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Small-scale fishers should be a big part of the future in West Africa

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Abstract

West African small-scale fisheries (SSF) act as critical socio-economic lifelines. As industrial overfishing reduces the resource base, escalates costs, and pushes fishers into migration, women face diminishing managerial influence and selective poverty risks. This paper evaluates the structural vulnerabilities within small-scale fisheries (SSF), where top-down global market forces challenge localized, more participatory and sustainable governance models. We analyze operational support for the SSF Guidelines, highlighting the success of multi-stakeholder spaces like the SSF Academy in Senegal and, recently, Ghana, alongside transnational coalitions between fisher organizations, environmental non-profits, and researchers. To substantiate these field observations further, we employ a structured narrative review using the Scale for the Assessment of Narrative Review Articles (SANRA) framework covering literature between 2015 and 2025. We argue that systematic, multi-actor cooperation for resilient food systems provides a pathway toward resource regeneration, low-impact production, and secure coastal livelihoods by opening viable futures for SSF in West Africa.

1. Introduction

For centuries, marine fishing relied fundamentally on wind and human energy, with large-scale drying, salting, and curing techniques overcoming perishability to sustain preservation in hot climates and/or long-distance trade. This model supported massive, historically sustainable operations, such as the North Atlantic herring fisheries (Dickey-Collas, Nash, Brunel, et al. 2010) and five-centuries of Newfoundland cod fishery, which was for some time the biggest fishery worldwide (Hayes, Holm & Nicholls 2025). However, the introduction of steam engines in the late 19th century into fishing vessels to increase their reach and power for active gears like bottom trawling (Hallén, Bornmalm & Alexandersson 2023; Robinson 1998) triggered technological innovations with far-reaching effects. The massive increase in catching power, driven by the post-WWII fossil-fuel economy, caused both of these major historical fisheries to collapse (Dickey-Collas, Nash, Brunel, et al. 2010; Hayes, Holm & Nicholls 2025). The environmental, social, and economic repercussions of this industrial transition were drastic.

Ecosystem assessments indicate that perhaps as little as 10% of the biomass of large predatory fish structuring healthy marine ecosystems remained since the beginning of the 20th century (Christensen, Guénette, Heymans, et al. 2003). In social terms, the loss of jobs as a result of overfished resources and further industrialization at the expense of artisanal jobs was heavily felt across all coastal nations particularly around the North Atlantic (Symes 1991). These economic effects rippled through the wider economy, leaving behind abandoned fishing port infrastructures and structural decay (Millich 1999). As catches peaked in Europe during the 1970s, heavily subsidized distant-water fleets from Spain, France, and other industrial nations adapted by shifting their operations further south and deeper down, substituting shrinking local catches by encroaching upon the waters of less industrialized regions (Pauly & Watson 2009). The reckless appropriation of renewable ocean resources proceeded with little regard for the continued functioning of marine ecosystems, the sustainability of the resource base in all but its

name, or basic ethics and social justice, as is now amply documented in the academic literature (Nauen, Adhuri & Fakoya 2025; Pauly & Zeller 2016; Österblom, Jouffray, Folke, et al. 2015).

A specialized body of literature regarding artisanal fisheries began to build slowly in the 1980s, when the World Bank envisioned the technological and economic development of small-scale fisheries in developing countries to complement or replace the dominance of foreign industrial fleets following the establishment of Exclusive Economic Zones (EEZs) (Sfeir-Younis 1980). Looking at value chains from catch to marketing, the policy emphasis at the time was on stimulating technological development and national resource management to achieve higher production and address widespread poverty, while hopefully avoiding overfishing and industrial pollution (Sfeir-Younis 1980). Some nods were offered toward national and rural-urban specificities, the overall conceptualization of fisheries development during this era was imbued with gender-blind concepts borrowed largely from industrial countries (Sfeir-Younis 1980).

In many less industrialized regions along the West African coast, against the expectations of some, small-scale or artisanal fisheries have resisted industrial replacement (Chauveau & Samba 1990). They remain important producers of seafood, acting as critical socio-economic lifelines that generate vital employment, underpin regional food security, and sustain coastal cultures extending deep through regional trade networks into the Sahelian hinterlands. Historically robust in Senegal and Ghana, these artisanal networks also play indispensable local roles across Nigeria, Benin, Sierra Leone, and Guinea (Chauveau 1991).

Despite their foundational importance, West African small-scale fisheries have historically been marginalized within national accounting systems due to limitations in recording the large gendered numbers of people involved. Because of the vast geographical spread of landing sites, modest rural infrastructure, and the informal nature of the trade, their true production and involvement in trade have long been poorly documented (Jerven 2013). This structural invisibility began to change globally with the publication of the World Bank's *Hidden Harvest* report (2012) and the subsequent adoption by the FAO Committee on Fisheries (COFI) in 2014 of the *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication* (FAO 2015), following a two-year bottom-up consultation process spearheaded by fishworkers' organisations.

Nevertheless, a profound friction remains between local livelihood requirements and a global market for seafood and fisheries products, where the fish goes to the highest bidder, often mediated by local traders under contract with fish meal and oil factories or other industrial companies. Over the past decade, national fisheries management frameworks across West Africa have increasingly leaned toward neoliberal governance mechanisms.

This manifests itself acutely in the rapid industrialization of the coastline largely driven by foreign investment. Small-scale fishers (men and women) often lack even basic facilities at beach landing places, such as sanitation, including toilets, and safe fish processing facilities and may be denied tenure rights, despite long-term occupation of working spaces (Nauen & N'diaye 2022). On the other hand, the

industrialization trend is characterized e.g. by a proliferation of container and mass-products ports and other coastal infrastructure as well as fish meal and oil factories in Mauritania, The Gambia, and Senegal (Costalago, Chakravarty, de la Puente, et al. 2026). These latter, by processing small pelagic fish into animal feed for export, directly compete with low cost local food supplies, women's access to catches for traditional processing and marketing, and cultural preferences (Pauly, Nauen, Le Manach, et al. 2025; Muhl, Armitage, Nayak, et al. 2026; Costalago, Chakravarty, de la Puente, et al. 2026).

Combined with the changing expectations of increasingly urbanized clients, local domestic and regional market flows and employment are progressively altered (Muhl, Armitage, Nayak, et al. 2026; Costalago, Chakravarty, de la Puente, et al. 2026). Squeezed by external investors, high cost of credit, and dwindling access to fresh fish from local catches and safe working spaces, women face an escalated risk of displacement and selective poverty as many governments appear to overlook customary rights, including tenure rights, and gender specific livelihoods in favour of export oriented industrial priorities (Costalago, Chakravarty, de la Puente, et al. 2026). While some men have found temporary, volatile complementarities with industrial operations to their advantage, they are far from immune to these structural shocks, as evidenced by the region's increase in irregular migration and weak local employment effects of such industries (Pauly, Nauen, Le Manach, et al. 2025; Costalago, Chakravarty, de la Puente, et al. 2026).

Within this shifting political economy, women processors and fish traders who have historically been central to marketing catches bear the heaviest burden. Though long denied formal institutional recognition, these women have routinely shown immense creativity and tenacity in navigating volatile social and economic contexts. Nevertheless, as industrial overfishing, primarily by foreign vessels, and the expansion of export-oriented reduction fisheries aggressively restrict the resource base and increase costs, women are systematically losing their managerial influence and access to raw landings, pushing them selectively into deeper precarity and into poverty (Pauly, Nauen, Le Manach, et al. 2025).

To fulfill the explicit mandates of the SSF Guidelines addressed primarily to governments, policy interventions must move beyond superficial visibility, directly confronting the macroeconomic inequalities and industrial encroachment such as trawlers violating exclusive artisanal zones like Nigeria's reserved coastal waters that exclude women and strip fishers of key local target species like *Sardinella maderensis* (Adewale, Aheto, Okyere, et al. 2024; Williams, 2017).

In response to these compounding crises, new spaces for resistance and adaptive governance are emerging through growing cooperation between small-scale fishers, local organizations, environmental non-profits, and researchers. A notable operational example is the Small-Scale Fisheries (SSF) Academy, launched together with fishers, men and women, in 2018 in Senegal prior to the pandemic as an operational support to implementing the SSF Guidelines. Designed as an inclusive multi-stakeholder arena, the Academy has successfully fostered respectful dialogue focused on addressing common challenges. Practising such respectful deliberations in a safe space has enabled growing self-confidence, agency, and localized improvements in living conditions among participants (Arraes Treffner

2019; Mundus maris 2019, Nauen & Arraes Treffner 2021, 2022). A recent partnership agreement between *Mundus maris* asbl and the Canoe and Fishing Gear Owners Association of Ghana (CaFGOAG) has launched the SSF Academy in Ghana in support of restoring resources and enabling co-management (Mundus maris 2026).

