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Equitable participation as a key mechanism towards sustainable fisheries management: a case study of the pargo (*Lutjanus purpureus*) fishery governance in northern Brazil

Lol Dahlet [a,b,c,*]

[a] Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany
[b] Institute of Geography, University of Bremen, Bremen, Germany
[c] Grupo de Estudos Socioambientais Costeiros (ESAC), Universidade Federal do Pará (UFPA), Bragança, Brazil

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ABSTRACT

Equity, i.e. fair valuation and respect for the entitlements of all concerned, is increasingly recognized as a critical component of sustainable marine fisheries. However, in the Brazilian coastal Amazon, socio-economic disparities and complex governance structures undermine equity, with major implications for resource sustainability. A case in point is the large-scale artisanal and export-oriented pargo (*Lutjanus purpureus*, Poey, 1866) fishery landing in Bragança (Pará, northern Brazil). This study adopts a political ecology framework to examine how distinct perceptions of key governance actors regarding the fishery and its governance have varying equity implications. Data were collected qualitatively between December 2022 and January 2024 through participant observation during two meetings of the Standing Management Committee (CPG-NN) in 2022 (online) and 2023 (Belém, Brazil) and 18 in-depth interviews with: civil society organizations, government agencies, academia, the fishing industry and fishers. Three competing narratives reveal distinct yet interrelated understandings of scarcity, resource allocation, and benefit distribution. It is argued that different perceptions of resource scarcity operate within tensions between major putative divides related to exclusionary practices that may be particularly amplified in large-scale artisanal fisheries: environmental protection and economic profitability, legal and illegal, and local scarcity and global market. The article argues that equitable participation is a key mechanism to support equity as a normative principle for sustainable marine fisheries in the Brazilian Amazon coast.

1. Introduction

Coastal fishing livelihoods around the world are under increasing pressure from high rates of exploitation of fisheries resources (FAO, 2024). In the 2024 State of World Fisheries and Aquaculture (FAO, 2024), 37.7 % of the 445 marine fish stocks assessed are found to be at unsustainable levels of exploitation, up from 10 % in 1970. In FAO's Major Fishing Area 41, in which Brazil's Economic Exclusive Zone (EEZ) is situated, 41.2 % of the stocks are being exploited unsustainably (FAO, 2024). Other major human-induced environmental changes affecting fisheries include diverse forms of coastal and marine enclosures (Barbesgaard, 2017; Queffelec et al., 2021), climate change, and pollution (FAO, 2024). But more than an indication of an ongoing environmental crisis, dwindling catches illustrate the challenges that current governance models face in addressing this major overfishing trend. In a rapidly changing world and in the face of increasingly complex sustainability challenges, it is essential to rethink patterns of resource use, human-nature relationships and governance models (IPBES et al., 2024). This requires integrating an ethical and socially equitable dimension into fisheries management in a more transparent and decisive manner (Hernes et al., 2005; Roberts et al., 2024; N. Bennett et al., 2025). 'Equity' can be defined as "equal treatment [across individuals and groups in society], with an assessment of what constitutes fair treatment across both substantive outcomes and procedural concerns" (Österblom et al., 2023, p. 487).

In some middle-income countries (with their respective regional specificities), such as Brazil, the lack of monitoring and indicators on social sustainability (Glaser and Diele, 2004), and likewise equity (Lopes et al., 2021; Österblom et al., 2023; N. Bennett et al., 2025) permeate fisheries management as a historical and structural problem (Diegues,

* Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany.
E-mail address: lol.dahlet@leibniz-zmt.de.

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1983; Lopes et al., 2021). This is reflected in existing exclusionary structures and practices that disproportionately affect artisanal fishers, even in fisheries that are considered "governable" (Song et al., 2018). Artisanal fishers are often prevented from effectively participating in decision-making processes, and their rights are typically overridden by the prevailing development- or conservation-oriented policies (Gasalla and de Castro, 2016; N. Bennett et al., 2021; Jentoft et al., 2022). Even where participatory structures exist, power inequalities support the narratives and agendas of more dominant actors (Jentoft, 2007; Armitage et al., 2009; Quimby and Levine, 2018).

One case in point is the governance of the pargo (*Lutjanus purpureus*, Poey, 1866) fishery off the Brazilian coastal Amazon. Formal negotiations for the management of this fishery mainly unfold within the *Comitê Permanente de Gestão da Pesca e do Uso Sustentável dos recursos pesqueiros demersais das Regiões Norte e Nordeste* (Standing Committee on Fisheries Management and the Sustainable Use of demersal fisheries resources in the North and Northeast Regions, hereafter CPG-NN), a consultative and advisory body. While many other marine fisheries resources are found to be heavily exploited in North Brazil (Isaac et al., 2009; Jimenez et al., 2021; Araújo et al., 2022), the pargo is one of the few species to benefit from an improved governance framework as provided by the CPG-NN. A turning point was Ordinance 445/2014, issued by the Ministry of the Environment and Climate Change[1] (*Ministério do Meio Ambiente e Mudança do Clima*, hereafter referred to as the MMA), which included the pargo in the official national list of endangered species of fauna, in the category of 'vulnerable'. This category permitted the exploitation of species as long as it was regulated and approved by the relevant federal authorities. This transformed the pargo from an export-oriented commodity into a protected natural resource. Its harvesting and marketing became subject to specific regulation, which triggered a 'governance rush' to comply with the new regulatory requirements.

The fishery's governance is further complicated by its ambiguous institutional status. While under the 2009 Brazilian Fisheries Law, the pargo fishery formally qualifies as industrial,[2] previous studies have classified it as both industrial and large-scale artisanal, primarily based on the vessels, gear, and technology used[3] (Isaac et al., 2009; Frédou et al., 2009; Bentes et al. 2012, 2017). Furthermore, the fishery employs a hired labor force, which is often a distinctive feature for industrial fishing systems (Campling, 2012). Yet, both formal and informal working arrangements are observed. In the absence of formal employment contracts, fishers are eligible to access state benefits for social protection designed for formally recognized artisanal fishers (Lourenço et al., 2006). The formal status of pargo fishers can thus vary, affecting, among other things, their political identity and capacity for political representation, as well as their access to distinct public policies. These broader institutional ambiguities suggest that the fishery operates at the intersection of artisanal and industrial regimes, which can complicate the enforcement of labor rights and the equitable allocation of resource entitlements.

However, pargo fishers currently do not have a voice in this decision-making processes concerning the fishery. The CPG-NN's founding decree does not allow for the participation of grassroots movements (Decree no. 10.736, of June 29, 2021) (Movimento dos Pescadores e Pescadoras Artesanais – MPP, 2024). Fishing actors are typically represented only up to the level of the vessel owner (Mescouto et al., 2024). This poses a fundamental issue of procedural equity (i.e., what kind of knowledge is actually included in decision-making) (N. Bennett et al., 2021), which directly influences governance outcomes in terms of access distribution (or 'distributional equity'[4] as per N. Bennett et al., 2021).

In January 2023, a new government took power in Brazil and restructured the ministerial framework. Notably, the Ministry of Fisheries and Aquaculture (*Ministério da Pesca e Aquicultura*, MPA) was reinstated, and the Ministry of the Environment was renamed the Ministry of the Environment and Climate Change (*Ministério do Meio Ambiente e Mudança do Clima*, hereafter referred to as the MMA). Unless otherwise indicated, the article will refer to the ministerial structure established under the newly formed government.

1.1. Equitable fisheries governance and the role of narratives

Contemporary Latin American and Caribbean approaches to fisheries management are grounded in systems of knowledge and power that took precedence from the colonial period on (Queffelec et al., 2021; Silver et al., 2022; Barragán-Paladines et al., 2023). Traditional fisheries science and management are rooted in key theories that establish particular relationships between patterns of resource use, socioeconomic indicators, and regulatory regimes, with critical implications in terms of equity.

This suggests that who participates and what kind of knowledge is actually included in decision-making, or "procedural equity", has a direct impact on how benefits and burdens are distributed among fishing actors, also described as "distributional equity" (N. Bennett et al., 2021). Discursive production and negotiation of narratives about environmental issues is key to this causal link. Political arenas, such as the CPG-NN central to this study, are comparable to "force fields" where different knowledges and narratives compete as one expression of power struggles whereby "certain forms of dominance, contention and resistance may develop, as well as certain regularities and forms of ordering" (Nuijten, 2003:12, in Sikor and Lund, 2009, p.2). This exercise in power ultimately shapes particular forms of access distribution, resource allocation and exclusion. Scoones et al.'s (2019) analysis of global and Africa-specific food and agriculture policy documents can be usefully transposed to the fisheries context in order to illustrate how constructs of scarcity are manufactured and negotiated.

Adherents to the perspective of "absolute scarcity" (Scoones et al., 2019) are guided by Malthusian precepts on population growth and argue for a real and inexorable physical finitude of resources. Influential in fisheries are the early work of Gordon (1954) and Hardin (1968), which emphasized the depletion of common-pool resources due to individual self-interest in the absence of regulation. Their theories, rooted in Malthusian assumptions, suggest that without strict controls, overexploitation leads to resource collapse and diminished returns. These ideas continue to be used to advocate for government restrictions and privatization to prevent tragedy in open-access fisheries (Partelow et al., 2019) thereby justifying exclusionary practices (McClanahan et al., 2008; Finkbeiner et al., 2017; Asche and Smith, 2018) and require either a sharp reduction in fishing effort or strong environmental protection measures (e.g., no-take areas).

Two key legacies in fisheries were the Malthusian overfishing model (Pauly, 1994) and the reliance on complex modeling techniques and associated concepts, such as maximum sustainable yield (MSY). However, scholars have argued that the emphasis on these techniques may marginalize other forms of knowledge, such as local and indigenous knowledge, and preclude effective and balanced participation (Silvano and Valbo-Jørgensen, 2008; Begossi, 2015; Silver et al., 2022). Furthermore, the role of social and economic inequality, the influence of

[1] Then Ministry of the Environment.

[2] Industrial fishing is defined by the Brazilian law as that "practiced by an individual or legal entity and involving professional fishers, employed or in a share partnership, using small, medium or large vessels, for commercial purposes" (Brazil, *Lei n° 11.959, de 29 de junho de 2009*, Diário Oficial da União, June 30, 2009, https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/lei/l11959.htm).

