prospective du protocole à l'accord de partenariat dans le domaine de la pêche durable entre l'Union européenne et la République du Sénégal – Rapport final*, <https://op.europa.eu/en/publication-detail/-/publication/64f8d28e-60bb-11e9-b6eb-01aa75ed71a1>.
- Thiam, N., Fall, M. & Thiaw, M. (2014) *Évaluation de la capacité et de l'effort de pêche industrielle démersale côtière*, DPM [updated final version on file with EJF; a previous version is available online at http://intranet.isra.sn/aurifere/opac_css/docnum/OC1702403.pdf].
- The University of British Columbia, Sea Around Us, <https://www.seaaroundus.org/data/#/eez/686/stock-status>; data from Belhabib, D., Baio, A., Camara, O. T., Copeland, D. et al. (2020) 'Updating to 2018 the catch reconstructions for 14 countries of the West African mainland', in Derrick, B., Khalfallah, M., Relano, V., Zeller, D. et al. (eds) *Updating to 2018 the 1950–2010 Marine Catch Reconstructions of the Sea Around Us: Part I – Africa, Antarctica, Europe and the North Atlantic*, *Fisheries Centre Research Report*, vol. 28, pp. 115–147.
- CECAF (2020) *Report of the Working Group on the Assessment of Small Pelagic Fish off Northwest Africa, Casablanca, Morocco, 8–13 July 2019*, FAO Fisheries and Aquaculture Report no. 1309/FAO, <https://www.fao.org/3/ca9562b/CA9562B.pdf>. See also: CECAF (2022) *Small pelagic fish Working Group North 2022 – meeting summary*, Doc. CECAF/SSCIX/2022/4a, <https://www.fao.org/3/cc3286b/cc3286b.pdf>; CRODT (2020) *État actuel des stocks halieutiques exploités dans la ZEE Sénégalaise*, <https://www.aprapam.org/storage/articles/June2020/qBjVlcnbKwysBPU624.pdf>.
- DITP (n.d.) *Rapport statistique des exportations de produits de la pêche, année 2019*, <https://aquadocs.org/bitstream/handle/1834/42030/Rapport%20statistique%20annuel%20DITP-2019.pdf?sequence=1&isAllowed=y>.

- 43 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 44 Freezing in water is estimated to increase wet weight by a maximum of ca. 10–15%: see Crane, D. P., Killourhy, C. C. & Clapsadl, M. D. (2016) 'Effects of three frozen storage methods on wet weight of fish', *Fisheries Research*, 175, pp. 142–147, <https://doi.org/10.1016/j.fishres.2015.11.022>
- 45 According to a DPM official, artisanal fisheries landings from the Thiès region destined for industrial processing and export are incorrectly categorised as being destined for the local market in Dakar. About 90% of the reported volumes are in fact destined for industrial processing.
- 46 Dème, B., Diédhiou, I. & Failler, P. (2020) 'Dynamique des exportations de produits halieutiques du Sénégal et les impacts sur l'approvisionnement du marché local', *Dynamiques environnementales*, no. 46, pp. 24–42, <https://doi.org/10.4000/dynenviron.2760>.
- 47 ANSD (2021) *Note d'analyse de commerce extérieur, édition 2021*, <https://www.ansd.sn/Indicateur/note-danalyse-du-commerce-exterieur-nace>.
- 48 *Ibid.*
- 49 DITP (n.d.) *Rapport statistique des exportations de produits de la pêche, année 2020*, <https://aquadocs.org/bitstream/handle/1834/42032/Rapport%20statistique%20annuel%20DITP-2020.pdf?sequence=1&isAllowed=y>.
- 50 *Ibid.*
- 51 *Ibid.*
- 52 Data reported by Senegal in UN Comtrade under HS code 230120; data reported by Spain in Eurostat-Comext under HS code 23012000 for the year 2022.
- 53 DITP (2022) *Liste des entreprises de pêche (mise à jour au 31 décembre 2022)*, <https://ditp.sec.gouv.sn/sites/default/files/docs/Liste%20des%20%C3%A9tablissements%20agr%C3%A9%C3%A9s%20%C3%A0%20l'exportation%20au%2031%20d%C3%A9cembre%202022%20.pdf>.
- 54 International Trade Centre data, reported in Thiao, D. & Bunting, S. W. (2022) *Socio-economic and biological impacts of the fish-based feed industry for sub-Saharan Africa*, FAO Fisheries and Aquaculture Circular no. 1236, Rome: UN FAO, <https://doi.org/10.4060/cb7990en>. Fishmeal production reported in official government statistics is believed to be underestimated: see and compare DITP (n.d.) *Rapport statistique des exportations de produits de la pêche, année 2020*, <https://aquadocs.org/bitstream/handle/1834/42032/Rapport%20statistique%20annuel%20DITP-2020.pdf?sequence=1&isAllowed=y>.
- 55 Péron, G., Mittaine, J.-F. & Le Gallic, B. (2010) 'Where do fishmeal and fish oil products come from? An analysis of the conversion ratios in the global fishmeal industry', *Marine Policy*, 34, pp. 815–820, <https://doi.org/10.1016/j.marpol.2010.01.027>.
- 56 Dème, B. & Dème, M. (2021) 'Mise en marché des petits pélagiques côtiers au Sénégal : formes de valorisation et enjeux autour de la ressource', *EchoGéo*, no. 58, <https://doi.org/10.4000/echogeo.22771>; Thiao, D. & Bunting, S. W. (2022) *Socio-economic and biological impacts of the fish-based feed industry for sub-Saharan Africa*, FAO Fisheries and Aquaculture Circular no. 1236, Rome: UN FAO, <https://doi.org/10.4060/cb7990en>.
