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ARTISANAL FISHING AND SUSTAINABILITY IN THE AMAZON: TENSIONS UNDERWAY ON THE OCEANIC COAST OF AMAPÁ

PESCA ARTESANAL E SUSTENTABILIDADE NA AMAZÔNIA: TENSÕES EM CURSO NA COSTA OCEÂNICA DO AMAPÁ

PESCA ARTESANAL Y SOSTENIBILIDAD EN LA AMAZONÍA: TENSIONES EN CURSO EN LA COSTA OCEÁNICA DE AMAPÁ

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ABSTRACT

Artisanal fishing along the Amazonian coast is a core activity for traditional fishing communities, including in border areas where different interests and ways of using natural resources overlap. On the oceanic coast of Amapá, located on Brazil's northern border, artisanal fishing takes place in a setting shaped by conflicts with medium and large-scale vessels, the subordinate integration of small-scale fishers into production chains, and the expansion of capitalist strategies aimed at exploiting marine resources. This article seeks to characterize artisanal fishing in the region and to examine the challenges faced by traditional fishers amid declining autonomy and growing threats to the sustainability of marine fauna. The study adopts a participatory ethnographic approach, based on long-term fieldwork that included participant observation, systematic field notes, and direct engagement with fishers both at sea and in their daily activities in the municipalities of Oiapoque and Calçoene, in northern Amapá. The findings reveal an increasing dependence of artisanal fishers on private financing arrangements, linked to the control of key inputs and fish marketing, which reinforces unequal power relations within the fishing chain. In addition, rising pressure on marine species was identified, particularly on the yellow croaker (Cynoscion acoupa), driven by the high value of its swim bladder on the international market, posing significant risks to environmental sustainability and to the continuity of traditional artisanal fishing in the region.

Keywords: Traditional Artisanal Fishing. Sustainability. Amazon. Marine Natural Resources.

RESUMO

A pesca artesanal na Amazônia costeira constitui uma atividade central para as populações pesqueiras tradicionais, incluindo na região de fronteira, onde diferentes interesses e formas de apropriação dos recursos naturais se sobrepõem. Na costa oceânica do estado do Amapá, situada na fronteira norte do Brasil, a pesca artesanal tradicional se desenvolve em um contexto marcado pelas disputas com as embarcações de médio e grande porte, pela inserção subordinada dos pescadores artesanais nas cadeias produtivas e pelo

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avanço de estratégias capitalistas de exploração dos recursos pesqueiros marinhos. Este artigo tem como objetivo caracterizar a pesca artesanal na região, analisando os desafios enfrentados pelos pescadores artesanais tradicionais em um contexto de perda de autonomia e de ameaças à sustentabilidade da fauna marinha. A pesquisa adota uma abordagem etnográfica de caráter participativo, baseada em imersão prolongada em campo, observação participante e registro sistemático em diário de campo, a partir do acompanhamento de pescadores artesanais em alto mar e em atividades realizadas nos municípios de Oiapoque e Calçoene, no extremo norte do Amapá. Os resultados evidenciam uma crescente dependência dos pescadores artesanais de esquemas privados de financiamento, associados ao controle de insumos estratégicos e da comercialização do pescado, configurando relações assimétricas de poder na cadeia da pesca. Constatou-se, ainda, o aumento da pressão sobre a fauna marinha, com destaque para a pescada amarela (Cynoscion acoupa), impulsionada pela valorização de sua bexiga natatória no mercado internacional, o que amplia os riscos à sustentabilidade ambiental e à continuidade da pesca artesanal tradicional na região.

Palavras-chave: Pesca Artesanal Tradicional. Sustentabilidade. Amazônia. Recursos Naturais Marítimos.

RESUMEN

La pesca artesanal en la Amazonía costera constituye una actividad central para las poblaciones pesqueras tradicionales, incluida la región de frontera, donde se superponen distintos intereses y formas de apropiación de los recursos naturales. En la costa oceánica del estado de Amapá, situada en la frontera norte de Brasil, la pesca artesanal tradicional se desarrolla en un contexto marcado por disputas con embarcaciones de mediano y gran porte, por la inserción subordinada de los pescadores artesanales en las cadenas productivas y por el avance de estrategias capitalistas de explotación de los recursos pesqueros marinos. Este artículo tiene como objetivo caracterizar la pesca artesanal en la región, analizando los desafíos que enfrentan los pescadores artesanales tradicionales en un contexto de pérdida de autonomía y de amenazas a la sostenibilidad de la fauna marina. La investigación adopta un enfoque etnográfico de carácter participativo, basado en una inmersión prolongada en campo, observación participante y registro sistemático en diario de campo, a partir del acompañamiento de pescadores artesanales en alta mar y en actividades realizadas en los municipios de Oiapoque y Calçoene, en el extremo norte de Amapá. Los resultados evidencian una creciente dependencia de los pescadores artesanales respecto de esquemas privados de financiamiento, asociados al control de insumos estratégicos y de la comercialización del pescado, configurando relaciones asimétricas de poder en la cadena pesquera. Asimismo, se constató un aumento de la presión sobre la fauna marina, con especial énfasis en la corvina amarilla (Cynoscion acoupa), impulsado por la valorización de su vejiga natatoria en el mercado internacional, lo que incrementa los riesgos para la sostenibilidad ambiental y la continuidad de la pesca artesanal tradicional en la región.