[3] Section 2.2 provides a more detailed explanation of the distinction between the different fishery systems.

[4] For further interlinked dimensions of equity, namely 'recognition', 'management', 'environment' and 'context or structural' refer to N. Bennett et al. (2021).

global markets, power relations, and technological advances as drivers of overfishing are less considered (Sunderlin, 1994; Finkbeiner et al., 2017; Bavinck et al., 2024). Notions of 'scarcity', 'abundance', 'endangered' and 'sustainability' emerge as totalizing and politically neutral support the by-passing of equity-sensitive debates (Glaser and Diele, 2004; Mehta et al., 2019; Scoones et al., 2019; Boucquey, 2020).

The "relative scarcity" framing (Scoones et al., 2019) suggests that finite limits are negotiable in that resource availability is regulated by demand. Accordingly, scientific improvements and technological innovations can optimize resource allocation combining environmental sustainability and economic growth. In fisheries, solutions include new technologies to improve gear selectivity (Squires and Vestergaard, 2013), vessel tracking systems (e.g., Drakopulos et al., 2023), and the development of market-based seafood certifications (Foley, 2012). However, these can potentially add an extra burden on the most vulnerable fishing groups by excluding those who are unable to access new technologies or meet market demands while benefiting more capital intensive enterprises (Foley, 2012; Blythe et al., 2021). These consequences may be amplified in contexts where fisheries are diverse in terms of their contributions to food security, livelihood strategies, and labor relationships (Song et al., 2020).

Finally, proponents of "political scarcity" (Scoones et al., 2019) emphasize the relational aspect of scarcity, and its political and discursive manufacture. From a constructive point of view, realities are subjectively experienced, and discursively co-produced. Constructs of scarcity are never politically neutral because they are embedded in dynamic, historicized social-ecological contexts (Blythe et al., 2021; Silver et al., 2022; Clark and Cisneros-Montemayor, 2024), and the unequal access to, and distribution of, resources and benefits. Context-specific, multi-level social hierarchies and associated power dynamics influence how fishery-related problems are predominantly framed and what types of solutions are ultimately devised.

This research explores the link between procedural and distributional equity by contrasting the perceptions and narratives of key governance actors - both *de facto* included and excluded from decision-making - regarding the pargo fishery and its management in northern Brazil. By doing so, it highlights key differences between the dominant discourses and themes in management and that of excluded actors, shedding light on how central equity considerations in the pargo fishery are framed and prioritized differently.

2. Methods

2.1. Study area

This study focuses on the municipality of Bragança as the second most important fishing town in the state of Pará, after the state capital Belém, and main landing site for the pargo (Bentes et al., 2017), or Caribbean red snapper (*Lutjanus purpureus*, Poey, 1866). The study area encompasses the marine ecoregion North Brazilian Amazonia Shelf (hereafter NBAS) (Spalding et al., 2007) .[5] The NBAS includes a ~300 km wide continental shelf highly influenced by the Amazon river outflow and its associated seasonality (Isaac and Ferrari, 2017). A recently described 56,000 km^2 large Amazon reef system (Milliman and Barretto, 1975; Moura et al., 2016; Francini-Filho et al., 2018) is the home to a rich biodiversity, including the pargo, which is the target for export-oriented fisheries. Yet, growing interest in oil drilling poses a significant threat to the Great Amazon Reef system and its biodiversity, prompting calls for the establishment of marine protected areas as a countermeasure (Francini-Filho et al., 2018; Araujo et al., 2021). Unsustainable pressure on fisheries resources and declining catches have been reported (Moura et al., 2016; Freire et al., 2022; Klautau et al., 2025).

Apart from fishing, family farming and tourism importantly contribute to the municipality's economy. However, Bragança faces significant deficits in basic infrastructure, including health, sanitation, drinking water, and other critical services (Gorayeb et al., 2009). In 2022, the average monthly salary of officially registered formal workers was equivalent to 1.5 legal minimum salaries[6] (IBGE, n.d.). Yet, official statistics only report 6.21 % of the population in the labor force, suggesting an extremely high rate of informal work.

2.2. The pargo fishery in Bragança, Pará

The pargo, *Lutjanus purpureus* (Poey, 1866), is a demersal fish geographically distributed along the coasts of northeastern Brazil up to the Caribbean Sea (AquaMaps, 2019). Adult individuals mainly inhabit rocky bottoms from 70m-depth on (Moura et al., 2016). The pargo feeds on fish, crustaceans and plankton, among others. The size at first maturity is estimated at 32.1 cm for females and 35.2 cm for males (Freire et al., 2022). If the fish is caught below these sizes, it is unlikely to have reproduced at all.

The fishery's beginnings in the states of Ceará and Pernambuco (northeastern Brazil) date back to the 1960s. However, rising fishing effort and more efficient fleets led to early signs of stock depletion (Asano Filho et al., 2000). By the late 1990s, fishing companies and fishers began migrating to Bragança, Pará, in search of more abundant fishing grounds (Asano Filho et al., 2000). Most landings historically concentrated in Bragança (Asano Filho et al., 2000; Bentes et al., 2017).

According to the national fishing statistics, the total catch of pargo in 2024 was equivalent to 3812.91 tons[7] (MPA - Ministério da Pesca e Aquicultura, 2025). However, previous national production estimates are lower than reported Brazilian pargo exports, U.S. import figures, and data from other fishing sources (as summarized by Klautau et al., 2025). This suggests that the total pargo production declared to the national government likely underrepresents actual catches.[8] Similarly, only 123 vessels were officially permitted to operate in the fishery in 2016. However, estimates suggest that the actual number of operating vessels was closer to 150, indicating the presence of a number of vessels without formal permission. Over 90 % of these vessels were based in Bragança (OEI/MAPA, 2017; as cited in Aragão, 2018, p. 17). In 2023, only 88 vessels were officially permitted to enter the fishery (MPA Ordinance 38/2023).

Previous studies have identified different types of pargo fishing systems operating along the North Brazilian coast, based on vessel type, fishing gear and techniques. A large-scale artisanal sector is defined by wooden vessels and the use of *linhas pargueiras* (vertical longlines) (Isaac et al., 2009; Frédou et al., 2009; Bentes et al. 2012, 2017). Fishers deploy these lines either directly from the main vessel or from *caícos (*small canoes) launched from the main vessel while at sea. This latter method

[5] According to the authors, ecoregions are "areas of relatively homogeneous species composition, clearly distinct from adjacent systems. The species composition is likely to be determined by the predominance of a small number of ecosystems and/or a distinct suite of oceanographic or topographic features. The dominant biogeographic forcing agents defining the ecoregions vary from location to location but may include isolation, upwelling, nutrient inputs, freshwater influx, temperature regimes, ice regimes, exposure, sediments, currents, and bathymetric or coastal complexity". (Spalding et al., 2007, pp. 575).

[6] In 2022, the minimum salary in Brazil was R$1212.00 (Provisional Measure no. 1091/2021). At the time, this was equivalent to 188.76 euros.

[7] The total catch of pargo (*Lutjanus purpureus*) was calculated by the author based on the database downloaded from the Open Data Portal of the MPA: https://dados.gov.br/dados/organizacoes/visualizar/ministerio-da-pesca-e-aquicultura in May 2025.

[8] It should be noted that the reliability of official fishing statistics in Brazil (Freire et al., 2021) and in the state of Pará in particular has been questioned (Resende et al., 2003; Isaac et al. 2008).

involves considerable safety risks, as fishers work alone in drifting *caícos* equipped only with an oar, a flag and an anchor (Bentes et al., 2017). Traps (*manzuás*) are also used, with up to 20 traps carried by vessels per fishing trip. An industrial system is also described which makes up around 9.7 % of the fleet (Bentes et al., 2017). Vessels are typically made of steel or fiberglass, and *manzuás* are used for gears. The overall fishing fleet primarily consists of medium-sized vessels that are over 12 m long. These vessels have storage capacities of between 17 and 18 tons and can remain at sea for an average of 20 days with a crew of nine (Bentes et al., 2017).

The fishery is estimated to support around 4000 jobs in the state of Pará, including 1500 in the harvesting (Bentes et al., 2017). Fishers may work either formally or informally. In the latter case, access to state-provided social security benefits depends on being registered as a *segurado especial* (special insured) and meeting the necessary legal requirements. Benefits include access to insurance during the temporary closed season and in the event of a work-related illness. In the large-scale artisanal system, fishers are mostly –formally or informally- hired by the vessel owner which is a "physical person" or "legal entity" owning one or several vessels. In these cases, the share system usually prevails in which the crew divides a percentage of the production value among themselves. The vessel master receives the largest share. Fishers may also be hired by a fishing industry, in which case they usually have a formal employment contract and are entitled to legal workers' rights. A fixed base payment per day trip may be agreed upon. The scarce socio-economic documentation depicts economically better-off fishers earning incomes above the minimum wage (Isaac et al., 2009; Bentes et al., 2017; Mescouto et al., 2024), while also recognizing that labor relations are marked by power asymmetries and informality across the value chain (Bentes et al., 2017). These dynamics reflect issues of distributional equity but they remain largely unexamined in existing studies and official reports about the pargo fishery.

The harvesting phase generates the highest annual gross revenue (Trindade et al., 2023). At the landing site, pargo specimens are sorted by weight and appearance. The most valuable fish is the G-sized one. Bigger pargos are called *sacolão* (literally translated as "big bag") and do not qualify for international export. About one-third of the production is processed in Bragança. The rest is processed in Belém and other factories in northeastern Brazil (Trindade et al., 2023). Less than five companies concentrate 90 % of the processing of pargo that benefits from a quality seal provided by the Federal Inspection Service linked to the Ministry of Agriculture and Livestock (*Ministério da Agricultura e Pecuária*, MAPA) (Dias et al., 2023). These companies are also responsible for the majority of pargo exports, with 75 % of production shipped abroad, primarily as frozen whole fish and fillets to the United States (Aragão, 2018). The rest is sold within Brazil, mainly in the Northeast region. In 2015, pargo exports amounted to 3250 tons and 19.6 million dollars (Aragão, 2018).

