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The role of certifications and eco-labels in fisheries: a systematic literature review of their benefits and challenges

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Abstract

Eco-labels are market tools that provide consumers with relevant information, enabling more informed and sustainable purchasing decisions. As fisheries operate on a high production scale, it is possible to dilute the costs of implementing and maintaining these initiatives. However, as the production scale decreases, small producing communities may need help participating in product certification processes. In global contexts, where consumer markets become increasingly demanding, the need for certification can translate into a barrier to selling such products. In this context, the present article aims to investigate existing certifications in the literature for large- and small-scale fisheries and their benefits and challenges for the fisheries. The systematic literature review was conducted to achieve the research objectives. A total of 38 articles were analyzed for this study. The Marine Stewardship Council emerged as the most recognizable certification body worldwide. Market access was the benefit of this certification scheme. On the other hand, small-scale fisheries face barriers in obtaining this market access tool, with costs being the primary challenge cited. *Certification schemes* can significantly enhance the fisheries value chain by fostering better interactions between fisheries stakeholders and reshaping the structure of small-scale fisheries.

Keywords Eco-labels, Seafood, Small-scale fishery, SLR

Introduction

There has been a growing concern among the population regarding the importance of sourcing products from a clean and sustainable production chain, a trend also emerging in the seafood sector. Ramachandran and Shinoj [39] suggest that ecologically concerned consumers prefer to buy fish from responsible sources.

The Triple Bottom Line (TBL) was coined by John Elkington as a result of pressure from governments and citizens for measures to manage the impacts of companies' actions across multiple domains, thus creating the sustainability tripod, which evaluates social performance, environmental and economic aspects of companies [11].

With the popularization of TBL, activities related to sustainability began to be analyzed from a social, environmental, and economic perspective. In this study, many of the issues analyzed and understood come from the TBL perspective. Eco-labels originated from the Sustainable Seafood Movement in the early 1990s, when non-governmental organizations (NGOs) and other institutions and players pressured market trends to induce sustainable practices, recognizing the need to protect fisheries resources [19].

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Eco-labels are market tools designed to provide information to help consumers make informed decisions on purchasing, adding both ethical and economic value addition by certifying that the product comes from a sustainably responsible source [39].

Besides the origin knowledge, the eco-labels and certification schemes play a role in protecting overexploited fish stocks and overfishing [50]. These initiatives also combat the impacts of Illegal, Unregulated, and Unreported (IUU) fishing activities by having an assured chain of custody, as demonstrated by the most recognized sustainable certification scheme, the Marine Stewardship Council (MSC) [26].

Currently, the MSC blue label is the largest certification standard program for fisheries products. Its certified products include 74% wild white fish, 57% tuna, 83% wild salmon, and 14% wild lobster and crab [28]. Another significant institution is Friend of the Sea (FOS), which claims to certify more than 80 fish stocks in 30 types of fisheries [16]. According to their 2012–2018 annual report, FOS claims to certify 770 companies in 65 countries [15]. Unlike the MSC, which operates predominantly in developed countries, this certification scheme has many certifications in developing countries [50].

On the other hand, obtaining certification schemes is often costly. It may not be reachable for many fisheries due to complex procedures that not all fish producers can afford [7]. Price premiums are given to some fisheries to help cover the costs and to instigate some producers to seek certification. Still, studies have shown that this kind of incentive depends on species commercialized, markets, and the whole supply chain [3].

The first initiatives for fisheries eco-certification schemes date back to the 90 s when institutions like Dolphin Safe created awareness of dolphin bycatch in the tuna industry [51] and in 1996 with the union between Unilever and the World Wildlife Fund (WWF) to create the MSC [45]. As time progresses, certification is becoming more important due to market entry and sustainability concerns, although some fisheries face challenges in accessing this tool.

Large-scale fisheries can dilute the costs of implementing and maintaining these initiatives. However, as the production scale decreases, small producing communities may find it challenging to participate in product certification processes. In global contexts, where consumer markets become increasingly demanding, the lack of certification can translate into a barrier to selling such products.

Small-scale fisheries play a vital role in seafood production globally, accounting for at least 40 percent of the total catch in global fishery, employing 90 percent of the people operating in the fisheries value chain. Around 492 million people depend, at least partially, on small-scale fishing for their livelihoods [12]. Given the importance of small producers in the fish production chain, it is necessary to understand the role of certification schemes in this context.

Unfortunately, the essential role played by small producers faces challenges such as a lack of transparency, specific consumer demand, traceability, limited entrepreneurial activities, and no distinction between artisanal and industrial fish products, pushes the SSF to face heavy pressure by its globalized value chain [35].

Private certification can address some of the problems. For instance, the lack of distinction between products from artisanal or industrial fleets could be resolved if labels indicated the origin of production. However, the certification schemes are more concerned with the environmental context of catch and product [35].

Although certifications can address some challenges fisheries face, they can also negatively impact or be more difficult for some fisheries to attain, mainly due to costs. To address these problems, territorial eco-certification schemes have been developed as alternatives to exclusionary certifications like MSC, particularly for small-scale and developing country fisheries [13].

In this context, the present article aims to investigate existing certifications in the literature for large- and small-scale fisheries and their associated benefits and challenges for fisheries to enrich the data on this subject and compile information on existing certifications. This article presents a systematic literature review (SLR) on fishing certification schemes, their benefits, and challenges. It seeks to answer the following research questions (RQ): RQ1—what types of certifications exist for fisheries? And RQ2—what benefits and challenges do certifications bring to the fisheries value chain?

Methods

Given the relevance and impacts caused by certification in the value chain of industrial and small-scale fisheries, a literature review was conducted on the certifications currently in force. To this end, a systematic review was developed, according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines [32], aiming at a detailed, replicable methodology that provides a comprehensive structure to objectively evaluate the indicators of quality and risk of bias in research.

A systematic review identifies, evaluates, and interprets all available research relating to the research question and aims to understand better and explore the topic, which is a planned and ideally repeatable way of synthesizing results from the existing body of scientific literature that has been prepared [30].

Thus, to achieve our objective, two research questions were elaborated: RQ1—What types of certifications exist for products from small-scale fisheries? And RQ2—What benefits and challenges do certifications bring to the fish value chain?

We conducted a Boolean search to ensure the capture of a wide variety of documents: (("artisanal fishery" OR "small-scale fisheries" OR fishery*) AND certification AND seafood). These terms were chosen based on an exploratory reading on the topic highlighted in the articles consulted in the Scopus and Web of Science bibliographic databases. The databases were selected due to the relevance of the journals in their composition and because they contain a more extensive collection of references on the theme. The selection of articles took place from September to November 2022.

