Subsection 5A

Subchapter 1B

Small-scale fishing, including subsistence fishing

Writing team: Derek Armitage (coordinating author), Denis Aheto, Donovan Campbell (co-lead member), Beodeul Kang, Tricia Lovell, Melissa Marschke, Ella-Kari Muhl, Prateep Nayak, Ife Okafor-Yarwood, Cristina Pita, Sisir Pradhan, Deborah Prado, Micaela Trimble, Ron Vave, Nobuyuki Yagi and Chang-Ik Zhang (lead member).

Key points

- Small-scale and subsistence fisheries make substantial contributions to national and global economies and are socially and culturally important.
- The cumulative effects of a wide range of drivers, including social, economic, environmental and climate drivers, pose significant threats to the viability and resilience of small-scale and subsistence fisheries globally.
- Sustainable pathways for small-scale and subsistence fisheries must address the cumulative effects of multiple drivers of vulnerability, build on knowledge and experience, and take into consideration equity, human rights and security concerns.

1. Introduction

The Food and Agriculture Organization of the United Nations (FAO) Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication were ratified in 2014 (FAO, 2015), providing a road map aimed at reinforcing sustainable small-scale and subsistence fisheries and their multidimensional contributions (food security and income generation) along the value chain (i.e. the nodes and networks of activity that yield value from pre- and post-harvest processing and marketing activities) (Jentoft and others, 2017; Arthur and others, 2022; Nakamura and others, 2021; Basurto and others, 2025). The contributions of small-scale fisheries to the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, as well as to the implementation of the Kunming-Montreal Global Biodiversity Framework, have been increasingly recognized (Charles and others, 2024). However, small-scale fisheries tend to be economically vulnerable and politically marginalized in global policy debates (Jentoft and others, 2022).

There is no globally agreed definition of small-scale fisheries, but they can be characterized as place-based and primarily for family consumption (low production), with limited capital or resource inputs, but labour-intensive and based on trips that are spatially and temporally limited (i.e. close to shore or completed within a day) (FAO, 2018). Individual nation States have adopted a wide range of definitions linked to gear type (i.e. type and size of nets), length of boat and means of power, vessel ownership, trip duration and area of fishing activity (e.g. inshore or nearshore) (Pita and others, 2020; Smith and Basurto, 2019), as shown in the table below. Small-scale fisheries undertake pre-harvest activities (e.g. preparing gear or planning), harvesting of fishery resources and post-harvest activities (e.g. marketing or trading). Activities along the value chain are undertaken by both men and women (Rosales and others, 2017; Pradhan and others, 2022; Galappaththi and others, 2023).

Table

Selected attributes and elements of small-scale fisheries

Attribute	*Related elements*	*Examples*
Indicative gear	Fishing gear	Labour-intensive gear
		Passive gear
	Mechanization	No mechanization
		Small power winch (hauler powered off engine)
Vessel	Size of fishing vessel	No vessel
		Less than 12 m, or 12–24 m
	Motorization	No engine
		Engine less than 100 hp, or 100–400 hp
Operation	Fishing trip duration	Less than 6 hours
		Day trip
		1–4 days
	Fishing location and range	Less than 100 m from shore
		Up to 10 km offshore
		10–20 km offshore
Storage/preservation	Refrigeration/storage	No cold storage
		Ice box on board
		Ice hold below deck
Employment/labour	Labour crew	Individual or family
		Cooperative group
		Small number of employed crew
	Ownership	Owner or owner-operator
		Lease arrangement
	Time commitment	Occasional
		Full-time seasonal or part-time all year
		Full-time

Use of catch	Disposal of catch	Household consumption or barter exchange
		Direct sale at landing site(s)
		Sale to traders (intermediaries)
	Utilization of catch, value addition, preservation	For direct human consumption
		Chilled, locally processed, cured/salted/dried
		Frozen (temporarily)
	Integration into economy and/or management system	Informal, non-integrated (no fees)
		Integrated (registered, untaxed)
		Formalized (licensed, landing fees)

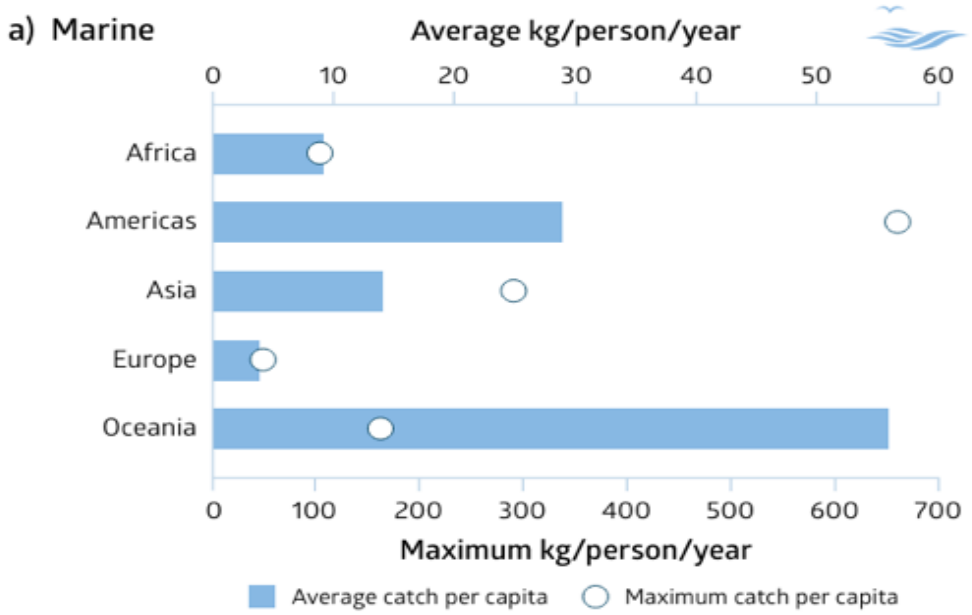
Source: Adapted from FAO, Duke University and WorldFish, 2023.