Palabras clave: Pesca Artesanal Tradicional. Sostenibilidad. Amazonía. Recursos Naturales Marinos.

1 INTRODUCTION

Artisanal fishing is an economic, social, and cultural activity of major importance for coastal populations in the Brazilian Amazon, including those living in border regions where different interests and values related to fishing intersect. Traditional artisanal fishing is understood as a way of life, grounded in local ecological knowledge, community relationships, and historically shaped interactions with aquatic environments (Diegues, 1983). In this context, fishing plays a central role in sustaining local communities and ensuring regional food security.

On the oceanic coast of the state of Amapá, located on Brazil's northern border with French Guiana, artisanal fishing takes place in a setting characterized by intense interaction with fishers from other Brazilian states and from countries in the Guianas Region. This configuration gives the region a complex and dynamic character, marked by power asymmetries in access to natural resources, productive inputs, and consumer markets. In recent decades, these tensions have intensified as Amazonian marine resources have become increasingly incorporated into capitalist accumulation strategies (Boulet; Levy, 2018). As a result, traditional artisanal fishers have come to occupy increasingly subordinate positions within fishing production chains, largely due to the technical limitations of their vessels and difficulties in securing financial resources to support fishing trips.

The municipalities of Calçoene and Oiapoque clearly illustrate this situation. Between May and November, vessel density along the Amapá coast increases significantly, with the presence of medium and large-scale boats from the Brazilian states of Pará, Maranhão, and Piauí, as well as from countries such as Venezuela, French Guiana, and Suriname. This intensification of fishing activity heightens disputes over fishing grounds and strategic inputs—most notably ice, which is essential for fish preservation and a key factor in shaping inequalities between vessels of different sizes.

Among the most heavily targeted species in the region is the yellow croaker (*Cynoscion acoupa*), whose economic relevance extends beyond its role in food markets. The growing international demand for its swim bladder, locally known as *grude*, particularly in Asian markets, has reshaped fishing practices, increasing pressure on the species and heightening environmental risks associated with its exploitation (Freire, 2019; Jimenez et al., 2019). This process links Amazonian artisanal fishing more directly to global value chains, highlighting the subordinate integration of traditional communities into contemporary capitalist dynamics.

Given this context, this article aims to characterize artisanal fishing in the region in light of the challenges faced by traditional artisanal fishers confronting the advancement of

capitalist strategies for appropriating oceanic fishing natural resources. It seeks to understand how artisanal fishers experience and interpret ongoing transformations, especially regarding loss of productive autonomy, dependence on private financing schemes, and threats to the sustainability of marine natural resources, with emphasis on pressure over the yellow croaker. By adopting an ethnographic approach, the study intends to contribute to the debate on fishing governance, sustainability of marine fauna, and protection of traditional artisanal fishing in the coastal Amazon, reinforcing the centrality of artisanal fishers in the social and environmental sustainability of fishing (Jentoft, 2017).

2. MATERIALS AND METHOD

2.1 METHODOLOGICAL PROCEDURES AND STUDY AREA

This research aims to investigate territorial tensions underway in the border region in northern Brazil. The conceptual foundation that methodologically grounds the work is ethnographic, with an approach anchored in Geertz (1997; 1989), which considers that subjects are immersed in a cultural system of meanings and that, in this sense, the interpretation of relations that people construct of themselves and the spaces they inhabit must be contextualized.

This understanding is closely connected to the consolidation of ethnography as a method, particularly in the work of Malinowski (1976), one of its foundational figures. Malinowski emphasized prolonged field immersion and participant observation as essential to understanding social life and cultural practices. Building on this tradition, Geertz (1989) revisits Malinowski's approach and highlights interpretation as a central element of ethnographic analysis. He frames fieldwork as a hermeneutic process, in which social relations are seen as dense with meaning and cannot be understood solely through the description of behavior, but rather through the interpretation of their situated and contextual significance. Guided by this perspective, the present study seeks to understand how social actors construct discourses that sustain their perceptions of reality, particularly in relation to territorial belonging and the tensions that challenge and reshape these territorialities.