Document selection

The initial research produced 283 articles (Scopus = 168 and Web of Science = 120) due to the search string and filters resulting from the inclusion criteria. Table 1 shows the filters used for each database.

The article selection process consisted of two phases: an initial selection to identify research results that could satisfy the selection criteria based on reading the titles and abstracts of the articles (selection), and the second part, a final selection based on the reading of their introductions and conclusions (extraction).

To minimize the bias, two researchers conducted a blind check of the inclusion and exclusion criteria. A third evaluator would be consulted if any discrepancies were identified; however, no third evaluator was needed due to the consistent agreement between the first two reviewers.

In this review, 283 articles were downloaded from the Scopus (168 articles) and Web of Science (120 articles) databases. The first stage of the process resulted in the rejection of 143 articles, and 140 were accepted. At the end of the second stage, 38 articles were selected for the SLR, 80 were rejected, and 22 were duplicates, as shown in Fig. 1. The articles selected for this review can be viewed in Appendix B.

Table 1 Databases and search filters

Database	Search filters
Scopus	Search in: Article Title, Abstract, Keywords – Document type: Article – Data range: 2000–2022 – Language: English
Web of Science (WoS)	Search in: Article, Title, Abstract, Keywords – Document type: Article – Data range: 2000–2022 – Language: English

Source: authors (2023)

Inclusion and exclusion criteria and quality assessment

The following criteria were used to guide the selection of articles that could answer our research questions. These criteria guided the entire article selection process, from Stage 1 (reading titles and abstracts) to Stage 2 (reading introductions and conclusions), as illustrated in Fig. 2. By the end of Stage 2, the 38 remaining articles were further assessed based on the criteria described below to determine their eligibility for this review. Figure 1 shows the criteria used at each stage of study selection.

Quality assessment was conducted at the end of Stage 2 (extraction), when seven criteria were assessed to analyze the accepted article's quality, covering three main quality issues [10]. The following were analyzed: rigor—Has a thorough and appropriate approach been applied to the required research methods?, credibility—Are the findings well-presented and meaningful?; relevance—How useful are the findings to the fisheries sector and the research community? (See Appendix A—based on a quality assessment).

Articles must meet all quality criteria and present at least one inclusion criterion to be eligible. In total, 22 duplicate articles were rejected. After excluding duplicates, 140 articles progressed to the first stage of the selection process. Of these, 80 were eliminated in Stage 2, leaving 38 articles eligible for data extraction and synthesis (see Appendix B—based on the PRISMA table). Data were organized using StArt software and Excel.

Results

After the stage of extraction (reading introduction and conclusion), the articles chosen for the critical reading are reached, which will extract the quality, quotas, and group codes for the discussion; 38 articles were accepted, as shown in Appendix B.

As presented in Fig. 3 below, most of them are published in the Marine Policy journal, which accounts for 18 articles. This one shows more relevance to the topic. Still, there are articles published in 16 distinct journals, with 2 publications on Frontiers, Fish and Fisheries, Fisheries Research and Ocean and Coastal Management. There is

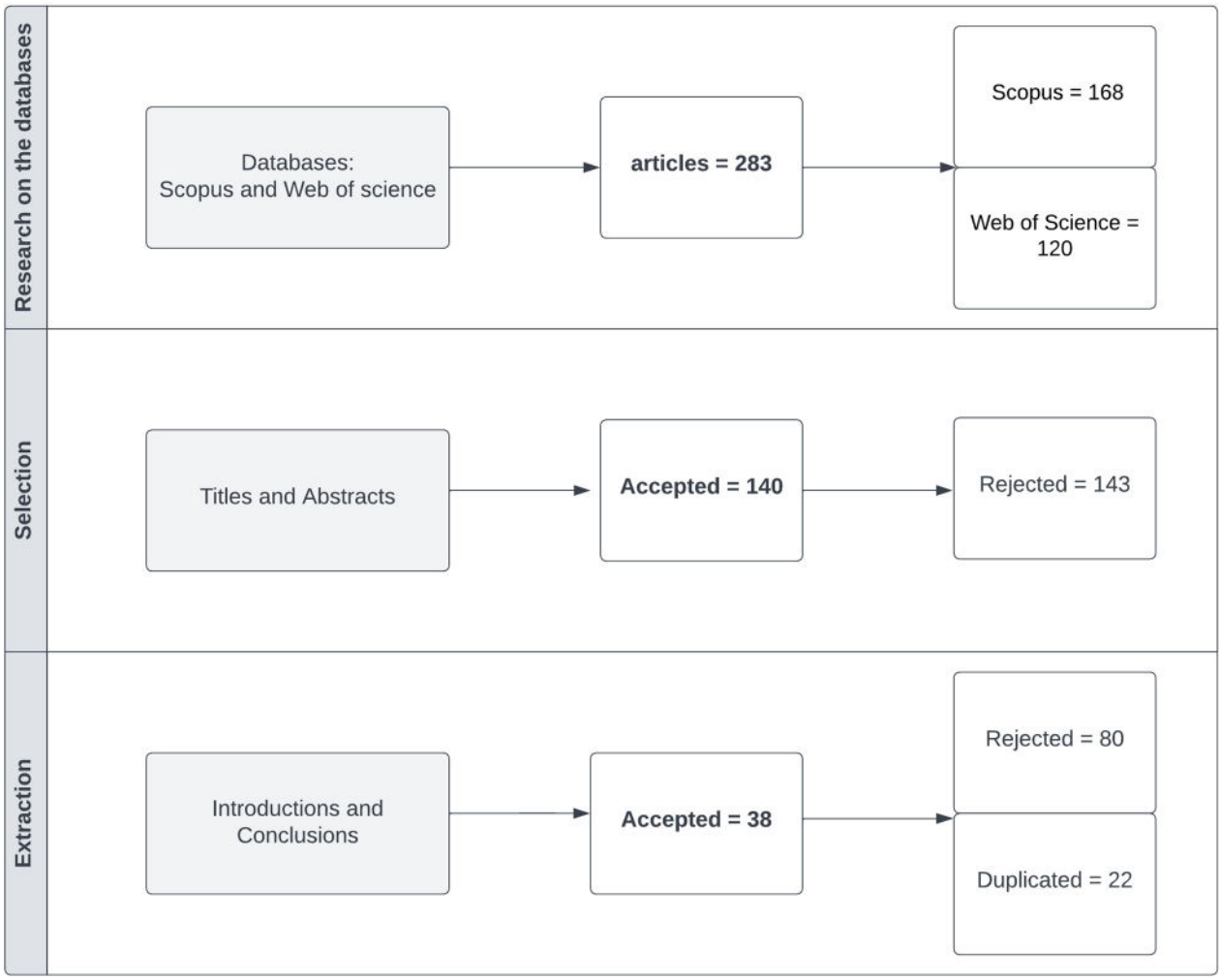

Fig. 1 Procedures for the systematic literature review. Source: Authors (2023)

one article published on Sustainability from Switzerland, Agricultural and Food Economics, Aquaculture Reports, Current Science, Plos One, Environmental Evidence, Global Environmental Change, Australian Journal of Agricultural and Resource Economics, Geoforum, Ecology, and Society, Ices Journal of Marine Science and Ecological Economics.

