Research

How fishers attribute blame for marine ecosystem degradation: developing a social relational approach to conflict in capture fisheries

Dražen Cepić [1] , *Branko Ančić* [1] and *Mislav Škacan* [2]

ABSTRACT. Although fisheries resources are under significant pressure from various fisheries stakeholders, we explore how fishers perceive responsibility for excessive, irresponsible, or harmful exploitation of marine resources. This is analyzed using survey data of fishers' perceptions of illegalities and harmful impacts of their own and other fishing fleets and segments. Relations between competing fleets and segments are observed through the intergroup blame attribution model. The results confirmed both hypotheses: that fishers tend to attribute less blame to their own group (ingroup) and more to others (outgroups), exhibiting ingroup favoritism when attributing blame (H1); and that blame attribution increases with structural distance between fishing fleets (H2). The methodological approach includes a two-step procedure based on Kruskal-Wallis test, ordinal logistic regression, and Spearman's rank-order correlation, conducted on a sample of 567 respondents active in small-scale and large-scale commercial fishing, recreational fishing, and subsistence fishing, in Croatia.

Key Words: *blame attribution; conflict; fisheries; illegalities; ingroup favoritism; social relational approach*

INTRODUCTION

Recent debates on the Blue Economy and Blue Justice illustrate that marine and coastal resources are under strong pressure from various groups of stakeholders. As different groups claim rights to use inherently limited space and resources, this often leads to conflicts (Silver et al. 2015, Ertör and Hadjimichael 2019, Bennett et al. 2021, Penca et al. 2025). The disputes arise between various types of stakeholders and can concern aquaculture planning (McGinnis and Collins 2013, Ertör and Ortega-Cerdà 2015); different use of sea space (Węsławski et al. 2010, Sowman et al. 2023); and relations between competing economic sectors. For instance, Pascual (2005) reported on disputes between artisanal fishers, aquaculture, and tourism in the Canary Islands, while Wever et al. (2015) and Guyader et al. (2013) described conflicting interests between fishers, marine aquaculture, and offshore wind farms.

The relations within capture fisheries make a special case of such competition, with the most salient axis of conflict traditionally pertaining to the relations between large-scale fisheries (LSF), which usually involve larger crews, longer distances, bigger catch, and more intensive, industrial, fishing effort, and small-scale fisheries (SSF), which usually involve smaller crews, fish closer to the coast, and have lower catches with less fishing effort. Fabinyi (2024) addressed SSF-LSF dynamics in the Philippines; Carvalho et al. (2011) described a hindered sustainability of SSF fisheries due to increasing competition with LSF in the Azores; Howard (2017) reported on the conflicts between trawlers and netters-vessels that fish the same grounds, but use different fishing gears-in Scotland; while Jimenez et al. (2019) studied the Amazon's coast of Brazil. Furthermore, increasing attention is given in the literature to the conflicts between commercial fishers and other stakeholders interested in the extraction of fisheries resources, primarily the recreational fishers (Gómez et al. 2021).

While climate changes may only aggravate the risk of fisheries conflict between competing fishing fleets and segments (Mendenhall et al. 2020), the literature contains numerous indications that different types of extractors blame other groups for negative impacts on the marine environment and irregular behavior at sea, in the context of the competition for scarce resources. The underlying causes of conflicts therefore often relate to equity and justice (Bennett et al. 2021), which contribute to the "complex causality behind fishery conflict" (Spijkers et al. 2021a:393). However, despite numerous reports of conflict between fishing fleets, which are accompanied by blaming others for resource depletion, in the literature there has been little systematic research on this.

We embark on an examination of this topic through a novel theoretical angle by applying a blame attribution model, in line with the work of social psychologists on intergroup attribution of blame (Ruback and Singh 2007, Halabi et al. 2015; M. R. Joslyn and D. P. Haider-Markel 2010, *unpublished manuscript*). Furthermore, we use this model to analytically examine how different groups of extractors perceive themselves and others in a social relational manner (Bodin et al. 2011). Our analysis thereby focuses on how different types of fishers assess sustainable practices and the effects of their own and other groups' activities. Specifically, we test the hypothesis that fishers assess other categories as more damaging than their own group, and we analyze the main axes of conflict and criticism. The fishers' perceptions of sustainability were explored via two distinct dimensions: the ecological harm caused by each fishing fleet and segment, and the degree of illegality present in each of them.