Contributions from other interpretive scholars further inform this approach. Authors such as Turner (2008) and Douglas (1991) have expanded the debate on context-based ethnography by emphasizing symbolic and classificatory dimensions of social life. Turner's concept of liminality refers to an in-between space in which different groups encounter and negotiate difference, a notion later reworked by Bhabha (2013) within postcolonial cultural studies. *Liminality* helps illuminate contexts of tension—such as border regions—as symbolic arenas where identities, positions, and meanings are continuously negotiated.

Douglas (1991), in turn, underscores the importance of cultural classifications and symbolic boundaries in shaping processes of belonging and exclusion. Together, these perspectives deepen the analysis of conflictual territories by revealing how symbolic distinctions structure political practices and social relations.

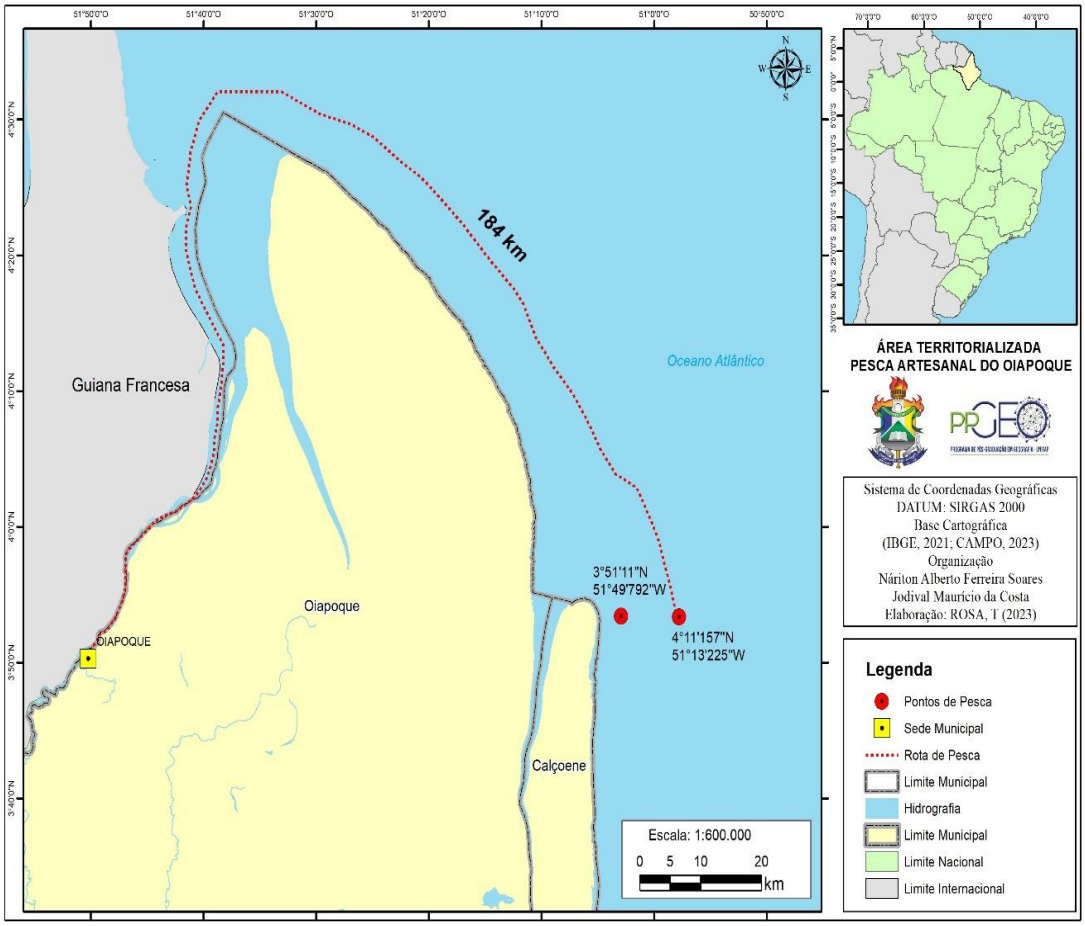
From this standpoint, the study of territorial tensions in the northern border region calls for an interpretive ethnographic approach capable of articulating local meanings, everyday practices, and historical power structures. Geertz's framework provides the methodological basis for interpreting the symbolic webs that guide social action, while the contributions of other authors enrich this reading by incorporating dimensions such as colonial legacies, social inequalities, and specific ways of inhabiting and narrating territory. The research is thus grounded in an ethnographic tradition that combines interpretation, sustained field engagement, and attention to the social and symbolic complexities that shape contemporary Amazonian borders.