There are numerous exceptions to the attributes reflected in the table above (FAO, 2015; Smith and Basurto, 2019). Identification of the size, scope and scale of fishery operations is recommended in order to improve policy implementation (e.g. access and tenure, marketing, economic policy, regulation and enforcement) and to enhance evidence-based and comparative assessment. However, definitions of small-scale fisheries do not fall within an immutable category fixed in time and space. Rigid adherence to a specific definition is neither possible nor desirable.

The economic, social and cultural importance of small-scale fisheries is very well established (Chuenpagdee and others 2017; Dias and others, 2023; Berkes and Franz, 2025). Total landings of all species by marine small-scale fisheries are estimated at 25.1 million tons per year, or approximately 40% of global landings (FAO, 2023), with an estimated annual revenue of approximately $77 billion (FAO, Duke University and WorldFish, 2023). There are significant regional variations in total catch per capita (see figure I). Oceania has the largest average annual marine catch per capita, while Europe has the lowest. However, regional variations in catch per capita do not necessarily indicate relative importance. Despite lower catch per capita levels, small-scale fisheries in Africa and Asia are of crucial importance because of the overall number of fishers in the sector.

Figure I

Global estimates of marine small-scale fisheries' catch per capita, by region (average annual values, 2013–2017)



Source: FAO, Duke University and WorldFish, 2023.

Small-scale fisheries' contributions are different for men and women, highlighting the importance of gender analysis in small-scale fisheries policy (Lawless and others, 2021; Okafor-Yarwood and others, 2024a). Small-scale fisheries contribute to poverty alleviation and viable livelihoods and are linked to cultural identity and stewardship (Arthur and others, 2022; Béné and others, 2016; Mangubhai and others, 2023). They are also important for food security and nutrition (e.g. vitamin B12, calcium and important fatty acids) and provide an average of 17% of the nutrient supply globally (Viana and others, 2023; Basurto and others, 2025).

2. Pressures and impacts

Significant pressures and impacts on small-scale fisheries include: (a) economic growth and coastal development (Brent and others, 2020); (b) overfishing, environmental impacts and climate change (Ruiz-Díaz and others, 2020); (c) competition with medium- or large-scale fisheries sectors, including illegal, unreported and unregulated (IUU) fisheries and marine security/boundary issues (Ayilu and others, 2023; Okafor-Yarwood and others, 2024b); (d) loss of access catalysed by efforts to meet marine conservation targets (Bennett and others, 2021a); (e) global trade and competition for market access (Schuhbauer and others, 2019); and (f) policy and governance shifts (Sowman and Sunde, 2021; Berkes and Franz, 2025) (see sect. 4, chap. 1). The heterogeneity of small-scale fisheries, non-standardized approaches to data collection and analysis, and a lack of data collection generally across a range of environmental drivers affecting small-scale fisheries limits the fine-grained assessments that are necessary to support targeted policy interventions.

Most Member States with ocean areas within their national jurisdiction have adopted or are adopting strategies or regulatory frameworks related to ocean use and planning in order to catalyse economic growth and coastal development. Investments in marine sectors by financial institutions and other donors in Latin America, for example, expanded considerably between 2012 and 2020 (Gerhardinger and others, 2022). Investment strategies rarely include the participation of small-scale fisheries organizations (Schuhbauer and others, 2020). Evidence that poorly structured coastal and ocean economic development policies have a negative impact on small-scale fisher communities is established but incomplete (Bennett and others, 2021a; Ertör, 2023; Jentoft, 2022; Okafor-Yarwood and others, 2020). Ocean "grabbing" (i.e. securing ocean space) by private and/or State actors may create significant injustices through a set of displacement and dispossession processes targeting fisher communities, and may sometimes be in conflict with customary tenure and access rights (Ertör, 2023; The Ocean Defenders Project, 2025). These social processes exacerbate the effects of sea level rise, including tidal flooding and erosion (Gonzalez-Mon and others, 2021), which already drive displacement and migration decisions. The displacement and/or migration of communities from their fishing territories to different locations creates social challenges given the strong sense of place of most small-scale fishing communities (Cánovas-Molina and others, 2022; FAO, Duke University and WorldFish, 2023; Okafor-Yarwood and others, 2020; Queffelec and others, 2021).

Plans for new ports, tourist facilities, shipping lanes and security zones, oil rigs, mining areas, wind farms and new aquaculture ponds can also encroach upon geographical, political and economic territorial spaces and have a negative impact on the environment on which small-scale fishers rely. Offshore hydrocarbon operations affect wild-capture fisheries by displacing fish stocks and altering fish biochemistry, and submarine pipelines and cables may also hinder the activity of small-scale fisheries (Jouffray and others, 2020). The growth of offshore sea mining will have significant impact on habitats, including the discharge of sediments and metals into the water column (United Nations Environment Programme (UNEP), 2022), which will have a negative effect on ecosystems and small-scale fisheries. The negative impacts of underwater noise, vibration and electromagnetic waves from large wind farms on fisheries resources have also been identified (Oh and others, 2021).

The cumulative effects of environmental and climate drivers on the viability of small-scale fisheries is very well established (Brent and others, 2020; Evans and others, 2023; Louey, 2022). Fish disease, habitat degradation, invasive species and loss of species diversity were identified as important environmental drivers affecting small-scale fishers across 12 focal countries in Asia and Africa (Dias and others, 2023). The livelihoods of small-scale fishers depend on aquatic and marine environments. The conditions of these ecosystems, such as water quality, temperature and salinity, are crucial for their sustainability. Environmental degradation, such as pollution from domestic, industrial, agricultural and aquaculture waste, and poor watershed management can adversely affect these conditions, threatening the viability of small-scale fisheries (Nayak and others, 2014; Martínez-Vázquez and others, 2021; Evans and others, 2023). Variations in water quality across geographical areas can affect the accessibility and availability of fish.