- 57 Based on reported landings data for 2019: see DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 58 Dème, M. & Kébé, M. (2000) *Revue sectorielle de la pêche au Sénégal, aspects socio-économiques*, CRODT, <https://aquadocs.org/bitstream/handle/1834/184/RevueSectorielle.pdf>; Ekpu, G. & Whittle, P. (2023) 'Senegal struggles with loss of fish central to diet, culture', Associated Press, April 6, <https://apnews.com/article/overfishing-senegal-africa-grouper-fish-seafood-climate-56ab28781307b88026c618ffdf6f257>.
- 59 Dème, B., Diédhiou, I. & Failler, P. (2020) 'Dynamique des exportations de produits halieutiques du Sénégal et les impacts sur l'approvisionnement du marché local', *Dynamiques environnementales*, no. 46, pp. 24–42, <https://doi.org/10.4000/dynenviron.2760>. The reduced per capita availability of fish products is also attributable in part to demographic growth.
- 60 Cai, J. & Leung, P. S. (2017) *Short-term projection of global fish demand and supply gaps*, FAO Fisheries and Aquaculture Technical Paper no. 607, Rome: UN FAO, <https://www.fao.org/3/i7623e/i7623E.pdf>.
- 61 Dème, B. & Failler, P. (2022) 'Public policies to support artisanal fishing in Senegal: Between inconsistency and perverse effects', *Marine Policy*, 138, 105012, <https://doi.org/10.1016/j.marpol.2022.105012>.
- 62 Cited in Confédération africaine des organisations de pêche artisanale & Réseau des journalistes pour une pêche responsable et durable en Afrique de l'Ouest (2016) *Voices from African Artisanal Fishers*, https://www.researchgate.net/publication/307852974_Voices_from_African_Artisanal_Fisheries.
- 63 Loi n° 2015-18 du 13 juillet 2015 portant Code de la Pêche maritime.
- 64 Décret n° 2016-1804 du 22 juillet 2016 portant application de la Loi n° 2015-18 du 13 juillet 2015 portant Code de la Pêche maritime.
- 65 Loi n° 2002-22 du 16 août 2002 portant Code de la Marine marchande, Art. 90.
- 66 Code de la Pêche maritime, Art. 27.
- 67 Code général des impôts, Art. 633(I).
- 68 By contrast, a central beneficial ownership register, kept by the Senegalese judiciary, has been established for companies in the extractive (i.e. oil and gas, and mining) sector, and may be accessed upon request by any person demonstrating a legitimate interest (Décret n° 2020-791 du 19 mars 2020 relatif au registre des bénéficiaires effectifs, Art. 12).
- 69 Code de la Pêche maritime, Art. 34.
- 70 Décret n° 2016-1804 du 22 juillet 2016, Art. 2.
- 71 *Ibid.*, Art. 9.
- 72 Code de la Pêche maritime, Art. 57.
- 73 Arrêté ministériel n° 5308 du 07 avril 2015 abrogeant et remplaçant l'arrêté n° 5916 du 25 octobre 2005 portant instauration d'un permis de pêche artisanale.
- 74 Décret n° 2016-1804 du 22 juillet 2016, Art. 17 and 45–51.
- 75 *Ibid.*, Art. 45 and 46.
- 76 *Ibid.*
- 77 *Ibid.*, Art. 48.
- 78 Arrêté interministériel n° 1965 du 4 mars 2010 portant sur les montants des redevances et les modalités de paiement des licences de pêche industrielle pour les navires battant pavillon sénégalais et les navires affrétés pour l'année 2010.
- 79 Code de la Pêche maritime, Art. 33(h).
- 80 Décret n° 2016-1804 du 22 juillet 2016, Art. 25–28 and 29–37, respectively.
- 81 *Ibid.*, Art. 38.
- 82 *Ibid.*, Art. 52.
- 83 Arrêté n° 019392 du 3 juin 2021 fixant, pour l'année 2021, la période de repos biologique pour les chalutiers poissonniers de pêche démersale profonde exerçant dans les eaux sous juridiction sénégalaise.
- 84 Arrêté n° 032763 du 6 octobre 2021 fixant, pour l'année 2021, la période de repos biologique pour les chalutiers de pêche démersale et de pêche pélagique côtières exerçant dans les eaux sous juridiction sénégalaise.
- 85 Décret n° 2016-1804 du 22 juillet 2016, Art. 43.
- 86 Direction des aires marines communautaires protégées (n.d.) 'Les aires marines protégées', <https://www.damcp.gouv.sn/les-amp> (accessed 26 June 2023). This includes five estuarine MPAs which are not at risk of being impacted by bottom trawling.
- 87 Code de la Pêche maritime, Art. 123.
- 88 *Ibid.*, Art. 125.
- 89 *Ibid.*, Art. 127.
- 90 *Ibid.*, Art. 124, 126, and 129.
- 91 *Ibid.*, Art. 123–129.
- 92 *Ibid.*, Art. 135.
- 93 Code de la Marine marchande, Art. 96.
- 94 Décret n° 2018-1292 du 16 juillet 2018 portant organisation du Ministère de la Pêche et de l'Économie maritime, Art. 18.
- 95 Arrêté n° 002210 du 6 février 2019 portant organisation et fonctionnement de la Direction de la Protection et de la Surveillance des Pêches.
- 96 Code de la Pêche maritime, Art. 72.
- 97 Arrêté n° 007958 du 5 décembre 2005 portant organisation et fonctionnement du système de positionnement et de localisation des navires de pêche opérant dans les eaux sous juridiction sénégalaise.
