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# Integrating assessments of secure tenure rights and co-management for small-scale fisheries in seafood sustainability ratings systems: two new scoring methods for FishSource's sustainability assessments

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Market-based approaches to seafood sustainability have gained popularity in the last decade. Market-based tools, such as certification and ratings systems, enable seafood companies along supply chains to engage in sustainability initiatives while reducing business risks. Yet, these approaches are predominantly utilized in Global North markets and often evaluate performance against standards that build upon resource-intensive, mainstream fisheries management models. These management models have yielded successful outcomes in industrial fisheries, mainly in the Global North, where science, management, and compliance authorities are well-resourced. In contrast, artisanal and small-scale fisheries in the Global South have seen limited success in applying mainstream management approaches. Co-management approaches based on secure tenure rights, which emphasize effective partnerships between management authorities and resource users with specific rights over the resources, have shown better outcomes in these contexts. Despite this, market-based tools have largely overlooked co-management principles and tenure rights in their standards. To address this gap, this paper introduces two step-wise evaluative methods designed for the ratings system FishSource, aiming to score whether fishers enjoy secure tenure rights and effectively participate in decision making. The proposed methods use available secondary data to evaluate these crucial aspects of well-managed and equitable small-scale fisheries, while aligning with international policy instruments like the Food and Agriculture Organization Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries and the United Nations Sustainable Development Goals.

## KEYWORDS

co-management, secure tenure rights, artisanal and small-scale fisheries, market-based tools, seafood rating systems

## 1 Introduction

Market demand has a significant impact on ocean health, livelihoods, and the wellbeing of seafood-dependent communities. As such, businesses can amplify their positive footprint by ensuring responsible behavior throughout their supply chains while promoting sustainable fisheries and aquaculture practices (SFP, 2021a). Market-based approaches, which arose from the collapse of flagship fisheries in the 1990s, gained increased traction due to their ability to facilitate improvements in ocean health while at the same time offering tools to enable supply chains to support sustainability initiatives. By engaging in fisheries improvements, brands could reduce economic, legal, and reputational risks (SFP, 2021b, 2023) while becoming part of the solution. Market-based approaches have evolved rapidly, and several tools are now readily available. Among them, certifications, ratings, and fishery improvement projects (FIPs)<sup>1</sup> are some of the most prominent. While certification systems are widely known, mainly due to their consumer-facing approach, ratings systems are less well-known by the general public. In contrast with certification, seafood sustainability ratings do not provide third-party assurance of the sustainability of a fishing fleet or company, nor do they grant ecolabels. Instead, they allow companies to analyze the risks of purchasing from specific fisheries, tailor their purchasing requirements accordingly, and track improvements over time via sustainability evaluations developed by a third party. Typically based on secondary information, ratings systems provide evaluative assessments of the performance of entire fisheries, based on publicly available standards and methodologies. These ratings systems provide assurance mechanisms in business-to-business relationships, making their evaluations public and also enabling public scrutiny, along with stakeholder engagement in solutions (e.g., via FIPs) to the sustainability challenges faced by specific fisheries (SFP, 2021a).

Currently, ratings systems are mainly used by the European Union and North American markets. As a result, this market-based tool has mainly focused on those fisheries and seafood sectors supplied by Global North markets. In parallel, the standards with which ratings systems evaluate sustainability build upon what can be conceptualized as mainstream fisheries management (SFP, 2021c). Mainstream fisheries management is here understood as a resource-intensive (see *Cochrane, 1999*) governance scheme, which is generally based on data-rich science (e.g., stock assessments) produced by a central government research institute that informs top-down management decisions enforced by a well-funded and functioning monitoring, control, and surveillance (MCS) enforcement body (SFP, 2021c). This “command-and-control” approach has a better track record in relatively well-funded countries and in industrial fisheries that are easier to monitor and control but it is often inefficient in fisheries known as artisanal

or small-scale (*Berkes et al., 2001; Stoll et al., 2020*)—henceforth both referred to as SSF—mainly in the Global South. In those fisheries, inclusive governance approaches that build on active partnerships between government and resource users have proven more effective, from both an environmental and social perspective (*Evans et al., 2011; Defeo et al., 2014; d’Armengol et al., 2018; Cohen et al., 2021*).

SSFs provide jobs, livelihoods, and food security to millions of people worldwide (FAO, 2015; FAO, *Duke University and WorldFish, 2023*). SSFs account for at least 40% of the world’s fish catch and employ about 90% of the global workforce in capture fisheries. Overall, 492 million people (~7% of the global population and about 13% of the population of least developed countries) are estimated to depend at least partially on SSFs (FAO, 2015; FAO, *Duke University and WorldFish, 2023*).

SSFs face significant challenges, including widespread poverty and vulnerability (*Jentoft and Eide, 2011*), high geographical dispersion of the operations and landing points, limited access to extension services and support, and a lack of resources to ensure that adequate research and management services are provided by government authorities. SSFs are highly complex, diverse, and dynamic, which makes their governance challenging (*Jentoft and Chuenpagdee, 2009*). Conflicts among producers and tensions arising from divergent interests along the supply chain are common, arising from low bargaining power, patron-client relationships and debt (*Basurto et al., 2020*), unequal rights and interactions with the industrial fishing sector (*Cánovas-Molina and García-Frapolli, 2022*), and widespread institutional marginalization (*Gozzer-Wuest et al., 2022*).

Since the late 1980s (*Jentoft, 1989; Jentoft and McCay, 1995; Nielsen and Vedsmann, 1999*), there have been significant efforts to build or strengthen governance solutions based upon the effective participation of resource users in fisheries management (*Castilla and Defeo, 2005; Gelcich et al., 2009*) and the allocation of secure tenure rights, which are inextricably linked to the expectation that fishers act in a responsible manner (*Charles, 2011a; FAO, 2015*). Recent research reveals, however, that co-management is likely employed for only 20% of the global SSFs catch, and formal management rights have been granted for only about a third of the catch (*Basurto et al., 2023*). In view of the above, fostering widespread adoption of co-management should be a priority for any initiative aiming to promote improved sustainability performance of SSFs worldwide, mostly considering the wide-ranging global importance of SSFs. Yet, until now, market-based tools (*Jacquet et al., 2009; Murphy et al., 2021*) have not addressed the importance of co-management principles as a keystone goal in the process of improving SSFs and have approached improvements from a mainstream fisheries management standpoint instead. The absence of co-management in tools that aim to engage markets in improving sustainability performance of commercially important SSFs at the global level, such as certifications, ratings, and FIPs, is a major omission (SFP, 2021c; SFP, 2023). To address this omission, this paper presents the first results of the development of two scoring methodologies for the rating system known as FishSource.

Created in 2007 by Sustainable Fisheries Partnership (SFP), FishSource aims to provide major seafood buyers with up-to-date, impartial, and actionable information on the sustainability of fisheries and the improvements they need to undergo to

<sup>1</sup> According to the CAAS, a FIP “is a multi-stakeholder effort to address environmental or social challenges in a fishery. These projects harness the power of the private sector to incentivize positive changes toward sustainability. Suppliers, retailers, and foodservice companies can support the efforts of their source fisheries by participating in or buying products from FIPs”.

become more sustainable (Cannon, 2006). While the primary intended audience for FishSource is seafood businesses, other audiences—including academics, researchers, governments, and non-profit organizations—are also frequent users of FishSource (see Kearns et al., 2021). To meet the needs of its diverse audiences, FishSource compiles and summarizes publicly available scientific and technical information and presents it in an easily interpretable form that is fully accessible online. FishSource publishes its sustainability evaluations on its website, organizing them into individual “Fishery Profiles.” Each Fishery Profile corresponds to a particular fishery and contains an assessment of its sustainability, which is determined against globally recognized benchmarks. Currently, each fishery assessment comprises three distinct groups of scores (see Figure 1): the management quality with three separate scores (Cannon, 2006), the stock health with two scores (Cannon, 2006), and the environmental impacts of the fishery with four scores (Portley et al., 2017).