No time filter was used because it was understood that any contributions to certification for fishing activity can be vital since it is a subject that is still not widespread; even though this study did not seek to filter the search regarding time, most of the selected articles were published in the year 2020(7) and 2021(8), as presented on Fig. 4, demonstrating that research on this topic has increased nowadays.

After the extraction stage, the 38 articles taken for this review were fully read; from this analysis, quotations were grouped into 3 different code groups and 14 codes.

There were 20 types of certification schemes in the reviewed literature, divided into product origin and segment type. Table 2 shows the results of those schemes.

The certification schemes presented in Table 2 were divided into certification names, segments, production types, and article codes. The segment specifies what kind of product the scheme certifies. The production type presents whether the seafood origin is from small- or large-scale fisheries or if the scheme is for aquaculture, which can also be headed for the three. The last topic presents the code of the articles from which the quotations were extracted, which had information about these topics (certification name, segment, and production type). Table 3 presents the quotations referring to benefits, challenges, and types of certification schemes for seafood.

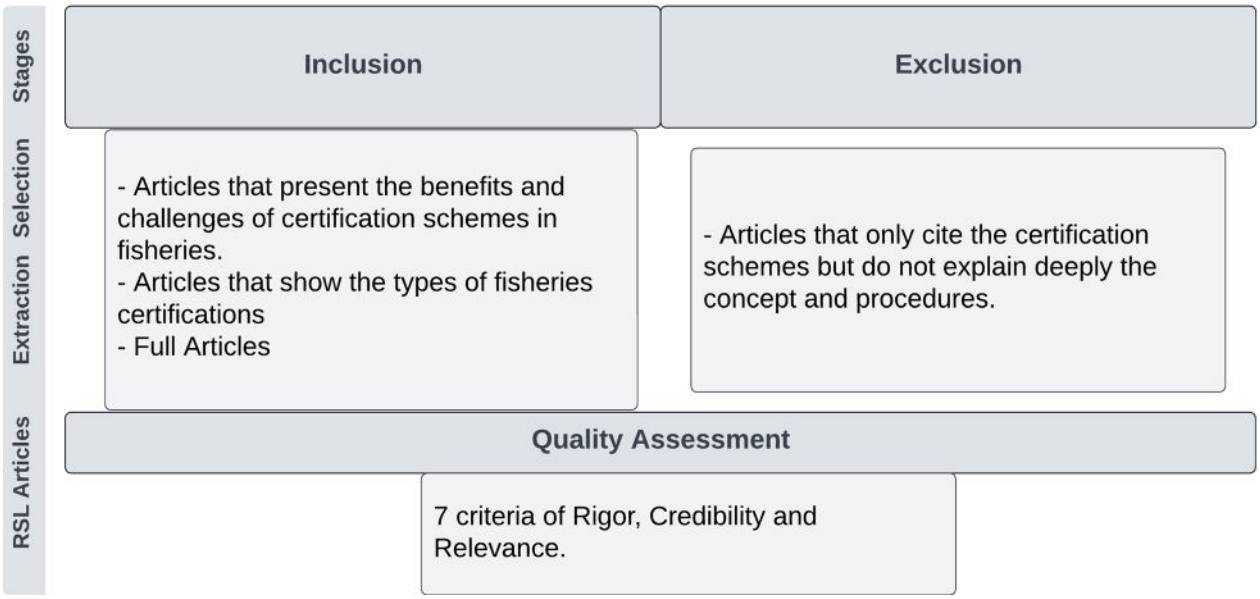

Fig. 2 Inclusion and exclusion criteria and quality assessment. Source: Authors (2023)

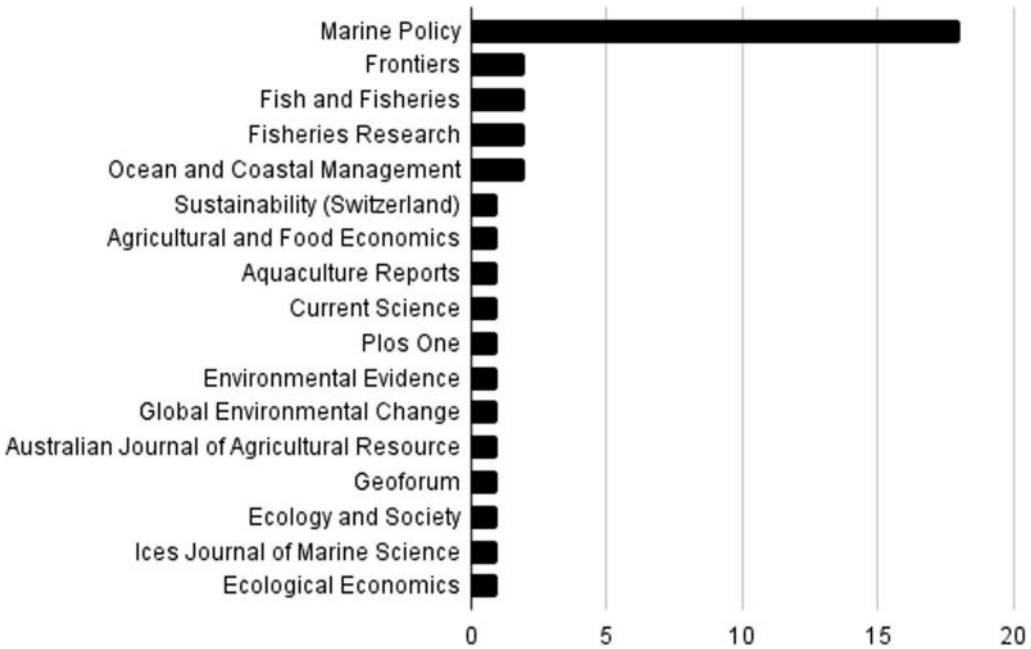

Fig. 3 Relevance of journals in this SLR. Source: Authors (2023)

Discussion

The benefits and challenges regarding fisheries certification schemes will be discussed, and the types of certifications in the literature reviewed for seafood products will be presented.