Crucially, this cooperative model successfully links global trends to local contexts, making macro-economic threats both visible and actionable. This type of cross-scale mobilization was vividly illustrated at the UN Ocean Conference in Nice, France, in June 2025. There, a transnational coalition of researchers and SSF representatives from four continents convened a high-level side event within the government-led Blue Zone, claiming a central role for small-scale actors in global ocean governance and food security (Mundus maris 2025). This expanding awareness has empowered local communities to directly engage with global instruments, fostering a determination to act in favour of the SSF Guidelines and e.g. against harmful fisheries subsidies negotiated in World Trade Organization (WTO) as well as engage with the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement under the Law of the Sea.

Systematic, multi-actor cooperation between local fisher organizations, researchers, civil society, and other practitioners is essential for designing locally adapted solutions that connect local initiatives to "the bigger picture". Building trust between different actors and engaging with government institutions to claim legitimate pathways for more participatory governance is an indispensable step towards implementing the SSF Guidelines and embark on a virtuous cycle of resource restoration, gender equity and social advancement. It is a major component of closing the implementation gap between official laws, regulations, and treaties and the practices on the ground (Nauen 2023). To ground our field observations and action research in a reproducible and rigorous academic framework, we conducted a structured narrative review following the Scale for the Assessment of Narrative Review Articles (SANRA) guidelines. A comprehensive literature search was executed on Google Scholar to analyze peer-reviewed articles, institutional reports, and book chapters published between 2015, the year following the adoption of the Voluntary SSF Guidelines, and 2025. By synthesizing this decade of literature, we analyze gendered livelihood innovations across West African hub countries, offering documented experiences as potential beacons for resource regeneration, low-impact production, and secure coastal livelihoods

2. Methodology

In the light of the broad-brush historical context sketched out above, our research question were:

- • How important are small-scale fisheries particularly in post-colonial West Africa, our main area of work?
- • How have gender roles evolved in small-scale fisheries value chains in West Africa?
- • What are possible futures for small scale fisheries in West Africa?

We adopted a structured narrative review approach that is inspired by the Scale for the Assessment of Narrative Review Articles (SANRA) framework developed originally in the medical literature to make

common narrative reviews more robust and complement heavy duty systematic reviews of narrow fields of knowledge.

2.1 Search Strategy and Selection Criteria

We ran an initial query with Boolean operators on Google Scholar "small-scale fisheries" AND/OR "gender" AND/OR "livelihood" AND/OR "innovation" AND "West Africa". That search generated 372 entries for the period from 2015 to 2025. The start year was chosen because artisanal fisheries have received increasing attention since the adoption by FAO's Committee of Fisheries (COFI) in 2014 of the 'Voluntary Guidelines for Ensuring Sustainable Small-Scale Fisheries' (FAO 2015). The choice of search terms and strategy is explained below.

To refine the initial, broad capture of 372 results into a highly targeted and manageable dataset, strict Boolean logic intersections and value-chain focus filters were applied as follows:

The initial broad query was narrowed from loose "AND/OR" strings to strict intersections "AND" to eliminate peripheral papers.

The generic term "innovation" was replaced with the more specific operational keyword "SSF Guidelines" that align with the *Mundus maris* SSF Academy approach and the foundational principles that are intended to project small-scale fisheries into the future based on human rights, nature positive and equity principles. The refined search generated 100 entries.

Articles were excluded if they focused exclusively on industrial fisheries, purely biological stock assessments without socio-economic context, covered almost exclusively other parts of the world, were too generic or duplicates. This systematic funnel successfully isolated the 58 core publications used to complement our narrative. We made very few exceptions to incorporate papers analysing the economic profitability trends of SSF as the shrinking profitability directly affects gender relations and shifting organisational arrangements along value chains, even if they are not explicitly elaborated in the papers in question.

With the rise of the rural livelihood concept proposed by Chambers and Conway (1991) the radical emphasis on participatory approaches to development opened the way to understand small-scale fisheries not as a primitive rural production mode, common among colonial administrators, but as a genuine local and regional social and economic response to meeting both subsistence and market demand for food and employment. Interest in the social organisation and the remarkable resilience of small-scale fisheries was further kindled gradually, e.g. through the ethnographic case studies by mostly French anthropologists and economists (Chavance, Jul-Larsen & Chaboud 2000). The livelihood concept to alleviate rural poverty underpinned also a major West African development project funded by DFID of the UK and executed by FAO in collaboration with 25 countries from 1999 to 2006 (Sustainable Fisheries Livelihoods Programme, SFLP, 2005).

This provided innovative ways to question earlier mindsets and perceptions in relation to small-scale fisheries leading up to the SSF Guidelines. We also draw on *Mundus maris* action research in Senegal, Nigeria and elsewhere in the sub-region, including a precursor 2002 workshop at the European Commission on gender (Williams, Hochet-Kigongui & Nauen 2005) before the gender concerns in small-scale fisheries became more generalised.

These got a major boost through such research efforts as harnessed by the 'Too Big To Ignore' platform publishing multi-author books in the MARE-Springer book series (Jentoft, Chuenpagdee, Barragán-Paladines, et al. 2017; Jentoft, Chuenpagdee, Bugeja Said, et al. 2022) to which one of us (CEN) contributed.

Particularly noteworthy are also the substantial efforts of the 'Illuminating Hidden Harvests' Initiative (FAO, Duke University & WorldFish 2023; Virdin, Bazurto, Nico, et al. 2023; Bazurto, Gutierrez, Franz, et al. 2025). The study mobilised around 800 researchers and practitioners in the core and country teams, methodological experts, and an oversight group that helped validate the data from questionnaires, more than 50 in-depth country studies and the perusal of generic household data to ascertain the multi-dimensional roles of some 100 million men, women and children in subsistence and commercial small-scale fisheries around the globe. This thoroughly invalidates the initial assumptions by French administrators and other colonisers in West Africa, but also some governments, that artisanal fisheries would disappear and be replaced by industrial operations (Chauveau & Samba 1990).

2.2 Limitations to keep in mind in the face of an evolving ocean and fisheries discourse

We are conscious of the difficulties to come up with reliable data on production and trade as national accounting systems in the region are chronically under-resourced (Jerven 2013) and FAO statistics are composed of partial reports from national offices, sometimes raised by FAO estimates. Some reconstructed extraction estimates by the Sea Around Us Initiative[1] that strives to complement FAO statistics by estimates of SSF, discards at sea and illegal, unrecorded and unregulated (IUU) fishing, based on research reports and local information and expertise, are typically about twice the official numbers, including in some West African countries. This is why we refrain in this paper to provide a table of production and export estimates by country.

We pay particular attention to the qualitative evolution of commercial artisanal fisheries during the last decades, increasing migrations triggered by local resource scarcity, technological innovations and market opportunities, the gender dynamics during these changing times. We also note the rising ambitions of small-scale fisher organisations to overcome marginalisation through strengthening their organisations and broaden collaborations, namely with researchers, and environmental and civil society organisations to claim an active role in sector and resource governance.

The objective of this paper is thus to trace the principal trajectories of West African small-scale fisheries in social, economic and ecological settings characterised by remarkable transmutations and maturation,

yet remaining vulnerable if dominant policies pitch them in direct competition to industrial fisheries and large-scale coastal infrastructure developments progressively eroding their social, cultural and economic spaces. Conversely, under regenerative ocean policies inspired by major international treaties and agreements, artisanal fisheries could graduate to become a centre-piece of cooperative ocean governance and confirm their role as one of the pillars of domestic and regional development and food security.

2.3 AI Tools & Models Utilized: Generative AI Assistant models

Formatting, Copy-Proofing, and Editing: AI assistance was employed across manuscript sections for structural refinement, text simplification, tabular reorganization (Table S1) and grammatical copy-editing.

Human Oversight & Ethical Compliance: AI tools were not used to generate original research findings, raw data, or unverified facts. The final interpretation, scholarly analysis, synthesis, and conclusions remain entirely the intellectual responsibility of the human authors.

3. Findings

3.1 SSF for national and regional food supply and employment

West African artisanal fisheries have long traditions of both domestic and regional scale market supplies of fresh and smoked, dried, or cured aquatic foods, even before ice and refrigeration became more widely available. Managed often by extended family networks with activities even beyond fishing and marketing (Chauveau, Jul-Larsen & Chaboud 2000), West African fisheries have expanded despite attempts of colonial control and intended industrialisation of governments after independence. While coastal and marine fisheries are typically the focus of attention, the great inland streams and lakes sustain very substantial freshwater fisheries in the Sahel countries with notable flood plain fisheries e.g. in Mali, Nigeria, Ghana, and Tchad (Funge-Smith & Bennett 2019). In Nigeria, where fish is a highly sought after food commodity, inland fisheries produce more fish food than domestic marine waters. In addition, the country imports substantive quantities of frozen fish to meet demand, particularly small pelagics from industrial fisheries in NW Africa that complement local supply chains of industrial and artisanal fisheries (Etim, Belhabib & Pauly 2015).