Macroplastic and microplastic pollution (fragments and fibres) has emerged as a crucial challenge for coasts and fisheries, with human health implications (Barboza and others, 2018; Rochman and others, 2015; Smith and others, 2021). Evidence of the relationship between microplastics and small-scale fisheries is established but incomplete, yet research points to an environmental driver affecting a diverse

range of fisheries and ecosystems (e.g. pelagic, demersal and benthic zones), with negative implications for the fisheries. For example, Savoca and others (2021) estimate that plastic ingestion is occurring in 386 species of marine fish globally, while Pellini and others (2018) indicate that about 95% of fish analysed in the Adriatic Sea were observed to contain microplastics. A study in Puerto Morelos, Mexico, in 2024 recorded high levels of microplastics in commercial reef species, many of which make up a significant component of landings for small-scale fisheries in the Mexican Caribbean (Rivera-Garibay and others, 2024). Regional variations in the impacts of plastic pollution are likely and may disproportionately affect small-scale fisheries, although evidence on this relationship is incomplete.

Small-scale fisheries are overlooked in the climate change literature and in assessments by the Intergovernmental Panel on Climate Change (IPCC) (Villasante and others, 2022). However, the projected effects of climate change (IPCC, 2023) will have a disproportionate impact on small-scale fishing communities, with varying levels of intensity in different regions associated with shifts in sea surface temperature, range shifts and stock composition change, sea level rise, changes in rainfall patterns, shifts in salinity associated with saltwater intrusion from higher levels of freshwater inflow, an increase in extreme weather events and associated coastal erosion, ocean acidification and coral reef bleaching (Bell and others, 2013; Mimura, 1999; Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) 2019, 2024). Abnormally warm water temperatures and other climate stressors directly affect the quantity and the quality of small-scale fisheries' catch (FAO, Duke University and WorldFish, 2023), with correlated socioeconomic impacts for thousands of vulnerable households. The total maximum catch potential in the world's exclusive economic zones (EEZs) is likely to decrease by 7 to 12% by 2050 if a "business-as-usual" greenhouse gas emission scenario is followed, strongly driven by changes in plankton productivity (Monnier and others, 2020). The decrease could be up to 40% in some areas of the intertropical zone, largely affecting countries that are most dependent on fisheries as a source of protein (Monnier and others, 2020). Small-scale fisheries are likely to suffer the most significant impacts from these climate-driven changes, compounded by the effects of increasing industrialization, urbanization and the multiple uses of aquatic spaces (FAO, Duke University and WorldFish, 2023; Berkes and Franz, 2025).

Competition with other fisheries sectors, including IUU fishing, generates a range of pressures and impacts. For instance, it is well established that competition and conflicts with industrial fishing boats are a major threat to small-scale fishing livelihoods in some regions (Horta and Defeo, 2012; Okafor-Yarwood and others, 2022; Seto and others, 2023) (see subsect. 5A, subchap. 1A). Many countries have pursued the expansion of industrial fisheries as a development strategy for decades (Ayilu and others, 2023; Schuhbauer and others, 2019). This has intensified the overexploitation of resources and increased pressure on small-scale fishing, leading to significant levels of inequity and evidence of conflict between small-scale and industrial fisheries (Crona and others, 2021; Seto and others, 2023). Small-scale fisheries frequently compete for market share with products from industrial fisheries, aquaculture and imports (Crona and others, 2016; Pita and others, 2020), posing a range of livelihood challenges. Furthermore, IUU fishing, piracy and unsustainable fishing practices are closely connected to a lack of enforcement and limited public involvement in management (Widjaja and others, 2023). IUU fishing is a major threat to marine ecosystems and fishery resources and can lead to the significant loss of local fisheries, with small-scale fisheries in developing countries known to be particularly vulnerable (FAO, 2024; Song and others, 2020; WIOMSA, 2022). However, assessments of the impacts of IUU on small-scale fisheries are complicated by the various forms and drivers of IUU, the role of small-scale fisheries in IUU, and the

lack of consensus on what constitutes IUU in some regions (WIOMSA, 2022; FAO, 2024). Regional variation complicates the development of guidelines to address IUU and common monitoring indicators (FAO, 2024).

Globally, the impact of maritime safety interventions and security policies, often in tandem with blue economy strategies, is established but incomplete. In West Africa, for example, security zones are being imposed around sensitive maritime areas (e.g. offshore hydrocarbon infrastructure) (Adjei and Overå, 2019; Beseng, 2019). Artisanal fishers may be detained or harassed if they enter these areas. A ban on fishing within 500 m of oil rigs similarly limits the activities of artisanal fishers in Ghana and Nigeria and reduces access to traditional fishing grounds (Okafor-Yarwood and others, 2022; Bell and others, 2021), thus requiring them to go further out to sea, with concomitant safety risks.

Disruptions to sea lines of communication through acts of piracy and armed robbery in strategic regions, such as the Gulf of Aden, the Gulf of Guinea, the South China Sea and the Red Sea, further limit freedom of navigation for small-scale fishers (Liss, 2014; Bell and others, 2021; Guilfoyle, 2013). Numerous Security Council resolutions on piracy and armed robbery at sea have been adopted with the aim of mitigating these dangers. At the national level, anti-piracy measures may include prohibitions on small-scale fishers using certain harbours, the imposition of curfews (Bell and others, 2021) and no-fishing zones. An increased law enforcement presence at sea may reduce piracy and armed robbery, but results in the loss of traditional fishing grounds or restricts access to fishing areas at specific times for fishers, often without compensation (Bell and others, 2021). In some situations, small-scale fishers are mistaken for pirates and either reported as suspicious (mostly in the Gulf of Guinea) or targeted, as in the Southern Indian Ocean. Many artisanal fishers operate at night (Mills and others, 2014), leading to further uncertainty and livelihood impacts.