Types of certifications

Industrial wild-caught fisheries

The large-scale wild-caught seafood supply chain has increased the demand for private standards such as quality, safety, and sustainability. These standards include

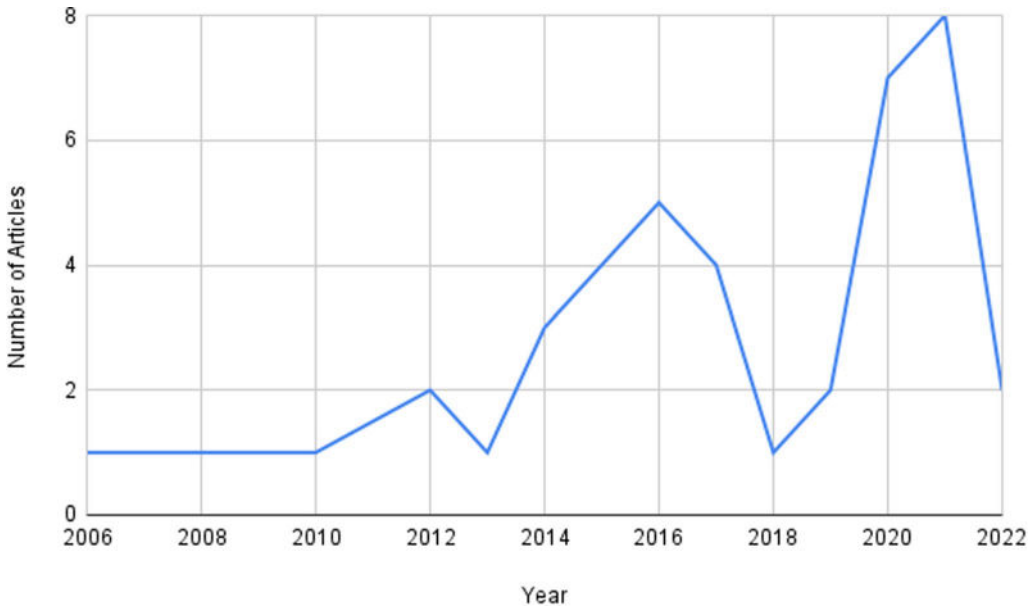

Fig. 4 Number of articles per year

certification schemes. Firms seek these certification schemes not only to demonstrate to consumers that they practice responsible fishing, but also to align international suppliers and ensure transparency, as traceability becomes clear and product standardization is followed [51].

The most cited in the literature reviewed was MSC leading this market; they are internationally established in balancing ecological and management standards [7, 34, 40, 43, 47].

Large firms often seek the certification of MSC, as some markets are only open for these blue-labeled products [51]. The firm's size differs from non-certified, large-scale fisheries that can afford the procedures of obtaining and maintaining the certification, while small firms cannot [31, 50].

In Japan, MEL certification schemes are used for large- and small-scale fishers who search for rapid and low-cost certification. In Iceland and Alaska, fishing industry actors obtain IRF and RFM certifications to avoid enormous costs, respectively [13].

Small-scale fisheries

To certify fishing communities and small-scale fisheries, some institutions are working on it. IRF, MEL-Japan, and Slow Food Presidia (Italy) are types of certifications interesting to regional producers. They need more scalable certifiers like MSC, which certifies smaller fisheries but is interested in certifying sustainability. In contrast, IRF, MEL-Japan, and Slow Food Presidia certify the local products [13, 47, 50].

Territorial eco-certification has emerged in demand for certifying local products with less cost and bureaucracy. Territorial eco-labels are MEL (Japan), IRF (Iceland), and RFM (Alaska) [4, 13]. Some eco-labels focus only on sustainability standards, and others assemble the social aspect [40].

The Slow Food Presidia are related mainly to small-scale and traditional lagoon fisheries and supply only some retailers that demand their product, like Eataly, Coop Italia, and Conad [38]. NaturSkånsom is a Danish certification institution committed to certifying only small-scale fisheries, as they believe it is low environmental-impact fisheries [4].

Aquaculture

As a market-driven segment, aquaculture also followed the growing demand for sustainability. Therefore, a bunch of certification schemes for aquaculture products were created. They can differ as organic (IFOAM, Naturland, SA, and BioGro), nonorganic (GAA, GlobalG.A.P., ACC and GSA), and sustainable (ASC and FOS) [42]. The KRAV certificate also plays a role in the aquaculture labeling scenario [34].

IFOAM, Naturland, Biogro, and GAA seek to improve small-scale fish farmers' production, while the others are headed for large firms [42]. In Tuscany (Italy), some aquaculture firms adopt the FOS certificate, and others prefer the Slow Food Presidia label, a local brand certifying regional products [38].

Table 2 Types of certifications for fish products

Certification	Segment	Fishery type	Authors
Naturland	Eco-label	Small scale and aquaculture	Saha [42], Wakamatsu and Wakamatsu [50]
Slow Food Presidia	Territorial Eco-label	Small scale	Prosperi et al. [38]
NaturSkånsom	Eco-label	Small scale	Autzen and Hegland [4]
Marine Stewardship Council (MSC)	Eco-label	Industrial wild-caught and small scale	Robinson et al. [40], Fernández Sánchez et al. [43], Peiró-Signes et al. [34], Miret-Pastor et al. [31], Wakamatsu and Wakamatsu [50], Swartz et al. [47], Blasiak et al. [7]
Marine Eco-label (MEL-Japan)	Eco-label	Industrial wild-caught and small scale	Wakamatsu and Wakamatsu [50], Foley and Havice [13], Autzen and Hegland [4]
Iceland Responsible Fishery (IRF)	Eco-label	Industrial wild-caught and small scale	Foley and Havice [13], Autzen and Hegland [4], Blasiak et al. [7]
Friend of the Sea (FOS)	Eco-label	Industrial wild-caught and aquaculture	Saha [42], Robinson et al. [40], Prosperi et al. [38], Fernández Sánchez et al. [43], Peiró-Signes et al. [34], Miret-Pastor et al. [31], Wakamatsu and Wakamatsu [50]
Swedish Association for Alternative Cultivation (KRAV)	Territorial Eco-label	Industrial wild-caught and aquaculture	Peiró-Signes et al. [34], Miret-Pastor et al. [31]
Alaska Responsible Fisheries Management (RFM)	Eco-label	Industrial wild-caught	Foley and Havice [13], Blasiak et al. [7]
Aquaculture Stewardship Council (ASC)	Eco-label	Aquaculture	Saha [42]
International Federation of Organic Agriculture MoveN.I.ments (IFOAM)	Eco-label	Aquaculture	Saha [42]
Soil Association (SA)	Eco-label	Aquaculture	Saha [42]
BioGro	Eco-label	Aquaculture	Saha [42]
Global Aquaculture Alliance (GAA)	Eco-label	Aquaculture	Saha [42]
Global Good Agri- cultural Practice (GlobalG.A.P.)	Eco-label	Aquaculture	Saha [42]
Aquaculture Certification Council (ACC)	Eco-label	Aquaculture	Saha [42]
Global Seafood Assurances (GSA)	Eco-label	Aquaculture	Saha [42]
Fairtrade USA	Eco-label	N.I	Robinson et al. [40]
Dolphin Safe	Eco-label	N.I	Fernández Sánchez et al. [43]
Ocean Wise	Eco-label	N.I	Fernández Sánchez et al. [43]