A large global study was carried out by FAO, Duke University, and WorldFish Center to cast further light on small scale fisheries. Together with subsistence fisheries and gleaning of seafood, small-scale fisheries provide globally an estimated roughly 37 million tons of aquatic food per year. That is equal or more than what industrial trawl fisheries land, albeit with higher environmental impact. Small-scale production corresponds, on average, to 20% of the dietary intake across six key micro-nutrients essential for human health for 2.3 billion people (Basurto, Gutierrez, Franz, et al. 2025). The approximately

100 million people working in capture fisheries and along the value chain, almost 50% of whom are women, generate some 44% (US$77.2 billion) of the total value at first point of landing of all wild captured fish and seafood (Basurto, Gutierrez, Franz, et al. 2025).

Fishing traditions, including migration within countries or to neighbouring countries, sometimes at considerable distances, are particularly strong in Ghana and Senegal, but common in many countries since the 19th century (Chauveau 1991), including in inland fisheries such as in Mali (Kassibo 2000). The mobility of fishers, typically associated with that of fish processors and fishmongers and their more or less periodical operation out of host villages, needs to be taken into account. Such dynamics caution against turning a blind eye to the often considerable diversity within 'communities' and their differentiated rights and needs (Haakonsen & Diaw 1991; Chauveau, Jul-Larsen & Chaboud 2000; Sall, Failler, Drakeford, et al. 2020). Historical fishing outposts of Beninois fishers in Gabon (Jul-Larsen 2000), of Fante and Ewe fishers in Côte d'Ivoire (Delauney 2000) and developments in other West African artisanal fisheries are documented in the anthropological literature from the perspective of social organisation in response to managing power relations and markets. In most cases, cohabitation is peaceful, except when migrants with more powerful boats and gear interfere directly with the fishing of residents. As migrants send remittances home, e.g. to upgrade housing, and create income streams from ancillary activities in host communities, the overall economic effect is considered mostly positive both in their communities of origin and their hosts (Chauveau, Jul-Larsen & Chaboud 2000).

Women from different fishing groups in Ghana often follow the men into migration and take over the typical managerial, processing and marketing tasks, but also take on support jobs when local customs restrict their economic reach (Chaveau 1991; Odotei 1991). As in some other countries, women may also be managers of family businesses as described by Overå (2000) for the Fante town of Moree, Central Region of Ghana, whether ownership of canoes and other assets is publicly displayed or not. Similar patterns of divisions of labour between men and women as business partners mostly within larger family businesses in SSF can be observed e.g. in Senegal (Sall 2018).

The objective of the women is always to build up sufficient capital for their own undertakings as well as being able to extend loans to fishers for gear, other equipment, or fuel and supplies for fishing trips in order to have privileged access to fish landings for processing and marketing. Because of limitations in inheritance rights, women need to be economically active both in their own right to provide for themselves and the family and support the economic interests of their men folk. This is a wider-spread pattern, even though specifics vary by ethnic group and local tradition. Women may also work temporarily in support jobs, such as fish scaling and cleaning at beach landing places, to generate some income for the family, even when they may not have long-standing involvement in fisheries because they leave rural areas where agriculture does not provide livelihoods any more (own observations).

In the following we outline trends from Senegal, which can be found with variation in several other West African countries. Driven primarily by only partially accounted for both industrial and artisanal extractions (Belhabib, Baio, Camara, et al. 2020), the typical resources targeted by small-scale fisheries

became scarcer. This concerned notably the range of relatively small pelagics for the domestic and regional markets. These fish, like sardines and sardinellas, are cheap but of high nutritional value. In some artisanal fisheries high value bottom-dwelling, demersal fish, like groupers, seabreams and snappers, are caught mostly for export. As reported in the interview with Khady Sarr (Sall 2018), the women, especially from large traditional families, used to have sufficient capital from running the family business to pre-finance fishing trips, preferential access on credit to catches, and enjoy high social standing.

Since the mid-2000s catches and landings of the artisanal pirogues started to decline and incomes began to shrink (Ba, Schmidt, Deme, et al. 2017). The response of building more and bigger pirogues eventually matching the catching capacity of the industrial fleet of the 1950s only intensified the direct competition between the industrial and artisanal fleet segments (Belhabib, Cheung & Kroodsma 2020). Diversifying catches to the extent possible, e.g. by catching cephalopods, not traditionally targeted by the artisanal fleet, provided but a temporary respite. Increasing costs of longer fishing trips to account for makes it harder to compensate for reduced resource availability and changed many of the fundamentals. As the capital outlay required soared, the women's own financial resources became insufficient for financing the trips, especially as formal credit was not accessible to them and usury rates in the informal credit market meant excessive costs. As outside investors from urban elites or even foreigners progressively replaced the financial role of women in many instances, their economic and social influence shrank as fishers did not accept anymore to defer payment until after marketing the catch. Cash was now required to get fish for processing and marketing (Sall 2018; Pauly, Nauen, Le Menach, et al. 2025).

The social ripple effects were stark as reduced money flows in the community also meant less investment in maintaining social bonds through festivities, solidarity with less fortunate families, and covering the food and shelter of crew members. As a result, a hapless pirogue could not keep its crew paid typically in catch shares. The build-up of numerous fish meal factories primarily in Mauritania, The Gambia, and Senegal processing small pelagic fish into fish meal and oil for export as animal feed have strongly influenced the internal dynamics between men and women in the SSF (Sall & Sow 2025; Pauly, Nauen, Le Manach, et al. 2025; Costalago, Chakravarty, de la Puente, et al. 2026). Similar developments have been observed, even in the absence of major fish meal and oil factories, but with an industrial and export orientation e.g. in Ghana (Arizi, Sagoe, Attipoe, et al. 2021) and Nigeria (Akintola, Fakoya, Areola, et al. 2024). In combination with evolving consumer behaviours as part of urbanisation processes pressures on small-scale fisheries are growing, particular on women and youth when their access to formal recognition and education remains curtailed.

3.2 Small-scale fisheries according to the main operational elements of the SSF Guidelines

The main operational sections of the SSF Guidelines are (1) governance of tenure in small-scale fisheries and resource management; (2) social development, employment, and decent work; (3) value chains,

post-harvest, and trade; (4) gender equality; (5) Disaster risks and climate change; (6) ensuring and enabling environment and supporting implementation. Suppl. Table S1 provides a broad overview of how the literature addresses each of the operational sections, showing challenges and opportunities based on field studies, case material, and analyses of large bodies of statistics and interdisciplinary research.

The political economy of West African small-scale fisheries (SSF) reveals a complex dynamic between domestic food security and macro-level economic transformations. To present these findings succinctly, while honoring both the integrated structure of the SSF Guidelines and our analytical framework, the results are organized into three thematic areas that hark back at our research questions.

3.3 The importance of small-scale fisheries in West Africa

Globally, the foundational role of SSF is verified by the Illuminating Hidden Harvests project conducted by the FAO, Duke University, and WorldFish. Small-scale capture and gleaning yield roughly 37 million tons of aquatic food annually—matching or exceeding industrial trawl landings, albeit with significantly lower environmental impacts. This production satisfies an average of 20% of the essential dietary intake across six key micro-nutrients for 2.3 billion people (Basurto, Gutierrez, Franz, et al. 2025).

However, this socio-economic lifeline faces severe structural shocks. Driven primarily by only partially accounted industrial and artisanal extractions, traditional target resources have become dangerously scarce (Belhabib, Baio, Camara, et al. 2020). In Senegal, the decline of cheap, highly nutritional small pelagics (such as sardines and sardinellas) and high-value demersal species (like groupers and snappers) has upended community stability. Since the mid-2000s, dwindling catches have caused artisanal incomes to shrink (Ba, Schmidt, Deme, et al. 2017). Fishers responded by constructing larger pirogues that matched the capacity of 1950s industrial fleets, a move that only intensified direct competition between the artisanal and industrial segments (Belhabib, Cheung & Kroodsma 2020).

Compounding this resource scarcity are the complex realities of fisher mobility. Fishing traditions involving long-distance migration to neighboring countries have been common since the 19th century, particularly in Ghana and Senegal (Chauveau 1991). The anthropological literature documents historical fishing outposts, illustrating that while migrant cohabitation is often peaceful and generates positive economic remittances for home villages, modern resource scarcity triggers conflicts. The mobility of these fishers demands that policymakers recognize the considerable diversity within these communities and their differentiated rights and needs, especially when more powerful migrant boats interfere with local residents' operations (Haakonsen & Diaw 1991; Sall, Failler, Drakeford, et al. 2020).