Marine conservation policies and specific interventions, such as marine protected areas (MPAs), can contribute to the sustainability of small-scale fisheries (e.g. spillover effects) and the protection of habitats and species at specific life stages. There is evidence that well-managed MPAs may result in “co-benefits” for fisheries and coastal communities (Ban and others, 2019; Nowakowski and others, 2023; Costello, 2024). However, increased efforts to achieve the “30 by 30” targets of the Kunming-Montreal Global Biodiversity Framework may exacerbate the challenges faced by small-scale fisheries. More than 190 countries committed to the target of protecting at least 30% of terrestrial and inland water areas and marine and coastal areas by 2030 (Eckert and others, 2023). Contemporary marine conservation efforts can marginalize coastal and small-scale fishing communities (Cinti and others, 2024; Tafon and others, 2022) through the implementation of fishing bans and no-take zones, enclosure and access constraints, or top-down enforcement of conservation regulations (Muhl and others, 2020; Trimble and others, 2014; Bennett and others, 2021b; Ertör, 2023). In South Africa, for example, conservation efforts have displaced small-scale fishing communities from historically important fishing areas (Peer and others, 2022; Sowman and Sunde, 2018). Such initiatives can further alienate the underresearched, and largely undocumented, cultural fisheries management strategies for funerals or chiefly investiture of Indigenous Peoples and local communities, resulting in further displacement and exclusion (Vave, 2022). Negative impacts include the loss of community harvesting in conservation zones for funerary feasts and the loss of Indigenous Peoples’ and local communities’ cultural practices, which can affect access rights and identity (Vave, 2022).

3. Social components

Along the fish value chain (i.e. harvest/capture, processing and marketing), small-scale capture fisheries provide full- or part-time employment opportunities for approximately 60.2 million people, or about 90% of the total number of people employed in capture fisheries globally (FAO, Duke University and WorldFish, 2023; FAO, 2024). As of 2016, when the latest projections were available, close to 500 million people were estimated to depend in some way on small-scale fisheries for their livelihood, with an estimated 53 million people directly involved in fishing for subsistence (i.e. primarily for family food needs (FAO, 2024). Notably, FAO technical guidelines for responsible fishing place an emphasis on fish processing, trade and poor-friendly market systems to enhance economic efficiency and welfare gains in developing countries (Bjorndal and others, 2014; Pradhan and others, 2022).

Key social attributes influence the distribution of economic and livelihood benefits within small-scale fishing communities, including gender and identity (Galappaththi and others, 2022), displacement and labour precarity (Marschke and others, 2019), security/safety at sea (Guilfoyle, 2014), social protection (FAO, 2019; Tabe-Ojong and others, 2025) and well-being (Trimble and Johnson, 2013; Weeratunge and others, 2014). Efforts to build socially viable small-scale fisheries must engage more fully with fishers' place-based knowledge (Kitolelei and others, 2021; Pascua and others, 2017). A focus on value chains also enables a coherent assessment of equity and the distribution of benefits. There is evidence of traders and processors accessing exclusive market information that facilitates exploitative social relationships and constrains the power of small-scale fishers (Ferrol-Schulte, 2014; Pradhan and others, 2022).

The financial viability of small-scale fisheries is influenced by other sectors and actors, including informal finance providers, such as fish buyers or gear suppliers, through high-interest loans and unfavourable repayment structures, including selling catches when market prices are at their lowest (Kleih and others, 2013; Okafor-Yarwood and others, 2024a). Fish buyers provide de facto controls on the amount and price of small-scale fishery catches, serving as a driver for overexploitation (Kamiyama and others, 2015). There is limited reporting on the specific terms and conditions imposed by such fund providers. Informal financing of small-scale fisheries is common because formal banks are reluctant to lend money to perceived high-risk or unstable borrowers, including small-scale fisheries (Jimenez and others, 2020). In many cases, opportunities to upgrade small-scale fisheries are structured by social relationships and local embeddedness (Adhuri and others, 2016).

The gender dimensions of small-scale fisheries are significant (see subsect. 5B, chap. 6). An estimated 53 million people are directly involved in fishing for subsistence; 39.6% of those engaged in the small-scale fisheries value chain through direct employment or subsistence fishing are women (FAO, Duke University and WorldFish, 2023). Close to 50% of post-harvest workers are women (FAO, Duke University and WorldFish, 2023). Compared with other industries, small-scale fisheries significantly contribute to gender equality (Harper and others, 2020; Kleiber and others, 2017). Women and men perform complementary roles: men are primarily involved in marine capture fisheries, while women focus on processing, trade and marketing (Pedroza-Gutiérrez and Hapke, 2022).

Globally, women catch approximately 2.9 million (+/- 835,000) tons of fish and invertebrates annually, with an estimated landed value of $5.6 billion (Harper and others, 2020; FAO, Duke University and WorldFish, 2023). This accounts for 12% of the total landed value of small-scale fishery catches and generates an overall economic impact of $14.8 billion annually (+/- $4 billion) (Harper and others, 2020).

Women may also have prominent leadership roles in all aspects of a fishery, including management and governance (Chambon and others, 2024; Galappaththi and others, 2022). However, women tend to have more unstable positions within fishery value chains despite their roles (Eurostat, 2023; Chambon and others, 2024). Women in small-scale fisheries are also subjected to wage inequalities (Aini, 2022), domestic and/or workplace violence (Mangubhai and others, 2023) and limited acknowledgement of their work, which is often viewed as an extension of their household responsibility (United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women), 2020). Opportunities to enhance environmental and human well-being outcomes require ongoing efforts to address gender inequities across the small-scale fisheries value chain (Cohen and others, 2024).