N.I. not informed

Source: Authors (2023)

Benefits

Environmental

Since the environment has become a key concern for investors, the market has asked producers to proactively consider the sustainability question. These changes can open more markets to products that have a greener footprint [31]. Innovation and technology are essential tools to help these seafood producers achieve those environmental standards [37].

The changes arising from eco-labeling help build a positive relationship between consumers, market actors, and industry [26, 49]. The initiatives of sustainable certification schemes and eco-labeling have been increasing the consumer's understanding and concern about the importance of consuming products from a clean food chain, people desire to buy responsible seafood [34, 50].

Once certified by the Marine Stewardship Council (MSC), the fishery must meet criteria like target stock health and ecosystem health; even if, at the moment getting the certification, they do not achieve those criteria, they can still get the certification, but there is a time frame for achieving those. Otherwise, the fishery can be withdrawn [45].

Another benefit of MSC's sustainable certification is related to fish stocks. The growing demand to increase production has put pressure on many fish stocks, and the surveillance method acting on these fisheries can positively deal with this problem [14, 25]. In addition, some mentions of the MSC were reported due to improvements in benthic mapping and bycatch exclusion devices [49]. MSC has changed marine management and environmental conditions in many, but not all cases [1].

Table 3 Quotations and article codes about benefits, challenges, and types of certification in each segment

Category	Description	Authors
Benefits		
Environmental	Environmental status change	Agnew et al. [1], Selden et al. [45],Long and Jones [25], Van Putten et al. [49]
	Stock-specific management	Selden et al. [45], Long and Jones [25],Van Putten et al. [49]
	Incentivize sustainable practices	Wakamatsu and Wakamatsu [50], Peiró-Signes et al. [34], Longo et al. [26], Van Putten et al. [49]
Social	Corporate social responsibility achievement	Long and Jones [25]
	Community empowerment	Perez-Ramirez et al. [52], Carlson and Palmer [9]
	Government investments	Bellchambers et al. [5], Prosperi et al. [38], Perez-Ramirez et al. [52], Carlson and Palmer [9], Fernández Sánchez et al. [43]
	Fisheries value chain actors interactions	Fernández Sánchez et al. [43], Perez-Ramirez et al. [52]
Economic	Price premium	Lajus et al. [22], Fernández Sánchez et al. [43],Long and Jones [25], Peiró-Signes et al. [34], Bellchambers et al. [5], Van Putten et al. [49], Nyiawung and Erasmus [33], Agnew et al. [1], Carlson and Palmer [9]
	Market competitiveness	Miret-Pastor et al. [31], Wakamatsu and Wakamatsu [50], Fernández Sánchez et al. [43], Blandon and Ishihara [6], Long and Jones [25], Prosperi et al. [38]
	International reputation	Carlson and Palmer [9],Wakamatsu and Wakamatsu [50]
	Market access	Haas et al. [20], Long and Jones [25],Van Putten et al. [49], Nyiawung and Erasmus [33],Carlson and Palmer [9], Miret-Pastor et al. [31], Longo et al. [26]
Management	Address IUU practices	Longo et al. [26]
	Improved governance	Longo et al. [26], Nyiawung and Erasmus [33],Carlson and Palmer [9]
	Public recognition	Wakamatsu and Wakamatsu [50],Van Putten et al. [49]
	Management plans	Long and Jones [25], Lallemand et al. [23], Agnew et al. [1]
	Fishery improvement projects	Travaille et al. [48], Wakamatsu and Wakamatsu [50], Blasiak et al. [7]
	Value chain actors stewardship	Bellchambers et al. [5], Nyiawung and Erasmus [33], Perez-Ramirez et al. [52], Carlson and Palmer [9]
	scientific understanding of fisheries	Wakamatsu and Wakamatsu [50], Nyiawung and Erasmus [33]
Challenges		
Costs	Chain of custody certification	Van Putten et al. [49],Swartz et al. [47],
	Assessments, implementation and maintenance	Fernández Sánchez et al. [43], Travaille et al. [48], Nyiawung et al. [53], Carlson and Palmer [9], Nyiawung and Erasmus [33], Perez-Ramirez et al. [52]
Market	Increased prices	Perez-Ramirez et al. [52]
	Small sales volume	Perez-Ramirez et al. [52]
	Consumer preferences	Perez-Ramirez et al. [52]
	Market competition	Prosperi et al. [38]
	Production standards	Perez-Ramirez et al. [52], Carlson and Palmer [9], Swartz et al. [47]
Management	Lack of government support	Foley and Mccay [14], Bellchambers et al. [5], Carlson and Palmer [9]
	Community-oriented standards	Foley and Mccay [14], Arton et al. [2], Autzen and Hegland [4]
	Data-poor fisheries	Lajus et al. [22], Blasiak et al. [7], Nyiawung et al. [53]
Types of certification in each segment		
Industrial fishing		Wakamatsu and Wakamatsu [50], Foley and Havice [13], Miret-Pastor et al. [31]
Aquaculture		Saha [42], Prosperi et al. [38], Peiró-Signes et al. [34]
Small-scale fishery		Prosperi et al. [38], Wakamatsu and Wakamatsu [50], Foley and Havice [13], Autzen and Hegland [4], Swartz et al. [47], Robinson et al. [40]

Source: Authors (2023)

Social

Certification schemes and eco-labels bring more significant interaction between the various agents in the fish value chain, such as fishers, fisher guilds, and local authorities. This cooperation brings positive changes to the economy and the local ecosystem, and such benefits directly impact coastal communities that depend strictly on fishing as a means of subsistence [43, 52].

In addition, certifications that seek sustainability have drawn consumers' attention, forcing retailers to seek sustainable practices in their companies. Corporate social responsibility has been a critical target for organizations

that act in the global seafood market; the retailers want to be seen by the shareholders as responsible [25].