2.3. Governance of the pargo fishery

Marine fisheries management in Brazil is marked by fragmentation and challenges in integrating multi-level interests. Fig. 1 shows a timeline of the key events and governance shifts that have affected the pargo fishery. In the 1960's, fisheries management in Brazil was the responsibility of the Superintendence of Fisheries Development (SUDEPE) which aimed to foment industrial fishing (Dias Neto 2010). Tax incentive policies in the late 1960s spurred the growth of entrepreneurial industrial fishing, including pargo fishing, in the Brazilian Amazon (Penner, 1980 cited in Furtado 1981). Following the dissolution of SUDEPE in 1989 (Fig. 1), fisheries management was assigned to the Brazilian Institute for the Environment and Renewable Natural Resources (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis*, IBAMA), under the Ministry of the Environment and Climate Change[9] (*Ministério do Meio Ambiente e Mudança do Clima*, MMA). In 2003, the creation of the Ministry of Fisheries and Aquaculture (*Ministério da Pesca e Aquicultura*, MPA), aimed at the social and economic development of fisheries, triggered a gradual process of shared fisheries governance with the MMA, with a focus on environmental protection (Dias Neto, 2010; de Azevedo and Pierri, 2014). Over 35 years, fisheries have been shifted eight times to different federal-level management authorities. This meant frequent changes in the political focus of the pargo's management and a lack of long-term continuity in regulations. Further challenges to social participation, such as poor representation of vulnerable groups and the influence of vested interests, have hindered effective and equitable governance (Lima and Callou, 2015; Stori et al., 2019; Glaser et al., 2023).

Participation in fisheries governance processes in Brazil is operationalized through various management arrangements (Seixas and Kalikoski, 2009), among which are the *Comitês Permanentes de Gestão* (Standing Management Committees, hereafter CPGs). CPGs serve as consultative and advisory multi-stakeholder bodies that inform decisions taken by federal fisheries management authorities. Different CPGs encompass specific fisheries such as those targeting pelagic or demersal[10] species in Brazil's coastal regions.

The management of the *pargo* fishery mainly unfolds within the CPG-NN established in 2015 (Fig. 1). The CPG-NN has 24 members, with balanced representation from government bodies and civil society organizations involved in fishing activities. Four of the members of the civil society organization represent artisanal fishers, while vessel owners, professional fishworkers, exporters and processing industries each have two representatives. The participants of CPG-NN belonging to civil society are ultimately appointed by a government commission[11] made up of representatives from the MPA and MMA. CPG-NN meetings are held three times a year and are chaired by a representative of the National Secretariat for Industrial, Recreational and Sports Fishing within the MPA. Further members can be invited, including from academia and other civil society organizations representing fishers (Diário Oficial da União, 2023). External interested parties may also attend meetings upon request. However, management decisions are *de facto* driven by the interests of a male-dominated fishing industry and ship-owners, with no voice for fishers (Mescouto et al., 2024).

A pivotal event in the governance of the pargo fishery occurred with the issuance of Ordinance 445/2014 by the MMA. The ordinance listed pargo as "vulnerable" on the National List of Endangered Fauna Species, which made the fish population liable to full protection unless regulations for its use were approved by the relevant federal authorities. In response, the fishing industry mobilized and intense negotiations were initiated within the CPG-NN. In 2018, the MMA issued an ordinance recognizing pargo as suitable for exploitation or research under specific terms. Also in 2018, the Pargo Recovery Plan was issued, establishing rules for its sustainable use. These efforts led to compromises that allowed for continued fishing and export of pargo to the US, making the fishery a relevant case of MPA and MMA shared management.

Changes in the pargo fishery regulations (Fig. 1) demonstrate how national sustainability goals are constantly renegotiated in response to international market pressures. In 2004, the MMA established a minimum capture size of 41 cm for the resource which was later dismissed due to the US market's preference for fish around 30 cm (the size of a plate). The minimum size requirement was then replaced by an obligation to fish in waters deeper than 50 m, since juveniles mostly inhabit

[9] Then Ministry of the Enrivonment.

[10] The term "pelagic" refers to marine animals that live in the water column while "demersal" refers to those animals that live on the bottom of the sea, such as the *pargo*, whose habitat is associated with the Amazon reef.

[11] The Technical Committee for the Shared Management of Fisheries Resources (*Comissão Técnica da Gestão Compartilhada dos Recursos Pesqueiros,* CTGP), established by Decree no. 6.981, of October 13, 2009.

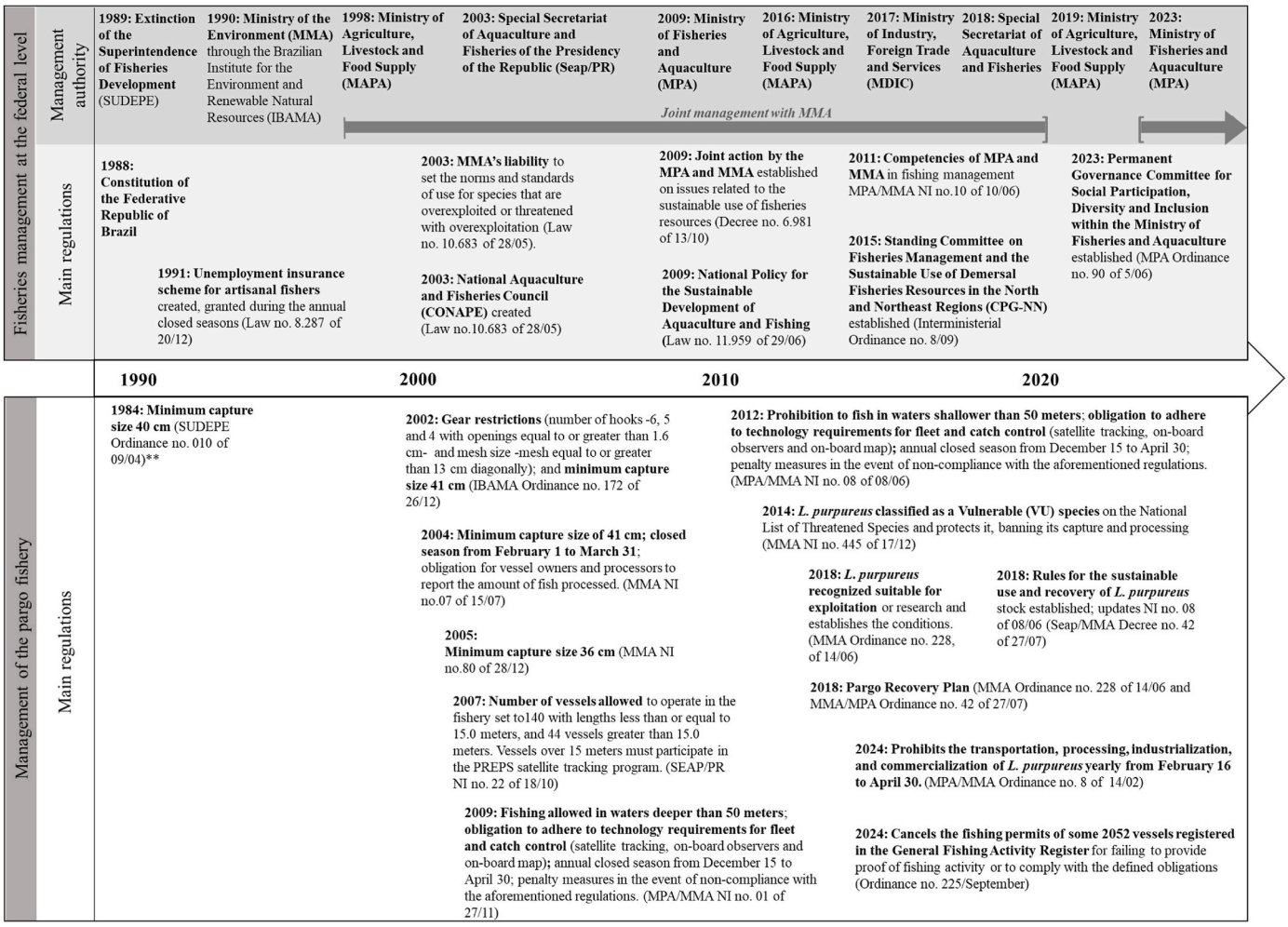

Fig. 1. Timeline of selected key events and regulations for the pargo fishery in Brazil. References used include Nakamura and Hazin (2020) for federal-level fisheries management institutions and Bentes et al. (2017) and Klautau et al. (2025) for main regulations for the pargo fishery.

shallow coastal areas. The US market continues to prefer pargo weighing up to 1.8 kg (Dias et al., 2023). Fish exceeding 1.8 kg or showing signs of odor changes or skin and eye discoloration are directed to the national market. Current fishing regulations include an obligation to comply with satellite tracking for vessels greater than 15 m in length, and an annual closed season from December 15 to April 30. The CPG-NN's final recommendations for fishery management include adopting quotas and spatial management strategies, as well as revising the minimum capture size upward (MPA - Ministério da Pesca e Aquicultura, 2024). However, non-compliance with regulations, lack of effective monitoring and lack of systematic fisheries data are key challenges to the sustainability of the pargo fishery (Barclay et al., 2016; Santos et al., 2023; Klautau et al., 2025).

2.4. Data collection

This research explores how key governance actors perceive and narrate the governance of the pargo fishery, and how these viewpoints promote dominant themes with particular implications for equity. To investigate this, the study employed a mixed-methods approach, drawing on multiple sources and data collection techniques.

Secondary data sources were compiled, including government policy documents, reports and minutes of CPG-NN meetings, as well as media content, to understand how the northern Brazilian pargo fishery and its challenges are represented.

Participant observation (Guest et al., 2013) was performed during two CPG-NN meetings, two-days each, in December 2022 (online) and November 2023 (in person, in Belém). Participant observation was also performed at pargo landing piers and during a 3-h visit to one of the main fishing company that catches, processes and markets pargo in Bragança. Further informal conversations were conducted with residents of the municipality to understand their perceptions of, and relationship with the fish and fishery.