FishSource relies solely on secondary information available publicly via the internet and does not involve site visits or interviews in the research process. The reliance on secondary information requires that each indicator is evaluated based on data elements that are highly likely to be found in the public domain, are reliable, and can be regularly obtained over time. Current FishSource scores (Figure 1) are calculated on a scale from zero to ten. A specific method is followed to provide a scoring value to a fishery. Each FishSource scoring method is a composite of indicators, some build upon quantitative information when available and rely on a tabular scoring category approach when not (e.g., FishSource score for Fishers’ Compliance) and others use dichotomous yes/no answers and decision trees (e.g., FishSource score for Ecosystem Impacts). Indicators are assessed based on data obtained from stock assessment reports (e.g., scores for Current Health and Future Health), management measures adopted in the fishery (e.g., scores for Management Strategy, Managers’ Compliance and Fishers’ Compliance), and from reliable reports on environmental impacts (e.g., in scores for Bycatch—Endangered, Threatened and Protected (ETP) Species Impacts—Habitat and Ecosystem Impacts).

In this methods paper, we present the development process, the rationale for, and the conceptual basis of two new FishSource score methods aimed to assess key aspects of the sustainability performance of SSFs, namely (a) secure tenure rights and (b) participatory management. We present the resulting method and discuss issues which may require consideration in further versions once the method is widely applied to evaluate performance of a large set of fisheries. The goal of these new methods is to help seafood buyers and a range of audiences take positive actions toward improving sustainability performance while contributing to advancing the wellbeing of small-scale fishing communities.

## 2 Materials, development process, and key concepts

The development of new FishSource scoring method requires first a careful selection of the conceptual sets that inform the development of indicators, as well as the specific rationale behind the definition of each step forming the decision trees. In this

section, we report on the process for the development of the two new methods and clarify the rationale and key concepts behind the decision process and indicator sets, respectively. This section concludes with the framing of the assessment.

### 2.1 Development process

To initiate the development process of the FishSource secure tenure rights (herein referred to as STR) and participatory management (herein referred to as PM) methods presented in this paper, several internal working sessions were carried out between July 2021 and January 2022 among SFP staff relevant to the project, with a view to determine the scope and aim of the scores. Once the scope was agreed on, an iterative development process kicked off in January 2022, led by the lead author with the support of the core team (co-authors). This process entailed literature reviews, identification of key themes and scoring categories, and drafting of evaluative protocols to develop a zero-draft method. First, primary academic and gray literature was reviewed to identify the basis for the development of potential indicators. The Food and Agriculture Organization (FAO) Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (hereinafter referred to as the SSFs Guidelines; FAO, 2015) and the United Nation’s (UN) Sustainable Development Goal 14.b (United Nations, 2015) provided the starting point. Key references to develop the zero draft included the recently released FAO, Duke University and WorldFish (2023) Illuminating Hidden Harvests (IHH) study, as the study developed a broad set of indicators based on questionnaires and in-depth case and country studies. Although the work presented in this paper was concluded before the public release of the IHH report, feedback was obtained from a lead author (Xavier Basurto) and the study was used to test alignment and assumptions between both efforts. Other key references used to build the zero draft methods included the rapid assessment method “Social Responsibility Assessment Tool for the Seafood Sector” (SRA; Conservation International, 2021), specifically, SRA’s Principles 1 and 2 (mainly Components 1.2 on use rights and transparency and 2.1 on stakeholder participation and grievance reporting). Other key references include Cochrane (2002), Anderson et al. (2016), Courtney and Jhaveri (2017), ELI (2020), FAO (2020), MRAG (2020), Conservation International (2021), Nakamura et al. (2021), Swasey et al. (2021), Basurto et al. (2022), FAO (2022a), Pomeroy et al. (2022), and Puley and Charles (2022).

As a key milestone in the development process of the SSFs STR and PM methods, a dedicated in-person workshop, was held in February 2022. Considering the key role that FishSource analysts play in the development of FishSource evaluations and the relevance of their experience in assessing the feasibility of the draft decision trees, the core team worked together with FishSource analysts to adequately integrate their feedback and suggestions into the method. The work of the core team continued afterwards, via regular online discussions and written feedback.

From October 2022 to October 2023, the draft scoring methods were pilot tested in six diverse fisheries by selected analysts (south pacific hake *Merluccius gayi gayi* in Chile, jumbo flying squid



*Dosidicus gigas* in Chile, and stone crab *Metacarcinus edwardsii* in Chile's Coastal and Marine Indigenous Peoples' Space "Rauco," jumbo flying squid *Dosidicus gigas* in Peru, grouper *Mycteroperca bonaci* in Mexico, and blue swimming crab *Portunus pelagicus* in Indonesia).<sup>2</sup> Feedback from the FishSource analysts, which comprise external consultants and staff in charge of creating the content of the profile, was used to refine the methods.

## 2.2 Rationale and key concepts

Secure tenure is a precondition to any fisheries governance system that aims to ensure sustainable resource use (see e.g., Onyango, 2013; Basurto et al., 2023) and the wellbeing of fishery-dependent communities (see e.g., Parma et al., 2006). Furthermore, authors have shown that the efficiency of participatory management and the levels of sustainability in a fishery are inextricably linked (see Lundquist and Granek, 2005; Roa-Ureta et al., 2020; Smallhorn-West et al., 2022) and have identified key factors to make co-management succeed (e.g., Pomeroy et al., 2001; Defeo and Castilla, 2005; Gutiérrez et al., 2011). Both performance categories are here considered basic pillars or principles of a well-(co-)managed SSF. Both are highlighted in the SSFs Guidelines and the UN's Sustainable Development Goal 14.b as key elements of the responsible

governance of tenure and sustainable resource management, respectively. The SSFs Guidelines state that "Small-scale fishing communities need to have secure tenure rights to the resources that form the basis for their social and cultural wellbeing, their livelihoods and their sustainable development" (FAO, 2015).

Other crucial aspects of responsible SSFs highlighted in the SSFs Guidelines are either addressed elsewhere in FishSource, incorporated into these two new methods (e.g., information and research, policy coherence), or are considered too challenging to assess for most SSFs following the FishSource data limitations—because the system uses only publicly available secondary data sources and most SSFs are notoriously data-limited (e.g., organizational development and leadership of fisherfolk organizations for which public information is rarely available).

### 2.2.1 Fishery

A fishery is defined here as the combination of a flag country and specific fishing gear operating within a management unit targeting a single species' biological stock, where feasible. This is the highest level of granularity available within FishSource profiles and one that allows for a fairly detailed evaluation of environmental sustainability using publicly available data. This framework is based on the premise that biological stock serves as the fundamental unit for evaluating stock health and implementing effective fisheries management (FAO, 1995), despite acknowledging that management practices rarely align precisely with this scale. Inclusion of the flag country allows for the assessment of

<sup>2</sup> For more detail on the results of the implementation of the methods in some of these fisheries, see <https://www.fishsource.org/>.

compliance with management measures, and the incorporation of fishing gear enables the differentiation of the fishery's impact on the broader ecosystem, particularly regarding bycatch.

## 2.2.2 Tenure rights

Tenure is the relationship among people with respect to land and other natural resources. Tenure systems determine who can use which resources, for how long, and under which conditions. Such systems can be shaped by written policies and laws, as well as unwritten customs and practices (FAO, 2012, 2013).

The significance of STR for small-scale fishing communities is highlighted in the SSFs Guidelines, which in turn build upon the FAO's Voluntary Guidelines on the Responsible Governance of Tenure (VGGT; FAO, 2012). The 1995 FAO Code of Conduct for Responsible Fisheries (CCRF; FAO, 1995) requires countries to "appropriately protect the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction." The issue of preferential access for SSFs is also subject to the attention of one of the Sustainable Development Goal targets, 14.b: "Provide access for small-scale artisanal fishers to marine resources and markets." Additionally, the indicator associated with SDG 14.b is 14.b.1, which specifically measures "Progress by countries in the degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries."