In the Mexican Baja California (MBC) red rock lobster fishery, the effort from the government to seek MSC certification brought improvements in the infrastructure of these fishing communities, like access to electricity, drinking water, and basic amenities. The formal representation on national committees was also a positive change that transformed the fishery's capacity to influence policy and management. Government investment was also provided in West Australia; in recognition of the benefits of WA rock lobster fisheries, the government invested about AUS$14 million in a WA MSC program [5].

Cooperation between local fishing communities has brought national and international recognition, obtained government support, and increased access rights [52]. The MSC certification has been proven to be an essential tool for empowering fishing organizations by promoting autonomy and self-confidence [9, 52].

Seafood labeling has an essential role in structuring the value chain of fisheries, especially when small-scale fisheries have access to some market strategies currently used by large-scale companies, like marketing, tools of coordination, and production. Those actions can target new economic models and strategies for small-scale fisheries [38]. Learning also plays an essential role for small-scale fisheries certified by MSC, they can get information about management strategies, stock status, adopting fishing techniques to reduce bycatch and better seafood processing, and managing product losses [9].

Economic

When the private sector sees certification schemes as valuable business investments, they can rapidly change international policies and make progress to meet social demands like environmental concerns [44]. E-certifications have gained global recognition, which is very significant for the seafood value chain actors [9].

Sustainability has been the key concern of both companies and consumers. New markets are open for corporations that care for the environment, and eco-certification differentiates the products from competitors and brings market segmentation [50]. If consumers are concerned about the environment, they will seek products with sustainable certification and distance themselves from the other products [41].

Miret-Pastor et al. [31] presented that MSC impacts the total incomes of certified fisheries. Eco-labels are a strategic business tool that leads conventional markets to compete with large-scale retailers [38]. Market access is one of the main reasons why fisheries and retailers want to participate in certifications, they are afraid of being excluded in the future [25], Blandon and Ishihara [6]. On the other hand, market access can vary in the availability of competing products and trade conditions [49].

To get the certification, there are high costs, but market access and price premiums balance the injuries [9, 25]. Eco-labels can impact sales and prices positively, making profits for producers and improving total income [1, 34]. Price premiums have been identified in the retail market of Alaskan pollock, haddock, and salmon [5].

In France, the price between certificated and uncertificated seafood products varies by 15–20%; this can motivate fisheries to obtain certification [22]. European market opportunities are increased for certificated products,consumers want to know if their food comes from a sustainable source [20]. The MSC secured about 12 million tons of catch volume and, in 2022, was responsible for about 15% of the total global wild marine catch [29].

Management

Certification schemes like the blue label of MSC have grown the need to deepen the studies about fisheries management and improve previous practices [50]. The knowledge about fishing trap impact and benthic habitat that this kind of scheme demands increases the management plan and research programs to get the use of the certification still [25, 26]. These projects can also address Illegal, Unreported, and Unregulated (IUU) fishing problems with the assured chain of custody assessment [26].

There is a high cost to implement eco-certification when the fishery is well below the sustainability standards. To address this problem, Fishery Improvement Projects (FIPs) are implemented by stakeholders such as governmental and non-governmental organizations. Some retailers also recognize the FIPs as fisheries that are walking to meet sustainability requirements [48].

Implementing FIPs helps fisheries achieve sustainability standards and is also an alternative for small-scale fisheries that desire MSC certification [48, 50]. Getting FIPs also gives the fishery market access with the promise of efforts to obtain the certification [7].

In addition, the MSC has a resilience plan for certified fisheries, where all certified fisheries never get to a past undesirable state and always get improvements [48]. To enter the program, certain requirements need to be met, and after the assessment, some of the criteria noted for subsequent assessments have already been resolved [26].

After meeting the sustainable requirements of MSC's blue label in South Africa, significant improvements were made in the fisheries' management approach by applying an ecosystem-based management plan [23]. In Gambia, internal and external forces engaged in improving sole fisheries by giving financial support to establish the National Sole Co-Management (NASCOM), which

enhanced management capabilities such as data collection, exports, processing, and harvest management. Approaches integrating management power can engage small-scale fisheries in developing countries in achieving certification [33].

In Australia, the certified lobster fishery received recognition at the event United Nations Association of Australia World Environment Day, having 15 years of using the MSC's logo; this mention brings to the public the importance of this project and the stewardship of government and industry practices in getting an effort to achieve that third-party certification [5].

MSC's certification is proven to be not only a market tool, but it can improve local scientific research, empower fishing by promoting autonomy and self-confidence in political battles, and have a direct relationship with fishing actors [9, 52], and in general improve management plan [1, 9].

Challenges

Costs

Obtaining fishery certification is costly due to implementing necessary improvements, data collection, and the need for knowledge [48]. Small-scale and artisanal fleets often give up on them, given this high financial demand being onerous and expensive [33, 43, 53]. More expenses are related to chain of custody certification and higher business costs [49].

The assessment, getting standards, and maintaining certification are the main reasons that make the certification process so expensive [33]. Costs are why many fisheries do not seek MSC's eco-label [9].

In Japan, there are diverse participants in the seafood supply chain, such as trade houses, wholesalers, and processors. MSC requests certification for everyone involved in the chain, making the process more costly because many participants in the supply chain are small-scale operators. The techniques requested for MSC's certification demand investments that those processors hardly have [47].

Market

Price premiums play a crucial role for small-scale fisheries that obtain certification. In contrast, large-scale fisheries have many benefits through certification, like expanded market share and artisanal fleets have only price premiums to benefit from and cover the high costs that come from being certified [43]. They must also adopt different strategies to compete in the market [38]. According to Perez-Ramirez et al. [52], it is much harder to obtain certification for small-scale fisheries than for large ones.

Even if price premiums are a key motivator, sales cannot work as expected, as shown by the FEDECOOP examples. After obtaining certification, the cooperative of fisheries which are responsible for the MBC red rock lobster (FEDECOOP) reported that the sales did not work as imagined, the costs increased as transport was demanded, consumers interested in MSC-labeled products had demands for frozen lobster, not for the fishery alive lobster product [52].

Along the supply chain, not only are sales problems faced by small fisheries, but international markets and retailers ask for products with a regularity and uniformity standard, making it difficult for small-scale developing country fisheries with irregular production to achieve those requirements [9, 46, 47].

Management

Good management is required when certification programs are being played, but this reality is only for some trying to obtain certifications. Some regions have minimal technical resources, government stewardship, and financial investments [5].

The MSC certification is not addressed for small-scale fisheries, as community-oriented standards of sustainability are not set and the expensive process remains, it is harder for small producers to seek those schemes [2, 14, 33]. There is concern that the global south fisheries are even more disadvantaged in obtaining eco-labels [4].