A total of 18 semi-structured interviews were conducted with key actors involved in the governance of the pargo fishery within the CPG-NN between December 2022 and January 2024. Most interviews were conducted in person in Belém and Bragança (Pará, North Brazil). Two interviews were conducted online. Interviewees were representatives of: civil society organizations, public authorities, academia, fishers and fishing industry (Table 1). The interviewees were selected through purposive sampling (Patton, 2002) to understand the perceptions of groups of actors actively involved in the CPG-NN. These perceptions were then compared with those of fishers who are excluded from the CPG-NN. The interviewed fishers were between 34 and 65 years old. They fished using both *bicicleta* (vertical longlines) and *manzuá* (traps), worked for fishing companies under formal contracts and for vessel owners under informal contracts.

Of the 18 interviews, 15 in-depth interviews were conducted based on a script including eight open-ended questions. These interviews lasted between 18 and 151 min. The questions referred to perceptions and subjective assessments of: the pargo fishery governance process, opportunities for different actors to participate in this process, the main

Table 1
Summary of interviewed organizations and actor groups (December 2022 and January 2024 in Belém and Bragança, State of Pará, Brazil).

Key groups represented by interviewees	Organization(s) or group represented	Main mission and role	Participation in the CPG-NN	Total key informants interviewed
Public authority	Ministry of the Environment and Climate Change (MMA)	Formulate and implement national environmental public policies for the protection of the natural environment	Yes	1
	Federal environmental agencies linked to the MMA with state-level representation	Environmental licensing, quality control, authorization for the use of natural resources, surveillance and monitoring; research in marine and aquatic environments	Yes	2
Civil society organization	Cooperative for vessel owners; national-level collective representing unions from the vessel owners' and fish processing industries; national-level representative entity for vessel owners; a state-level fishing industry union	Represent and advocate for the interests of various fishing sector groups at multiple levels, including individual and corporate vessel owners, as well as industry operators	Yes	4
	Non-governmental organization	Protect marine biodiversity and promote marine conservation by influencing policy decisions	Yes	1
Fishing industry	Fish processing industries (with or without owned vessels)	Harvesting, buying, processing, and exporting fish	Yes	2
Academia	Public federal universities	Produce, share and transform scientific knowledge through teaching, research and outreach	Yes	2
Fisher	Fishers working on board *pargo*'s fishing vessels	Operate fishing gear on the vessel's deck under the command of the vessel's master	No	5
	Master of *pargo* fishing vessel	Make sure the vessel is well-equipped, recruit crew members, and serve as the main authority on fishing vessels at sea, overseeing fishing operations	No	1

challenges associated with the governance process, the main complaints of the actors and ways to address them.

The remaining three interviews were conducted using an adapted net-map method (Schiffer and Hauck, 2010). Net-map is an interview-based participatory network mapping method (for more details on the method, see Schiffer and Hauck, 2010) which allows for a deep understanding of perceptions of complex governance networks of actors and interactions. Key informants were interviewed representing artisanal fishers working aboard pargo fishing vessels (group of three interviewees), an agency linked to the MMA (single interviewee), and a cooperative representing vessel owners (single interviewee). In this specific case, fishers' interviewees were selected through snowball sampling (Braun and Clarke, 2013). The fishers' net map was conducted during the closed season, when a number of fishers are unoccupied and gather daily in Bragança's main city square. After informing the participants of the ethical considerations of the study, all interviews were recorded with their consent. The interviews lasted between 77 and 108 min.

The study aimed to compare the views of those *de facto* involved in the CPG-NN with those of pargo fishers. Some relevant governance organizations representing artisanal fishers at local, regional and national levels were underrepresented, reflecting their limited presence within the CPG-NN itself. Additionally, the sampling strategy used to interview fishers may have introduced a bias towards individuals who are more present in public spaces, or who are less engaged in other economic activities or community roles. This case study prioritizes qualitative depth (Braun and Clarke, 2013) over breadth, which may limit the generalizability of the findings.

2.5. Data analysis

All the 18 interviews were transcribed using the online transcription platform Sonix Inc. and subsequently manually corrected and edited in the original language, Brazilian Portuguese.

The 15 in-depth interviews were analyzed qualitatively using an inductive approach based on reflexive thematic analysis (adapted from Braun and Clarke, 2013). The interview transcripts were coded using MaxQDA Plus version 2020. The codes aimed to reflect, as closely as possible, the sense of the interviewee's statements for particular units of text. As coding progressed, notes were made in a separate document on the main concepts, issues and overall arguments presented by each interviewee. Narratives were conceptualized as consisting of four main elements: framing, evidence, implications, and proposed solutions (based on Roe, 1994 cited in Scoones et al., 2019). These elements are summarized in the findings for different categories of actors. The non-governmental organization (NGO) is identified separately from other civil society organizations (CSOs) to reflect its influence in formal governance.

A visual representation was generated for each of the three perceived governance networks using the open-source software Gephi (product version 0.10.1). The perceived network structure and composition were analyzed using basic visual descriptions (i.e., which actors were perceived to interact with whom, and what types of interactions were perceived) and basic frequency counting (e.g., how many actors and interactions were perceived) (based on Gerhardinger et al., 2022).

Subjectivity, on the part of both the interviewees and the researcher, is an integral part of the qualitative research process (see Braun and Clarke, 2013). The use of a structured interview guide ensured consistency across participants. In addition, triangulation was employed by drawing on multiple data sources, including interviews, official documents, and observational notes, in order to contrast and compare findings. Personal reflexivity was also exercised through the keeping of a researcher's journal (Braun and Clarke, 2013), which allowed for the critical consideration of the researcher's positionality and potential influence on the research inquiry process.

2.6. Ethical considerations

This study observes the guidelines outlined in Resolution No. 466 of December 12, 2012, by the Brazilian National Health Council Plenary, which establishes regulations for research involving human participants. The research was approved by the Brazilian National Research Ethics Committee (CONEP), under *Plataforma Brasil* (CAAE number: 65040122.3.0000.0018).

3. Results

3.1. Perceptions of the governance structure and main actors' interactions

The three net-maps revealed both similarities and differences in the perceptions of pargo fishers, the federal environmental agency, and the cooperative representatives regarding the actors and structure in fishery

governance (Fig. 2, but see Appendix 1 for description of actors' acronym).

The fishers' net-map (Fig. 2A) identified 15 actors, among which two types of pargo fishing systems: large-scale artisanal and industrial. Artisanal pargo fishers were central to the network with the greatest number of interactions with other actors. Pargo fishers were depicted as being primarily connected to vessel owners through 'complaints', 'money flow', and 'control' links. These links translated into grievances related to poor working conditions and inadequate pay, highlighting issues in the distribution of benefits. The fishers were seen as holding grievances with other civil society organizations such as the fishers' guild and the artisanal fisher's union. By contrast, the user's association of the *Reserva Extrativista Marinha de Caeté-Taperaçu* (Caeté-Taperaçu Marine Extractive Reserve) was the only entity seen as supporting pargo fishers, both industrial and artisanal. The Ministry of Labor and Employment (*Ministério do Trabalho e Emprego*, MTE) was perceived as exercising control over vessel and company owners through inspections, but the environmental agency IBAMA was seen to support vessel owners. One interviewee mentioned a "Maritime Workers Rights" entity that supports vessel owners, but no organization with that name was subsequently identified. The interviewees did not mention the CPG-NN, suggesting a lack of procedural equity.

The environmental agency's representative mapped out a complex network comprising 30 different actors (Fig. 2B). The pargo fishery was identified as large-scale artisanal. The civil society organizations mentioned included unions representing vessel and fishing company owners, as well as federations, social movements, and NGOs representing fishers. These organizations were depicted as supportive of each other and of industry-linked actors. Pargo fishers were perceived as receiving no support from any such organization. The CPG-NN was perceived as a key bridging actor between civil society organizations linked to fishing industries, research organizations, and public authorities. However, no connection was depicted between civil society organizations representing artisanal fishers' interests (e.g. the National Movement of Fishermen and Fisherwomen, MONAPE) and the CPG-NN. Although public authorities were perceived to be well-connected among them, they only interacted with pargo fishers through monitoring and surveillance activities conducted by environmental agencies IBAMA and ICMBio (*Instituto Chico Mendes de Conservação da Biodiversidade*, Chico Mendes Institute for Biodiversity Conservation). This indicates the *de facto* lack of participation of fishers in the CPG-NN and raises issues of procedural equity. The MMA and MPA were seen as interacting through a 'communication' link, indicating a reference to the shared management system. Other onshore and offshore businesses were mentioned, such as oil exploitation off the Amazon estuary and an offshore port. However, these enterprises were depicted as isolated from the rest of the network.

The cooperative representative's net-map comprised 17 densely connected actors. The respondent perceived the pargo fishery as industrial and only industrial fisheries were mentioned in this network. The cooperative (COOP) was depicted as very well linked to the various fishing groups, vessel owners, research organizations, and public authorities. The cooperative was seen as supporting individual private vessel owners, vessel owners with legal status, industry-linked vessel owners, and the processing industry, and it received support from all of the public authorities, except the Ministry of Labor and Employment. All link types were mentioned except for 'complaint' links. The respondent perceived the environmental agency IBAMA and the Ministry of Labor and Employment as bodies controlling fisheries and vessel owners respectively. Other than the cooperative itself, only one civil society organization was mentioned: the Brazil Cooperatives Organization, which supported the cooperative. The net mapper did not mention the CPG-NN or any interaction between the MPA and the MMA.

3.2. Narratives about the fishery and governance processes

The results reveal that governance actors have distinct ways of framing the main issues surrounding the pargo fishery and its governance. These can be summarized under three narratives as developed below.

3.2.1. Narrative 1 - Unity in crisis: declining fish stocks, a challenge for all

Under Narrative 1 (Fig. 3), the pargo population was perceived under an imminent threat of exceeding the biological limits set by the biological characteristics of the target species. Two framings emerged within this narrative. The NGO and the fishing industry-linked entities, supported by the MPA asserted a state of overfishing and overexploitation. The MMA considered the pargo as an endangered species.