In the context of fisheries, tenure systems are closely connected to use rights. Use rights regulate who can access the fishery, the level of fishing effort allowed, and/or the quantity of catch that can be taken (Charles, 2011a,b). These "rights to use," recognized or assigned by relevant management authorities (whether formal or informal), grant individual fishers, fishing groups, fishing communities, or companies access to the fishery and its resources (Cochrane, 2002). It should be noted that use rights pertain solely to the right to utilize the resources yielded by the fishery and do not imply ownership of the fish resource itself (Charles, 2011a).

Tenure rights in fisheries come with responsibilities, including the obligation to fish in a responsible manner. Both the CCRF (FAO, 1995) and SSFs Guidelines (FAO, 2015) stress the interconnectedness of rights and responsibilities. Tenure rights should be balanced by duties that support the long-term conservation and sustainable use of resources, as well as the preservation of the ecological foundations of food production. As such, the SSFs Guidelines emphasize the importance of SSFs employing fishing practices that minimize harm to the aquatic environment and associated species and promote resource sustainability (FAO, 2015).

The key types of tenure rights in fisheries have been identified as "access rights" and "withdrawal rights" (Charles, 2002; Huppert, 2005). Access rights, enable the rightsholder(s) to take part in a fishery (limited entry) or to fish in a particular location (territorial use rights in fisheries or "TURFs"). Withdrawal rights, in turn, typically involve quantitative limits on resource usage, either

through input (effort) or output (harvest) rights. A third type, "collective choice rights," was considered for the development of the methods. Collective choice rights include management rights, exclusion rights, and transferability.

### 2.2.2.1 Access rights

Access rights are commonly prescribed as a remedy to the problems caused by open access and are particularly recommended for the case of SSFs, e.g., "preferential access" for small-scale fishers in the FAO SSFs Guidelines (FAO, 2015). Types of access rights include:

- i. Spatial access rights: two categories of spatial rights are most common, customary marine tenure and TURFs. While these approaches have seen increasing recognition and popularity over recent decades, they may pose particular challenges in some situations, for instance in the case of migrant or nomadic fishers (Charles, 2011a).
- ii. Limited entry access rights: these are usually found in the form of fishing licenses that restrict access to the fishery to those holders who have the "right" to fish. Limiting access is common in SSFs, though the objectives of such restrictions need to be clearly stated to determine whether they are being used to protect local livelihoods, protect stocks by reducing effort or limiting destructive gear types, or other reasons. The allocation of limited entry access rights may have adverse impacts, such as those on equity (Charles, 2011a).
- iii. Preferential access for SSFs: the CCRF (FAO, 1995) calls for considering exclusive or preferential access<sup>3</sup> for SSFs to fish in national waters. The SSFs Guidelines (FAO, 2015) (Paragraph 5.7) adds that states should implement measures such as exclusive zones for SSFs and consider claims of small-scale fishing communities to such areas before granting resource access to third parties (FAO, 2020). Preferential access for SSFs may take the form of areas of exclusive access for SSFs (e.g., based on vessels' landing ports, fishers' residential criteria) or for access to be qualified by restricting or prohibiting access to other persons or groups (e.g., industrial fishers). Often, legislation identifies areas in which SSFs may operate and sets out the prerequisites for access (FAO, 2020).

### 2.2.2.2 Withdrawal rights

Use rights may be conveyed through rights that can be measured with quantitative parameters, e.g., those that exert a specific amount of fishing effort (effort rights) or that set individual or collective catch limits (harvest rights). These forms of rights rely upon relatively high

3 In the IHH report, the authors chose a more inclusive approach for consistency and defined it as: "...areas identified in formal national, regional or local legislation either by designating areas of the sea that are restricted (or that give preference) to small-scale fisheries, or through regulations that implicitly or explicitly favor small-scale fisheries by mandating moratoriums on the operation of large-scale vessels in those areas. Areas of the sea that are de facto exclusive to small-scale fisheries, by nature of the absence of large-scale fleets, are also included" (Basurto et al., 2022).

levels of data input (e.g., catch data) and resource-intensive management and, thus, may be less commonly used in SSF (Charles, 2011a).

- i. Effort rights: these may specify a certain amount of fishing time and/or gear to be used by each fisher or vessel, which can serve conservation needs as well as the share of effort in a more equitable manner (Charles, 2011a). In these cases, care needs to be taken to update or review the effort restrictions to ensure that technological improvements, for instance, do not increase fishing efficiency over time, to the detriment of the management objectives.
- ii. Harvest rights: catch quotas are shares of a total allowable catch (TAC) calculated for the fishery. These shares may be allocated collectively (e.g., community quotas, fleet quotas), as limits per trip to individual fishers or as individual quotas to harvest on a given timeframe (e.g., annually). These rights may be non-transferrable or they may be subject to trade, such as the case of individual transferrable quotas. Harvest rights raise specific concerns in SSFs and, despite being intensively promoted in industrial fisheries, should be treated with caution in SSFs. Concerns include prohibitive costs of determining the TAC and monitoring and enforcing catch allocations, incentives to cheat (e.g., under-reporting), incentives to dump or high-grade fish, or pressure on decision makers to increase the TAC beyond sustainable levels to favor fishers (Charles, 2011a).

### 2.2.2.3 Collective choice rights

Collective choice rights include management rights, exclusion rights, and transferability (or alienation), referred to as the right to sell or lease any of these rights (Ostrom and Schlager, 1996).

Management rights are assessed primarily through the PM method, which evaluates the existence of the right as well as effectiveness in implementation of the management rights. Exclusion rights are treated here as an extreme form of access right, i.e., preferential access to the extent of sole access. Transferability is technically considered a feature of the most devolved levels of tenure (FAO, Duke University and WorldFish, 2023). Yet, this may be outweighed by concerns over rights transfer that would change the very nature of the SSF, including whether rights are transferred to new entrants, groups operating at other scales within the fishery (e.g., industrial fleets), or businesses or individuals from other sectors (e.g., mining companies). FAO, Duke University and WorldFish (2023) uses a “devolution rights index”<sup>4</sup> based on management, exclusion, and transferability. The index provides a higher score the more these rights are devolved to fishers. However, for these “collective choice rights,” we consider transferability to

4 The devolution rights index (DRI) considers three levels of devolution based on rights of (i) management, (ii) exclusion, and (iii) transferability: partially devolved, when any one of the above rights is devolved to fishers; mostly devolved, when any two of the above rights are devolved; fully devolved, when all three rights of management, exclusion and transferability are devolved at the same time in a fishery (FAO, Duke University and WorldFish, 2023).

be a double-edged sword and treat this separately, penalizing negative transferability that allows for over-concentration of rights or transfer of rights out of the SSF sector.

The STR method recognizes the above access and withdrawal rights for SSFs but prioritizes exclusivity to SSFs of these rights in indicators in the STR method, particularly for spatial rights. Collective choice rights are dealt with in the PM method more comprehensively.

### 2.2.3 Attributes of use rights

The most crucial attributes of rights identified by Scott (1996, 2008), as cited in Anderson et al. (2016) and Arnason and Runolfsson (2023) in their widely cited work on Fishery Performance Indicators (FPI), was considered of particular interest to the development of the method. These are:

- i. Security: the extent to which the government reduces or threatens to change the access rights.
- ii. Exclusivity: the ability of the rightsholder to utilize and manage the resource without outside interference.
- iii. Durability: the life span of the right. In SSFs, fishers usually have a long-term dependence on the fishery, and guaranteed access to the fishery has impacts on social, economic, and human rights. Combined with the security of tenure, this may lead to local stewardship. In SSFs, access rights tend to be of indefinite duration (Charles, 2011a).
- iv. Transferability: the capability of rightsholders to shift ownership of the right to someone else, whether permanently (e.g., by selling or handing them down from one generation to the next) or temporarily (e.g., from one fisher to another within a fishing season). The means by which rights are transferred deserves particular attention in terms of potential impacts on fishing communities, as transferring via inheritance may improve community stability but market trading of rights may lead to overconcentration of those rights and negative impacts on community stability and rural livelihoods. Authors have called attention to the need to constrain or directly prohibit the permanent transfer of use rights in SSFs, particularly via marketable user rights (Charles, 2011a).