In terms of research design, a participatory research approach was adopted, enabling participant observation alongside fishers at sea and allowing the researcher to engage inductively with the research process. According to Geertz (1997), this type of approach allows interpretations to be constructed from within the social context, increasing the researcher's ability to grasp the dynamics through which social relations are produced. Malinowski (1976) likewise highlights participant observation and prolonged fieldwork as central to understanding the sociocultural processes of a society, establishing daily immersion as a core principle of ethnographic research.

Methodologically, the study was based on field data collected directly with the actors involved. In addition to participatory observation, the research employed active listening, logbooks, and systematic field notes, which were essential for documenting the tensions present in the fishing territory, their underlying drivers, and the challenges faced by fishers in contexts of conflict. The perspectives of those immersed in this territorial setting were fundamental to interpreting the meanings attributed to these phenomena. Fieldwork at sea was carried out over 12 days aboard a fishing vessel with four fishers, allowing for close observation of labor relations in the fishing environment. This was complemented by six additional field trips to the municipalities under study, covering the entire Oiapoque River basin and the oceanic coast of the municipality of Calçoene. Figure 01 illustrates the study area and identifies the routes departing from Oiapoque and Calçoene. Calçoene functions as a fishing entrepôt due to its proximity to the sea and greater availability of ice, while Oiapoque, although it has direct access to the ocean via the Oiapoque River, does not have the same capacity for ice supply.

Figure 1

Fishing Points in the Atlantic Ocean



Source: Prepared Elaborated by the authors. 2023.

3 RESULTS AND DISCUSSION

3.1 CHARACTERIZATION OF ARTISANAL FISHING ON THE AMAPÁ COAST: VULNERABILITIES AND TENSIONS

Fishing on the oceanic coast of Amapá has as its main capture targets seven fish species: the *yellow croaker* (Cynoscion acoupa), *cambucu croaker* (Cynoscion virescens), *white croaker* (Cynoscion leiachus), *gó croaker* (Macrodon ancylodon), *gurijuba* (Arius parkeri), *corvina* (Micropogonias furnieri), and *robalo* (Centropomus undecimalis).

Artisanal fishing in the Amazon, particularly along the oceanic coast, involves different types of vessels and fishers. Among them are the region's traditional fishers, who are custodians of extensive knowledge of Amazonian waters, both rivers and sea. These fishers operate small vessels with an average storage capacity of between 3.5 and 4.5 tons of fish (Interlocutor 1). Small and medium-sized vessels from the municipalities of Oiapoque and Calçoene typically use coarse-mesh nets (0.65 mm), which reduce the capture of juvenile fish and contribute to the balance of riverine and marine fauna. In contrast, medium and

large-sized vessels from other Brazilian states and from neighboring countries use fine-mesh nets (0.35 mm). Although this type of net is prohibited under Brazilian environmental infra-constitutional legislation because it captures species unsuitable for fishing, enforcement remains weak.

Vessel size and cargo capacity directly shape the duration and spatial range of fishing trips, as they limit both navigation in deeper waters and onboard storage. Most of the fishers interviewed reported that they can engage only in “shore fishing” and remain at sea for no more than one week due to these vessel constraints. This situation highlights infrastructural vulnerabilities related to both the vessels themselves and fish storage logistics.

In this study, logistics is understood as the storage, preservation, and transport of fish to consumer markets. For the fishers who participated in the research, all catches are sold immediately upon arrival in the municipalities of Calçoene and Oiapoque. As a result, logistics in this context primarily concerns storage and preservation during the fishing trip, making ice the most critical input in regional fishing activity. Limited access to ice represents a major vulnerability for small-scale artisanal fishing throughout the Brazilian Amazon, including in Amapá. In Calçoene, there are three ice factories: one public facility managed by the Amapá Fisheries Agency (Pescap) and two private plants—the Atlântico Norte Pescados Factory and the Calçomar Factory. In addition, the Cunhaú Fishing Company operates an ice factory primarily for its own use, but it also supplies third-party vessels on the condition that they grant the company exclusive rights to purchase their catch and its by-products, such as *grude.*

At the other end of the spectrum of traditional artisanal fishing are operations oriented toward large-scale commercial and industrial activity, involving vessels with storage capacities of up to 30 tons (Interlocutor 1, Interlocutor 2)[3]. Given their greater storage capacity and the limited supply of ice in the region, these larger vessels are able to purchase most of the available ice, which creates significant constraints for smaller boats that depend on ice to preserve their catch. This imbalance is a key factor behind the practice locally known as “louse fishing,” in which small vessels operate as auxiliaries to a larger “mother boat.” In this arrangement, the so-called “louse boat” may fish to supply the mother vessel, provide security against cargo theft, and/or monitor fishing nets to prevent their theft or damage by other boats. According to the interlocutors, difficulties in accessing ice intensify between May and November, a period that coincides with the highest influx of vessels from other Brazilian states and from the Guianas region.