Overall, West African artisanal fisheries maintain deep-rooted practices of supplying fresh, smoked, dried, and cured aquatic foods across domestic and regional markets, from marine, coastal and inland water bodies. Far from remaining steeped only in traditions, men and women have developed and adopted innovations, both technological and social. Contrary to a sometimes ideologically-tainted perception of artisanal fishing as backward, transported not only of colonial officials, the men and women in artisanal value chains in West Africa have shown considerable acumen in seizing social and

economic opportunities. This is reflected in the updated production estimates of the case studies undertaken by the 'Hidden Harvest Illuminated' initiative (FAO, Duke University & WorldFish 2023) and catch reconstructions by the Sea Around Us[2]. For long periods small-scale fisheries offered greater income earning opportunities than rural small-scale agriculture (Sall 2018). Far from a simplistic opposition between marine industrial and artisanal operations interactions ranged from various forms of collaboration to outright competition. Dème, Failler, Fall, et al. (2023) show how, for some time, migrant small-scale fishers supported the emergence of fish meal factories in Mauritania, Senegal and The Gambia as they could fetch higher prices for bulk catches of small pelagics compared to what women fish processors and traders could pay at local landing places. The down side was and is reduced local cheap nutritious fish for human consumption.

3.4. Gender Dynamics in the Small-Scale Fisheries Value Chains in West Africa

Of the approximately 100 million people working in global capture fisheries value chains, nearly 50% are women, helping to generate some 44% (US$77.2 billion) of the total first-point-of-landing value (Basurto, Gutierrez, Franz, et al. 2025). In West Africa, women operate as the core of the post-harvest sector. In Ghana, women from different fishing groups often follow men into migration, taking over typical managerial, processing, and marketing tasks, while adapting to local customs that might restrict their economic reach (Chauveau 1991; Odotei 1991). Similarly, in Senegal, distinct divisions of labor position women as critical business partners within larger family enterprises (Sall 2018). Because of limitations in formal inheritance rights, women historically amassed their own capital to extend loans for gear, fuel, and supplies, securing privileged access to fish landings in return.

This gendered economic model is strained under (global) market pressures. As catch volumes contract and the capital required to fund long-distance trips soars, women's independent financial reserves have proven insufficient. Excluded from formal credit and crippled by usury rates in informal markets, women are increasingly being replaced by external investors from urban elites or foreign interests. As fishers demand immediate cash payments for their catch, women processors without liquid capital have no or reduced access to landings for processing and marketing (Sall 2017, 2018). This shift tends to strip women of their traditional managerial influence and high social standing. Furthermore, the aggressive expansion of export-oriented fish meal and oil factories in Mauritania, The Gambia, and Senegal directly outbids these women for landings of small pelagics, diverting food away from regional markets and selectively pushing many women into poverty.

Work on value chains in the Small-Scale Fisheries Academy in Senegal before the pandemic mapped all actors and their roles bringing to the fore opportunities to reduce frictions and mismatches (Arraes Treffner 2019; Nauen & Arraes Treffner 2022). It showed potential for evolving gendered roles as part of the fishers honored the more traditional relationships with women fish processors and traders. Women also teamed up in savings groups and carried out group purchases to enhance their access to raw material, particularly when they had to buy from foreign middlemen like is partially the case in Guinea

(Sall 2017). Value chain innovations arose when refrigerated trucks from e.g. Burkina Faso and Mali started buying fresh fish in Guet Ndar and other major landing sites in Senegal to complement regional fish trade in smoked small pelagics. These and other development were also analysed in the SSF Academy (Nauen & Arraes Treffner 2022) when exploring options for future developments, whether with an exclusive focus on the sector or looking beyond towards complementary sources of income when traditional models ceased working sufficiently well. Many women in Nigeria also seek opportunities e.g. in catfish farming, processing and trading diversifying more conventional roles in processing and marketing locally caught from coastal or inland waters or imported frozen fish (Oyinbo & Mohammed 2015).

3.5. What are possible futures for small scale fisheries in West Africa?

Securing a sustainable future for West African SSF requires transitioning away from top-down, global-market-centric arrangements which have been shown to fail in multiple respects. They appear neither to be able to manage stable levels of resources nor enjoy the legitimacy and institutional capacity necessary to enforce the rules and curb illegalities. Conversely, developments toward formal rights-based co-management frameworks that legally protect local fishing grounds and value chains with legitimised pathways for participation of actors stand a much higher chance to succeed. The SSF Guidelines adopted by FAO's Committee of Fisheries in 2014 (FAO 2015) provide a suitable framework with due attention to human rights, gender equity, domestic and regional food and nutrition security, and disaster and climate change preparedness as cross-cutting issues.

Empirical evidence suggests that the SSF Guidelines being voluntary are not strongly implemented. Rather, the political economy in several coastal West Africa reveals a deepening friction between local subsistence requirements and macro-level market orientations. Over the past decade, national fisheries management frameworks have increasingly leaned toward neoliberal governance mechanisms. This creates an environment in those countries where small-scale fishers are under marginalisation pressures within their traditional fishing grounds.

The physical manifestation of this resource displacement is observed in the rapid industrialization of the coastline, including new container and mass products ports, mineral extractions, and other infrastructures. The build-up of numerous fish meal factories primarily in Mauritania, The Gambia, and Senegal processing small pelagic fish into fish meal and oil for export as animal feed directly competes with local food security (Muhl, Armitage, Nayak, et al. 2026). Conversely, adequate infrastructure for ensuring good sanitary conditions at beach landing sites of artisanal fishers and their land-based support professions, tends to be scarce. This puts the range of actors along SSF value chains at a serious disadvantage.

Initiatives like the *Mundus maris* supported Small-Scale Fisheries Academy in Senegal (Arraes Treffner 2019; Mundus maris 2019) and Ghana (Mundus maris 2026) offer critical, scalable evidence of the feasibility of alternative governance structures. By acting as inclusive, safe, multi-actor deliberative

arenas, such initiatives build local capacity, elevate the self-confidence of often marginalized fishworkers, and empower all actors along the value chain, including women processors and traders to assert their rights and recognise their responsibilities. Regular multi-actor dialogues to co-create solutions to common problems are a reliable pathway to operationalise the SSF Guidelines (Mundus maris 2026).

Co-management between government departments and the diverse SSF value chain actors has considerable potential for creating solutions that are less financially demanding than big scale industrial investments in a situation where African countries face very unfavourable credit and finance conditions (Ikpesu 2021; Ntarmah, Kong & Manu 2021). Connecting such local operational experiences to global networks empowers fishing communities to actively resist corporate capture, engage constructively with government institutions, and re-establish small-scale fisheries as a resilient cornerstone of regional food security, especially if governments are amenable to the co-management provisions of the SSF Guidelines.

4. Discussion

The empirical findings of this study demonstrate a critical structural transmutation within West African small-scale fisheries (SSF). Historical social-ecological resilience is increasingly compromised by neoliberal economic shifts and industrial over-capitalization at the expense of more locally rooted approaches to development. When evaluating these outcomes against the foundational literature, a stark contrast emerges between earlier developmentalist paradigms and modern rights-based approaches. Historically, colonial administrations and early post-colonial states operated under a modernization paradigm which assumed that artisanal fleets were primitive, inefficient structures destined to disappear and be completely replaced by industrial operations (Chauveau & Samba, 1990). The production realities documented across West African hub countries—extending from coastal zones deep into Sahelian inland networks—thoroughly invalidate this historical narrative. This study's synthesis aligns with the landmark global findings of the *Illuminating Hidden Harvests* initiative, which proved that small-scale networks match or exceed the landings of industrial trawl fisheries while providing critical micro-nutrients for billions of people (Basurto, Gutierrez, Franz, et al. 2025; FAO, Duke University & WorldFish 2023). Rather than a dying sector, SSF remain a central, structural centerpiece of regional food security and employment, so long as they not pitched directly against often subsidized industrial fleets and infrastructure developments are stacked against the tenure rights and lower key SSF needs. Paying heed to the latter would strengthen distributional justice and local food security rather than accentuating trends towards concentrating wealth and power in the hands of fewer internationally operating corporations (Österblom, Jouffray, Folke, et al. 2015).