A crucial consideration when assessing tenure rights is how these rights are allocated. Issues include the fairness of the initial—sometimes historical—rights allocation system, the distribution, the existence of customary tenure rights, and the current systems of rights allocations.

### 2.2.4 Shared resources

FishSource profiles may evaluate fisheries that are operated by different fleets or that are managed under separate management units. That is the case, for example, of straddling or transboundary stocks, which may fall under multiple jurisdictions. These are evaluated under a single biological stock profile but can also be evaluated separately in multiple management units. This situation can occur even within the same jurisdiction whenever different

fleets operate with different gears. This definition is not inconsistent with the approach of [Anderson et al. \(2016\)](#) FPI's, which describes the "primary scale at which the fishery unit for analysis is defined" as "the scope of the management system." Whenever resources are shared between industrial and small-scale fishing fleets, additional risks for small-scale users may arise, as they may be disproportionately affected by poor management decisions, differential power and access to political capital, and fishing practices by industrial operators.

### 2.2.5 Patron–client conditions or concentration

Patron–client conditions occur where capital, financial resources, and property rights (if they exist) belong to a patron who often controls commercialization, leaving fishers with reduced opportunity to engage in collective activities (bargaining or management). Powerful individuals may, through favors, loans, protection, or intermediation receive labor, goods, or other benefits ([Basurto et al., 2020](#)). A risk exists that such conditions will increase the likelihood of exploitative conditions for the fishers or cause them to receive an unfair share of the benefits ([Basurto et al., 2020](#)) and may reduce the likelihood of effective co-management or increase the likelihood of unsustainable fishing practices ([Nurdin and Grydehøj, 2014](#)). A fishers' organization may help guard against these risks to some extent, but patron–client arrangements may have lower initial transaction costs and be easily established in the short term ([Lindkvist et al., 2017](#)), to the detriment of longer-term arrangements. Changes in the prevalence or scope of patron–client relations or outright purchase of vessels or rights need to be considered particularly carefully, to ensure, for instance, that those representing or employing fishers are sufficiently invested in fishery stewardship and that the rights of local fishers and labor are sufficiently safeguarded.

### 2.2.6 Participation in fisheries management

Formal co-management refers to the existence of written policy, law, regulations, or other mandates explicitly instructing systematic inclusion of the voices of "fishers" in management ([FAO, Duke University and WorldFish, 2023](#)). Informal co-management, therefore, refers to any other systematic inclusion of the voices of "fishers" in management, i.e., according to a known plan or system (noting the definition of "fishers" used).

[FAO, Duke University and WorldFish \(2023\)](#) and [Gray et al. \(2023\)](#) compile criticisms relating to overreliance on co-management as a feature of equitable and well-governed SSFs. Co-management does not protect the SSFs from a number of challenges, particularly whenever risks exist that the co-management mechanisms end up being dominated by the large-scale sector or other non-SSFs actors. [Basurto et al. \(2023\)](#) note that debate continues regarding the direction of the causal link between co-management and participation and assess whether participation is a necessary but nonetheless insufficient factor for the effectiveness of co-management.

The [FAO, Duke University and WorldFish \(2023\)](#) IHH study assessed perceived levels of participation among fishers using the following categories: "no engagement," "low engagement," "some engagement," and "majority of fishers participated in the

management of their fishery." This global study found that only half or less of the SSFs with formal co-management had a high level of fisher participation. Though the IHH study acknowledged the spectrum of involvement from passive recipients to control over decision making, they did not use this in their assessment.

### 2.2.7 Stakeholder participation

Stakeholder participation is a process by which an institution involves all people (men and women) and groups who may be affected by the decisions it makes (adapted from [Conservation International, 2021](#)). Co-management is described as an arrangement where responsibility for resource management is shared between the government and user groups ([Sen and Nielsen, 1996](#)). Describing the potential roles and activities of fisheries agencies, fishers, and other stakeholders, a ladder of participation ([McCay, 1993](#)) and later a spectrum of co-management ([Berkes, 1994](#)) have been widely used in the literature. This ladder or spectrum of co-management provides a useful conceptualization of potential modes through which agencies may engage with stakeholders, from weakly participatory to high levels of participation or agency of the fishers.

The PM score focuses on the meaningful participation of fishers in fisheries management functions. For this assessment, a simplified version of the ladder or spectrum of participation in co-management provides the following types of participation:

- a. NA/No information available.
- b. Informed/mechanism—one-way flow of information to fishers, usually from government.
- c. Provide information—information provided by or extracted from fishers, usually by government.
- d. Consulted/discussion—fishers and government engage in two-way discussion. Information provided by fishers is considered, discussed, or used.
- e. Decisions and decision making (party to)—fishers participate in decision making and have clear opportunity to influence or even be responsible for decisions.

### 2.2.8 Management roles

Fisheries management comprises a number of components or fishery management goals. The components of fisheries management in which fishers may participate, adapted here are from [Puley and Charles \(2022\)](#), include the following:

- i. Direction setting, planning, and policy development.
- ii. Rules and harvest management.
- iii. Compliance and enforcement.
- iv. Ecosystem stewardship, conservation, and rehabilitation.
- v. Research.
- vi. Organizational management and development and conflict management.

### 2.2.9 Stakeholders

The effectiveness of co-management mechanisms has reportedly suffered from the "participation paradox" ([Suárez](#)

de Vivero et al., 2008), in which the greater the number of actors, the smaller the role each plays, causing the influence of less-powerful groups to be disproportionately reduced (Labraña-Cornejo et al., 2023). Over-involvement of many stakeholder groups may dilute or drown out the concerns of the most affected groups and has been linked to poorer outcomes for fishers (Ouréns et al., 2022). Considering the methodological constraint of relying exclusively on secondary data, evaluations consider the following two levels of participants in co-management: fishers and fishery stakeholders. Due to the same constraints, the participation of third parties, such as “affected stakeholders” or “those who will experience consequences by the decision made” (Conservation International, 2021), cannot be evaluated.

### 2.2.9.1 Fishers

The fisheries-dependent users are rightsholders who are directly affected by and compelled to obey, the laws and rules pertaining to fisheries management (Mikalsen and Jentoft, 2001). These are primarily fishers or their legitimate representatives, those who capture or harvest the fishery products and directly exert the fishing pressure. In cases where the vessel owners are part of the fishing activity, consideration should be made to workers and crew.

### 2.2.9.2 Fishery stakeholders

There are a wide range of potential stakeholders in addition to fishers (as defined above), including the public as “resource owners” and government as representatives of the citizens, as well as other stakeholders in civil society (Mikalsen and Jentoft, 2001; Puley and Charles, 2022). Management decisions may have an impact on other stakeholders; whenever appropriate, they should be identified and appropriately involved. Fishery stakeholders are here understood as the broadest category of anyone who has a stake in decisions made on the fishery. The PM method follows Conservation International’s (2021) SRA distinction between the following two categories: (a) affected stakeholders, which include anyone who will experience consequences by the decision(s) made (e.g., fisher/worker/farmer, community member, women, minorities) and (b) relevant stakeholders, who include anyone who has a stake in the decision made (e.g., government, businesses, non-governmental organizations, other interest groups and sectors such as aquaculture, etc.).

## 2.3 Framing of the assessment

### 2.3.1 The unit of assessment

Considering that the new scoring methods are meant to apply only to SSFs, evaluations of FishSource must effectively assess first whether a fishery, or part of a fishery, qualifies as an SSF. FAO, Duke University and WorldFish (2023) highlight the numerous attempts to develop frameworks for distinguishing SSF from large-scale fisheries. Instead of adopting a standardized definition of SSFs, the study opted to use the definitions established by each country in their

legal frameworks. These authors developed a “fishing activity characterization matrix” that is very comprehensive but requires more data than is likely to be available for the purposes of the present methods.

Therefore, the current approach first considers whether the fishery is designated as SSF within the country’s legal framework or in supporting documentation. If this designation is not available, we have compiled a simple set of criteria from literature sources. We consider a fishery as a SSF if it meets at least two of these criteria (see decision tree in [Supplementary material 1](#)). While the authors have provided examples based on cases, they are familiar with, it is noted that this simplified approach may require further testing and refinement as it is applied at a broader scale.