Small-scale fisheries are increasingly characterized by precarious working conditions, including extreme weather events, and labour relations that can undermine the significant contributions of small-scale fishers (Marschke and Vandergeest, 2016; Belton and others, 2019; Cruz-Del Rosario and Rigg, 2019). Furthermore, in developing countries, small-scale fisheries may lack social protection programmes or receive limited support to mitigate vulnerabilities (Tabe-Ojong and others, 2025). Small-scale fishers are often forced to fish further from shore for longer periods of time, particularly given general decline in stocks. Workers in small-scale fisheries rarely have contracts, work long hours, are often paid on share of the catch, based on how much fish is caught, and fish seasonally. Depending on the context, boat ownership can be next to impossible in some coastal communities, resulting in some fishers migrating for work elsewhere. For example, former Cambodian small-scale fisher households can be found in Thailand working in pre-processing (women) and as fish workers (men) on crab boats. In Indonesia, small-scale fishers migrate for work, with men separated from their families for years at a time. Investments around labour protection, individual and collective control and decent work are critical for such fisheries (Marschke and Vandergeest, 2016; Bavinck and others, 2024; Lozano and others, 2022).

Small-scale fishers, including Indigenous small-scale fishers, are keen stewards of their environments, reflecting patterns of change and seasonal variability (Galappaththi and others, 2021) (see subsect. 5B, chap. 8). A systems-oriented understanding of their environment emerges from the accumulation of shared knowledge over generations within communities, often transmitted orally (Galappaththi and Schlingmann, 2023; Silvano and others, 2023). The importance of paying greater attention to knowledge systems is reflected in evidence that aquatic food dependence among coastal Indigenous Peoples worldwide is much higher than it is among non-Indigenous peoples (Cisneros-Montemayor and others, 2016). This dependence was greatly affected by the coronavirus disease (COVID-19) pandemic and was addressed through barter exchanges for goods such as dried fish (Nhiwatiwa and Matanzima, 2023) (see subsect. 5B, chap. 7). In West Africa, responses to the pandemic highlighted the level of resilience in small-scale fishing communities, where fishers were forced to innovate in light of limited support (Okafor-Yarwood and others, 2022). In other global assessments, there is a reluctance to draw on fisher knowledge and observations (Ford and others, 2016).

4. Governance

Small-scale fisheries are complex socioecological systems (Charles, 2023; Berkes and Franz, 2025), requiring governance approaches that are collaborative, adaptive and multilevel (see sect. 3). Governance of small-scale fisheries also requires transparency, accountability and a focus on equity (see subsect. 5B, chap. 5). Globally, small-scale fishers and partner civil society organizations have a long history of documenting inequities associated with coastal development policies. Policies that have an impact on

small-scale fisheries should seek more inclusive outcomes aligned with the Sustainable Development Goals.[1] The Ocean, Water and Fisher Peoples' Tribunals under the World Forum of Fisher Peoples are an example of forums of justice being established to give voice to testimonies and experiences of human rights abuses faced by fishing communities. In addition, independent people's tribunals on the implications of the blue economy were held in at least six countries around the Indian Ocean and in Brazil (Satizábal and others, 2024). Similar initiatives have emerged in Latin America and the Caribbean and elsewhere (Gerhardinger and others, 2023; García-Lorenzo and others, 2024).

At the global level, the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (FAO, 2015) represent the first international policy instrument entirely dedicated to small-scale fisheries. However, experiences implementing the Guidelines in different jurisdictions have been ad hoc (Chuenpagdee and others, 2017; Said and Chuenpagdee, 2019). There is established but incomplete evidence that key obstacles to the full implementation of the Guidelines include incoherence with existing national policies and requirements for national Governments to adapt or adjust existing regulatory frameworks (Cohen and others, 2017). Efforts to increase policy coherence with the Guidelines are being supported through the development of national plans of action for small-scale fisheries, with support from FAO.

The implementation of the Voluntary Guidelines is a pathway to achieving the Sustainable Development Goals of the 2030 Agenda. Small-scale fisheries are explicitly addressed in target 14b of Goal 14, on life below water: provide access for small-scale artisanal fishers to marine resources and markets. However, preferential access for small-scale fisheries globally is very low (Said and Chuenpagdee, 2019). Aligning their policy frameworks at the local, subnational and national levels with the Goals and the Guidelines provides a foundation for multilevel interventions (Smallhorn-West and others, 2022). With reference to small-scale fisheries, particularly Indigenous People's fisheries, attention is increasingly being paid to human rights-based approaches (FAO, 2015), including links between small-scale fisheries and rights to food security (FAO, 2015). The basis for a human-rights based approach is expressed in the United Nations Declaration on the Rights of Indigenous Peoples of 2007 and the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas of 2018. Other global governance dialogues and multilateral environmental agreements will increasingly affect small-scale fisheries (see sect. 3), as reflected in the findings and evidence provided by IPBES assessments or in the emerging global plastics treaty.

At the national and subnational levels, evidence that the co-management and participatory governance of small-scale fisheries yield more equitable outcomes is well established, although strongly context-dependent (d'Armengol and others, 2018; Evans and others, 2023; Ruano-Chamorro and others, 2023). Success requires the active involvement of fishers and diverse stakeholders, strong government support, sustainable financial resources and transparent and adaptive decision-making processes (d'Armengol and others, 2018; Livingstone and Anthony, 2023). The Voluntary Guidelines and several international and national policy instruments already advocate for the increased participation of men and women in decision-making processes. Co-management, involving small-scale fisheries, Governments and other stakeholders, is now widely considered a best practice governance approach (Prado and others, 2022; Smallhorn-West and others, 2022). The most frequent goal of co-management is to improve fisheries

[1] See www.ssfcalltoaction.org.

management through increased participation, increased legitimacy and/or compliance with fishing rules, the definition or enforcement of fishing rights and the incorporation of customary management norms into formal management (d'Armengol and others, 2018). Evidence showing that co-management leads directly to better ecological outcomes is unresolved.