The primary divergence from historical patterns lies in the systematic reconfiguration of value-chain governance. Early academic interventions regarding artisanal value chains in the 1980s were mostly technocratic and entirely gender-blind, focusing narrowly on maximizing landings to mitigate poverty (Sfeir-Younis 1980). This study shows that contemporary challenges are not driven by a lack of

technology, but by the corporate capture of fish access rights. Historically, women processors and traders demonstrated immense tenacity, operating as autonomous financial anchors who pre-financed fishing trips to secure privileged credit-based access to catches (Sall 2017, 2018). However, as resource over exploitation generates a vicious circle of more over investment, this transition has caused a severe capital crunch. Women are progressively being replaced as managers of family businesses by external urban elites and foreign investors who command immediate cash payments, stripping women of their managerial influence and high social standing (Sall 2018, Pauly, Nauen, Le Manach, et al. 2025).

Furthermore, the rapid expansion of export-oriented fish meal and oil factories in Mauritania, Senegal, and The Gambia marks an unwelcome departure from historical resource usage for human consumption. While West African fishers have a rich history of long-distance cyclical migrations that typically yielded peaceful cohabitation and positive economic remittances (Chauveau 1991; Haakonsen & Diaw 1991), modern industrial encroachment has fundamentally altered these dynamics. The direct competition for small pelagics between local food security and external reduction factories has induced severe localized resource scarcity (Muhl, Armitage, Nayak, et al. 2026). This ecological strain has fractured traditional community solidarity, shattered catch-share safety nets for crews, and driven a dramatic regional spike in economic and irregular migration (Ba, Schmidt, Deme, et al. 2017; Pauly, Nauen, Le Manach, et al. 2025).

Ultimately, this analysis highlights that small-scale fisheries cannot survive if dominant state policies continue to pitch them in direct competition with destructive industrial extraction and coastal corporate infrastructure. Moving forward, multi-stakeholder dialogue platforms like the *Mundus maris* promoted SSF Academy for the co-creation of solutions are vital to create opportunities for socially just change in combination with ecosystem conservation and regeneration. By linking field-level action with global legal frameworks - such as the WTO fisheries subsidies negotiations and the BBNJ Agreement - artisanal networks can transition from vulnerable, ignored sectors into active, self-confident leaders of cooperative ocean governance (Jentoft, Chuenpagdee, Bugeja Said, et al. 2022).

5. Conclusion

The political economy of West African small-scale fisheries demonstrates that their historical social-ecological resilience is reaching a critical breaking point under the pressures of neoliberal governance and industrial encroachments. This paper has shown that rather than being a transient, primitive mode of production destined to fade away, artisanal fisheries remain an indispensable structural centerpiece for regional food security, supporting the nutritional demands of millions of people across coastal and Sahelian zones. However, the shift toward market-driven policies, corporate capture of access rights, and the aggressive expansion of export-oriented fish meal factories have stripped women processors of their traditional managerial and financial influence, while driving vulnerable fishers into economic displacement and irregular migration.

To reverse these structural vulnerabilities, national policies must shift away from frameworks that place small-scale fisheries networks in direct, unequal competition with destructive industrial extraction and coastal corporate infrastructure. Securing a viable future for West African small-scale fisheries depends on the formal execution of rights-based co-management governance aligned with the FAO SSF Guidelines. As evidenced by the operational achievements of the *Mundus maris* SSF Academy, systematic, multi-actor collaborations among fisher organizations, civil society, and researchers are vital. By successfully linking localized field innovations with global policy spaces—such as international treaties, WTO subsidies reforms, and the BBNJ Agreement—small-scale actors can transition from marginalized stakeholders into self-confident leaders of a cooperative, regenerative ocean economy.

Declarations

Author Contribution

All authors conceived of the manuscript, CEN and AOAS wrote the main manuscript text, AOAS used AI for structural refinement, text simplification, reorganization of Suppl. Table 1 and grammatical copy-editing, CEN complemented missing references in the Suppl., CEN did most of the bibliographic research and initial analysis, all authors carefully reviewed and approved the manuscript.

References

1. Adewale, T., D. Aheto, and I. Okyere et al. 2024. Effects of Anthropogenic Activities on *Sardinella maderensis* (Lowe, 1838) Fisheries in Coastal Communities of Ibeju-Lekki. *Lagos Nigeria Sustainability* 16(7):2848. https://doi.org/10.3390/su16072848
2. Akintola, S. L. 2022. Perception and reality of justice in the small-scale fisheries of Nigeria. Ch. 10. In *Blue Justice*, MARE Publication Series ed. S. Jentoft, R. Chuenpagdee, and Bugeja Said, A., et al., vol. 26 179–198. Cham: Springer. https://doi.org/10.1007/978-3-030-89624-10
3. Akintola, S. L., K. A. Fakoya, and F. O. Areola et al. 2024. Legal and Policy Instruments on Rights and Provisions on Other Issues in Small-Scale Fisheries of Nigeria. In *Implementation of the Small-Scale Fisheries Guidelines*, MARE Publication Series ed. J. Nakamura, R. Chuenpagdee, and S. Jentoft. vol. 28 Cham: Springer. https://doi.org/10.1007/978-3-031-56716-2_13
4. Akintola, S. L., K. A. Fakoya, and I. O. Elegbede et al. 2022. Chapter three - Postharvest Practices in Small-Scale Fisheries. *Sustainable Fish Production and Processing* 79–110. https://doi.org/10.1016/B978-0-12-824296-4.00008-6
5. Akintola, S. L., K. A. Fakoya, and O. O. Joseph. 2017. Applying the Small-Scale Fisheries Guidelines in Nigeria: Status and Strategies for Badagry Coastal and Creek Fisheries. Ch. In *The Small-Scale Fisheries Guidelines*, ed. S. Jentoft, R. Chuenpagdee, M. J. Baragán, and Paladines et al., vol. 14 635–656. MARE Publication Series.
6. Akintola, S. L., and K. A. Fakoya. 2017. Small-scale fisheries in the context of traditional post-harvest practice and the quest for food and nutritional security in Nigeria. *Agriculture & Food Security* 6:34.

https://doi.org/10.1186/s40066-017-0110-z

7. Antwi, D. K., S. T. Yeboah, and B. Sarfo. 2023. Analysing the performance of fishing technologies among marine artisanal fishers in the central region of Ghana. *International Journal of Economics Commerce and Management*, 11, Issue 4.
8. Areola, F. O. 2022. An Evaluation of Multidimensional Justice Conflicts in Small-Scale Fisheries in Nigeria. Ch. 9. pp. 161–178 In: Jentoft, S., Chuenpagdee, R., Bugeja Said, A., Isaacs, M. (eds). *Blue Justice*. MARE Publication Series, vol 26. https://doi.org/10.1007/978-3-030-89624-9_9
9. Arizi, E. K., A. A. Sagoe, and E. Attipoe et al. 2021. *A Situational Analysis of Small-Scale Fisheries in Ghana: From Vulnerability to Viability*. V2V Working Paper 2021-2. V2V Global Partnership, University of Waterloo, Canada.
10. Arraes Treffner, M. F. 2019. Système d'apprentissage action focalisée sur les aspects de genre pour une pêche artisanale durable. Design de l'initiative pilote. Mundus maris, 26 p. ISBN 97894643641-2. https://www.mundusmaris.org/fr/download/systeme-dapprentissage/?wpdmdl=5316&refresh=6ac8d328002ab1791546152
11. Auld, K. G. 2021. Sustainable Development of Small-Scale Fisheries and the Need for Strong Measures to Protect Small-Scale Fisheries in International Trade Law. PhD Thesis, 228 p. Dep. of Public Law, Faculty of Law, University of Cape Town. http://hdl.handle.net/11427/33429
12. Ayilu, R. K., and S. Appiah. 2020. Fish traders and processors network: Enhancing trade and market access for small-scale fisheries in the West Central Gulf of Guinea. pp. 71–83 In Zelasney, J., Ford, A., Westlund, L. Securing sustainable small-scale fisheries: Showcasing applied practices in value chains, post-harvest operations and trade. *FAO Fisheries and Aquaculture Technical Paper*, 652.
13. Ba, A., J. Schmidt, and M. Deme et al. 2017. Profitability and economic drivers of small pelagic fisheries in West Africa: a twenty-year perspective. *Marine Policy* 76:152–158. https://doi.org/10.1016/j.marpol.2016.11.00
14. Basurto, X., N. L. Gutierrez, and N. Franz et al. 2025. Illuminating the multidimensional contributions of small-scale fisheries. *Nature* 637:875–884. https://doi.org/10.1038/s41586-024-08448-z
15. Basurto, X., B. Siegelman, and M. Navarro et al. 2023. Global patterns of management and governance of small-scale fisheries:contributions towards the implementation of the SSF Guidelines. Ch. 8. In *FAO, Duke University & WorldFish. 2023. Illuminating Hidden Harvests: the contributions of small-scale fisheries to sustainable development*, 175–214. Rome, FAO; Durham, USA: Duke University. Penang, Malaysia, WorldFish. FAO. 2023. ⟨hal-04071592⟩.
16. Belhabib, D., A. Baio, and O. T. Camara et al. 2020. Updating to 2018 the catch reconstructions for 14 countries of the West African mainland, pp. 115–147. In Derrick, D., Khalfallah, M., Relano, V. (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 Reports*, 28(5).
17. Belhabib, D., W. W. L. Cheung, and D. Kroodsma. 2020. Catching industrial fishing incursions into inshore waters of Africa from space. *Fish and Fisheries* 21(2):379–392. https://doi.org/10.1111/faf12436