Finally, in this research we have applied the blame attribution model to fisheries fleets and segments from Croatia which include fishers working on purse seiners and bottom trawlers as two main LSF segments in Croatia, SSF fishers, subsistence fishers, and recreational fishers. In so doing, we consider relations between a broader spectrum of fishing fleets and segments than is usually studied in the literature. Although most literature sources on conflicts in fisheries focus on separate lines of conflict, e.g., by studying relations between SSF and LSF, or relations between commercial and recreational fishers. In our research, we employ

[1]Institute for Social Research in Zagreb, Zagreb, Croatia, [2]Independent Researcher, Zagreb, Croatia

a more comprehensive and more granular approach. The analysis draws on data from Croatia (Cepić et al. 2024), collected by the authors from 567 fishers representing 4 main extractor groups in Croatian fisheries: LSF, SSF, recreational, and subsistence.

THEORETICAL FRAMEWORK

Relational approach to blame attribution

Social relational approaches in natural resource governance have been used as a conceptual and analytical framework for uncovering how social factors affect natural resource governance (Bodin et al. 2011). Following a theoretical movement in sociology called "relational sociology" and the theoretical advancements related to the development of social network analysis (Emirbayer 1997, Mische 2011), one of its core ideas was to investigate "how patterns of social relations among actors within a system enable and constrain actors and processes" (Bodin et al. 2011:7).

Relationalism follows one of the central tenets of social network analysis about transcending the atomized, undersocialized, and oversocialized conception of social actors (Granovetter 1985). "Just as understanding of the environment has moved towards a systems' perspective of interacting parts and emergent wholes, so has the notion of understanding human and social behavior moved from an atomist model, where individuals are studied in a case-by-variable format, to one of seeing individuals in the context of their relationships with others" (Bodin 2011:7). In the same vein, the model of studying blame attribution between competing fisheries fleets looks at how competing groups perceive each other by focusing on how fishers view other competing fleets and their own group about the harmful effects and illegal practices. This is relevant because people's assumptions about the behavior of others sets the interactive frame which then feeds their further actions, in fisheries as in other human activities. Such assessments can therefore critically shape the fishers' extractive practices.

The literature shows that fishers' behavior, including the type and volume of extraction, as well as other aspects of fishing practice, is shaped by a myriad of social factors that transcend purely monetary motivations, such as identities, social networks, beliefs, and emotions (Bodin et al. 2011, Howard 2017, Nunan et al. 2018a). The perception of the harmfulness or illegality of competitors' practices adds to this list. While the moral justification of harmful or illegal behavior has been increasingly documented in fisheries research (Gezelius 2004, Nahuelhual et al. 2020, Ballesteros et al. 2023, Drury O'Neill et al. 2024), one specific manifestation of this phenomenon pertains to the tendency of resource users to minimize their own sense of responsibility by pointing to the similar behavior of others.

In the case of the Lake Victoria fisheries, Cepić and Nunan (2017) described this as the principle of futility, while a related logic lies at the core of Hardin's (1968) tragedy of the commons. The expectation that others will act destructively, and the resulting justification of one's own harmful behavior, captures the essence of the "blame game" among fisheries stakeholders. This dynamic highlights that, although fishers may not deny the ecological problem of resource depletion, they often perceive others as more responsible (or equally responsible but less sanctioned). Furthermore, when fishers believe others are already breaking the rules (Battista et al. 2018), or that rule-breakers are not punished

(Nunan et al. 2018b), they may feel that their own compliance is unnecessary or unfair, weakening the moral imperative to follow rules. This can ultimately lead to non-compliance with regulations or to behavior that, while formally compliant, remains ecologically detrimental.

Although the same pattern is likely to apply even more generally when it comes to competition for fish stocks (or other scarce natural resources), we are applying the model of blame attribution to the relations between competing fishing fleets and segments: SSF, LSF, recreational, and subsistence fishers. This makes a relationalist approach especially useful insofar as it looks at the interaction between different groups by analyzing how they perceive one another (as opposed to analyzing the values of separate groups of fishers to establish similarities or differences between them).

In this way, we view blame attribution as a proxy for studying conflicts, by examining how fishers attribute blame to other groups. Blame attribution is hence conceived as a mechanism, or a conceptual device used by fishers to legitimize their access to fish as the basic resource, and to morally disenfranchise their competitors thereof. At the same time, this approach could be applied to other cases of natural resource management marked by high structural differentiation of various extractor groups, in which cross-group dynamics can explain their excessive, illegal, or harmful behavior.