Evidence in support of the co-management and participatory governance of small-scale fisheries is often aligned with recognition of tenure. The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (FAO, 2022) clearly articulate the importance of tenure in regulating how societies make decisions about who can use which resources, for how long and under what conditions, including rights of decision-making. Effective and equitable governance of tenure is a critical variable in small-scale fishery outcomes, including for biodiversity (Cohen and others, 2024; Tholan and others, 2024). Groups with secure tenure can advance cost-effective management strategies. Secure tenure also makes it more likely that activities along the small-scale fisheries value chain will be compliant with international protocols and achieve positive environmental outcomes (IPBES, 2022a, 2022b). Secure governance of tenure for small-scale fisheries must extend to land for storing boats and gear, as well as post-harvest activities, including space to sort or dry fish, and also allow related economic activities such as marketing and selling (FAO, 2024). Despite a recognition of tenure implications, regional experience shows that the governance of tenure for small-scale fisheries in many jurisdictions is under threat from various forms of development – such as infrastructure and industrial aquaculture – as well as conservation pressures (Okafor-Yarwood and others, 2022; Cohen and others, 2019). There is evidence of arbitrary evictions and conflict in many small-scale fisheries contexts despite legal and policy frameworks established to limit such situations (FAO, 2015; Courtney and Jhaveri, 2017). Secure systems of tenure established through customary law and/or Indigenous systems of governance are particularly vulnerable. Loss of tenure can undermine the sense of place and area-specific knowledge of small-scale fishers (Bavinck and Gupta, 2014).

The availability of data and information on diverse small-scale fisheries activities and catch levels remains an ongoing governance issue, amplified further by the wide range of targeted species (Pita and others, 2019). There are also regional and national variations in how data-poor fisheries are defined, although some basic criteria provide a foundation for the development of monitoring programmes (Dowling and others, 2015). Fishers themselves provide valuable data and information on fisheries stocks, trends, harvest pressures and livelihood/food security implications, which can counter perceptions about data-poor small-scale fisheries (Gill and others, 2019). To enhance governance of these fisheries, ongoing efforts are required to improve low-cost methodologies that provide access to a wide range of social and ecological knowledge to overcome data-poor situations (Pita and others, 2019).

Data-poor fisheries are linked in part to compliance and traceability concerns in the small-scale fisheries sector, including IUU fisheries. Compliance at the individual fisher level remains poorly understood (Battista and others, 2018). Perceptions of legitimacy, fairness and equitability of rules play a key role in compliance, and are mediated by social norms and collective obligations. The participation of small-scale fishers in developing and applying rules has a significant effect on compliance (FAO, 2024). The role of technology in improving data collection for marine management is worth acknowledging, while noting the vulnerability of some small-scale fisheries to targeted monitoring. For example, in West and Central Africa, the close proximity of small-scale fishers to the shore and their visibility to law enforcement personnel makes them an easy surveillance and enforcement target (Okafor-Yarwood and others, 2024c;

Paes and Okafor-Yarwood 2024), and may restrict their activities compared with the monitoring measures applied in the industrial sector (Okafor-Yarwood and others, 2022).

The value of ecosystem-based fisheries management to support governance is increasingly well established. The implementation of ecosystem approaches, such as the ecosystem approach to fisheries, over the past decade has helped to reorient management objectives and establish new methods that are relevant to data-limited contexts (Zhang and others, 2011; Link and Brown, 2017) (see chap. 27 of the second *World Ocean Assessment*). Integrated fisheries risk analysis methods for ecosystem approaches (Zhang and others, 2009, 2011) explicitly consider the status of local fish stocks, habitats, biodiversity measures and economic indicators for fisheries (see chap. 25 of the second *Assessment*). Ecosystem approaches have recently been applied in several small-scale fisheries, such as Egyptian fisheries in the Red Sea (Alsolami and others, 2020), local fisheries on the south coast of the Republic of Korea (Kang and Zhang, 2023) and fisheries in Indonesian waters (Tirtadanu and others, 2024). Efforts to improve traceability and certification are also aimed at increasing transparency in value chain governance and adherence to sustainable harvesting norms. However, global eco-label standards in general remain expensive, struggle to include social sustainability criteria and, most importantly, have not effectively included small-scale fisheries (Purcell and others, 2018; Bailey and others, 2016). Similar governance mechanisms such as fair trade certification have a stronger emphasis on repositioning and empowering producers by mandating fair pricing standards. A growing number of local and national certification and labelling schemes for small-scale fisheries is emerging (e.g. Abalobi in South Africa and Pesca de Rias in Spain). However, certification processes are not fully developed in small-scale fisheries contexts and are rarely focused on ecological sustainability dimensions (Purcell, 2017).

5. Sustainable pathways

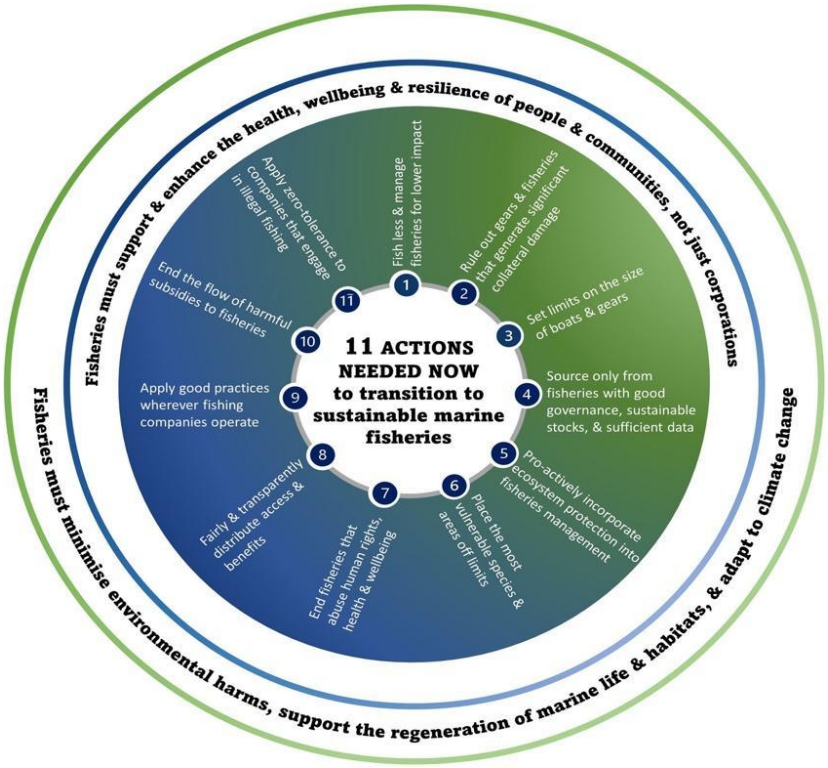
The FAO Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication outline diverse pathways to help to secure sustainable small-scale fisheries. Efforts to amplify and extend these pathways must be centred on the calls to action from small-scale fishers themselves and the Coalition for Fair Fisheries Arrangements (CFFA) “Rules of conduct for working with small-scale fishers and fishworkers” (CFFA, 2023). Indeed, small-scale fisheries are a crucial economic sector, employ millions of people, support food security for millions more and exhibit significant resilience despite numerous challenges (Basurto and others, 2025; Berkes and Franz, 2025). Transition pathways for sustainable small-scale fisheries that build on the Guidelines and are aligned with the Oceans 2050 scenario are emerging but incomplete.