The researcher, the CSO, and the NGO representatives all emphasized the importance of models as crucial tools for assessing the abundance of the pargo fish stock. According to a CSO representative, one explanation for overfishing was the targeting of young fish, i.e. juveniles, that had not yet reproduced. The pargo's classification as vulnerable on the National Endangered Species List (Ordinance MMA 445/2014) was referenced as proof of its low biomass and poor stock health. This reference was primarily made by the MMA representative, but also by the academic respondent.

CSO representatives used discourse about ecological sustainability as politically neutral terrain. Some CSO respondents explicitly acknowledged endorsing this approach to avoid thorny debates about the distribution of benefits and allocation of rights. Academic respondents criticized this political strategy.

In order to address the imminent decline in fish stocks, the NGO is spearheading a proposal to implement an export-based quota system. This system would suspend the pargo fishery once a predetermined export volume (hereafter referred to as quota) threshold is reached. This rationale stems from the fact that approximately 75 % of pargo production is exported to the U.S., making export figures a more consistent and easily monitored data source. One of the interviewed researchers criticized this management approach, arguing that this quota system fails to account for inter-annual variability and broader environmental drivers, such as teleconnections and other climatic processes that influence rainfall and ocean currents. In this view, the quota was seen less as a robust ecological measure and more as a way to present the fishery as ecologically sustainable.

Overall, opinions were favorable to the regularization of the entire fleet, including the informal segment, provided that the export-based quota solution was adopted. The need for general fleet regularization was justified using technical and environmental sustainability arguments. Academic, NGO, and other civil society organization (CSO) respondents emphasized the importance of knowing the exact number of vessels operating in the fishery in order to calculate catch per unit effort (CPUE) and better assess the health of the fish stock.

Representatives of the MMA and the NGO identified the lack of monitoring and surveillance as a major obstacle to preventing illegal fishing. This could be addressed by focusing on controlling pargo exports. The academia representative, the NGO, and other CSO representatives identified changes in government structure due to changes in mandates, centralization, and inefficiency in management as factors hindering sustainable fisheries.

3.2.2. Narrative 2 - Declining catch shares, not biomass: negotiating open access

In Narrative 2, the state of the pargo fishery was primarily framed in terms of its production levels, with the fishery being depicted as generally in good condition (Fig. 4). However, a key concern highlighted in this narrative was the overcapacity in terms of the number of vessels operating, described as a threat to the sustainability of the fishery.

All of the interviewees in this narrative based their arguments on the positive export balance of pargo. CSO representatives and the fishing

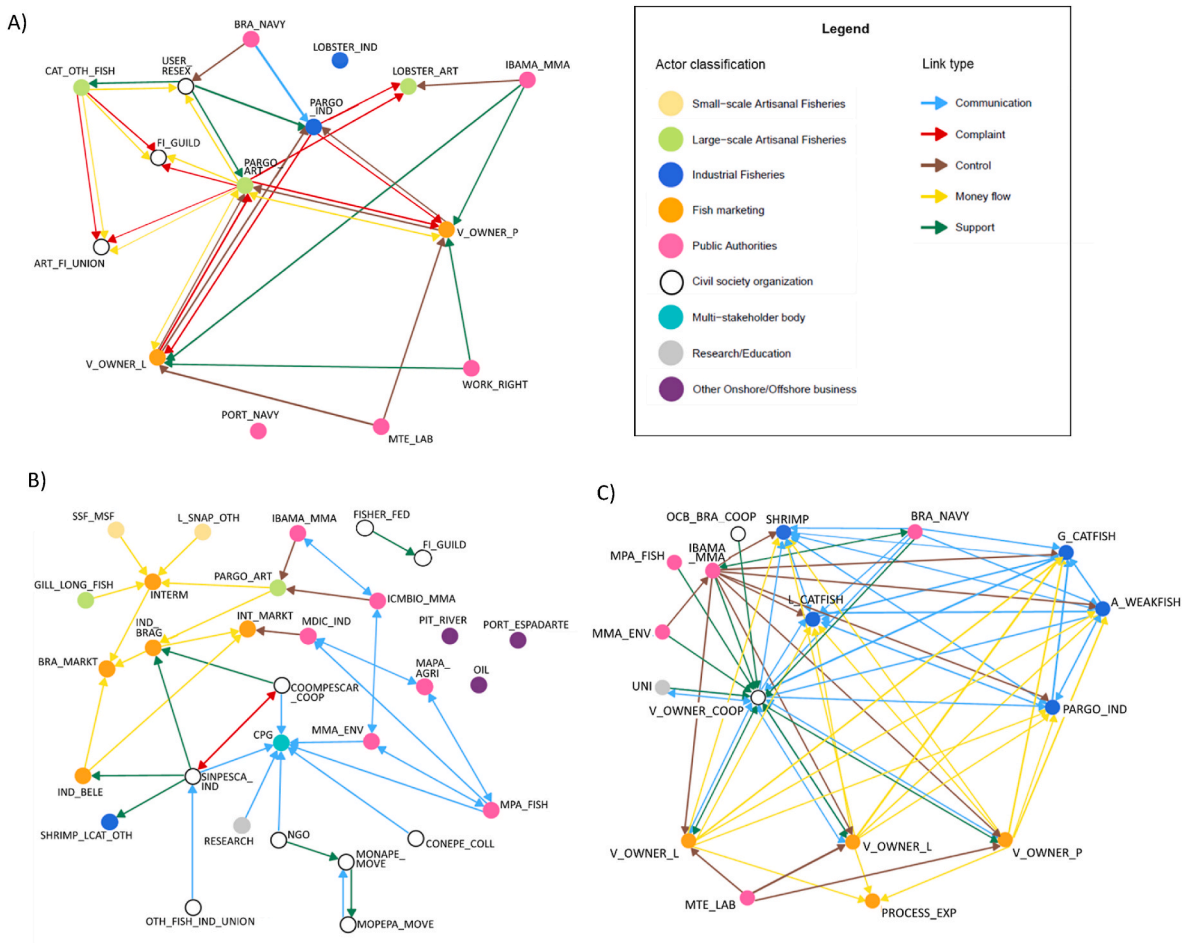

Fig. 2. Perceived governance networks by: A) pargo fishers; B) federal environmental agency; and the C) vessel owners' cooperative. Appendix 1 provides a list of the acronyms used for actors' names and their meaning.

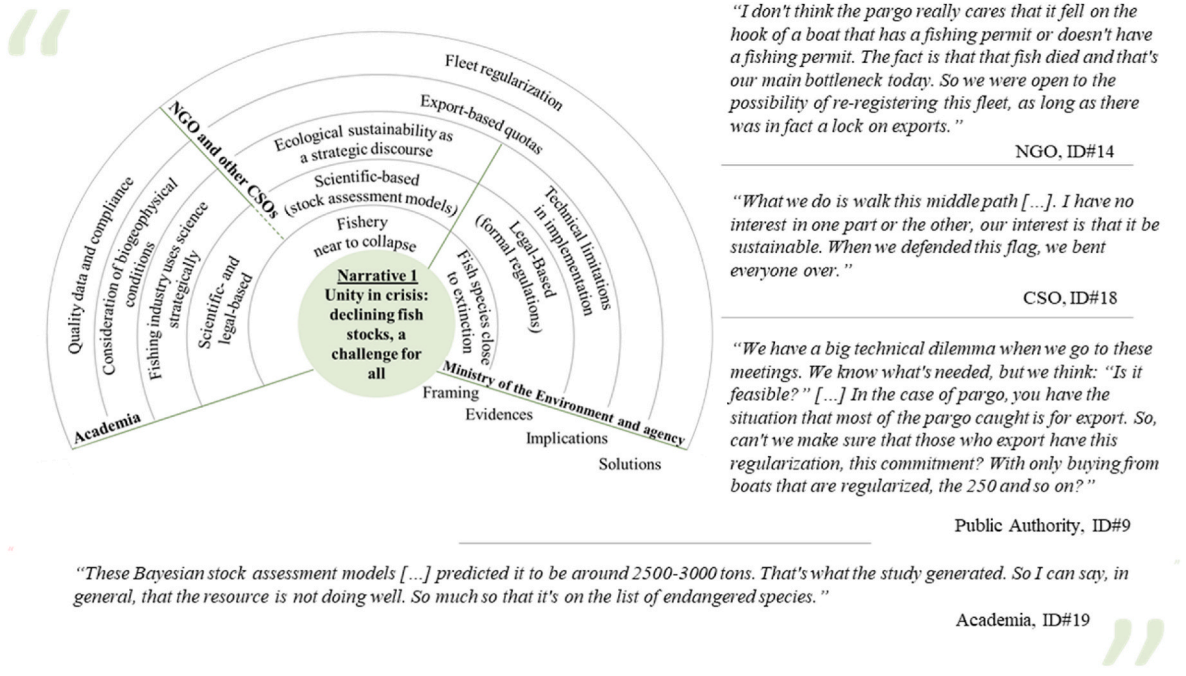

Fig. 3. Summary of the key actors and elements that compose Narrative 1, along with illustrative selected interview quotes. NGO = non-governmental organization; CSO = civil society organization.