### 2.3.2 Data sources and reliability

The selection of indicators followed the considerations outlined in SFP (2016), focusing on ease of understanding, data availability, and usefulness for improvement processes. The indicators selected need to be evaluated upon publicly available data, relying on the best evidence, which may often be limited. Throughout the methods, the presence or absence of evidence is addressed in the form of queries (e.g., “Any evidence that....?”). Yet, to ensure consistency in evaluations, the methods propose a standard to determine acceptable levels of reliability. While government publications and reputable media outlets are preferred sources, official agencies are increasingly using social media as a significant communication tool. Thus, when appropriately justified by the analysts, social media can be considered as “official evidence.” Fishing communities often rely on social media to publicize conflicts or situations of inequality, highlighting its use as one of the only available means of alert. In such cases, the phrase “Any evidence...” includes such sources, provided that the analyst clarifies the data limitations in the narrative. Finally, in order to encourage informed and justified decisions instead of relying on vague responses like “insufficient data,” the methods combine straightforward yes/no approaches with multiple-choice options where necessary.

### 2.3.3 Weighting indicators

It is important to note that the various indicators reflect topics that hold different levels of importance or significance. Consequently, determining the appropriate weighting for each indicator can spark endless, yet potentially valuable, debate. For the purposes of these methods, the scoring system is kept as simple as possible and used to assess positive indicators by default. However, the method introduces the nuanced approach of assigning different weights to four steps in each method, based on the rationale developed above. Additionally, certain indicators in the first steps may indicate that the assessment should be halted, such as the absence of detectable participatory management or the lack of a rights-granting system.



### 2.3.4 Scoring values

Both the STR and PM methods use the same final scoring ranges as the existing FishSource scores (see [FishSource, 2023a,b](#)). The scores are each calculated on a scale from zero to ten, with benchmark points at six and eight that point to the scope of the sustainability performance and the level of improvements needed. A value of six equals performance that can be considered “acceptable but with improvements required,” while scores over eight are a proxy for “strong performance.”

## 3 Results: the proposed methods and their application

### 3.1 Applying the scoring methods: a stepwise approach

After an extensive literature review, an in-person workshop, and the pilot testing of several fisheries the following scoring methods were drafted to measure the performance of a SSF against the two selected SSFs attributes of STR and PM, STR indicators are assessed first and with greatest emphasis, given the global experience described above that appropriate rights are the fundamental basis for SSFs governance (see recent comprehensive reviews [FAO, Duke University and WorldFish, 2023](#); [Gray et al., 2023](#)).

The structure of both methods is divided into the following four broad steps or topic clusters:

- A. Evidence for existence in practice and in law
- B. Appropriateness to the SSF
- C. Effectiveness from an SSF perspective
- D. Risks and other considerations.

Whenever there is absence of evidence at stage A, the analysis stops and the fishery “fails.” For the full methods, decision trees, and scoring, refer to [Supplementary material 2, 3](#).

#### 3.1.1 Secure tenure rights: fisher rights and empowerment

The STR method (see [Figure 2](#); [Table 1](#); [Supplementary material 2](#)) begins by looking at overall national conditions and moves on to assessing the specific fishery. In addition, steps C and D of STR are sensitive to weaknesses in the rights systems (as the method asks for evidence of bad practice). Weighting is used to favor fisheries with more devolved or exclusive rights complemented by scoring higher for lack of evidence of failures or inadequacies in the implementation or defense of rights.

Step A provides the highest scores for SSFs that are governed by legally recognized tenure rights and exclusive spatial access, yet allow for recognition of informal tenure rights systems and acknowledge credible plans to develop a legal basis for tenure systems. If no evidence for the use of tenure rights is found, the assessment concludes.

Step B assesses four different use rights (spatial access, licensing, input, and output) and provides the highest scores where at least one is devolved, i.e., exclusive to fishers. The scores are reduced

according to the extent and number of rights that are at least partially devolved/preferential.

Step C assesses whether the rights are effectively granted or not protected from a series of risks, including transfer and over-concentration, inadequate duration, or impacts of other users. This step attempts to detect signs that the rights assessed in step B are effectively implemented.

Step D includes the only indicator that assesses whether SSFs are fulfilling their responsibilities and otherwise examines risks to the future support of the rights by government or other sectors. A key question is included relating to whether the fisher rights affect marginalized or vulnerable groups.

#### 3.1.2 Participatory management: fisher participation in decision making

The PM scoring method (see [Figure 3](#); [Table 2](#); [Supplementary material 3](#)), assesses the existence of formal or informal co-management, whether the co-management mechanisms are appropriate and effectively implemented and whether the system is at risk. The PM method specifically focuses on the quality of participation, in terms of whether fishers are likely to be prominently represented in management and whether their participation is meaningful, i.e., a high level on the spectrum of involvement for policy development, rule setting, and MCS. As FishSource evaluations rely on desk-based analyses, it is considered more feasible for the PM methods to seek any evidence of good practice. This is likely to give more favorable consideration and is distinct from the STR, which looks for evidence of bad practice (it was considered more feasible to look for conflicts over rights). To avoid the score risking the “participation paradox”, ([Labraña-Cornejo et al., 2023](#); adapted from [Suárez de Vivero et al., 2008](#)), and given the challenge for analysts to evaluate if this is happening, the rationale of the scoring methodology aims to ensure the voices of primary resource users or “fishers” are not alienated throughout the participation process itself. To do that, at an entry point, the score measures the participation of broader fishery stakeholders; yet, at higher scoring levels, the methodology focuses on the participation of fishers as defined below.

Step A detects any sign of participatory management in the fishery, giving more weight to frameworks legally supported, allowing informal systems whenever justified by the analyst, and concluding the assessment if no evidence is found.

Step B seeks evidence of mechanisms that would allow fishers to be prominently represented in the management process, with the lowest score if no evidence of formal or informal mechanisms is found.

Step C is the most detailed step. After checking whether fishers or other stakeholders are impeded from participating, this step seeks evidence of the degree to which fishers participate in each of three management roles (setting policy, setting rules, and monitoring, surveillance, and control). Scoring is higher with the greater degree of participation in more roles.

Step D examines other desirable features of SSFs co-management, such as transparency, capacity building, grievance reporting, conflict management with other sectors operating in the same ecosystem, and use of fisher knowledge.