- 98 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 99 *Ibid.*
- 100 See: Niasse, M. L. & Seck, M. (2011) *L'accaparement des ressources marines ouest africaines : Sociétés mixtes de façade et licences de complaisance. Expériences du Sénégal et de la Mauritanie*, Evangelische Entwicklungsdienst, Coalition pour des accords de pêche équitables & Confédération africaine des organisations de pêche artisanale, <https://aquadocs.org/handle/1834/4574>; Greenpeace (2015) *Scam on the African Coast: The Hidden Face of Chinese and Joint-Venture Vessels Tonnage Fraud in Senegal, Guinea Bissau and Guinea*, <https://www.greenpeace.org/static/planet4-africa-stateless/2018/10/9b77bf5d-9b77bf5d-scam-on-the-african-coast-final-proof1.pdf>; Coalition for Fair Fisheries Arrangements (2020) *Investment and transparency in EU-Africa fisheries relations: what about joint ventures?*, <https://www.cffacape.org/publications-blog/q2nriapby782wqmauibptr43x1ku>.
- 101 Calculated from DPM, *Résultats généraux des pêches maritimes* for the years 2010–2019.
- 102 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 103 *Ibid.* The exact proportions of landings respectively destined for the export and local markets could not be reliably quantified.
- 104 European Commission (n.d.) 'Senegal: Sustainable fisheries partnership agreement with Senegal', https://oceans-and-fisheries.ec.europa.eu/fisheries/international-agreements/sustainable-fisheries-partnership-agreements-sfpas/senegal_en (accessed 26 June 2023).
- 105 Calculated from DPM, *Résultats généraux des pêches maritimes* for the years 2015 to 2019.
- 106 European Commission, Directorate-General for Maritime Affairs and Fisheries (2019) *Évaluation rétrospective et prospective du protocole à l'accord de partenariat dans le domaine de la pêche durable entre l'Union européenne et la République du Sénégal – Rapport final*, <https://op.europa.eu/en/publication-detail/-/publication/64f8d28e-60bb-11e9-b6eb-01aa75e71a1>.
- 107 Thiam, N., Fall, M. & Thiaw, M. (2014) *Évaluation de la capacité et de l'effort de pêche industrielle démersale côtière*, DPM [updated final version on file with EJF; a previous version is available online at http://intranet.isra.sn/aurifere/opac_css/docnum/OC1702403.pdf].
- 108 Based on the number of active vessels reported in DPM, *Résultats généraux des pêches maritimes*. Unfortunately fleet size data for previous years does not distinguish between the coastal demersal and deep-sea demersal fleets.
- 109 Thiam, N., Fall, M. & Thiaw, M. (2014) *Évaluation de la capacité et de l'effort de pêche industrielle démersale côtière*, DPM [updated final version on file with EJF; a previous version is available online at http://intranet.isra.sn/aurifere/opac_css/docnum/OC1702403.pdf].

- 110 Arrêté n° 005166 du 8 août 2006 portant gel des licences de pêche démersale côtière.
- 111 European Commission, Directorate-General for Maritime Affairs and Fisheries (2019) *Évaluation rétrospective et prospective du protocole à l'accord de partenariat dans le domaine de la pêche durable entre l'Union européenne et la République du Sénégal – Rapport final*, <https://op.europa.eu/en/publication-detail/-/publication/64f8d28e-60bb-11e9-b6eb-01aa75ed71a1>. See also: GAIPES (2020) 'Lettre ouverte du GAIPES à Monsieur Alioune NDOYE, Ministre des Pêches et de L'Economie maritime sur 52 demandes de promesses de licences de pêche destinées à des navires chinois', 16 April 2020, <https://www.aprapam.org/publication/l-actualite-d-aprapam/lettre-ouverte-du-gaipes-a-monsieur-alioune-ndoye-ministre-des-peches-et-de-l-economie-maritime-sur-52-demandes-de-promesses-de-licences-de-peche-destinees-a-des-navires-chinois> (accessed 30 June 2023).
- 112 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 113 European Commission, Directorate-General for Maritime Affairs and Fisheries (2019) *Évaluation rétrospective et prospective du protocole à l'accord de partenariat dans le domaine de la pêche durable entre l'Union européenne et la République du Sénégal – Rapport final*, <https://op.europa.eu/en/publication-detail/-/publication/64f8d28e-60bb-11e9-b6eb-01aa75ed71a1>.
- 114 Barange, M., Pillar, S. C., Huse, I. & Hutchings, L. (2005) 'Vertical migration, catchability and acoustic assessment of semi-pelagic Cape horse mackerel *Trachurus trachurus capensis* in the southern Benguela', *African Journal of Marine Science*, 27, pp. 459–469, <https://doi.org/10.2989/18142320509504104>.
- 115 Greenpeace (2015) *Africa's fisheries paradise at a crossroads: investigating Chinese companies' illegal fishing practices in West Africa*, <https://wayback.archive-it.org/9650/20200403031825/http://p3-raw.greenpeace.org/africa/en/Press-Centre-Hub/Publications/Africas-fisheries-paradise-at-a-crossroads/>.
- 116 C4ADS (2023) *Sea Shells: Developing beneficial ownership transparency in the fishing industry*, <https://c4ads.org/issue-briefs/sea-shells/>.
- 117 Data reported by Senegal in FAO FishStat, under demersal fish (whole and fillets, fresh and frozen), excluding dogfish and other sharks and toothfish; shrimps and prawns, including Norway lobsters, cuttlefish and squid and octopus.