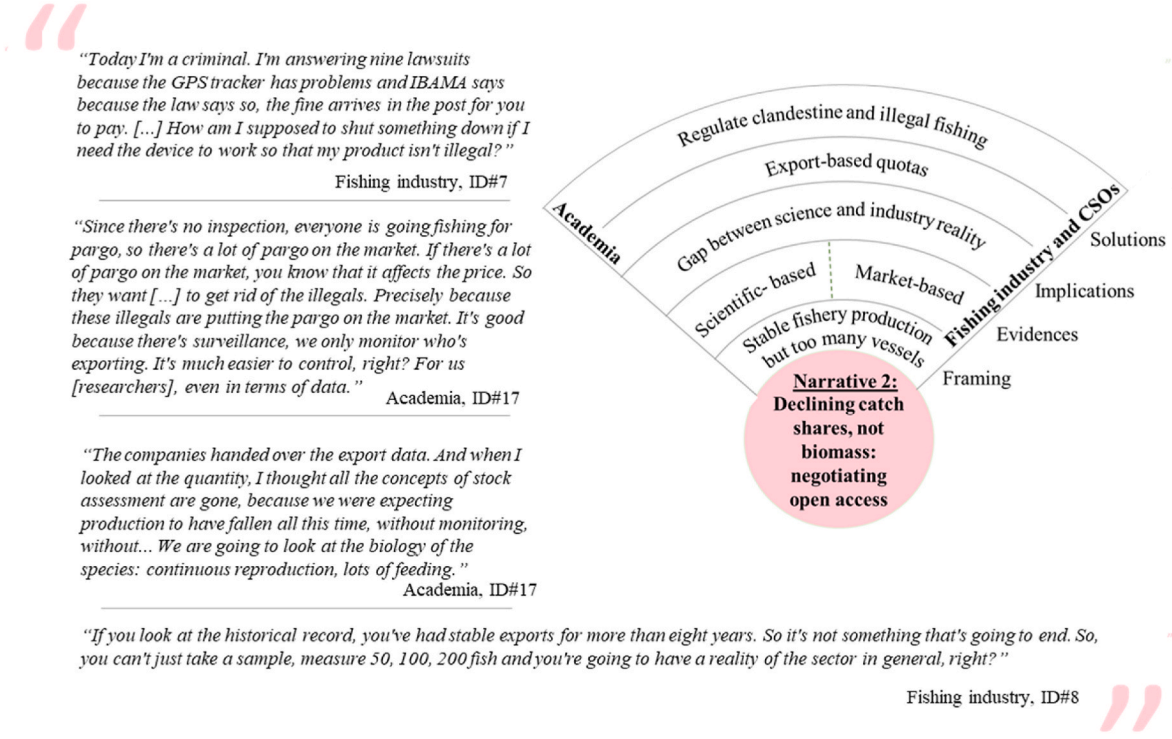

Fig. 4. Summary of the key actors and elements that compose Narrative 2, along with illustrative selected interview quotes. CSO = civil society organization.

industry stated that export numbers demonstrate this trend. The academia representative used scientific knowledge to explain why pargo production has not declined. According to the respondent, this was due to continuous reproduction of the species and an abundant food supply provided by the biogeophysical conditions of its ecosystem. Respondents from the fishing industry emphasized that production is subject to a self-regulating feedback loop between market demand and stock abundance. According to this view, the fish population would never collapse as below a certain threshold of catches, the fishery would no longer be economically viable.

Respondents from both CSOs and the fishing industry, as well as from academia, argued that the absence of a decline in pargo production contradicts results from scientific studies. One fishing industry representative criticized the extent to which scientific research reflected reality. These studies were said to rely on samples that were collected within constrained time frames and were of limited size. This makes the studies unreliable for reflecting the day-to-day realities experienced by those working in the sector.

Given the perception of stable pargo production, the necessity of a quota, which would ultimately impose catch limitations, appeared ambiguous within this narrative, despite its endorsement. The perceived value of a quota appeared to be primarily linked to regulating illegal, clandestine or unregulated fishing, suggesting that quotas could be used as a tool for regulating access. When discussing compliance with satellite (Global Positioning System) tracking regulations for vessels over 15 m, a representative of the fishing industry highlighted a dimension of (il)legality. They complained about unfair and inefficient inspections and unrealistic policies. Ultimately, regulating the entire fleet would benefit exporting industries because they would be able to demonstrate the traceability of the fish, which has implications for distributional equity.

Other elements were mentioned as the need to invest in new fishing technologies, such as fiber vessels, in order to achieve a cleaner ecological footprint. This statement is supported by the perception of fishing in Brazil as a symbol of backwardness, lack of modernization and development.

3.2.3. Narrative 3 - Silenced scarcities: scarcity for some, abundance for others

Narrative 3 brought together the perspectives of fishers employed in the pargo fishery and an agency representative associated with the MMA (Fig. 5). While the respondents in this narrative perceived a decline in the abundance of the pargo fishing stock, poor labor rights were the central concern for fishers. This suggests that immediate livelihood challenges take precedence over environmental concerns, highlighting perceived inequities regarding the distribution of risks and benefits in the context of the pargo fishery.

The increased difficulty in catching pargo was explained in part by the increase in fishing capacity per vessel, including the increase in the time spent at sea. The poor labor rights experienced by many fishers were exemplified by reports of food insecurity during the closed season, poor pay and unequal power relationships with the vessel owner. Interviewees reported that, if they could not rely on the *Bolsa Família*[12] during the closed season, fishers would not even have salt or manioc flour to eat. This was because, among others, they struggled to access the *seguro defeso*. The corresponding quote in Fig. 5 illustrates issues of procedural inclusion, social recognition and dignity, as the fishers felt that no one is looking after them.

On board fishing vessels, fishers reported often being under strong competition and pressure to fish continuously at the expense of less rest. This was particularly the case in the *bicicleta* (vertical longline) fishing system. In this system, fishers line up on one side of the vessel. If a fisher's catch exceeds that of the others, they move closer to the stern. As the longlines are pulled up from the bow to the stern to avoid encroachment, the longline remains underwater longer for the fisher positioned at the stern. This increases this fishers' chances of catching more fish.

After its harvesting, the pargo is directly sorted according to the

[12] Created in 2003, the *Bolsa Família* program is run by the Brazilian federal government and aims to combat poverty and social inequality by providing cash transfers.

"The stay [at sea] has increased more, the pargo has become less. And there's more vessels and there's also a lot of traps. In the past we used to fish with 25 manzuás [traps]. Now they're going with 100 manzuás in a boat. That means that everything is going to come to an end."

Fisher, ID#12

"Because if you work for a registered company and the employee has a formal contract; it's called industrial. And artisanal is when you work on your own, a vessel that doesn't have a registered company."

Fisher, ID#13

"If a fisher falls sick. Then they [vessel owners] *say you're going to get well tomorrow. When we come ashore, fishers are almost dead. And if the boss helps the fishers who are sick, he still wants to deduct the money he gave to buy the medicines from the fisher's production."*

Fisher, ID#16

"If it weren't for Bolsa Família [rent transfer program by the Brazilian government]*, he'd have to go hungry. [..] If it wasn't for that, he'd be eating salt. Because there's no one to look at them. Look, we need a closed season for the people who fish for pargo, there isn't one. If there is, you're hiding it."*

Fisher, ID#10

Fig. 5. Summary of the key actors and elements that compose Narrative 3, along with illustrative selected interview quotes.

international market requirements. On board and after catching the fish, the fishers must carry out a series of manipulations to prevent the fish from losing its vibrant red color. For example, the entrails must be removed while the fish is still alive; otherwise, it turns white, which causes both the exporters and the fishers to lose out. The potential loss of export-quality standards was mentioned to put added pressure on fishers during fishing operations.

The pay of fishers depends on the international export value of the fish they capture. The most valuable specimens on the international market are typically around 30 cm long, weigh between 600 g and 1 kg, and are bright red. One fisher interviewee challenged this classification, which was said to be based on international export market requirements. The sale of smaller pargo was recognized as detrimental to the sustainability of the stock, while the devaluation of larger specimens, known locally as *sacolão*, was seen as conflicting with local valuation logics, wherein the largest fish are considered the most valuable. Fishers receive higher payments for the portion of their catch that meets these optimal export standards. One fisher interviewee who worked for a fishing company reported that if the fishers receive R $2.50/kg for the optimal pargo, the vessel owner resells the fish for 12 times the price payed to fishers, i.e. R$30/kg. This low payment rate was why the interviewee did not want to continue working in the pargo fishery after the current fishing season ended. According to another interviewee, no fisher in this fishery was satisfied with their pay because it did not reflect the value of their work in terms of the physical effort provided and the physical consequences endured.

The relationship between fishers and vessel owners was negatively depicted as one of dependency. One example was the *vale*, a financial voucher provided by vessel owners to support fisher's families during trips. The owner defined the amount of the *vale* according to his judgement of the fisher's performance and experience. This voucher was considered to create dependency because it must be repaid by the fisher with the catch. The catch was reported to be often insufficient, and the remaining amount was deducted from future earnings.

The interviewed fishers unanimously emphasized the difference in employment status between artisanal and industrial fishing systems: in the latter, fishers were employed by companies under formal contracts, while in the artisanal system, fishers worked for independent vessel owners without formal contract (Fig. 5). Under formal contracts, fishers could benefit from formal workers' rights but could not access government support programs for special social protection. In contrast, artisanal fishers were defined as those who are entitled to receive the *seguro defeso* (financial support provided by the government to fishers during closed seasons). The perceived differences between fishing segments were more strongly associated with disparities in access to specific benefits, such as social protection and labor opportunities, than with the environmental impact or scale of the fishery itself.

In practice, however, fishers in both fishing systems were often denied their right to decent working conditions. Interviewees revealed that vessel owners sometimes cancelled work contracts of formalized fishers to avoid paying during the closed season. Additionally, artisanal fishers encountered difficulties in accessing social protection benefits such as the *seguro defeso* to which they were entitled, as well as employment injury or sickness benefits. Some fishers received support from other cash transfer programs, such as *Bolsa Familia* (Fig. 5). Fishers also complained that they were billed for health-related expenses that occurred while working on fishing vessels.

Fishers interviewees suggested the implementation of an inspection process and enhanced assistance from public authorities to ensure decent work conditions. The agency representative linked to the MMA mentioned the need to regulate clandestine and illegal fishing, referring to fishing vessels operating without fishing license. But unregulated fishing was mentioned by fishers in reference to the absence of a formal employment contract.

4. Discussion

The narratives of governance actors revealed different constructions of the main issues related to pargo fishing and governance in Bragança, northern Brazil. In the following, I argue that these different constructions rely on the discursive mobilization, to varying degrees, of three sets of contrasting realms: (1) environmental protection and economic profitability; (2) the legal and the illegal; and (3) global markets and the local scarcities. The following section discusses how these influence the relationship between ecological sustainability, access distribution and exclusionary practices, and how they may be particularly amplified in a large-scale artisanal fishery such as the pargo.

4.1. Environmental and economic priorities: social equity overlooked

In Narratives 1 and 2, respondents highlighted a fundamental tension between two dominant management approaches: one framing pargo as a "nature to be protected", the other as a "commodity" (A. Bennett et al., 2021). Although this dichotomy has recently been

highlighted as an antagonist in the pargo fishery governance (Klautau et al., 2025), it is argued here that these approaches essentially also converge on a shared management focus: maintaining the ecological health of fish populations. This convergence narrows the scope of governance in a way that overshadows critical discussions on access, distribution, and equity more broadly.