18. Belja, E., R. van Anrooy, and D. Kalikoski. 2022. Regional fisheries bodies and their role in improving safety and decent work on fishing vessels. *FAO Fisheries and Aquaculture Circular* 1260:35. https://doi.org/10.4060/cc1145en
19. Biswas, N., and A. Lakshmi. 2023. Building solidarities: A panel discussion during the 8th Global Symposium on Gender in Aquaculture and Fisheries on women's shared experiences in the fisheries highlighted key issues facing women in the sector today. *Yemaya*, 66, 11–16. ISSN 0973–1156.
20. Bunting, S. W., D. Thiao, and M. Ahern et al. 2024. Evaluating rational and healthy use options for small pelagic fish species in sub-Saharan Africa. *Food Security* 16:1459–1477. https://doi.org/10.1007/s12571-024-01491-8
21. Chambers, R., and G. R. Conway. 1991. *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century*. Institute of Development Studies Discussion Paper, 296, 33 p.
22. Charles, A., A. Macnaughton, and S. Hicks. 2024. *Environmental stewardship by small-scale fisheries*. Rome: FAO. https://doi.org/10.4060/cc9342en
23. Chaveau, J.-P. 1991. The historical geography of fisheries migrations in the CECAF Region (end 19th century to the 1980s). pp. 12–35. In Haakonsen, J.M. & Diaw, M.C. (eds). Fishermen's migrations in West Africa. Programme de Développement Intégré des Péches Artisanales en Afrique de l'OUEST – DIPA / Programme for Integrated Development of Artisanal Fisheries in West Africa-IDAF. *IDAF/WP*/36.
24. Chauveau, J.-P., and A. Samba. 1990. *Un développement sans développeurs? Historique de la pêche artisanale maritime et des politiques de développement de la pêche au Sénégal*. *11*. https://aquadocs.org/items/d7065988-9ce3-46b0-b53e-27c835761e5b
25. Chauveau, J.-P., E. Jul-Larsen, and C. Chaboud. 2000. (éds.) *Les pêches piroguières en Afrique de l'Ouest. Pouvoirs, mobilités, marchés*. CMI Bergen, IRD Paris, Editions Karthala Paris, 383 p. ISBN 2-84586-071-4.
26. Christensen, V., S. Guénette, and J. J. Heymans et al. 2003. Hundred-year decline of North Atlantic predatory fishes. *Fish and Fisheries* 4:1–24. https://doi.org/10.1046/j.1467-2979.2003.00103.x
27. Christoffels-DuPlessis, A., B. Erinosho, and L. Major et al. 2022. Navigating a Sea of Laws: Small-Scale Fishing Communities and Customary Rights in Ghana and South Africa. In *The Palgrave Handbook of Blue Heritage*, ed. R. Boswell, D. O'Kane, and J. Hills. Cham: Palgrave Macmillan. https://doi.org/10.1007/978-3-030-99347-4_18
28. Chukwuemeka, H. N. 2023. *Value Chain and Vulnerabilities in Small-Scale Fisheries Communities of Makoko, Lagos, Nigeria*. A thesis presented to the University of Waterloo in fulfillment of the thesis requirement of the degree of Master of Environmental Studies in Sustainability Management, 116 p.
29. Claeys, P., and M. Edelman. 2020. The United Nations Declaration on the rights of peasants and other people working in rural areas. *The Journal of Peasant Studies* 47(1):1–68. https://doi.org/10.1080/03066150.2019.1672665
30. Costalago, D., S. Chakravarty, and S. de la Puente et al. 2026. The fishmeal and fish oil industry: a perspective on sustainability, justice, and food security. *Frontiers in Ocean Sustainability* 4:1833441.

10.3389/focsu.2026.1833441

31. Delaunay, K. 2000. Vridi (Côte d'Ivoire). Histoire d'une révélation. Ch. 1 pp. 87–123 In Chauveau, J.-P., Jul-Larsen, E., Chaboud, C. (éds.). *Les pêches piroguières en Afrique de l'Ouest. Pouvoirs, mobilités, marchés*. CMI Bergen, IRD Paris, Editions Karthala Paris, 383 p. ISBN 2-84586-071-4.
32. Dème, El H. B., P. Failler, and A. D. Fall et al. 2023. Contribution of small-scale migrant fishing to the emergence of the fishmeal industry in West Africa: Cases of Mauritania, Senegal and the Gambia. *Frontiers in Marine Science* 10:871911. 10.3389/fmars.2023.871911
33. Dickey-Collas, M., R. D. M. Nash, and T. Brunel et al. 2010. Lessons learned from stock collapse and recovery of North Sea herring: a review. – *ICES Journal of Marine Science* 67:1875–1886.
34. Etim, L., D. Belhabib, and D. Pauly. 2015. An overview of the Nigerian marine fisheries and a re-evaluation of its catch data for the years 1950–2010. pp. 66–76. In: Belhabib, D. & Pauly, D. (eds). Fisheries catch reconstructions: West Africa, Part II. *Fisheries Centre Research Reports*, vol.23(3). [ISSN 1198–6727].
35. Fakoya, K. A. 2020. Gopal, N. Turning points: A decade of change for women in fisheries – Q&A. *Yemaha*. *Suppl* 60:30–33.
36. Fakoya, K. A., and S. L. Akintola. 2018. A contextual analysis of small-scale fisheries governance in Nigeria: building on challenges and opportunities for sustainability. IIFET 2018 Seattle Conference Proceedings, 15p. https://ir.library.oregonstate.edu/concern/conference_proceedings_or_journals/fn1074546
37. FAO. 2015. *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication*. Rome, FAO, 18 p. ISBN 978-92-5-108704-6.
38. FAO. 2016. *Promoting gender equality and women's empowerment in fisheries and aquaculture*. Fact Sheet prepared by Ilaria Sisto. https://openknowledge.fao.org/items/d504e331-de55-4773-9796-632c23638e95
39. FAO, Duke University & WorldFish. 2023. *Illuminating Hidden Harvests – The contributions of small-scale fisheries to sustainable development*. Rome: FAO. https://doi.org/10.4060/cc4576en
40. Frangoudes, K., and S. Gerrard. 2019. Gender Perspective in Fisheries: Examples from the South and the North. In: Chuenpagdee, R., Jentoft, S. (eds). Transdisciplinarity for Small-Scale Fisheries Governance. MARE Publication Series, vol 21. https://doi.org/10.1007/978-3-319-94938-3_7
41. Funge-Smith, S., and A. Bennett. 2019. A fresh look at inland fisheries and their role in food security and livelihoods. *Fish and Fisheries* 20:1176–1195. 10.1111/faf.12403
42. Golo, H. K., and B. Erinosho. 2023. Tackling the challenges confronting women in the Elmina fishing community of Ghana: A human rights framework. *Marine Policy* 147:105349. https://doi.org/10.1016/j.marpol.2022.105349
43. Haakonsen, J. M., and M. C. Diaw. eds. 1991. Fishermen's migrations in West Africa. Programme de Développement Intégré des Péches Artisanales en Afrique de l'Ouest – DIPA / Programme for Integrated Development of Artisanal Fisheries in West Africa-IDAF. *IDAF/WP*/36, 322 p. FAOLIBRARYFICHEAN:317533-577.