The lack of government support for fisheries seeking certification is a problem often cited as a barrier [9]. Small fisheries usually need better conditions to maintain the certification requirements, government incentives are required to achieve and secure the standards [14].

Lack of data is an essential concern for small-scale fisheries in seeking certification, which increases barriers in the market entry and process of gaining certification [7, 53]. Two inland European small fisheries gained certifications in 2016. However, they faced problems during the process due to the need for more information regarding fish stocks and removing IUU fishing [22].

Not only the lack of data but the scientific capacity, market structure, fishery management, and NGO networks, in some places, are strictly tricky, making the certification scenario far from those communities [53].

Conclusion

This article aimed to investigate the literature certifications for fish products, and their benefits and challenges for fisheries. The certification schemes are programs capable of modifying social and institutional relationships, so it is vital for some small communities, especially in developing countries, to reach these schemes. Consumers are more concerned with the environment. Thus,

sustainable certification schemes are taking up from the traditional, fearing losing market space more organizations are seeking certification schemes. The types of certifications for seafood products most featured in the articles were the eco-labels, especially the MSC blue label, and some alternatives for small-scale fisheries and aquaculture.

MSC is the most recognizable certification institution in the world, having a unique space in European markets. The blue MSC label is required if selling on European markets is desired. Territorial eco-certification and policies such as FIPs help improve fisheries standards to achieve MSC certification. Territorial eco-certifications are examples of programs looking for local demands, considering the producer's capital level and business activities.

Market access and price premiums were the benefits regarding certification most mentioned by the authors, even though this second was only reached in some certified fisheries. Removing pressure on fish stocks was also pointed out as an environmental benefit accrued from eco-labels. In addition, the government can get an advantage from the certification procedures by supporting those fisheries in obtaining the label by structuring the scientific and basic needs of more remote fishing communities. The feedback gained from these investments is improved data and fisheries management (by addressing IUU fishing problems, for example) and enhanced development.

Some barriers to small-scale fisheries obtaining MSC certification are structure, costs, lack of data, and harmonization of production. Believing that certification schemes for small-scale fisheries need an approach different from sustainable-oriented standards, community-based certification mechanisms should embed the management and assessment methods for this segment, where government support and investments can help these fisheries achieve a better place on the market and manage the maintenance of this activity.

Certification schemes are measures that significantly improve the value chain by straightening interaction between fisheries agents, changing small fisheries structure, physical improvements, and access to information on market strategies, stock assessment, technologies to reduce bycatch, and fishing processing procedures, for example. The value chain gains a different approach, all fishery value chain actors must be certified and assessed, assuring the structuring of the whole activity.

Only some documents were found explaining the flexibility of fisheries' certification schemes, leading us to interpret that few schemes can afford the complexity of fisheries' reality. The SLR is interested in dealing with scientific reality, but much information about eco-label is still in gray literature, so this kind of review is limited here.

Further research should be conducted to compile information about certification schemes and eco-labels, not only on scientific data but also on gray literature. It should also be reviewed to show government authorities and fishery agents options to improve their segment.

Appendix

See Appendix A and Appendix B.

Appendix A The paper's quality assessment results

	Rigor				Credibility		Relevance	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Total
Saha [42]	1	0.5	1	1	1	1	1	6.5
Nyiawung and Erasmus [33]	1	0.5	1	1	0.5	1	1	6
Malcorps et al. [27]	1	0.5	1	1	0.5	1	1	6
Robinson et al. [40]	1	0.5	1	1	1	1	1	6.5
Longo et al. [26]	1	1	1	0.5	1	1	1	6.5
Schiller and Bailey [44]	1	1	1	1	1	1	1	7
Long and Jones [25]	1	0.5	0.5	0.5	1	1	1	5.5
Blandon and Ishihara [6]	1	0.5	0.5	1	1	1	1	6
Prosperi et al. [38]	1	0.5	1	0.5	1	1	1	6
Haas et al. [20]	1	0	1	1	0	1	1	5
Fernández Sánchez et al. [43]	1	0	1	1	0.5	1	1	5.5
Peiró-Signes et al. [34]	1	1	1	1	1	1	1	7
Ramachandran and Shinoj [39]	1	0	0.5	0.5	0	1	1	4
Van Putten et al. [49]	1	0	1	1	0.5	1	1	5.5
Arton et al. [2]	1	1	1	1	1	1	1	7

	Rigor				Credibility		Relevance	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Total
Travaille et al. [48]	1	0.5	1	1	1	1	1	6.5
Borland and Bailey [8]	1	1	0.5	0.5	1	1	1	6
Lajus et al. [22]	1	0	1	1	1	1	1	6
Asche and Bronnmann [3]	1	1	1	1	1	1	1	7
Wakamatsu and Wakamatsu [50]	1	0.5	0.5	0.5	0.5	1	1	5
Lallemand et al. [23]	1	1	1	1	1	1	1	7
Bellchambers et al. [5]	1	0	0.5	0.5	0.5	1	1	4.5
Foley and Havice [13]	1	0.5	1	1	1	1	1	6.5
Selden et al. [45]	1	0	1	1	0.5	1	1	5.5
Miret-Pastor et al. [31]	1	1	1	1	1	1	1	7
Foley and Mccay [14]	0.5	1	0.5	0.5	1	1	1	5.5
Pérez-Ramírez et al. [36]	1	0	0	0	0	1	1	3
Goyert et al. [17]	1	1	1	0.5	1	1	1	6.5
Gulbrandsen [18]	1	0	0.5	0.5	0	1	1	4
Leadbitter et al. [24]	1	0	0.5	0.5	0	1	1	4
Autzen and Hegland [4]	1	1	1	1	1	1	1	7
Heupel and Auster [21]	1	0.5	0.5	1	1	1	0.5	5.5
Perez-Ramirez et al. [52]	1	0	0.5	0.5	0.5	1	1	4.5
Agnew et al. [1]	1	1	0.5	1	1	1	1	6.5
Carlson and Palmer [9]	1	1	1	1	1	1	1	7
Swartz et al. [47]	1	0	0.5	0.5	0.5	1	1	4.5
Blasiak et al. [7]	1	0	0	0	0	1	1	3
Nyiawung et al. [53]	1	0.5	1	0.5	0.5	1	1	5.5

	Rigor				Credibility		Relevance	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Total

Assessment questions:
Q1. Is there a clear definition of the paper's objectives?
Q2.Is there a clear definition of the research question (RQ) and the paper's hypothesis?
Q3.Are the data collection methods used and described appropriately for the paper?
Q4. Is there an adequate description of the methods used to analyze data, and are the appropriate methods available to ensure the data analysis is valid?
Q5. Does the paper provide a clear answer or justification of the RQ hypothesis?
Q6.Does the paper present clearly stated findings accompanied by credible results?
Q7. Are the conclusions obtained in the paper justified?
Quality assessment form, each criterion was graded on a scale composed of the following values:
1 when the criterion was explicitly met;
0,5 when the criterion was almost explicitly met;
0 when the criterion was absent or not applicable

Appendix B

List of articles reviewed.