- 118 In 2019, the bottom trawl fleet landed a total of 31,283 tonnes of fish, and it was reported that the production of the industrial fleet as a whole was 'essentially' destined for the export market, and 'to a lesser extent' for the local market: see DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 119 DITP (2022) *Liste des entreprises de pêche (mise à jour au 31 décembre 2022)*, <https://ditp.sec.gouv.sn/sites/default/files/docs/Liste%20des%20%C3%A9tablissements%20agr%C3%A9%C3%A9s%20%C3%A0%20l%27exportation%20au%2031%20d%C3%A9cembre%202022%20.pdf>. While this list does not specify gear type, EJF confirmed this by cross-referencing vessel names to the 2019 licence list and to vessels identified as trawlers by GFW.
- 120 It was not possible to determine vessel sub-type for all trawlers with authorisation to export to the EU.
- 121 China National Fisheries Corp (n.d.) '发展历程', <https://cnfa.cnadc.com.cn/fzlc/index.jhtml> (accessed 30 June 2023).
- 122 360 Hyper (n.d.) *Linguado Inteiro Congelado Mar Fresco 100/200 1kg*, <https://www.360hyper.pt/makro/alfragide/linguadointeirocongeladomar fresco1002F2001kg> (accessed 20 January 2023).
- 123 Recheio (n.d.) 'Camarão tigre MARFRESCO 2kg', <https://www.recheio.pt/en/store/products/frozen-products/seafood/shrimp/camar-o-tigre-senegal-6-8-marfresco-con-gelado-caixa-2kg.html> (accessed 30 June 2023).
- 124 Ocean Disclosure Project (n.d.), 'Sysco France', <https://oceandisclosureproject.org/companies/sysco-france> (accessed 30 June 2023).
- 125 Delegation of the European Union to Senegal (2021) 'The European Union and Senegal', *European External Action Service (EEAS)*, 5 August 2021 (accessed 27 June 2023).
- 126 Code général des impôts, Art. 253.
- 127 Loi n° 95-34 du 29 décembre 1995 portant statut de l'Entreprise franche d'exportation, Art. 7; Décret n° 96- 869 portant application de la loi n°95-34 du 29 décembre 1995 instituant le statut d'Entreprise franche d'exportation (as amended).
- 128 Code général des impôts, Art. 249–252.
- 129 Based on data from Sumaila, U. R., Skerritt, D., Schubbauer, A., Ebrahim, N. et al. (2019) 'A global dataset on subsidies to the fisheries sector', *Data in Brief*, 27, 104706, <https://doi.org/10.1016/j.dib.2019.104706>; and Schubbauer, A., Skerritt, D. J., Ebrahim, N., Le Manach, F. et al. (2020) 'The global fisheries subsidies divide between small- and large-scale fisheries', *Frontiers in Marine Science*, 7, 539214, <https://doi.org/10.3389/fmars.2020.539214>.
- 130 It is noted that a fraction of these exports may come from artisanal fisheries.
- 131 Data reported by Senegal in FAO FishStat, under demersal fish (whole and fillets, fresh and frozen), excluding dogfish and other sharks and toothfish; shrimps and prawns, including Norway lobsters, cuttlefish and squid and octopus.
- 132 Data reported by Senegal in FAO FishStat.
- 133 Data reported by Senegal in FAO FishStat.
- 134 Data reported by Senegal in FAO FishStat.
- 135 Data reported by Senegal in UN Comtrade under HS subheadings 030194, 030195, 030231, 030232, 030233, 030234, 030235, 030236, 030239, 030341, 030342, 030343, 030344, 030345, 030346, 030349, 030487 and 160414.
- 136 CENOZO (2022) 'Publication des données du secteur des pêches au Sénégal : une bataille sans merci', 28 July 2022, <https://cenozo.org/publication-des-donnees-du-secteur-des-peches-au-senegal-une-bataille-sans-merci/> (accessed 30 June 2023).
- 137 USAID (2017) *Senegal Fisheries Applied Political Economy Analysis*, April 2017, <https://2017-2020.usaid.gov/documents/1860/senegal-fisheries-applied-political-economy-analysis> and CENOZO (2022) 'Publication des données du secteur des pêches au Sénégal : une bataille sans merci', 28 July 2022, <https://cenozo.org/publication-des-donnees-du-secteur-des-peches-au-senegal-une-bataille-sans-merci/> (accessed 30 June 2023). See also: Niang, A. (2022) 'Anti corruption report in Senegal: Greenpeace Africa urges Senegal to adopt transparency in the fishing sector', Greenpeace, 12 May 2022. <https://www.greenpeace.org/africa/en/press/51227/anti-corruption-report-in-senegal-greenpeace-africa-urges-senegal-to-adopt-transparency-in-the-fishing-sector/>.
- 138 *Ibid.*
- 139 Bierman, S. (2022) 'FiTI International Board urges national authorities in Senegal to complete FiTI sign-up steps', FiTI, 26 October 2022, <https://www.fiti.global/fiti-international-board-urges-senegal-authorities-to-complete-signupsteps>.
- 140 Additional applications were also submitted for industrial fishing of small pelagics, species reserved for artisanal fishers and which have been assessed as overexploited: GAIPES (2020) 'Lettre ouverte du GAIPES à Monsieur Alioune NDOYE, Ministre des Pêches et de L'Economie maritime sur 52 demandes de promesses de licences de pêche destinées à des navires chinois', 16 April 2020, <https://www.aprapam.org/publication/l-actualite-d-aprapam/lettre-ouverte-du-gaipes-a-monsieur-alioune-ndoye-ministre-des-peches-et-de-l-economie-maritime-sur-52-demandes-de-promesses-de-licences-de-peche-destinees-a-des-navires-chinois> (accessed 30 June 2023).