44. Hallén, P., L. Bornmalm, and H. Alexandersson. 2023. The power of fishing: The introduction of steam and motorization in Scandinavian fishing, 1880–1950. *International Journal of Maritime History* 35(3):454–474. 10.1177/08438714231178144
45. Hamilton, J. 2018. *Supporting small-scalee fisheries: World Bank aid, objectives and interventions over time. Master's project submitted in partial fulfillment of the requirements for the Master of Environmental Management degree*. 31. Nicholas School of the Environment, Duke University.
46. Hayes, P., P. Holm, and J. Nicholls. 2025. 500 years of the once largest fishery in the world: A comprehensive catch reconstruction for the Newfoundland cod fishery (1508–2023). *Fisheries Research* 285:107325. https://doi.org/10.1016/j.fishres.2025.107325
47. Ibrahim, S., H. K. Golo, and T. Sanni. 2025. Right to culture in fishery governance: insights from customary law practices of small-scale fisher communities in Ghana. In Sadowski, M.M., Bonaviri, G.M., Ceccotti, F. (eds.) *Heritage in War and Peace IV*. University of Strathclyde Publishing, Glasgow. ISBN 9781914241802 (https://doi.org/10.17868/strath.00093366)
48. Ikpesu, F. 2021. Banking sector credit, inflation and growth in sub-Saharan African countries. *Journal of Transnational Management* 26(3):164–178. https://doi.org/10.1080/15475778.2021.1947170
49. Isaacs, M., and M. Hara. 2015. Backing small-scale fishers: Opportunities and challenges in transforming the fish sector. PLAAS, *Rural Status Report*, 2, 22 p.
50. Jimu, T. 2022. Towards a conceptual framework for the analysis of governance arrangements and livelihoods of small-scale fisheries in Norton, Zimbabwe. Dissertation presented for the degree of Doctor of Philosophy in the Department of Geography and Environmental Studies, Faculty of Arts and Social Sciences, Stellenbosch University, 275 p.
51. Jentoft, S., R. Chuenpagdee, and Bugeja Said, A., et al. eds. 2022. *Blue Justice. Small-scale fisheries in a sustainable ocean economy*. MARE Publication Ser. 26. https://doi.org/10.1007/978-3-030-89624-9
52. Jentoft, S., R. Chuenpagdee, and M. J. Barragán-Paladines et al. eds. 2017. *The small-scale fisheries guidelines. Global implementation*. MARE Publication Ser. 14. ISBN 978-3-319-55073-2.
53. Jerven, M. 2013. *Poor Numbers: How We Are Misled by African Development Statistics and What to Do about It*. Cornell University Press. https://www.jstor.org/stable/10.7591/j.ctt1xx4sk
54. Jul-Larsen, E. 2000. Prolifération des institutions et performances économiques: l'accès aux ressources des pêcheurs migrants à Pointe-Noire (Congo). Ch. 3, pp. 167–203 In Chauveau, J.-P., Jul-Larsen, E. et Chaboud, C. (éds.). *Les pêches piroguières en Afrique de l'Ouest*. *Pouvoirs, mobilités, marchés*. CMI Bergen, IRD Paris, Editions Karthala Paris, 383 p. ISBN 2-84586-071-4.
55. Kassah, J. E., and C. Asare. 2022. Conflicts in the artisanal fishing industry of Ghana: Reactions of fishers to regulatory measures. Ch. 6 pp. 99–118 In: Jentoft, S., Chuenpagdee, R., Bugeja Said, A., (eds). *Blue Justice. Small-scale fisheries in a sustainable ocean economy*. MARE Publication Ser. 26. https://doi.org/10.1007/978-3-030-89624-9_6
56. Kassibo, B. 2000. Pêche continentale et migration: contrôle politique et contrôle social des migrations de pêche dans le Delta central du Niger. Ch. 5 pp. 231–246 In Chauveau, J.-P., Jul-Larsen,

E., Chaboud, C. (éds.). *Les pêches piroguières en Afrique de l'Ouest. Pouvoirs, mobilités, marchés*. CMI Bergen, IRD Paris, Editions Karthala Paris, 383 p. ISBN 2-84586-071-4.

57. Keleman, P. J., A. B. Mané, and R. M. Sá et al. 2025. Net gains or enmeshed losses? Mangrove fishing transformations among the Balanta across coastal Guinea-Bissau, West Africa. *Maritime Studies* 24:65. https://doi.org/10.1007/s40152-025-00453-w
58. Kimani, P., B. Adrien, and A. Ward et al. 2022. Post-harvest practices for empowering women in small-scale fisheries in Africa: Successful outcomes and guidance. *FAO Fisheries and Aquaculture Circular* 1241:25. https://doi.org/10.4060/cb7918.en
59. Kolding, J., P. van Zwieten, and F. Marttin et al. 2016. Fisheries in the drylands of sub-Saharan Africa – Fish come with the rains. Building resilience for fisheries-dependent livelihoods to enhance food security and nutrition in the drylands. *FAO Fisheries and Aquaculture Circular*, 1118. Rome, Italy.
60. Kurien, J. 2022. Involving the People – Democratizing the implementation and monitoring of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. *FAO Fisheries and Aquaculture Circular* 1242. https://doi.org/10.4060/cb8058en
61. Lentisco, A., and R. U. Lee. 2015. A review of women's access to fish in small-scale fisheries. *FAO Fisheries and Aquaculture Circular* 1098:36.
62. Livingstone, O. P. 2022. *Bridging the Implementation Gap in International Agreements on Marine Protection and Sustainable Use*. Vienna, in part fulfillment of the Degree of Master of Science: Central European University.
63. Ly, D. 2017. Alternative solutions for a traditional society undergoing change: support for adding value to Imraguen fishery products. pp. 57–68 In Westlund, L., Charles, A., Garcia, S., (eds) (2017). Marine protected areas: Interactions with fishery livelihoods and food security. *FAO Fisheries and Aquaculture Technical Paper*, 603.
64. March, A., and P. Failler. 2022. Small-scale fisheries development in Africa: Lessons learned and best practices for enhanced food security and livelihoods. *Marine Policy* 136:104925. https://doi.org/10.1016/j.marpol.2021.104925
65. Milich, L. 1999. Resource Mismanagement Versus Sustainable Livelihoods: The Collapse of the Newfoundland Cod Fishery. *Society & Natural Resources* 12(7):625–642. https://doi.org/10.1080/089419299279353
66. Mills, D., P. Smallhorn-West, and H. Eriksson. 2024. *Evidence to Turn the Tide for Small-Scale Fisheries [from WorldFish Annual Report 2023].* Report Section, pp. 14–15. WorldFish, Penang, Malaysia.
67. Muhl, E.-K., D. Armitage, and P. K. Nayak et al. 2026. Transition pathways from vulnerability to viability of small-scale fisheries in Africa and Asia. *People and Nature* 8:1033–1049. https://doi.org/10.1002/pan3.70305
68. Mundus maris. 2026. Restoring Ghana's fisheries starts with the people who depend on them. https://www.mundusmaris.org/activities/restoring-ghanas-fisheries-starts-with-the-people-who-depend-on-them/

69. Mundus, maris. 2025. Small-scale fishers at the center of ocean governance and food security. https://www.mundusmaris.org/small-scale-fisheries-academy/small-scale-fishers-at-the-center-of-ocean-governance-and-food-security/
70. Mundus maris. 2019. Strengthening capacities of the actors for sustainable small-scale fisheries. https://www.mundusmaris.org/small-scale-fisheries-academy/strengthening-capacities-of-the-actors-for-sustainable-small-scale-fisheries/
71. Musinguzi, L., V. Natugonza, and J. Efitre et al. 2018. The role of gender in improving adaptation to climate change among small-scale fishers. *Climate and Development* 10(6):566–576. https://doi.org/10.1080/17565529.2017.1372262
72. Nakamura, J. N. 2025. *The international law for small-scale fisheries: Connecting the ecosystem approach and human rights to secure participatory fisheries management*. Taylor & Francis. https://doi.org/10.4324/9781003584551-1
73. Nauen, C. E. 2023. Bridging the Implementation Gap in International Agreements on Marine Protection and Sustainable Use. *Examines in Marine Biology and Oceanography, 6*(3), EIMBO. 000636. https://doi.org/10.31031/EIMBO.2023.06.000636
74. Nauen, C. E., D. S. Adhuri, and K. A. Fakoya. 2025. Voices from the shorelines to navigate the Anthropocene. pp. 255–284. In Bohle, M. &. Nauen, C.E (eds). *Cross-Disciplinary Dialogues with the Earth Sciences*. Palgrave-Macmillan. https://doi.org/10.1007/978-3-031-97445-8_9
75. Nauen, C. E., and M. B. N'diaye. 2022. Women fish traders in Yoff and Hann, Senegal, victims or shapers of their destiny? https://www.mundusmaris.org/small-scale-fisheries-academy/women-fish-traders-in-yoff-and-hann-senegal-victims-or-shapers-of-their-destiny/
76. Nauen, C. E., and M. F. Arraes Treffner. 2022. Strengthening Capabilities of Individuals and Communities Through a Small-Scale Fisheries Academy. Ch. 32 pp. 611–633 In Jentoft. S., Chuenpagdee, R., Bugeja Said, A. (eds). *Blue Justice*. *Small-scale fisheries in a sustainable ocean economy*. MARE Publication Series 26. https://doi.org/10.1007/978-3-030-89624-9_32
77. Nauen, C. E., and M. F. Arraes Treffner. 2021. Translating SSF Guidelines Into Practice With the Small-Scale Fisheries Academy. *Frontiers in Marine Science*. 8https://doi.org/10.3389/fmars.2021.730396
78. Ntarmah, A. H., Y. Kong, and E. K. Manu. 2021. Investigating the dynamic relationships between credit supply, economic growth, and the environment: empirical evidence of sub-regional economies in Sub-Saharan Africa. *Environmental Science and Pollution Research* 28:5786–5808. https://doi.org/10.1007/
79. Nyiawung, R. A., and R. K. Ayilu. 2025. Social Innovation in Small-Scale Blue Food Systems: A Case Study of Oyster Harvesters in The Gambia, West Africa. *Environmental Policy and Governance* 35(6):1073–1085. https://doi.org/10.1002/eet.70024
80. Österblom, H., C. C. C. Wabnitz, and D. Tladi et al. 2020. Towards Ocean Equity. Washington, DC: World Resources Institute. Available online at www.oceanpanel.org/how-distribute-benefits-ocean-

equitably. Reprint by Springer International Publishing (2023). J. Lubchenco, P. M. Haugan (eds.), The Blue Compendium, https://doi.org/10.1007/978-3-031-16277-0_13