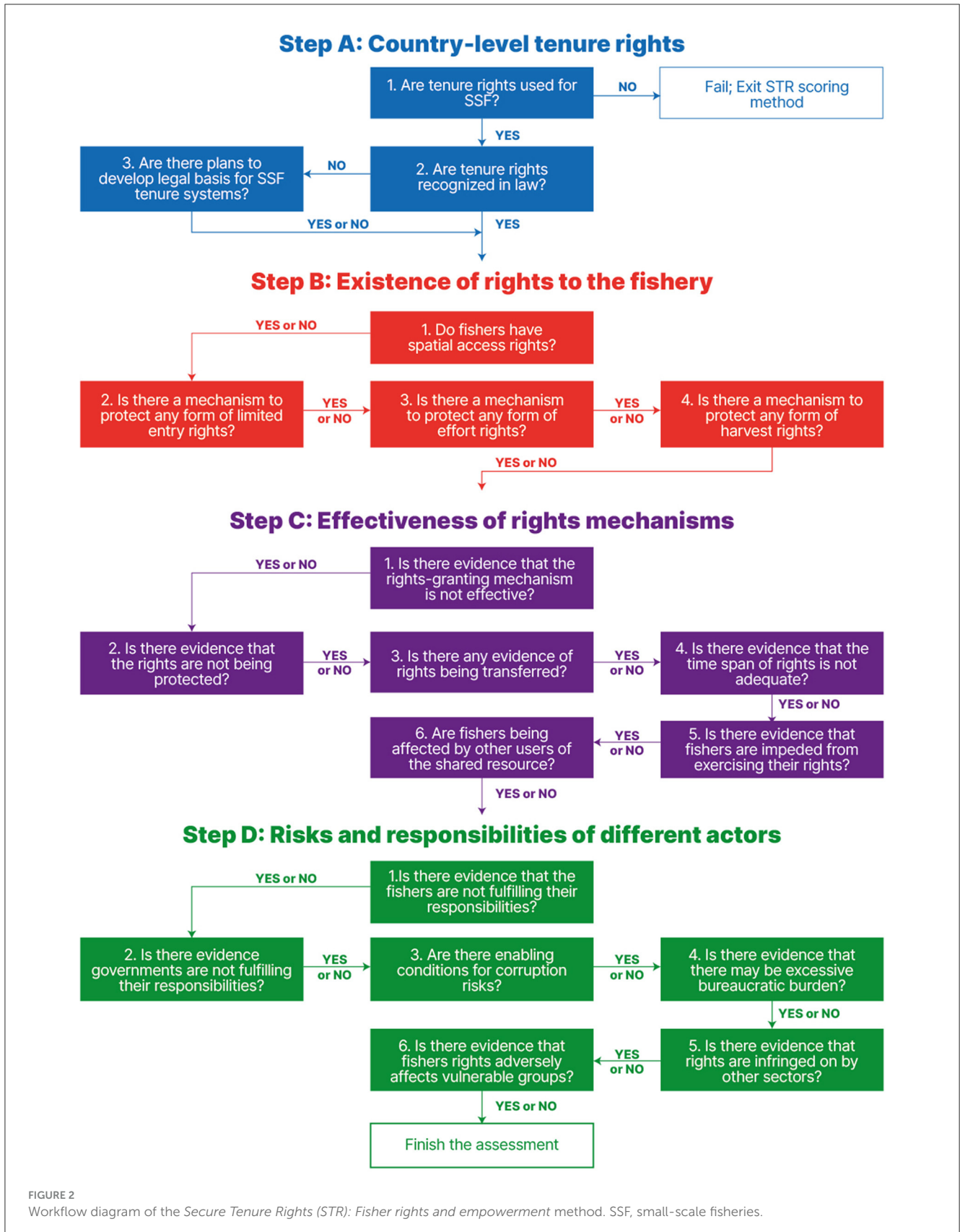


FIGURE 2 Workflow diagram of the *Secure Tenure Rights (STR): Fisher rights and empowerment* method. SSF, small-scale fisheries.

TABLE 1 Summary of secure tenure rights (STR): fisher rights and empowerment method, showing indicators and all possible scores.

Steps	Indicators	Score (weight %)
Step A: country-level tenure rights	1. Tenure rights used for SSFs	1, 0*
	2. Tenure rights in law	3
	3. Plans to develop legal basis	2, 1
	<b>Step A Maximum points and relative weight (%)</b>	<b>4 (15%)</b>
Step B: existence of rights to the fishery	1. Spatial rights	Computed <sup>1**</sup>
	2. Limited entry rights	Computed <sup>1**</sup>
	3. Effort rights	Computed <sup>1**</sup>
	4. Harvest rights	Computed <sup>1**</sup>
	<b>Step B Maximum points and relative weight (%)</b>	<b>4 (30%)</b>
Step C: effectiveness of rights mechanisms	1. Rights granting not effective	1
	2. Rights not protected	1
	3. Transferal of rights	1
	4. Rights of inadequate duration	1
	5. Impeded from exercising rights	1
	6. Affected by other users of the shared resource	1
	<b>Step C Maximum points and relative weight (%)</b>	<b>6 (30%)</b>
Step D: risks and responsibilities of different actors	1. SSF not fulfilling responsibilities	1
	2. Government not fulfilling responsibilities	1
	3. Corruption risks	1
	4. Excessive bureaucratic burden	1
	5. Rights infringed on by other sectors	1
	6. SSFs rights adversely affect vulnerable groups	1
	<b>Step D Maximum points and relative weight (%)</b>	<b>6 (25%)</b>

\* A poor outcome stops the analysis here and is considered a "fail."

\*\*The score is calculated to ensure a higher score if at least one right is exclusive to SSFs and correspondingly lower scores according to how many rights are preferentially applied (see Section 3.2.1).

SSF, small-scale fisheries.

## 3.2 Applying the scoring methods to the southern hake fishery: a case study

The southern hake (*Merluccius australis*) represents an important fishery for the regions of Los Lagos, Aysén and Magallanes of the Chilean Patagonia. For the period 2013–2020, this fishery yielded on average 16,935 tonnes per year, yet in 1988 the fishery reached landings of 69,300 tonnes. Today, the Undersecretariat for Fisheries and Aquaculture (SUBPESCA as per its acronym in Spanish), considers the resource as overexploited, and overfishing is still occurring (FishSource, 2022). This species is being exploited by artisanal and industrial fleets. The artisanal fishers only operate with longlines (maximum hook size of 18 mm), and the industrial fleet are only authorized to use trawls or longlines (FishSource, 2022). Since 2019, the industrial fleet operating in the fishery attained the Marine Stewardship Council certification.

To provide a better understanding of how the STR and PM scoring methods are applied to a given fishery, the following

sections provide the FishSource scoring method for the Chilean southern hake fishery.

### 3.2.1 The STR scoring method for the Chilean southern hake

The STR scoring method for the southern hake fishery of Chile was 3.7. The justification of this score is listed below:

#### 3.2.1.1 Evidence for existence in practice and in law

Chile recognizes the right of artisanal fishers, as declared by the UNDROP (United Nations, 2018), to access, use and manage fish stocks in order to achieve adequate standards of living. This is reflected in the General Fisheries and Aquaculture Law (LGPA as per its acronym in Spanish), enacted in 2013 (SUBPESCA, 2023a). Among these rights, Chile set a five-mile exclusive area for artisanal harvesting activities measured from the coastline, and including all interior waters in the three most southern regions, where this fishery takes place (SUBPESCA, 2023a). Additionally, the LGPA