Title	Authors	Year	Journal
Emergence and evolution of aquaculture sustainability certification schemes	Saha, C.K	2022	Marine Policy
Ocean and Marine Stewardship in Africa: The Marine Stewardship Council Certification in Namibia and The Gambia	Nyiawung, R.A. and Erasmus, V.N	2022	Frontiers in Marine Science
Global seafood trade: Insights in sustainability messaging and claims of the major producing and consuming regions	Malcorps, W. et al	2021	Sustainability (Switzerland)
Understanding societal approval of the fishing industry and the influence of third-party sustainability certification	Robinson, L.M. et al	2021	Fish and Fisheries
A Perspective on the Role of Eco-Certification in Eliminating Illegal, Unreported and Unregulated Fishing	Longo, C.S. and et al	2021	Frontiers in Ecology and Evolution
Rapidly increasing eco-certification coverage transforming management of world's tuna fisheries	Schiller, L. and Bailey, M	2021	Fish and Fisheries

Title	Authors	Year	Journal
Greenland's offshore Greenland halibut fishery and role of the Marine Stewardship Council certification: A governance case study	Long, S. and Jones, P.J.S	2021	Marine Policy
Seafood certification schemes in Japan: Examples of challenges and opportunities from three Marine Stewardship Council (MSC) applicants	Blandon, A. and Ishihara, H	2021	Marine Policy
Exploring institutional arrangements for local fish product labeling in Tuscany (Italy): a convention theory perspective	Prosperi, P. and et al	2020	Agricultural and Food Economics
Media representations of seafood certification in Australia: Mobilizing sustainability standards to attack or defend the value of an industry	Haas, B. and et al	2020	Marine Policy
Evidence of price premium for MSC-certified products at fisher's level: The case of the artisanal fleet of common octopus from Asturias (Spain)	Fernández Sánchez, J.L.et al	2020	Marine Policy
Effects of green certification and labeling on the Spanish fisheries industry	Peiró-Signes, A. et al	2020	Aquaculture Reports
Who should certify the sustainability of our fisheries? A property rights perspective on ecolabelling	Ramachandran, C. and Parappurathu, S	2020	Current Science
Shifting focus: The impacts of sustainable seafood certification	Van Putten, I. et al	2020	PLoS ONE
What do we know about the impacts of the Marine Stewardship Council seafood ecolabelling program? A systematic map	Arton, A. et al	2020	Environmental Evidence
The market for sustainable seafood drives transformative change in fishery social-ecological systems	Thomas Travaille, K.L. et al	2019	Global Environmental Change
A tale of two standards: A case study of the Fair Trade USA certified Maluku handline yellowfin tuna (Thunnus albacares) fishery	Borland, M.E. and Bailey, M	2019	Marine Policy
The implementation of Marine Stewardship Council (MSC) certification in Russia: Achievements and considerations	Lajus, D. and et al	2018	Marine Policy
Price premiums for ecolabelled seafood: MSC certification in Germany	Asche, F. and Bronnmann, J	2017	Australian Journal of Agricultural and Resource Economics
The certification of small-scale fisheries	Wakamatsu, M. and Wakamatsu, H	2017	Marine Policy
Estimating the economic benefits of MSC certification for the South African hake trawl fishery	Lallemand, P. et al	2016	Fisheries Research
From certification to recertification the benefits and challenges of the Marine Stewardship Council (MSC): A case study using lobsters	Bellchambers, L.M.et al	2016	Fisheries Research
The rise of territorial eco-certifications: New politics of transnational sustainability governance in the fishery sector	Foley, P. and Havice, E	2016	Geoforum
Evaluating seafood eco-labeling as a mechanism to reduce collateral impacts of fisheries in an ecosystem-based fisheries management context	Selden, R.L. et al	2016	Marine Policy
Empirical analysis of sustainable fisheries and the relation to economic performance enhancement: The case of the Spanish fishing industry	Miret-Pastor, L. et al	2014	Marine Policy
Certifying the commons: Eco-certification, privatization, and collective action	Foley, P. and McCay, B	2014	Ecology and Society
Perspectives for implementing fisheries certification in developing countries	Pérez-RamÍrez, M. and et al	2012	Marine Policy

Title	Authors	Year	Journal
The promise and pitfalls of Marine Stewardship Council certification: Maine lobster as a case study	Goyert, W. et al	2010	Marine Policy
The emergence and effectiveness of the Marine Stewardship Council	Gulbrandsen, L.H	2009	Marine Policy
Sustainable fisheries and the East Asian seas: Can the private sector play a role?	Leadbitter, D. et al	2006	Ocean and Coastal Management
When 'sustainability' becomes the norm: Power dynamics in the making of a new eco-label for low-environmental-impact, small-scale fisheries	Mathilde Højrup Autzen and Troels Jacob Hegland	2021	Marine Policy
Eco-labeling seafood: Addressing impacts to vulnerable seafloor species,communities, habitats and ecosystems in data-poor regions	Heupel, Eric and Auster, Peter J	2013	Marine Policy
The role of MSC certification in the empowerment of fishing cooperatives in Mexico: The case of red rock lobster co-managed fishery	Perez-Ramirez, Monica et al	2012	Ocean & Coastal Management
The MSC experience: developing an operational certification standard and a market incentive to improve fishery sustainability	Agnew, D. J. et al	2014	ICES Journal of Marine Science
A qualitative meta-synthesis of the benefits of eco-labeling in developing countries	Carlson, Anna and Palmer, Charles	2016	Ecological Economics
Searching for market-based sustainability pathways: Challenges and opportunities for seafood certification programs in Japan	Swartz, Wilf et al	2017	Marine Policy
Promoting diversity and inclusiveness in seafood certification and ecolabelling: Prospects for Asia	Blasiak, Robert et al	2017	Marine Policy
Marine Stewardship Council sustainability certification in developing countries: Certifiability and beyond in Kerala, India and The Gambia, West Africa	Nyiawung, Richard A. et al	2021	Marine Policy

Author contribution

The review process started with the protocol development, designed by MM, TL, and AR. The Systematic Review Analysis was conducted by MM and JB and they both wrote the text. Reviews of the process were made by MS. The final text reviews were made by all the authors.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Competing interests

The authors declare no competing interests.

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