81. Österblom, H., J.-B. Jouffray, and C. Folke et al. 2015. Transnational Corporations as 'Keystone Actors' in Marine Ecosystems. *Plos One* 10(5):e0127533. 10.1371/journal.pone.0127533
82. Odotei, I. 1991. The migration of Ghanaian women in the canoe fishing industry. pp. 297–307. In Haakonsen, J.M. & Diaw, M.C. (eds). Fishermen's migrations in West Africa. Programme de Développement Intégré des Péches Artisanales en Afrique de l'OUEST – DIPA / Programme for Integrated Development of Artisanal Fisheries in West Africa-IDAF. *IDAF/WP*/36.
83. Overå, R. 2000. Les femmes, chefs d'entreprise dans la pêche piroguière au Ghana. Le cas de la ville fante de Moree. Ch. 8, pp. 299–324 In Chauveau, J.-P., Jul-Larsen, E., Chaboud, C. (éds.). *Les pêches piroguières en Afrique de l'Ouest. Pouvoirs, mobilités, marchés*. CMI Bergen, IRD Paris, Editions Karthala Paris, 383 p. ISBN 2-84586-071-4.
84. Oyinbo, O., and M. O. Mohammed. 2015. Gender, Water Quality and Catfish Production for Livelihood Support: Evidence from Catfish Farmers in Lagos State, Nigeria. *Trakia Journal of Sciences* 3:222–227. 10.15547/tjs.2015.03.004
85. Pauly, D., C. E. Nauen, and F. Le Manach et al. 2025. From Science to Conscience: The Plunder of Senegal's Fisheries Resources, or Europe's Role in the Making of a Migration Crisis. In: *Proceedings of the Paris Institute for Advanced Study*, Vol. 21. https://doi.org/10.5281/zenodo.15833918
86. Pauly, D., and D. Zeller. 2016. Catch reconstructions reveal that global marine catches are higher than reported and declining. *Nature Communications* 7:10244. https://doi.org/10.1038/ncomms10244
87. Pauly, D., and R. Watson. 2009. Spatial dynamics of fisheries. pp. 501–509 + plate 14 In: S. Levin (ed.). *The Princeton Guide to Ecology.* Princeton University Press, Princeton, N.J.
88. Robinson, R. 1998. The Diffusion of Steam in the Fishing Industries of Northwest Europe. *International Journal of Maritime History* 10(2):179–200. https://doi.org/10.1177/084387149801000210
89. Sall, A. 2018. Entretien avec Madame Khady SARR au port de pêche artisanale de Hann. https://www.mundusmaris.org/fr/entre-tradition-et-modernite/entretien-avec-madame-khady-sarr-au-port-de-peche-artisanale-de-hann/
90. Sall, A. 2017. Un détour dans le port de pêche artisanale de Boulbinet à Conakry, Guinée. *Mundus maris* asbl. 7 p. https://archive.mundusmaris.org/index.php/fr/projets/proj2017/1847-boulbinet-fr?showall=1
91. Sall, A., and O. Sow. 2025. A situational analysis of small-scale fisheries in Senegal: Livelihoods, gender and governance in the context of globalization and climate change. *V2V Working Paper* 2025-01. V2V Global Partnership, University of Waterloo.
92. Sall, A., F. Failler, B. Drakeford, and A. March. 2021. Fisher migrations: social and economic perspectives on the emerging shark fishery in West Africa. *African Identities* 19(3):284–303. 10.1080/14725843.2021.1937051

93. Sanon, V. P. 2021. Traditional fisheries practices in transition: Dynamics and implications in Burkina Faso. PhD Thesis, Institute for Sustainable Economic Development, Institute for Development Research, BOKU-University of Natural Resources and Life Sciences, Vienna, 198 p.
94. Sfeir-Younis, A. 1980. Small-Scale Fisheries Development: A Challenge For The 1980s. *World Bank AGREP Division Working Paper* No. 17, 54 p.
95. Short, R. E., S. Gelcich, and D. C. Little et al. 2021. Harnessing the diversity of small-scale actors is key to the future of aquatic food systems. *Nature Food* 2:733–741. https://doi.org/10.1038/s43016-021-00363-0
96. Soung, M., and P. Nolasque. 2021. Lessons and best practices for effective engagement of Women and Youth in Fisheries and Aquaculture value chains. African Union-IBAR, https://repository.au-ibar.org/handle/123456789/1221
97. Sunde, J. 2016. Women in fisheries in Africa: 1999–2015. *Yemaya* 51:7–10.
98. Sustainable Fisheries Livelihoods Programme, SFLP. 2005. *Connecting fisheries and African Development. Project Summary*. 12. DFID and FAO.
99. Symes, D. 1991. UK Demersal Fisheries and the North Sea: Problems in Renewable Resource Management. *Geography* 76(2):131–142. https://doi.org/10.1080/20436564.1991.12452312
100. Thiao, D., and S. W. Bunting. 2022. Socio-economic and biological impacts of the fish-based feed industry for sub-Saharan Africa. *FAO Fisheries and Aquaculture Circular* 1336. https://doi.org/10.4060/cb7990en
101. Virdin, J., X. Basurto, and G. Nico et al. 2023. Fishing for subsistence constitutes a livelihood safety net for populations dependent on aquatic foods around the world. *Nature Food* 4:874–885. https://doi.org/10.1038/s43016-02-00844-4
102. Westlund, L., A. Charles, and S. Garcia et al. eds. 2017. Marine protected areas: Interactions with fishery livelihoods and food security. *FAO Fisheries and Aquaculture Technical Paper*, 603.
103. Williams, S. B. 2017. Gender considerations in small-scale fisheries governance in Nigeria. pp. 615–634 In Jentoft, S., Chuenpagdee, R., Barragán Paladines, M.J., (eds.), *The Small-Scale Fisheries Guidelines*. MARE Publication Series, Vol 14. https://doi.org/10.1007/978-3-319-55073-2_32
104. ed. S. B. Williams, A.-M. Hochet-Kibongui, and C. E. Nauen. Gender, fisheries and aquaculture: Social capital and knowledge for the transition towards sustainable use of aquatic ecosystems. / Genre, pêche et aquaculture: Capital social et connaissances pour la transition vers l'utilisation durable des écosystèmes aquatiques. / Género, pesca y acuicultura: Capital social y conocimientos para la transición hacia el desarrollo sostenible. / Género, pesca e aquacultura: Capital social e conhecimento para a transição para um uso sustentável dos ecosistemas aquáticos. Brussels, Bruxuelles, Bruselas, ed. Bruxelas. 2005. *ACP-EU Fish.Res.Rep*., (16), 128 p. ISSN 1025–3971 / EUR 20432.
105. Willmann, R., N. Franz, and C. Fuentevilla et al. 2017. A Human Rights-Based Approach in Small-Scale Fisheries: Evolution and Challenges in Implementation. Ch. In *The Small-Scale Fisheries*

Guidelines, ed. S. Jentoft, R. Chuenpagdee, and M. J. Baragán Paladines et al., vol. 14 763–787. MARE Publication Series.

106. World Bank. 2012. *Hidden harvest: the global contribution of capture fisheries (English)*. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/515701468152718292
107. Zelasney, J., A. Ford, and L. Westlund et al. 2020. Securing sustainable small-scale fisheries: Showcasing applied practices in value chains, post-harvest operations and trade. *FAO Fisheries and Aquaculture Tech.Pap*., 652. https://doi.org/10.4060/ca8402en

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