Roberts and others (2024) provide a road map for fisheries reform and 11 actions to transition to sustainable marine fisheries, most of which are of direct relevance to small-scale fisheries (see figure II). The *Illuminating Hidden Harvest* report (FAO, Duke University and WorldFish, 2023) outlines several pathways to secure the role of small-scale fisheries in sustainable development, including acting on existing policy commitments and improving how fisheries data and information are collected, analysed and used. Nayak and others (2021) outline a variety of domains and perspectives around which the vulnerability, viability and sustainable development transitions of small-scale fisheries can be navigated, with an emphasis on social struggles and contested arrangements of power (see figure III). Muhl and others (forthcoming) document five key transition pathways from vulnerability to viability for small-scale fisheries based on experiences in 12 countries in Africa and Asia, including building governance networks and partnerships, centring small-scale fisheries’ tenure and rights, advancing a gender and intersectional

perspective on viability pathways, enhancing opportunities for nature-based livelihoods and co-creating or co-producing the knowledge needed for transition pathways. A range of other empirical analyses and policy assessments further articulate elements of transition or transformation pathways for small-scale fisheries (see Saunders and others, 2016; Salgueiro-Otero and others, 2022; Villasante and others, 2022; Gianelli and others, 2024; Berkes and Franz, 2025). The transition pathways outlined in the present subchapter build on existing assessments, but with specific consideration of the Oceans 2050 scenario. Emphasis is placed on the innovations, structural/regime changes and narrative shifts needed to catalyse the technological, governance and socioeconomic dimensions of sustainable pathways (see figure IV).

Figure II

Road map and actions to transition to sustainable marine fisheries



Source: Roberts and others (2024).

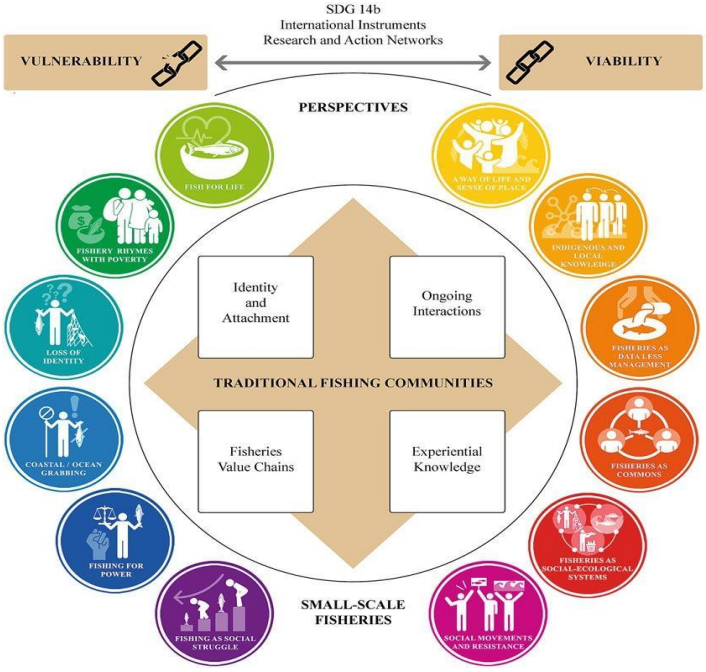
Social and economic mechanisms for sustainable pathways to the Oceans 2050 scenario are diverse and will vary across the value chain. Participation, collaboration and mutual support, partnerships and networks of small-scale fisheries are a core feature of any successful transition pathway. Pathways must also reflect a commitment to principles of equity and justice, drawing connections to human rights and security, including labour, safety and security of access (Reis-Filho and others, 2024). The significant knowledge and capacity of small-scale fisheries to lead transitions must be emphasized, along with a commitment to principles and practices of knowledge co-production (Mills and others, 2022; Muhl and others, 2023). Furthermore, pathways for sustainable small-scale fisheries must reflect the strong connections within and across sectors (for example, the links between small-scale and industrial fisheries through IUU and trawling practices are significant). More generally, a core principle in considering

sustainable pathways is recognition of the deep relationship between small-scale fishery practices, socioeconomic prosperity (e.g. food security and employment) and ecological systems (Charles, 2023).