In the late 1980's, the fisheries management portfolio in Brazil was transferred from a fisheries development agency (SUDEPE) to an environmental protection agency (IBAMA, linked to the MMA) (Dias Neto, 2010). Under this environmental turn, concessions to the corporate sector were reduced in order to ensure fish stocks recovery. This sparked pressure that ultimately led to the reintroduction of the fisheries agenda under the aura of the production focus within the Ministry of Agriculture and Livestock. Conflicts arising from the clash between environmental protection and economic profitability management goals have been widely reported (Grip and Blomqvist, 2020; Boucquey, 2020; Dahlet et al., 2023). In the Brazilian pargo fishery, this conflict is exacerbated by the challenge to conciliate multi-level governance interests. One example is the successive changes in Brazilian government regulations on minimum allowable catch sizes (c.f. Fig. 1) in order to meet the strict quality standards required by the U.S. market. These adjustments have allowed, and even encouraged, the capture of fish that have not yet reached their first maturation size in response to U.S. consumer preferences for smaller fish. This practice undermines local marine ecological sustainability, as studies indicate clear evidence of growth overfishing in the Brazilian pargo fishery (da Costa Pinheiro et al., 2024).

Narratives 1 and 2 largely relied on scientific and legal arguments to legitimize particular management strategies. Within the CPG-NN, CSOs and researchers see stock assessment models and the concept of maximum sustainable yield (MSY) as the authoritative basis for evaluating the fishery's status. Silver et al. (2022) observed a similar dynamic in the management of the Pacific herring fishery in British Columbia, Canada. In both cases, model parameters establish critical ecological thresholds beyond which population collapse becomes a tangible risk. Framing these scientific thresholds as objective reference points can act to minimize perceptions of uncertainty associated with scientific facts. This may be a necessary step in translating scientific knowledge into persuasive political arguments, as argued by Taddei (2017) in the case of Brazil's climate politics. However, this process silences alternative forms of knowledge and narratives about fishing and the marine environment, illustrating how power operates through the exclusion of certain epistemologies. This exclusion reinforces specific claims to resource allocation and serves to "naturalize interventions in the name of environmental protection" (Ribot and Peluso, 2003, p. 169), effectively sidelining social concerns.

4.2. Legal and illegal

As many artisanal and semi-industrial fisheries in the Global South (Sowman et al., 2014; O'Neill et al., 2018; Song et al., 2020), the pargo fishery in northern Brazil faces challenges in formalization due to barriers such as limited access to centralized authorities, lack of support from relevant civil society organizations (e.g., fishers' guilds), and complex, hard-to-navigate bureaucracies. As a result, a number of vessel owners and fishers operate outside the regulatory framework. Conversely, commercial fishing licensing policies have been found to concentrate benefits among a small number of powerful actors (see Silver and Stoll, 2019 for an analysis in a Global North context).

What is considered "legal" in fisheries management is often treated as self-evident. Yet, this status is also partly constructed by governance narratives when they legitimize certain practices, while rendering others invisible or illicit. The equation of legality with legitimacy is a powerful tool for asserting authority, shaping access, and promoting specific interests (Sikor and Lund, 2009), and this dynamic is evident among actors aligned with Narratives 1 and 2. Interchangeably used, the terms 'illegal', 'unregulated' and 'clandestine' are employed to describe segments of the pargo fishing fleet operating without formal fishing license (see also Mescouto et al., 2024); as opposed to acceptable modalities of fishing, which would be linked to the main fishing industries. In so doing, particular regulatory enforcements are justified, along with the exclusion of those deemed non-compliant, often targeting extra-industrial activities (Song et al., 2020).

Building on this, proponents of the export-quota system for the pargo fishery claim that controlling export volumes rather than landings enables more efficient and transparent accounting of fish production. Underpinning this perception is the idea that trade measures help deter unregulated and unlicensed practices; an idea also found in the broader literature (Leroy et al., 2016; Song et al., 2020; Garcia et al., 2021). However, basing quota allocations solely on export volumes overlooks the 25 % of pargo catches destined for Brazil's domestic market (Dias et al., 2023). This approach effectively excludes a significant portion of the fishing fleet from the regulatory framework. In doing so, it is likely to reinforce the divide between the highly regulated, export-oriented fishing industry and the unregulated fishing segment, which lacks the capacity to meet external market demands (Potts et al., 2011 in Foley, 2012). The discursive criminalization of unregulated and informal fishing practices reconfigures governance exclusion as a consequence of these practices, rather than recognizing such practices as emergent responses to pre-existing exclusion from governance structures.

As voiced by fishers, Narrative 3 disrupts dominant regulatory framings by exposing the deep interweaving of formal, informal, and illegal practices within the pargo fishery. Pargo fishers often need to navigate between formal and informal contractual arrangements. In the context of regulatory neglect and limited state protections, they view participation in industry-related activities as a pathway to greater legal recognition and formal status, echoing findings by Lourenço et al. (2006). Their accounts emphasize the precariousness of working and living conditions, which are rooted in broader patterns of regulatory neglect. The fishers experience limited access to social protection schemes (FAO, 2017), such as unemployment assistance (*seguro defeso*) during the closed season, pensions, and disability coverage. Even within formal employment, fishers reported facing consequences of vessel owners' illegal practices that prevent them from benefiting from their workers' right. Further challenges include low payment, economic dependency towards vessel owners through financial advances, as well as food insecurity. These findings reflect a widespread lack of compliance with International Labor Organization (ILO) standards across demersal fisheries on the Brazil-Guianas Shelf (Lout et al., 2022), challenging earlier reports highlighting the fishery's socio-economic benefits (e.g. Mescouto et al., 2024).

4.3. Global market and local scarcities

The governance of the northern Brazilian pargo fishery is deeply influenced by the requirements of the external market (Klautau et al., 2025). Despite the unpredictable and uncontrollable aspects of fishing, in the longline system, fishers receive higher pay for meeting ideal export specifications. Similar observations have been reported in other fisheries following fishing share remuneration schemes (Diegues, 1983 cited in Dias Neto, 2010; Campling et al., 2012). Share contracts shift the risks associated with low production or any other potential loss from the vessel owners to the crew (Platteau and Nugent, 1992), posing concerns of distributional equity. Fishers are thus at the forefront of the impacts due to the incongruity between the rigid market-set requirements and the daily biogeophysical dynamics affecting the pargo ant its *milieu*. As climate change alters hydrological cycles, species distributions, and fisheries productivity in Amazonian coastal ecosystems (Barros and Albernaz, 2014), it becomes essential to examine how these ecological shifts intersect with market demands and influence governance outcomes for those most affected (IPBES et al., 2024).

Narrative 3 also reveals the discrepancy between the global market's

preferences and unmet local fisher's needs. In Bragança, the pargo is landed but not sold locally. Interviewees reported that some fishers barely have what to eat during the closed season of the pargo fishery, which raises important questions about who benefits from the fishery and who is excluded from its economic, nutritional and cultural benefits. Significantly, the fishers were the only interviewees who intertwined any mention of food security in their discourse about pargo fishing. Trapped between a "fish as commodity" and "fish as nature to be protected" framing within the CPG-NN debate, the pargo is otherwise at no point acknowledged as a "fish as food" (A. Bennett et al., 2021) in the policy debates. This reflects the absence of discourse concerning nationally based market enhancements for the pargo, and, more crucially, on the significance of the pargo as a local and national source of healthy and nutrient-rich diets. Similarly, at the global level, international fisherfolks' movements raise food sovereignty to counter hegemonic discourses that commodify nature. In support of advancing aquaculture interests in northern Brazil (Brabo et al., 2016), international multilateral forums prioritize the aquaculture agenda as a means of producing more fish for consumption (e.g., FAO's Committee on Fisheries, COFI). However, this approach disregards the concerns of artisanal fishers' representatives regarding food security and quality (CLOC-La Vía Campesina and Alianza Biodiversidad, 2025). In line with A. Bennett et al. (2021), this study argues for an urgent reassessment of this gap. The findings suggest that the inclusion of fishers' perspectives into the management of the pargo fishery is a way to consider "fish as food," offering an opportunity to move beyond the dominant frameworks outlined in Narratives 1 and 2.

4.4. Fishers' representation and participation

Procedural equity requires more than access to decision-making; it demands mechanisms that accommodate epistemological pluralism and address power asymmetries (N. Bennett et al., 2025). Effective participation is a means of negotiating knowledge, authority, and legitimacy within governance. In the context of the pargo fishery, interviewees identified the *Reserva Extrativista Marinha Caeté-Taperaçú* (hereafter referred to as the RESEX, and RESEXs for its plural, generic form) as a key institutional space that enables inclusive governance (Seixas and Kalikoski, 2009), while non-fisher interviewees identified the CPG-NN.

Extractive reserves were originally designed as territorially bounded institutions for the collective management of natural resources and the protection of local traditional livelihoods (Prado and Seixas, 2018). Since pargo fishing occurs offshore, beyond the RESEX's spatial jurisdiction, it technically falls outside its institutional scope. Furthermore, the fishery exhibits characteristics of a capitalist production model, such as the presence of vessel owners external to the harvesting process and fishing companies (Diegues, 1983). This clearly distinguishes the pargo fishery from traditional extractive activities which are the focus of coastal RESEXs. Despite this, interviewed fishers reported benefiting from the RESEX Caeté-Taperaçú as artisanal fishers. These benefits included access to material goods, cash transfer programs, and social protections such as pensions and *seguro defeso*. Fishers who maintain ties to small-scale fisheries within the RESEX move between territorially grounded livelihoods and large-scale, capitalized artisanal fisheries in search of higher incomes. Consequently, they find themselves within a grey zone in terms of institutions and representation. Civil society organizations that focus on small-scale fisheries may not fully reflect the social, ecological and economic particularities of large-scale artisanal fisheries; and entities such as the fishers' guild and the artisanal fishers' union are widely perceived as being unable to ensure the rights of their members, as reflected in the fishers' net-map. Tailoring management strategies to the social and economic specifics of different fisheries, while accounting for connectivity, is crucial to achieving more inclusive governance (FAODuke University and WorldFish, 2023).