- 141 APRAPAM (2020) 'Arrivée massive de bateaux chinois et turcs : menace sur les ressources et les communautés de pêche artisanale', 17 April 2020, <https://www.aprapam.org/publication/l-actualite-d-aprapam/arrivee-massive-de-bateaux-chinois-et-turcs-menace-sur-les-ressources-et-les-communaut-es-de-peche-artisanale> and GAIPES (2020) 'Lettre ouverte du GAIPES à Monsieur Alioune NDOYE, Ministre des Pêches et de L'Economie maritime sur 52 demandes de promesses de licences de pêche destinées à des navires chinois', 16 April 2020, <https://www.aprapam.org/publication/l-actualite-d-aprapam/lettre-ouverte-du-gaipes-a-monsieur-alioune-ndoye-ministre-des-peches-et-de-l-economie-maritime-sur-52-demandes-de-promesses-de-licences-de-peche-destinees-a-des-navires-chinois> (accessed 30 June 2023).
- 142 CENOZO (2022) 'Publication des données du secteur des pêches au Sénégal : une bataille sans merci', 28 July 2022, <https://cenozo.org/publication-des-donnees-du-secteur-des-peches-au-senegal-une-bataille-sans-merci/> (accessed 30 June 2023).
- 143 GAIPES (2020) 'Lettre ouverte du GAIPES à Monsieur Alioune NDOYE, Ministre des Pêches et de L'Economie maritime sur 52 demandes de promesses de licences de pêche destinées à des navires chinois', 16 April 2020, <https://www.aprapam.org/publication/l-actualite-d-aprapam/lettre-ouverte-du-gaipes-a-monsieur-alioune-ndoye-ministre-des-peches-et-de-l-economie-maritime-sur-52-demandes-de-promesses-de-licences-de-peche-destinees-a-des-navires-chinois> (accessed 30 June 2023).
- 144 Cited in CENOZO (2022) 'Publication des données du secteur des pêches au Sénégal : une bataille sans merci', 28 July 2022, <https://cenozo.org/publication-des-donnees-du-secteur-des-peches-au-senegal-une-bataille-sans-merci/> (accessed 30 June 2023).
- 145 GAIPES (2020) 'Lettre ouverte du GAIPES à Monsieur Alioune NDOYE, Ministre des Pêches et de L'Economie maritime sur 52 demandes de promesses de licences de pêche destinées à des navires chinois', 16 April 2020, <https://www.aprapam.org/publication/l-actualite-d-aprapam/lettre-ouverte-du-gaipes-a-monsieur-alioune-ndoye-ministre-des-peches-et-de-l-economie-maritime-sur-52-demandes-de-promesses-de-licences-de-peche-destinees-a-des-navires-chinois> (accessed 30 June 2023).
- 146 Office national de lutte contre la fraude et la corruption (n.d.) 'Rapport d'enquête n° 05/2021, délivrance de licences de pêche au Sénégal' in *Rapport d'activités 2021*, <https://cafeactu.com/wp-content/uploads/2022/05/Rapport2021.pdf>.
- 147 Interviewed as part of a CENOZO investigation into transparency in Senegal's fisheries sector: CENOZO (2022) 'Publication des données du secteur des pêches au Sénégal : une bataille sans merci', 28 July 2022, <https://cenozo.org/publication-des-donnees-du-secteur-des-peches-au-senegal-une-bataille-sans-merci/> (accessed 30 June 2023).
- 148 Cited in CAOPA and REJOPRAO (2016) *Voices from African Artisanal Fishers*, https://www.researchgate.net/publication/307852974_Voices_from_African_Artisanal_Fisheries.
- 149 USAID (2017) *Senegal Fisheries Applied Political Economy Analysis*, April 2017, <https://2017-2020.usaid.gov/documents/1860/senegal-fisheries-applied-political-economy-analysis>. See also: Niasse, M. L. & Seck, M. (2011) *L'accapement des ressources marines ouest africaines : Sociétés mixtes de façade et licences de complaisance. Expériences du Sénégal et de la Mauritanie*, Evangelische Entwicklungsdienst, Coalition pour des accords de pêche équitables & Confédération africaine des organisations de pêche artisanale, <https://aquadocs.org/handle/1834/4574>.
- 150 European Commission, Directorate-General for Maritime Affairs and Fisheries (2019) *Évaluation rétrospective et prospective du protocole à l'accord de partenariat dans le domaine de la pêche durable entre l'Union européenne et la République du Sénégal – Rapport final*, <https://op.europa.eu/en/publication-detail/-/publication/64f8d28e-60bb-11e9-b6eb-01aa75ed71a1>.

- 151 See: Agreement on a Sustainable Fisheries Partnership between the European Union and the Republic of Senegal, OJ L304 (23 October 2014), p. 3, Art. 3(2).
- 152 Mean proportion of landings calculated from DPM, *Résultats généraux des pêches maritimes* for the years 2010–2019.
- 153 Calculated from DPM, *Résultats généraux des pêches maritimes* for the years 2010–2019.
- 154 Dème, B., Brehmer, P., Bâ, A. & Failier, P. (2021) 'Résilience et réactivité des pêcheurs artisans sénégalais : la crise écologique comme moteur d'innovations', *Mondes en développement*, no. 193, pp. 109–127, <https://doi.org/10.3917/med.193.0113>; Dème, M. & Kébé, M. (2000) *Revue sectorielle de la pêche au Sénégal, aspects socio-économiques*, CRODT, <https://aquadocs.org/bitstream/handle/1834/184/RevueSectorielle.pdf>.
- 155 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 156 Décret n° 2009-1226 du 4 novembre 2009 relatif à l'exercice de la profession de mareyeur, Art. 1.
- 157 *Ibid.*, Art. 12.