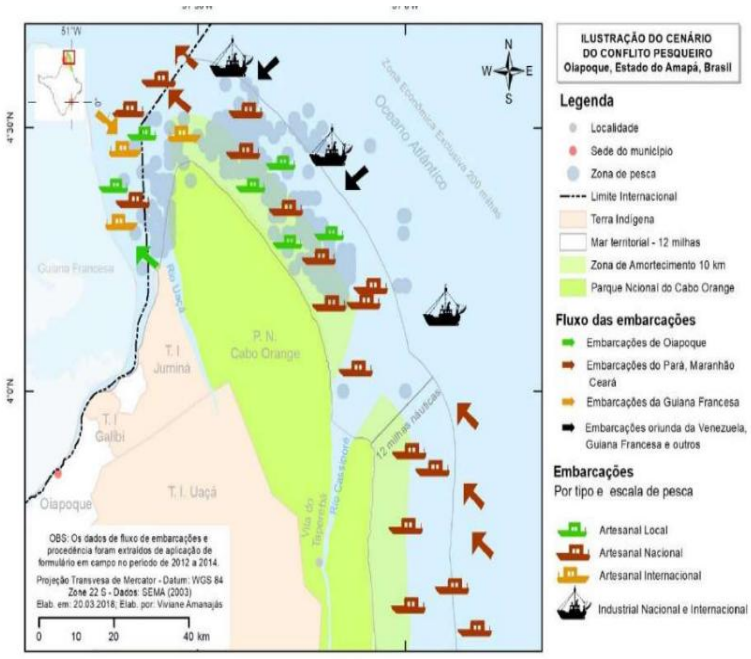
[3] Interviews shared in January, 2025.

The number of vessels from other states here in Calçoene has increased significantly. Large boats, some with storage capacities of up to 30 tons, begin arriving in May and remain until November. Some come with their families, rent houses in Calçoene, and stay for several months. What makes this period especially difficult for us is access to ice, because these vessels buy large quantities, leaving little or none available for small-scale fishers. (Interlocutor 2. Fieldwork conducted with fishers from Calçoene, January 2025).

Asymmetries in the ability to acquire fishing inputs such as ice, differences in vessel typology, and unequal access to financial resources reveal the vulnerability of small-scale artisanal fishers and threaten the continuity of fishing as a traditional activity in the Amazon. Figure 02 illustrates the spatial distribution of vessels along the Amapá coast, showing that local boats are not only fewer in number but are also concentrated in estuarine zones or areas close to the coastline, where they practice what research interlocutors refer to as “shore fishing.” This pattern is largely explained by vessel typology, as these boats are not suitable for navigating or operating in deeper waters.

Figure 2

Area of Concentration of Fishers on the Amapá Coast



Source: Prepared by Amanajás (2019) based on the cartographic Table of SEMA (AMAPÁ, 2003).

According to the interlocutors, these traditional artisanal fishers have lost the capacity to finance their own fishing. This opened space for the increase in power of an actor increasingly common in this region: the entrepreneur who finances small-scale artisanal fishing. This entrepreneur pays the costs of the fishing trip, on the condition that, in addition

to payment of the invested amount, they also have exclusivity in the purchase of captured fish and *grude*.

This arrangement can be understood as a reconfiguration of the historic *aviamento system*, which was widespread in the Amazon during the second half of the nineteenth century and the early twentieth century in the context of the rubber economy. In its contemporary form, however, it incorporates elements of labor outsourcing characteristic of the current period, resulting in the increased precarization of traditional artisanal fishers. Lacking the financial resources to fund fishing trips independently, fishers turn to entrepreneurs in the fishing sector who, in exchange for financing the trip, require exclusive rights to purchase the catch, thereby creating a cycle of dependency.

According to Interlocutor 1, the cost of a week-long fishing trip averages five thousand reais (5,000.00), accounting for expenses with fuel, ice, food, and boat crew. The average profit from a fishing trip of the interviewed interlocutors is one thousand five hundred reais (1,500.00), a reality that explains the vicious circle of the fishing *aviamento* scheme. According to an interlocutor's account, the fishing sector entrepreneur is the guarantee that the fishing trip happens: “The artisanal fisher here can fish thanks to the boss. I can't go out fishing without the help of the “patrão”[4]. What we earn from one trip[5] doesn't leave anything to pay for another trip.” (Interlocutor 1, Fieldwork, Calçoene/AP, August 2025).

This scheme is also the continuity of the “middleman,” with the difference that some of these entrepreneurs, whom the fisher refers to as “boss”, promote the verticalization of production, as they process the product to make it available on the market, principally the sale of frozen fish fillets. The middleman, at least as we traditionally know them in the Amazon, buys in-natura product to sell to processing and distribution centers. Beyond these, other actors integrate fishing governance on the Amapá coast, as can be observed in Table 1.