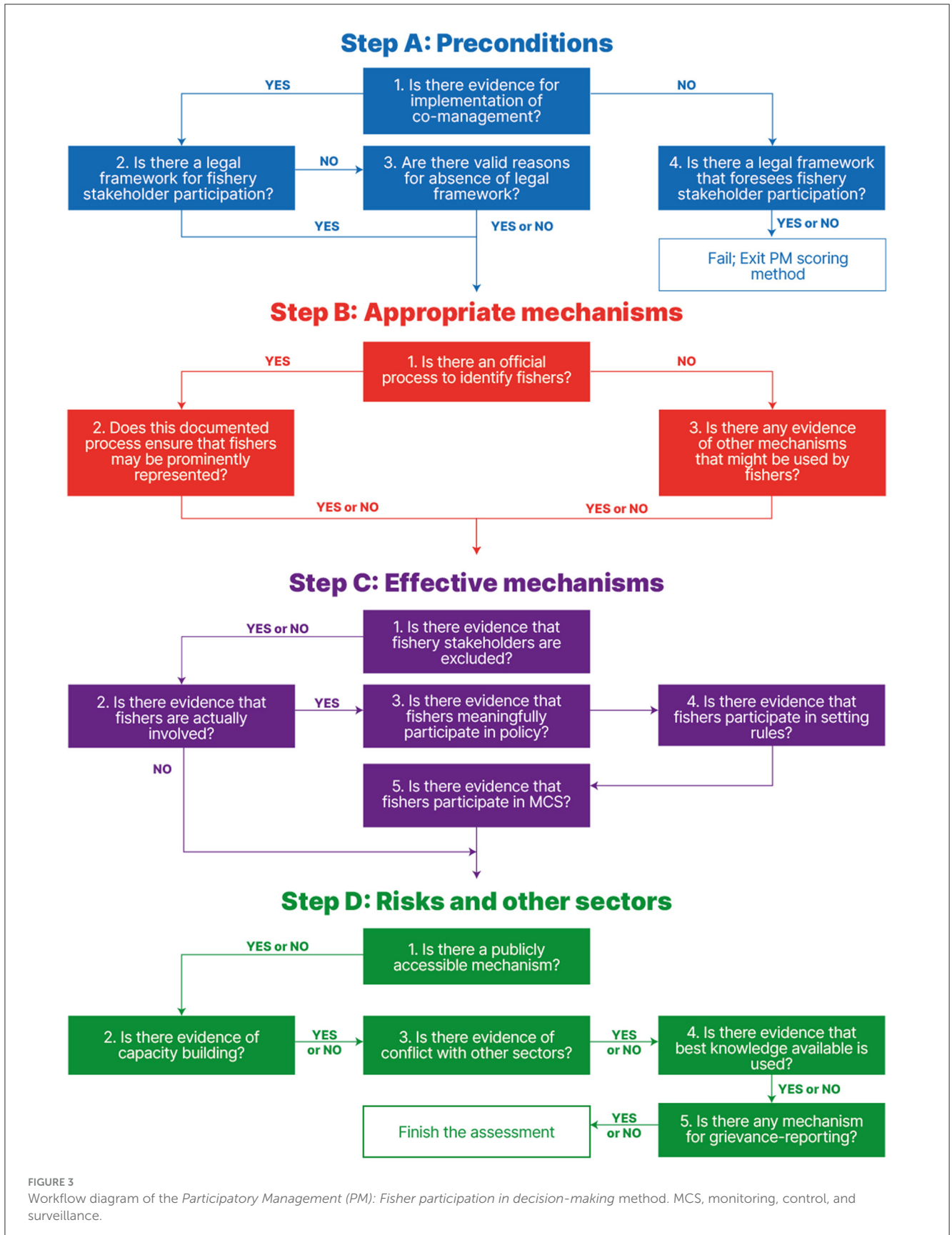


FIGURE 3 Workflow diagram of the *Participatory Management (PM): Fisher participation in decision-making* method. MCS, monitoring, control, and surveillance.

TABLE 2 Summary of participatory management (PM): fisher participation in decision-making method, showing indicators and all possible scores.

Steps	Indicators	Score (weight %)
Step A: preconditions	1. Evidence for implementation of co-management	No score*
	2. (Meets indicator 1). Existence of a legal framework for fishery stakeholder participation	4
	3. (Meets indicator 2). Valid reasons for absence of legal framework	3, 2, 1
	4. No implementation with or without legal framework	*
	<b>Step A Maximum points and relative weight (%)</b>	<b>4 (20%)</b>
Step B: appropriate mechanisms	1. Official process to identify the fishers	No score
	2. (Meets Indicator 1). Fishers may be prominently represented	4, 3, 1
	3. Other mechanisms that might be used by fishers	2, 0
	<b>Step B Maximum points and relative weight (%)</b>	<b>4 (30%)</b>
Step C: effective mechanisms	1. Fishery stakeholders are excluded	0, 1
	2. Fishers are actually involved	1, 0
	3. Fishers participate in policy	2, 1, 0
	4. Fishers participate in setting rules	2, 1, 0
	5. Fishers participate in MCS	2, 1, 0
	<b>Step C Maximum points and relative weight (%)</b>	<b>7 (30%)</b>
Step D: risks and other sectors	1. Transparency	1.5, 1, 0.5, 0
	2. Capacity building	1, 0.5, 0
	3. Conflict with other sectors	1, 0
	4. Use of best knowledge available	1, 0.5, 0
	5. Grievance-reporting mechanism	1.5, 1, 0.5, 0
	<b>Step D Maximum points and relative weight (%)</b>	<b>6 (20%)</b>

\* A poor outcome stops the analysis here and is considered a “fail.”  
MCS, monitoring, control, and surveillance.

provides other measures in favor of small-scale fishers, such as the need for aquaculture activities to consider them and not to interfere with their practice (SUBPESCA, 2023a).

### 3.2.1.2 Appropriateness to the SSF

Various types of fishing licenses create distinct conditions of access and incentives that tend to favor industrial fishers (Ríos and Gelcich, 2017). The development of the law was marred by corruption cases involving bribery from the industrial sector to public representatives in the Parliament (Reyes et al., 2017; El Mostrador, 2022; Franchini Rossa, 2022). The legal framework establishes that 60% of the quota is held by artisanal fishers (MEFT, 2020), and the inland waters of the Los Lagos, Aysén, and Magallanes regions are solely utilized by the artisanal fleet (SUBPESCA, 2019).

### 3.2.1.3 Effectiveness from an SSF perspective

Several issues hinder the effectiveness of the mechanisms providing small-scale fishers access rights. Despite the allocation of the majority of the southern hake quota to the artisanal fleet, substantial portions are transferred to the industrial sector (SERNAPESCA, 2023). Moreover, a lack of surveillance and enforcement is a critical issue (Oyanedel, 2019) that affects fishery stakeholders (Gozzer-Wuest et al., 2022). Inadequate scientific

research on the stock, with distorted data and weaknesses in quota setting, has also been identified to contribute to this issue (CM-MS, 2023; Gálvez, 2023).

### 3.2.1.4 Risks and other considerations

Lowered catches, combined with the important impact of illegal and unreported fishing, has affected the endurance of the artisanal activity (Donlan et al., 2020; CM-MS, 2023). Additionally, conflicts with different sectors, such as aquaculture or other economic activities have been identified (see Barton and Román, 2016; Chávez et al., 2019; Anbleyth-Evans et al., 2020).

Even though there have been improvements in reducing inequalities with vulnerable groups, such as indigenous people and women, several barriers and gaps are still identified and need to be addressed (Álvarez, 2021).

## 3.2.2 The PM scoring method for the Chilean southern hake fishery

The PM method for this fishery scored 8.9. This is justified with the following information:

### 3.2.2.1 Evidence for existence in practice and in law

The Undersecretary of Fisheries and Aquaculture (SUBPESCA for its acronym in Spanish) is mandated to manage Chilean

fisheries. However, the LGPA establishes the development of fishery-specific Management Committees (MC) that serve in an advisory capacity. Notably, in the context of the southern hake fishery, these committees are predominantly composed of artisanal fishers (SUBPESCA, 2022a, 2023a).

### 3.2.2.2 Appropriateness to the SSF

The MC is involved in the development of management measures for the fishery, and both National and Local Fishing Councils, including fisher's representation, are also advisory groups for SUBPESCA (2023a). Fishers are also reported as being involved in the ongoing design of a new LGPA (Gobierno de Chile, 2022; SUBPESCA, 2023b).

### 3.2.2.3 Effectiveness from an SSF perspective

The MC holds responsibility for designing, implementing, and reviewing the fishery-specific management plan, which in the case of the southern hake fishery was released in 2016 and modified in 2019 (SUBPESCA, 2016, 2019). The MC is an official platform where all registered fishers enrolled in the target fishery can apply to act as representatives (SUBPESCA, 2013). Even though the MC is considered as highly participative, several issues have been raised regarding its mode of representation (Tapia-Jopia, 2022) and performance (Gozer-Wuest et al., 2023), which reflect on the agreements reached by its members (CNP, 2015; Oceana, 2020; Tribunal Ambiental, 2021). Moreover, the MC has failed to design and implement a needed recovery program as it was agreed in 2016 (SUBPESCA, 2022b). These issues require close monitoring and inquiry in further iterations of the assessment.

### 3.2.2.4 Risks and other considerations

Transparency and a well-defined grievance mechanism are important tools improving the performance of co-management.<sup>5</sup> However, no systematic capacity-building program has been found to be in place. Moreover, fishers are not consistently involved in consultation processes related to activities that could impact their employments and livelihoods (Guarda and Vila, 2020). To show discontent or denounce a lack of inclusion, fishers have participated in demonstrations and media interviews (Resumen, 2014; Bolsamania, 2016; Menares, 2017).

## 4 Discussion

### 4.1 Consideration on levels of complexity

As the various indicators contained in each method could be ascribed different degrees of relevance, the methods strived for simplicity. Simple scoring of indicators of positive attributes is the default, with occasional extra weighting. Negative scoring was considered as an option during the development of the method (i.e., deducting points) but was found to add excess complexity. Negative scoring or caps on the final scores may be reconsidered in

<sup>5</sup> SUBPESCA's information, grievance and suggestion mechanism (<https://www.subpesca.cl/portal/616/w3-article-60000.html>) and fisheries regulations (<https://www.subpesca.cl/portal/615/w3-propertyvalue-679.html>) are available online.

future iterations of the method if, for example, certain attributes are considered unacceptable or need particular attention, e.g., impacts on marginalized people or the presence of corruption. A weighting system applies to the four topic clusters or steps (A-D).