- 158 Décret n° 2009-1226 du 4 novembre 2009 relatif à l'exercice de la profession de mareyeur, Art. 11.
- 159 See: Chaboud, C. (1983) 'Le mareyage au Sénégal', research paper no. 87, CRODT, https://www.researchgate.net/profile/Christian-Chaboud/publication/322951227_Le_mareyage_au_Senegal/links/5ab8a5270f7e9b68ef5f129b/Le-mareyage-au-Senegal.pdf.
- 160 DPM (2022) '1.601 cartes mareyeurs à la date du 24 octobre 2022', <https://www.dpm.gouv.sn/2022/10/24/1-601-cartes-mareyeurs-a-la-date-du-24-octobre-2022/> (accessed 30 June 2023).
- 161 Ndoye, F., Moity-Maizi, P. & Broutin, C. (2002) *De la pirogue au plat : Le poisson fumé sur la Petite Côte sénégalaise*, Centre de coopération internationale en recherche agronomique pour le développement, p. 15.
- 162 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 163 *Ibid.*
- 164 Dème, M., Inejih, A. O. & Baldé, B. M. (2019) *Importance économique, sociale et écologique des petits pélagiques au Sénégal, en Mauritanie et en Guinée Bissau – Rapport d'étude*, Partenariat Régional pour la Conservation de la Zone Côtière et Marine, <https://mava-foundation.org/wp-content/uploads/2020/02/Rapport-detude-sur-la-valeur-des-petits-p%C3%A9lagiques-PRCM-201908-Web.pdf>.
- 165 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 166 ITP (2022) *Liste des entreprises de pêche (mise à jour au 31 décembre 2022)*, <https://ditp.sec.gouv.sn/sites/default/files/docs/Liste%20des%20%C3%A9tablissements%20agr%C3%A9%C3%A9s%20%C3%A0%20%27exportation%20au%2031%20d%C3%A9cembre%202022%20.pdf>.
- 167 Calculated from DPM, *Résultats généraux des pêches maritimes* for the years 2010 to 2019.
- 168 Thiao, D., Diop, P. & Thiam, M. (2021) *Statistiques de la pêche maritime sénégalaise : Pêche artisanale en 2019*, research paper no. 228, CRODT [on file with EJF]; Thiao, D. & Thiam, M. (2020) *Statistiques de la pêche maritime sénégalaise : Pêche artisanale en 2016, 2018, et 2019*, research paper no. 227, CRODT [on file with EJF]; Thiao, D. & Ngom-Sow, F. (2014) *Statistiques de la pêche maritime sénégalaise en 2013 : Pêche artisanale et pêche thonière*, research paper no. 223, CRODT, <https://aquadocs.org/handle/1834/9068>.
- 169 DPM, *Résultats généraux des pêches maritimes* for the years 2010 to 2019.
- 170 Thiao, D., Diop, P. & Thiam, M. (2021) *Statistiques de la pêche maritime sénégalaise : Pêche artisanale en 2019*, research paper no. 228, CRODT [on file with EJF].
- 171 Arrêté n° 12-6397 du 29 août 2012 portant gel de l'immatriculation des embarcations de pêche artisanale maritime, Art. 2.
- 172 Dème, M. & Thiao, D. (2021) 'Politiques de pêche et innovations adaptatives des pêcheries artisanales sénégalaises', *Natures Sciences Sociétés*, 29, pp. 174–184, <https://doi.org/10.1051/nss/2021039>.
- 173 USAID (2017) *Senegal Fisheries Applied Political Economy Analysis*, <https://2017-2020.usaid.gov/documents/1860/senegal-fisheries-applied-political-economy-analysis>.
- 174 *Ibid.*
- 175 Dème, B. & Dème, M. (2021) 'Mise en marché des petits pélagiques côtiers au Sénégal : formes de valorisation et enjeux autour de la ressource', *EchoGéo*, no. 58, <https://doi.org/10.4000/echogeo.22771>.
- 176 Mbaye, L. (2005) *État des lieux de la filière de transformation artisanale des produits halieutiques au Sénégal*, InfoConseil MPEA & PAOA, <https://www.agroalimentaire.sn/etat-des-lieux-de-la-filiere-de-transformation-artisanale-des-produits-halieutiques-au-senegal/>.
- 177 Dème, B. & Ndiaye, N. (2022) 'La migration irrégulière des jeunes pêcheurs vers les côtes espagnoles : l'expression d'un secteur de la pêche artisanale sénégalaise en difficulté?', *Sciences et actions sociales*, no. 17, pp. 256–271, <https://journals.openedition.org/sas/2185>. See also: Chen-Zion, N. (2022) 'Caught in Europe's net: ecological destruction and Senegalese migration to Spain', *Review of African Political Economy*, 49, pp. 584–600, <https://doi.org/10.1080/03056244.2022.2186599>.
- 178 Ministerio del Interior (2022) *Informe quincenal sobre inmigración irregular, Datos acumulados desde el 1 de enero al 31 de diciembre de 2022*, https://www.interior.gob.es/opencms/export/sites/default/galerias/galeria-de-prensa/documentos-y-multimedia/balances-e-informes/2022/24_informe_quincenal_acumulado_01-01_al_31-12-2022.pdf.
- 179 International Organization for Migration (2021) 'Alarming Loss of Life on Way to Canaries Worsens in 2021', <https://www.iom.int/news/alarming-loss-life-way-canaries-worsens-2021> (accessed 30 June 2023).
- 180 Zeller D., Cashion T., Palomares M. & Pauly D. (2018) 'Global marine fisheries discards: a synthesis of reconstructed data', *Fish and Fisheries*, 19, pp. 30–39, <https://doi.org/10.1111/faf.12233>.