[4] “*Patrão*” (“boss”) is the term used by the fisher interlocutor to refer to the entrepreneur who finances the fishing activity.
[5] “Viagem” (“trip”) is the term used to refer to a fishing expedition lasting several days; in the case of this interlocutor, one week.

Table 1

Governance of the Fishing Chain on the Amapá Coast

Actors	Main Actions
Small-scale artisanal fisher	Hold extensive knowledge of fishing practices and local environmental dynamics; Play a central role in fishing as a food system; Experience socio-economic vulnerability that places them in a subordinate position within the fishing chain.
Commercial artisanal fisher/Industrial fishing	Vessels with storage capacities ranging from 18 to 30 tons; Large ice and fish storage capacity, allowing fishing trips lasting several weeks; Operate as “mother boats” for smaller vessels that are unable to fish independently due to lack of inputs, especially ice; Use drag fishing methods, which cause greater environmental damage by capturing species unsuitable for fishing; Control the most productive fishing areas and prioritize species with higher commercial value.
Entrepreneur/Middleman	Plays a central role in the artisanal fishing chain, often representing the only avenue for market access; Occupies an ambiguous position, as it both benefits from fishers’ vulnerable conditions and, according to the fishers themselves, enables the commercialization of their catch; Builds and maintains relationships of trust with fishers.
Private Ice Companies	Based on fieldwork conducted in Jubim, Amapá, and on the relevant literature, ice supply can be identified as the main constraint facing artisanal fishing in the Amazon; Limited supply combined with high demand drives up ice prices, which are largely regulated by entrepreneurs within the fishing sector.
Governments: Federal, State, Municipal	Three levels of government action were identified, some involving direct intervention and others consisting of action plans that may evolve into effective public policies; At the state level, the government of Amapá, through Pescap, provides support and operates an ice factory in the municipality of Calçoene; At the federal level, the main policy identified is unemployment insurance, which, although relevant for income support, is not considered a development-oriented policy.

Source: Elaborated by the authors based on fieldwork with fishers from Oiapoque and Calçoene, Amapá, conducted between January 2024 and January 2025.

3.2 THE VALORIZATION OF THE SWIM BLADDER (GRUDE) AND PRESSURE ON THE YELLOW CROAKER

Fishing in the Amazon is driven not only by the commercialization of fish meat but also by the trade in the swim bladders of certain species, popularly known as “*grude*”[6]. This product is traded mainly along the coast of the states of Pará, Maranhão, and Amapá. Among the species targeted, the swim bladder of the yellow croaker has the highest market

[6] *In the text, we chose to use both expressions: swim bladder and grude.*

value, distinguished by its greater thickness compared to other fish. Its price ranges between R$3,000 and R$3,500 per kilogram, which has stimulated an intense pursuit of this species and significantly increased fishing pressure. In northern Brazil, particularly in Pará and Amapá, the market for *grude* is intense and largely unregulated, with commercial relationships established directly by actors involved in its capture and sale. This situation is partly explained by the absence of a specific regulatory framework for swim bladder exports in Brazil's official export records. Although it is technically a fish byproduct, the high commercial value of *grude* often makes it more valuable than the fish itself.

Grude has a wide range of uses. Traditionally valued for its strong adhesive properties and ability to form firm, transparent gels, it is rich in natural fibers that give it a fine and uniform texture (Almeida; Santos, 2022). In the food industry, it is used to provide texture, stability, and gloss to jellies, confectionery, and desserts, and also functions as a clarifying agent in beverages such as beer and wine, helping to remove impurities and improve product appearance (Marinho at al, 2021). It is additionally employed as a binding agent in the manufacture of sandpaper and match heads, due to its resistance and strong adhesive capacity (Almeida; Santos, 2022). Although *grude* has gained greater visibility in recent decades, it has long been used by Amazonian riverside populations in artisanal practices that valorize fishing byproducts (Marinho et al., 2021). This demonstrates how traditional knowledge of forest and aquatic resources has historically underpinned industrial uses of these materials.