Providing stronger financial and economic support to small-scale fisheries is necessary to catalyse innovative practices, such as creating new markets, or diversifying or augmenting livelihoods. Several measures, such as savings groups, microfinance or insurance schemes, have been introduced to change the relationship between fishers and informal financial providers (i.e. fish buyers or gear suppliers) (Pomeroy and others, 2020). These interventions face challenges given the complex, long-standing social relationships in small local communities, but they help to shift the narrative of small-scale fisheries as vulnerable. Savings groups organized by local communities provide innovative pathways for such fisheries in Cambodia, the United Republic of Tanzania and other jurisdictions (Lieng and others, 2018; Nakamura and others, 2024). Advancing local, bottom-up initiatives, assisted by outside resources, is one pathway to disentangle the complex problems associated with informal finance providers, particularly at the harvest and marketing stages of the value chain (Pradhan and others, 2022). Furthermore, additional financial support is needed to ensure that individuals and small-scale fisheries organizations can engage with the growth of digitalization and e-commerce in the marketplace. An important social sustainability pathway also includes communities retaining and supporting traditional practices of bartering goods and services in lieu of monetary payments – a process that re-emerged during the COVID-19 pandemic (Nhiwatiwa and Matanzima, 2023). Traditional or customary practices serve as an important safety net since small-scale fishery incomes are typically low, may be the sole income contribution to households and/or support extended multigenerational families.

Figure III

Transitions from vulnerability to viability



Source: Nayak and others (2021).

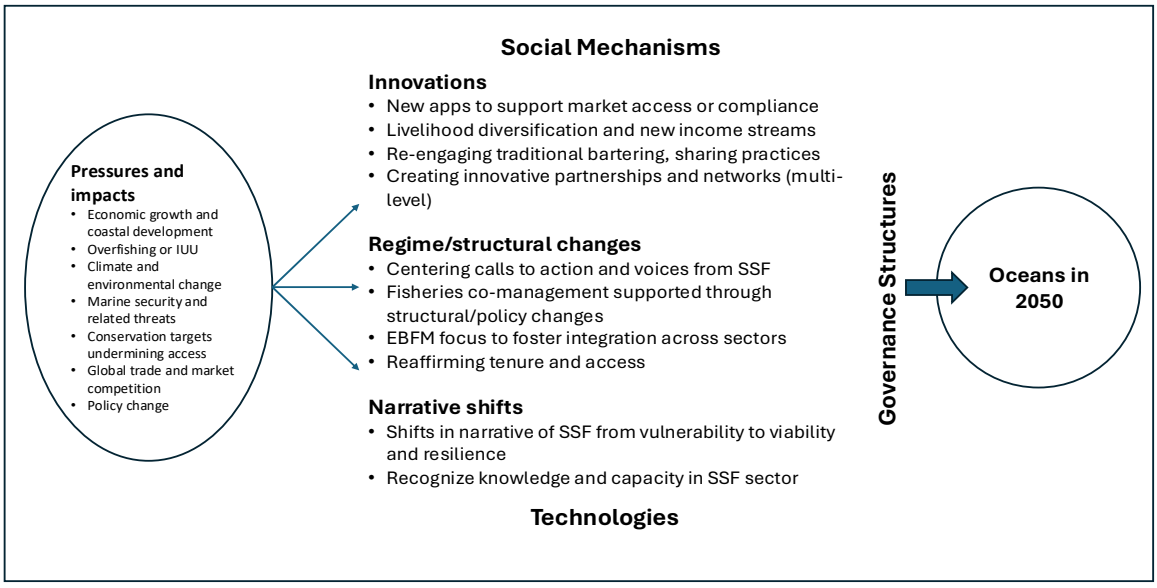
Governance processes related to small-scale fisheries for an Oceans 2050 scenario must be adaptive, collaborative and multilevel. They must also be transparent and inclusive and support more decentralized and/or bottom-up decision-making processes. The implementation of the 2030 Agenda requires management grounded in a socioecological systems approach in order to achieve the integrated set of global priorities and objectives set out in the Sustainable Development Goals (see chap. 27 of the second *World Ocean Assessment*), which provide a foundation for the Oceans 2050 scenario. There are still gaps in implementation and incomplete uptake across regions and stakeholders. Common frameworks and criteria for small-scale fisheries governance based on demonstrated best practices are necessary.

Governance changes are aligned with technological tools and opportunities. Advances in technology enable small-scale fisheries to play an active role in fisheries governance and co-management systems – a crucial pathway for sustainability. In Liberia, for example, "Dase App", a smartphone application developed and maintained by the Environmental Justice Foundation, has been used by local fishers as part of the co-management process to collect data on possible IUU fishing infractions by trawlers. The mobile app enables users to capture video or photo evidence of destructive IUU fishing in real time, regardless of their Internet connection. However, its effectiveness is contingent upon the training of fishers on safe use and the willingness of government departments to take appropriate action when possible infractions are reported (see Livingstone and Anthony, 2023).

Pathways to sustainability will require further investments in governance and technological innovations and transfers applied at scale, with the aim of supporting market access, security and management by fishers. Technology uptake in the service of small-scale fisheries requires system-level changes and a shift away from narratives that such fisheries are risk-averse or disconnected from other related sectors. In particular, technology changes are closely linked to issues of access (i.e. access to knowledge, markets, credit and resources/space) that catalyse sustainable pathways.

Figure IV

Sustainable pathways for small-scale fisheries under the Oceans 2050 scenario



Source: Prepared by the writing team.

6. Conclusions

Small-scale fisheries are highly variable and also distinct from other fisheries. They are of significant social, economic, cultural and ecological importance and play a crucial role in fostering food and nutritional security for millions of people (Basurto and others, 2025). Yet they face progressively significant pressures from many stressors, and their viability in many regions is increasingly threatened. Sustainable pathways for small-scale fisheries must be guided by the knowledge of fishers and, among other things, their active participation in decision-making. Their governance should be guided by principles of equity, justice and human rights. Furthermore, sustainable pathways must reflect the deep integration of the small-scale fisheries sector in a range of national and global governance processes, economic development policies and conservation agendas. There is a clear opportunity for Governments to support the knowledge, practices and capacity of small-scale fisheries and to recognize their crucial role in meeting the global Sustainable Development Goals.

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