- 181 Pérez Roda, M. A. (ed.) (2019) *A Third Assessment of Global Marine Fisheries Discards*, FAO Fisheries and Aquaculture Technical Paper no. 633, Rome: UN FAO, <https://www.fao.org/documents/card/en?details=c2905en%2f>.
- 182 Belhabib, D., Koutob, V., Sall, A., Lam, V. W. Y. et al. (2014) 'Fisheries catch misreporting and its implications: The case of Senegal', *Fisheries Research*, 151, pp. 1–11, <https://doi.org/10.1016/j.fishres.2013.12.006>.
- 183 Pérez Roda, M. A. (ed.) (2019) *A Third Assessment of Global Marine Fisheries Discards*, FAO Fisheries and Aquaculture Technical Paper no. 633, Rome: UN FAO, <https://www.fao.org/documents/card/en?details=c2905en%2f>.
- 184 EJF (2022) *On the precipice: Crime and corruption in Ghana's Chinese-owned trawler fleet*, <https://ejfoundation.org/reports/on-the-precipice-crime-and-corruption-in-ghanas-chinese-owned-trawler-fleet>.
- 185 Décret n° 2016-1804 du 22 juillet 2016, Art. 29.
- 186 Ba, K., Thiaw, M., Fall, M., Thiam, N. et al. (2018) 'Long-term fishing impact on the Senegalese coastal demersal resources: diagnosing from stock assessment models', *Aquatic Living Resources*, 31, 8, <https://doi.org/10.1051/alr/2017046>. See also Thiam, N., Fall, M. & Thiaw, M. (2014) *Évaluation de la capacité et de l'effort de pêche industrielle démersale côtière*, DPM [updated final version on file with EJF; a previous version is available online at http://intranet.isra.sn/aurifere/opac_css/docnum/OC1702403.pdf].
- 187 CECAF (2020) *Report of the FAO/CECAF Working Group on the Assessment of Demersal Resources – Subgroup North, Nouakchott, Mauritania, 2–10 December 2019*, CECAF/ECAF Series 20/83, <https://www.fao.org/publications/card/en/c/CB1539B>; CECAF (2018) *Report of the FAO/CECAF Working Group on the Assessment of Demersal Resources – Subgroup North, Tenerife, Spain, 6–15 June 2017*, CECAF/ECAF Series 18/78, <https://www.fao.org/publications/card/en/c/CA1003B>. See also: CRODT (2020) *État actuel des stocks halieutiques exploités dans la ZEE Sénégalaise*, <https://www.aprapam.org/storage/articles/June2020/qBjVlcnbKwysyBPU6z4.pdf>.
- 188 See the conclusions of the working group: CECAF (2022) 'Demersal species Working Group North 2022 – meeting summary', Doc. CECAF/SSCIX/2022/4c, <https://www.fao.org/3/cc3290b/cc3290b.pdf>.
- 189 Amoroso, R. O., Pitcher, C. R., Rijnsdorp, A. D., McConnaughey, R. A. et al. (2018) 'Bottom trawl fishing footprints on the world's continental shelves', *Proceedings of the National Academy of Sciences*, 115, pp. E10275–E10282, <https://doi.org/10.1073/pnas.1802379115>.
- 190 Eigaard, O. R., Bastardie, F., Breen, M., Dinesen, G. E. et al. (2016) 'Estimating seabed pressure from demersal trawls, seines, and dredges based on gear design and dimensions', *ICES Journal of Marine Science*, 73, pp. i27–i43, <https://doi.org/10.1093/icesjms/fsv099>.
- 191 *Ibid.*
- 192 Amoroso, R. O., Pitcher, C. R., Rijnsdorp, A. D., McConnaughey, R. A. et al. (2018) 'Bottom trawl fishing footprints on the world's continental shelves', *Proceedings of the National Academy of Sciences*, 115, pp. E10275–E10282, <https://doi.org/10.1073/pnas.1802379115>.
- 193 See: Hiddink, J. G., Jennings, S., Sciberras, M., Szostek, C. L. et al. (2017) 'Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance', *Proceedings of the National Academy of Sciences*, 114, pp. 8301–8306, <https://doi.org/10.1073/pnas.1618858114>.
- 194 This includes sediment disturbed multiple times due to the repeated trawling of the same seabed area. The actual volumetric footprint in terms of carbon stock disturbance is therefore lower (see **Section 6.4**).
- 195 Hiddink, J. G., Jennings, S., Sciberras, M., Szostek, C. L. et al. (2017) 'Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance', *Proceedings of the National Academy of Sciences*, 114, pp. 8301–8306, <https://doi.org/10.1073/pnas.1618858114>.
- 196 Following Atwood, T. B., Witt, A., Mayorga, J., Hammill, E. et al. (2020) 'Global patterns in marine sediment carbon stocks', *Frontiers in Marine Science*, 7, 165, <https://doi.org/10.3389/fmars.2020.00165>.
- 197 Our estimate is therefore conservative, as repeated trawling of the same area may disturb carbon buried deeper in the sediment layer, depending on the redeposition rate of stirred sediment.
- 198 Calculated from Saatchi, S. S., Harris, N. L., Brown, S., Lefsky, M. et al. (2011) 'Benchmark map of forest carbon stocks in tropical regions across three continents', *Proceedings of the National Academy of Sciences*, 108, pp. 9899–9904, <https://doi.org/10.1073/pnas.1019576108> (assuming a mean carbon density of 29 t C ha⁻¹ at 10% tree cover).