Networks of fishers and other actors can play a crucial role in enhancing participation in fisheries governance (Roberts et al., 2024). In the pargo fishery the shift to capitalist relationships marked by power imbalances between fishers and vessel owners has potentially undermined social cohesion, while limited state support further hampers collective efforts. Furthermore, governance frameworks in Brazil have historically prioritized industrial fisheries, often to the detriment of local and small-scale fishing communities (Leitão, 1995). In regions such as the Amazon, this has contributed to the marginalization of local social and economic development and the promotion of a fishing elite, reinforcing structural inequalities within extractive contexts (de Mello, 1994).

Nevertheless, the existence of multi-stakeholder advisory and consultative bodies, such as the CPG-NN, reveals valuable efforts to improve participatory fisheries governance in Brazil. The emergence of an NGO as influential actor within the CPG-NN signals a broader reconfiguration of governance networks. Similar trends, in which civil society organizations and technical experts increasingly assume authority in spaces traditionally dominated by state actors, have been documented both in other Brazilian fisheries governance contexts (Glaser et al., 2018; Doria et al., 2021) as well as in multilateral fisheries governance forums (Petersson, 2022; Gonçalves, 2025). These shifts are reshaping the balance of power and access claims among the state, market actors, and civil society. Despite these developments, the participation and knowledge of fishers remain marginalized and insufficiently integrated. In response, social movements such as the *Movimento dos Pescadores e Pescadoras Artesanais* are mobilizing to demand the systematic inclusion of artisanal fishers' voices in decision-making spaces (Movimento dos Pescadores e Pescadoras Artesanais – MPP, 2024).

To include fishers more effectively in the CPG-NN, concrete participation standards must be set and enforced for all relevant parties. As Trimble et al. (2014) argue, the government needs to rebuild trust and establish a supportive relationship with fishers. This can be achieved through strategies such as capacity building to promote fish workers' organizations, and transparent selection mechanisms to ensure democratic, bottom-up decision-making on representation and accountability. CPG-NN meetings should be organized in a way that accommodates fishers' availability to participate in terms of dates, times, and modalities. This study recommends establishing a dedicated advisory structure linked to the CPG-NN (and, by extension, the other CPGs) that include artisanal fishers' representatives to develop indicators, methods and evaluation approaches that promote social equity in the pargo fishery and governance processes. These could be based on N. Bennett et al.'s (2025) five-step guidance for supporting ocean equity. In order to achieve sustainable marine fisheries in Brazil, it is essential that equity in fisheries management not only be a goal of public policy, but also an integral part of fisheries governance practices and processes (Roberts et al., 2024; N. Bennett et al., 2025).

5. Conclusions

This study examined how the differing perceptions of the pargo (Caribbean red snapper, *Lutjanus purpureus*) fishery and its governance held by key actors, have distinct equity implications in northern Brazil. The fact that pargo fishers are *de facto* not represented in the *Comitê Permanente de Gestão da Pesca e do Uso Sustentável dos Recursos Pesqueiros Demersais das Regiões Norte e Nordeste* (Permanent Management Committee for Fishing and Sustainable Use of Fish Resources of the North and Northeast Regions, CPG-NN) indicates that current governance is fundamentally not procedurally equitable. This study shows that this has implications for distributional equity. The pargo is predominantly conceptualized by CPG-NN actors as either "fish as commodity" or "fish as nature to be protected", leaving limited space for an approach that recognizes the contribution of different groups within this fishery in the production of "fish for food" (A. Bennett et al., 2021). This study advocates for a governance approach to the pargo fishery that *de facto* incorporates the voices of fishers, addresses the poor labor conditions,

and reintegrates the fishery into the broader food security discourse. This imperative is particularly acute in the coastal Brazilian Amazon, where aquaculture interests are expanding in the name of increased food production, oil exploration prospects coincide with pargo fishing grounds, and the establishment of a marine protected area to counteract these developments is under consideration.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix 1. Full name and description of the acronyms (with actual organization's acronym at the time of the interviews) in the perceived governance networks of: A) pargo fishers; B) federal environmental agency; and the C) vessel owner's cooperative

Net-map ID	Acronym	Full name or description
A	LOBSTER_IND	*Lagosta* (caribbean spiny lobster and smoothtail spiny lobster) fishery, industrial
	LOBSTER_ART	*Lagosta* (caribbean spiny lobster and smoothtail spiny lobster) fishery, artisanal
	BRA_NAVY	Brazilian Navy
	CAT_OTH_FISH	*Pescada-amarela* (acoupa weakfish), *gurijuba* (gillbacker sea catfish), *corvina* (croaker), net and longline, coastal
	USER_RESEX	Users' Association of the Resex Caeté-Taperaçú (ASSUREMACATA)
	IBAMA_MMA	*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* (Brazilian Institute for the Environment and Renewable Natural Resources, IBAMA_linked to the Ministry of the Environment)
	PARGO_IND	Pargo (red snapper) fishery, industrial
	PARO_ART	Pargo (red snapper) fishery, artisanal
	FI_GUILD	Fishers' guild Z-17 of Bragança
	ART_FI_UNION	Artisanal fishers' union of Bragança
	V_OWNER_P	Vessel owners (person)
	V_OWNER_L	Vessel owners (company)
	MTE_LAB	*Ministério do Trabalho e Emprego* (MTE, Ministry of Labour and Employment)
	WORK_RIGHT	Public agency for maritime worker's right
	PORT_NAVY	Port Captaincy of the Brazilian Navy
B	MDIC_IND	*Ministério do Desenvolvimento, Indústria, Comércio e Serviços* (MDIC, Ministry of Development, Industry, Trade and Services)
	MPA_FISH	*Ministério da Pesca e Aquicultura* (MPA, Ministry of Fisheries and Aquaculture)
	ICMBIO_MMA	*Instituto Chico Mendes de Conservação da Biodiversidade* (Chico Mendes Institute for Biodiversity Conservation, ICMBio_linked to the Ministry of the Environment)
	MAPA_AGRI	*Ministério da Agricultura e Pecuária* (MAPA, Ministry of Agriculture, Livestock and Supply)
	CPG	Comitê Permanente de Gestão (CPG, Standing Management Committees, e.g. CPG-NN)
	MMA_ENV	*Ministério do Meio Ambiente e Mudança do Clima* (Ministry of the Environment and Climate Change, MMA)
	IBAMA_MMA	*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* (Brazilian Institute for the Environment and Renewable Natural Resources, IBAMA_linked to the Ministry of the Environment)
	SHRIMP_LCAT_OTH	*Camarão* (shrimp), *piramutaba* (laulao catfish) and diverse fishes fisheries
	INT_MARKT	International market
	BRA_MARKT	National market
	INTERM	Intermediary (Bragança)
	IND_BRAG	Fishing industry (Bragança)
	IND_BELE	Fishing industry (Belém)
	L_SNAP_OTH	*Ariacó* (lane snapper and *cioba* (dog snapper) fishery
	PARGO_ART	Pargo (red snapper) fishery, artisanal
	SSF_MSF	Small and medium-scale fisheries
	GILL_LONG_FISH	Fisher fishing diverse fishes with gillnet and longline
	CONEPE_COLL	*Coletivo Nacional da Pesca e Aquicultura* (CONEPE, National Fisheries and Aquaculture Collective)
	V_OWNER_COOP	Regional-level fishing and aquaculture cooperative
	RESEARCH	Research organizations
	MONAPE_MOVE	*Movimento Nacional dos Pescadores* (MONAPE, National Fishermen's Movement)
	NGO	Non-Governmental Organizations
	FISH_IND_UNION	State-level fishing industries' union
	OTH_FISH_IND_UNION	Union of Artisanal Fishermen and Fisherwomen of the State of Pará and Amapá (SINDPESCA); Union of Fishermen, Artisanal Fisherwomen and Aquaculture Producers of the Municipality of Baião, Mocajuba and Region-PA (SINPAB)
	MOPEPA_MOVE	*Movimento dos Pescadores do Estado do Pará* (MOPEPA, Fishermen's Movement of the State of Pará)
	FISHER_FED	*Federação dos Pescadores do Pará* (FEPA, Federation of Fishers from Pará)
	FI_GUILD	*Colônia de Pescadores de Bragança Z-17* (Bragança Fishers' Guild Z-17)
	PORT_ESPADARTE	Port of Espadarte
	OIL	Oil extraction

(*continued on next page*)

(*continued*)

Net-map ID	Acronym	Full name or description
	PIT_RIVER	Stone pit blasting and dredging of the Tocantins river
C	L_CATFISH	*Piramutaba* (laulao catfish) trawling fishery
	PARGO_IND	Pargo (red snapper) fishery using longline, trap, *caíco* (small canoe)
	A_WEAKFISH	*Pescada-amarela* (acoupa weakfish), net and longline
	G_CATFISH	*Gurijuba* (gillbacker sea catfish), horizontal bottom longline
	SHRIMP	*Camarão-rosa* (red shrimp), trawling
	BRA_NAVY	Brazilian Navy
	MPA_FISH	*Ministério da Pesca e Aquicultura* (MPA, Ministry of Fisheries and Aquaculture)
	IBAMA_MMA	*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* (Brazilian Institute for the Environment and Renewable Natural Resources, IBAMA_linked to the Ministry of the Environment)
	V_OWNER_P	Vessel owner (person)
	MMA_ENV	*Ministério do Meio Ambiente e Mudança do Clima* (Ministry of the Environment and Climate Change, MMA)
	V_OWNER_L	Vessel owners (legal entity)
	V_OWNER_COOP	Regional-level fishing and aquaculture cooperative
	V_OWNER_IND	Industry vessel owner, processing
	MTE_LAB	*Ministério do Trabalho e Emprego* (Federal Ministry of Labour and Employment, MTE)
	PROCESS_EXP	Fish Processing and export companies
	OCB_BRA_COOP	*Organização das Cooperativas Brasileiras* (OCB, Organization of Brazilian Cooperatives)
	UNI	Universities (UFPA and UFRA)

Data availability

The authors do not have permission to share data.

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