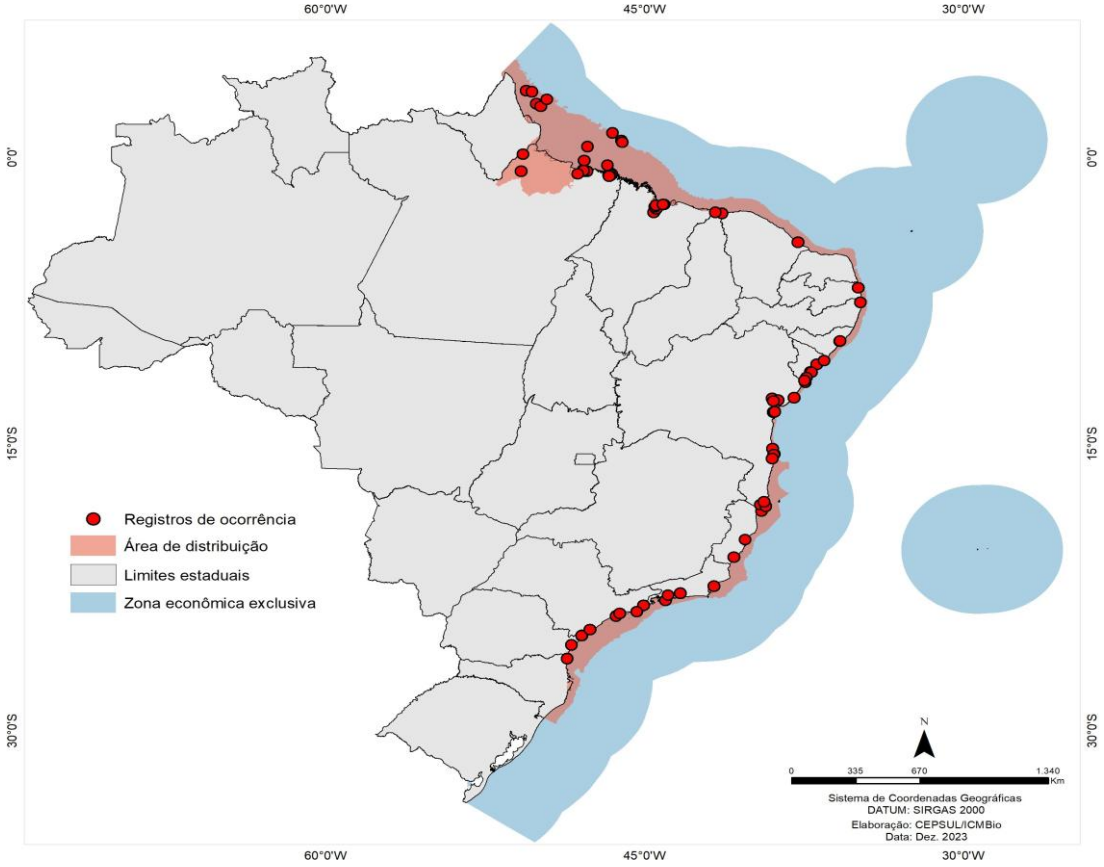
The primary destination of *grude* is the Asian market, particularly China. As noted by Bruno Morin, vice-director of maritime administration in French Guiana, "dried and ground into powder, the swim bladder is highly valued in Asia and was one of the seven dishes of Chinese emperors. In China, it is somewhat comparable to truffles" (Azzaro, 2019). According to Azzaro (2019), Chinese interest in yellow croaker *grude* has intensified partly because the totoaba—a species from the Gulf of California whose swim bladder is highly prized for medicinal purposes—has been listed as endangered due to overfishing.

This growing demand for yellow croaker has raised increasing concern within academic circles, prompting studies aimed at assessing its impacts on marine conservation, including risks of overfishing and potential population collapse (Freire, 2019; Jimenez et al., 2019; Jimenez, 2019). Similar concerns have emerged in French Guiana, which over the past decade has experienced dynamics comparable to those observed in Brazil regarding the exploitation of yellow croaker swim bladders (Azzaro, 2019; Marot, 2024). In Brazil, the yellow croaker is already classified by ICMBio as a species under pressure (Figure 03), due to high demand for both its meat and, especially, the extraction of *grude* (Frédou et al.,

2025). According to Azzaro (2019), approximately 30 kilograms of yellow croaker are required to produce just one kilogram of dried *grude*, underscoring the scale of fishing pressure exerted on the species.

Figure 3

Areas of Threats to Marine Fauna



Source: ICMBio, 2023. Accessed in December 2025.

In Pará, which hosts the main fish landing ports for catches from the Amapá coast, the yellow croaker accounts for 19% of the total landed species, according to the most recent data from 2018 (Mourão et al., 2018). This figure may be even higher, as official fisheries statistics in northern Brazil are widely underreported due to limited enforcement and institutional constraints on the ability of public agencies to monitor production.

3.3 THREATS TO THE SUSTAINABILITY OF NATURAL RESOURCES AND TRADITIONAL FISHING

The vulnerabilities experienced by small-scale artisanal fishers on the Amapá coast arise from the interplay between longstanding limitations in access to public policies and more recent transformations in the productive dynamics of marine fishing. These transformations have been intensified by the growing incorporation of marine resources into

economic strategies associated with a capitalist-oriented *Blue Economy.* Historically, these fishers have remained at the margins of development, credit, and infrastructure policies, which have constrained their capacity for productive modernization and adaptation to structural changes in the fishing sector.