- 199 Black, K. E., Smeaton, C., Turrell, W. R. & Austin, W. E. N. (2022) 'Assessing the potential vulnerability of sedimentary carbon stores to bottom trawling disturbance within the UK EEZ', *Frontiers in Marine Science*, 9, 892892, <https://doi.org/10.3389/fmars.2022.892892>.
- 200 Smeaton, C. & Austin, W. E. N. (2022) 'Quality not quantity: Prioritizing the management of sedimentary organic matter across continental shelf seas', *Geophysical Research Letters*, 49, e2021GL097481, <https://doi.org/10.1029/2021GL097481>.

- 201 Guinotte, J. M. & Fabry, V. J. (2008) 'Ocean acidification and its potential effects on marine ecosystems', *Annals of the New York Academy of Sciences*, 1134, pp. 320–342, <https://doi.org/10.1196/annals.1439.013>
- 202 Sala, E., Mayorga, J., Bradley, D., Cabral, R. B. et al. (2021) 'Protecting the global ocean for biodiversity, food and climate', *Nature*, 592, pp. 397–402, <https://doi.org/10.1038/s41586-021-03371-z>.
- 203 Hiddink, J. G., Jennings, S., Sciberras, M., Szostek, C. L. et al. (2017) 'Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance', *Proceedings of the National Academy of Sciences*, 114, pp. 8301–8306, <https://doi.org/10.1073/pnas.1618858114>.
- 204 Direction des Aires marines communautaires protégées (2014) *Plan d'aménagement et de gestion : Aire marine protégée de Saint Louis - Révision pour la période 2014-2018*, <https://www.damcp.gouv.sn/type-de-document/plan-dam%C3%A9nagement-et-de-gestion>; confirmed by interviews conducted by EJF in artisanal fishing communities.
- 205 Atwood, T. B., Witt, A., Mayorga, J., Hammill, E. et al. (2020) 'Global patterns in marine sediment carbon stocks', *Frontiers in Marine Science*, 7, 165, <https://doi.org/10.3389/fmars.2020.00165>.
- 206 Service hydrographique et océanographique de la marine (2021) 'Carte sédimentaire mondiale', <https://diffusion.shom.fr/donnees/sedimentologie/sedim-mondiale.html> (accessed 30 June 2023).
- 207 Calculated from Thiao, D., Diop, P. & Thiam, M. (2022) *Statistiques de la pêche maritime sénégalaise : Pêche artisanale en 2020*, research paper no. 229, CRODT [on file with EJF].
- 208 See: CRODT (2006) *Recensement national de la pêche artisanale maritime sénégalaise*, <https://anads.ansd.sn/index.php/catalog/77/related-materials>.
- 209 DPM (2022) *Résultats généraux des pêches maritimes 2019* [on file with EJF].
- 210 Diallo, M. (1995) *Analyse des interactions entre la pêche artisanale et la pêche industrielle*, research paper no. 199, CRODT, https://horizon.documentation.ird.fr/exl-doc/pleins_textes/2021-09/010021938.pdf.
- 211 Code de la Pêche maritime, Art. 127(h).
- 212 DPSP (n.d.) *Rapport annuel de la DPSP, année 2021* [on file with EJF].
- 213 *Ibid.*
- 214 Thiesinfo TV (2019) 'Incroyable! Des bateaux étrangers sèment la panique à Fass Boye', <https://www.youtube.com/watch?v=Wgcw2oUFiUo> (accessed 30 June 2023).
- 215 Jacob Postv (2023) 'Cela se passe à Lompoul: un bateau chinois attrapé par les habitants et qui interpellent directement le président Macky Sall...', https://www.facebook.com/jacobposttv/videos/628216759457671/?extid=WA-UNK-UNK-UNK-AN_GKOT-GKIC (accessed 30 June 2023).
- 216 Mallory, T. G. (2013) 'China's distant water fishing industry: evolving policies and implications', *Marine Policy*, 38, pp. 99–108, <https://doi.org/10.1016/j.marpol.2012.05.024>.
- 217 EJF (2022) *The ever-widening net: Mapping the scale, nature and corporate structures of illegal, unreported and unregulated fishing by the Chinese distant-water fleet*, <https://ejfoundation.org/reports/the-ever-widening-net-mapping-the-scale-nature-and-corporate-structures-of-illegal-unreported-and-unregulated-fishing-by-the-chinese-distant-water-fleet>.
- 218 Center for Naval Analyses (2021) *Exposing the gap between PRC rhetoric and illicit maritime activity*, <https://www.cna.org/reports/2021/12/illicit-maritime-activity-summary>.
- 219 Coalition for Fisheries Transparency (2023) *The Global Charter for Fisheries Transparency*, <https://fisheriestransparency.net/wp-content/uploads/2023/04/ONEPAGERA54-18.pdf>
- 220 Further recommendations for the government of the People's Republic of China may be found in EJF (2022) *The ever-widening net: Mapping the scale, nature and corporate structures of illegal, unreported and unregulated fishing by the Chinese distant-water fleet*, <https://ejfoundation.org/reports/the-ever-widening-net-mapping-the-scale-nature-and-corporate-structures-of-illegal-unreported-and-unregulated-fishing-by-the-chinese-distant-water-fleet>; and EJF (2022) *Murky waters: Analysis of the regulatory framework governing the distant water fishing fleet of the People's Republic of China*, <https://ejfoundation.org/reports/murky-waters>.
- 221 EU IUU Coalition (2020) *A comparative study of key data elements in import control schemes aimed at tackling illegal, unreported and unregulated fishing in the top three seafood markets: the European Union, the United States and Japan*, <https://www.iuuwatch.eu/wp-content/uploads/2020/11/CDS-2020-report-EN-WEB-Nov-2020.pdf>.



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