### 4.2 Consideration on whose performance is evaluated

High scores in the STR and PM methods indicate the presence of favorable enabling environments and effective implementation by government agencies of the co-management principles, whether at the national, provincial, or local level. On the other hand, low scores primarily stem from deficiencies in government support for SSFs or, in some cases, inadequate mechanisms to protect SSFs from industrial fishers or other sectors. Therefore, except for a single question, scoring reflects performance of government, not the fishers.

### 4.3 Considerations in weighting tenure questions

In Step A of the STR score, evidence for actual country-level tenure rights implementation and recognition in law for SSFs is assessed, as opposed to merely in policy or declarations. This is consistent with FAO (2022b), which affirms a "clear difference between a fisheries policy, which is non-binding, and a fisheries-related law, which is binding and enforceable by means of administrative and judicial proceedings." Step B assesses the degree to which at least one of four different use rights (spatial access, licensing, input, and output) is devolved to fishers. It may be necessary to consider in the future that some types of licensing may limit fishers' adaptive ability to switch between gear type and target species (FAO, Duke University and WorldFish, 2023). Licensing can be problematic for small-scale fishers because payments for licenses are not necessarily reinvested in management (Basurto et al., 2023). This could be addressed through weighting, e.g., increasing the weighting given to spatial access exclusivity. However, it was considered that the current, simpler approach captures a wider diversity of SSFs situations. In Step C, the STR score assesses the transferability of rights (e.g., quotas) because this method is interested in evaluating whether SSFs are vulnerable to rights concentration by industrial fisheries, for instance when artisanal/small-scale fishers transfer high volumes of quotas to industrial fishers (e.g., as is the case in one of the fisheries tested, the southern hake fishery in Chile). Regarding Step D, a few questions may be of great significance in general or to certain users of the method, for instance D1 on whether fishers are carrying out their responsibilities or D6 relating to the SSFs rights adversely affecting vulnerable groups. Weighting for D1 and D6 was kept simple, and analysts are expected to draw attention to failures in these areas and propose required solutions in their evaluations. However, failure under these questions could be more severely penalized in future iterations of the method.

#### 4.4 Considerations in weighting participatory management questions

In the PM score, Step A focusses on preconditions for legal or informal co-management in SSFs, with an emphasis on participatory processes defined or secured by fisheries agencies. The possibility of strong informal community-based management is considered for evaluation as well. Steps B and C focus on the degree to which fishers are involved and, equally importantly, the quality of that involvement in the main phases of management. These two steps together constitute up to 60% of the score, making them the decisive criteria for this method. In Step B, the score seeks to identify appropriate mechanisms that could guarantee fishers' participation, but Step C emphasizes how effective the participation of fishers actually is. The quality of participation is considered at various levels of engagement, ranging from fishers passively receiving information, to government and fishers collaborating as equals in decision making, data collection, monitoring, surveillance, and control, to fishers making most decisions and providing advice to the government (FAO, Duke University and WorldFish, 2023).

#### 4.5 Considerations for interconnectedness with other FishSource methods and scoring values

While the methods presented in this paper serve to evaluate the performance of fisheries management against two key principles, they are not enough to evaluate other relevant issues in SSFs management that are emphasized in the SSFs guidelines, such as whether the role of women is adequately considered in decision making (see Basurto et al., 2023) or if women are adequately represented in participatory management (see Alonso-Población and Siar, 2018). A specific method to capture gender issues in fisheries management is currently under development. Further iteration and testing of the methods will reveal if specific issues related to tenure will require refinement of the scoring methodologies or even development of other specific scoring methods, e.g., if tenure rights of indigenous peoples are adequately safeguarded (see Basurto et al., 2023).

Additionally, a medium-to-long-term iterative benchmarking process—as more fishery profiles are developed and scored—will be required to readjust the scoring so that the STR and PM methods deliver results that are consistent with the currently existing FishSource methods that evaluate management, stock health, and environmental impacts. As noted above, a score of six indicates a performance level that can be considered “acceptable but with improvements required,” while scores over eight are a proxy for “strong performance.”

#### 4.6 Considerations regarding the interplay of fishery profiles

The two methods presented in this paper are designed to be applied to fisheries where there is a small-scale fleet operating using the current definition of a fishery by FishSource. This means that for

fisheries where there are industrial and small-scale fleets operating simultaneously, within the same management unit and using the same gear, the FishSource fishery profiles (which comprise up to 11 scoring methods in total) will display some scores that are overarching for both fleets (e.g., status of the stocks), along with scores that evaluate only one of the fleets, specifically the STR and PM scores, as they only evaluate the performance of the small-scale component of the fishery. By displaying the two scores in a joint assessment of the entire fishery, the evaluations are expected to flag specific issues that, while affecting the small-scale component, may result from the operation of the industrial component. For example, if overconcentration by industrial fishing companies due to transferability from small-scale fishers is identified, the STR profile should be affected and therefore reduce overall scores for the entire fishery. It is expected that, in this way, buyers from the industrial fishery will be informed of the negative impacts of the fishery over small-scale operators. Yet, due to FishSource's definition of a fishery, this effect may not be triggered in some fishery profiles. This may be the case whenever, for example, the small-scale fleet operates over the same stock along with industrial operators but is managed separately by government authorities under a different management unit or operates with different gears. In this case, the PM and STR scores will only be displayed in the fishery profile of the SSF but not in the profile of the industrial fishery, masking to the user that the industrial fishery is negatively affecting the tenure of small-scale fishers (as the STR and PM scores will be displayed in different fishery profiles). In these cases, however, the stock-level profile (instead of the fishery profile—see Section 2.2.1) will be the evaluation level that displays the assessments of the SSF and the industrial fishery. Assessing the outcomes of this permeability and interactions between profiles will require further consideration and possibly iterations to evaluate improvements in profile structures.

### 5 Concluding remarks

The two new SSFs FishSource methods (*STR: Fisher rights and empowerment* and *PM: Fisher participation in decision making*) proposed in this paper aim to assess how well-management of the SSFs integrates these two basic principles. Both methods seek to find evidence of STR/PM in practice and in law, appropriateness to the SSF, and effectiveness from an SSF perspective, as well as identify risks and other general considerations.

The two new FishSource methods on STR and PM should both be used to assess SSFs because they are intrinsically linked. The STR method enables gauging, for instance, whether fishers are officially registered, if there are dedicated fishing zones for artisanal and small-scale operators, and if the rights of fishers are being adequately respected. The PM method assesses whether these rights are adequately put into practice in the decision-making process and implementation, e.g., they actually result in fishers having their voices heard or being able to affect management decisions.

While the proposed methods do not aim to be a comprehensive tool to evaluate or fully understand the overall conditions of a fishery, it is hoped that they may help identify clear and

actionable areas of improvement (Cannon, 2006), flag emerging issues, and monitor performance over time (see SFP, 2016; Cannon et al., 2018) of the management rights (see FAO, Duke University and WorldFish, 2023) of the still underserved SSF sector. By making this information publicly available, entire supply chains and fishery stakeholders can understand, prioritize, and support implementation of improvements that the fishery requires to enhance its governance.

## Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

HG: Conceptualization, Data curation, Formal analysis, Methodology, Visualization, Writing—original draft, Writing—review & editing. EA-P: Conceptualization, Data curation, Formal analysis, Methodology, Visualization, Writing—original draft, Writing—review & editing. SS: Data curation, Formal analysis, Methodology, Visualization, Writing—review & editing. RL-C: Data curation, Formal analysis, Methodology, Visualization, Writing—original draft, Writing—review & editing. PF-V: Conceptualization, Methodology, Writing—review & editing. MA-C: Investigation, Writing—review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fsufs.2024.1343473/full#supplementary-material>



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