In the contemporary context, there is a progressive loss of autonomy in fishing practices, as the activity increasingly depends on private financing arrangements, systems of business *aviamento*, and the intervention of middlemen. These actors control strategic inputs, commercialization channels, and, in many cases, the prices paid for fish and its byproducts, such as *grude*. This situation is further aggravated by asymmetrical competition for essential inputs—particularly ice—whose limited availability and concentration among medium and large-scale vessels impose significant restrictions on small-scale artisanal fishing.

The absence of effective public policies aimed at vessel acquisition or modernization confines many fishers to so-called “shore fishing,” restricted to estuarine and shallow coastal areas. This territorial limitation reduces both the volume and diversity of species captured and intensifies competition over fishing grounds, which are often appropriated and controlled by vessels with superior technical, financial, and logistical capacity. These dynamics reveal a clear asymmetry in access to natural resources, whereby the economic benefits of fishing activity are concentrated among the most capitalized actors in the production chain, highlighting power imbalances in regional fishing governance.

From a labor perspective, this process reflects the expansion of precarization within an activity traditionally organized around family and community structures, in line with Antunes’ (2018) analyses of outsourcing and labor precarization. Artisanal fishing becomes subordinately integrated into expanded market circuits, resulting in the gradual dispossession of conditions necessary for autonomous work. This precarization manifests in reduced fisher control over time, space, and means of production, weakening traditional strategies of social reproduction.

Regarding the sustainability of natural resources, although there is no conclusive evidence of overfishing on the Amapá coast, recent FAO reports (2022; 2023; 2024) warn of a global trend toward intensified fishing pressure, driven by increased fish consumption and the expansion of international value chains, including those associated with the commercialization of *grude*. In the regional context, particular concern centers on the growing pressure on yellow croaker stocks, driven not only by demand for its meat but, above all, by the rising value of its swim bladder on international markets. This dynamic heightens environmental risks to marine fauna by encouraging predatory practices and

intensifying exploitation of a species already classified as under pressure, thereby compromising both ecological sustainability and the continuity of traditional artisanal fishing in the region.

4 CONCLUSIONS

This study shows that artisanal fishing on the Amapá coast, located in a border region of the Amazon, is shaped by a set of social and environmental challenges that go well beyond isolated tensions between fishing vessels. The dynamics observed point to structural processes linked to the growing presence of external actors, the intensification of marine resource exploitation, and the increasing incorporation of traditional fishing into capitalist accumulation strategies.

The results reveal a progressive loss of autonomy among traditional artisanal fishers, particularly those operating small-sized vessels. This loss is expressed through dependence on private financing schemes, the reconfiguration of *aviamento* in new forms, and subordination to middlemen and fishing entrepreneurs who control strategic inputs, commercialization channels, and, in many cases, the prices paid for fish and its byproducts, such as *grude*. Unequal access to essential inputs—especially ice—further deepens these vulnerabilities, limiting the time fishers can remain at sea. This context also exposes the fragility of state action, as these fishers face significant barriers in accessing public policies capable of ensuring productive autonomy.

Amapá's border condition intensifies these vulnerabilities by transforming maritime space into an arena of tension marked by power asymmetries. In this context, so-called "shore fishing" emerges not as a technical or cultural choice, but as a constraint imposed by unequal access to vessels, technology, and infrastructure. This configuration reinforces the marginalization of local fishers within the fishing production chain itself, concentrating economic benefits in the hands of the most capitalized actors.

From a labor perspective, the research demonstrates that traditional artisanal fishing increasingly incorporates features typical of contemporary processes of labor precarization, approaching forms of outsourcing and subordination to capital. These dynamics undermine income stability, reduce fishers' control over the organization of their work, and weaken strategies of social reproduction, threatening historically constructed ways of life.

Concerning environmental sustainability, although no conclusive data confirm overfishing on the Amapá coast, dialogue with interlocutors and existing research indicate growing pressure on marine fauna, particularly the yellow croaker. The rising international value of the swim bladder reshapes fishing practices, encouraging more intensive and

potentially predatory exploitation in a context characterized by weak enforcement and underreporting in official statistics. Under these conditions, the yellow croaker increasingly becomes a byproduct of its swim bladder.

Given this scenario, these findings allow us to problematize the limits of a fishing production chain that overlooks the territorial, social, and cultural specificities of the Amazon. Ensuring the sustainability of artisanal fishing in the region requires public policies that strengthen fishers' productive autonomy, improve infrastructure, regulate resource use in ways grounded in traditional fishing populations, and value their knowledge systems. Artisanal fishing should therefore be understood not only as an economic activity, but as a cornerstone of food security and the social and cultural sustainability of Amazonian coastal communities.

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