Finally, our approach is in line with the work done by social psychologists on intergroup attribution of blame, which established that people make more favorable attributions for members of their own group than for members of outgroups (Ruback and Singh 2007). According to Halabi et al. (2015:105), "recognition of others in terms of their membership in one's own group (the ingroup) or another group (an outgroup) has a robust, general effect on perceptions and evaluations of others," whereby individuals evaluate ingroup members more highly than outgroup members and attribute blame for negative outcomes differently for ingroup than outgroup members.

Fishing fleets, segments, sectors

We analyze relations between SSF, LSF, recreational, and subsistence fishers, as four main groups of extractors in Croatian marine fisheries, which at the same time reflect the main lines of fisheries division globally. Furthermore, in the analysis, the LSF fleet was divided in two segments, purse seiners and bottom trawlers, which are perceived differently in terms of their environmental impact and targeted fish species.

Regarding the terminology, our main analytical units could be formulated in different ways. The two main sectors of commercial fishing, LSF and SSF, can be subsumed under the category of "fishing fleets" (i.e., SSF fleet, LSF fleet) as in Carvalho et al. (2011), Jimenez et al. (2019), and Korda et al. (2023). In a less granular way, fishing fleets can be drawn along national borders (e.g., French vs. Italian fishing fleet), whereas LSF and SSF could be classified as fisheries "sectors" (Nahuelhual et al. 2023) or "fleet subsectors" (Skerritt et al. 2023).

Besides fishing fleets and fleet sub/sectors, LSF and SSF, along with subsistence and recreational fishers, are sometimes described as different types of fishing activity or fishery activity levels as in Guyader et al. (2013), Boubekri et al. (2020), and Gómez et al.

(2021). Also, in a more granular sense, purse seiners and bottom trawlers are typically defined as fishing segments or "métiers," a notion pertaining to the attempt to classify fishing activity based on a combination of target species, gear, area fished, and seasonality (Schadeberg et al. 2021). However, smaller segments are sometimes also classified as fishing fleets (e.g., in Letschert et al. 2023).

Hence, there does not seem to be a clear convention on the naming of different levels of extraction in fisheries literature. Identical divisions are sometimes conceived in terms of fishing fleets, sometimes in terms of fisheries sectors and subsectors, and sometimes in terms of types of fishing activity. The literature sources therefore reflect a diversity of typologies typically applied. To make things even more complicated, we analyzed relations between actors that belong to different levels of extraction, from higher order concepts (LSF, SSF) to lower-level concepts (bottom trawlers, purse seiners). To address this complexity, we refer throughout to "fleets and segments" to capture different levels of extraction.

Croatian fisheries context
Croatia has a significant coastline along the Adriatic Sea (which occupies the northernmost region of the Mediterranean), in which the Croatian commercial fisheries fleet solely operates. As a member state of the European Union, Croatia adheres to the Common Fisheries Policy (CFP). Official statistics indicate that the Croatian fishing fleet remains diverse. In 2021, out of approximately 7757 registered vessels, only about 6200 were active, and a small segment of the fleet accounted for the overwhelming majority of production. Large-scale vessels, defined as those exceeding 12 meters in length or operating active towing gears, comprised roughly 14% of active vessels yet generated close to the entirety of landings by volume (98%) and the majority of landed value (83%; Directorate of Fisheries 2022). The majority of the LSF fleet consisted of high activity commercial purse seiners and demersal trawlers.

The category of SSF entails vessels under 12 meters in length and/ or using passive gears. As for the data for the reference year 2021, the small-scale fleet included around 5350 active vessels, which amounted to 86% of all vessels in the active fleet. However, the data for this category are somewhat misleading because besides the commercial SSF fleet, they included a specific category entitled *Mali obalni ribolov*, literally translated as "small-scale artisanal coastal fisheries," which consisted of some 3500 vessels, which we classify as subsistence fishing fleet. Within the commercial SSF segment, which amounted to about 1850 vessels, drift and/or fixed netters (DFN) vessels dominated activity and landings, followed by hook-and-line and pot/trap fisheries (Directorate of Fisheries 2022).

Although legally classified as commercial, the "small-scale artisanal coastal fisheries" segment was created during Croatia's accession to the European Union in 2013 to integrate previously non-commercial fishers into the commercial fleet. Although this category was historically referred to in the legislature as "fishing for personal needs" and "supplementary fishing" with "supplementary" indicating that fishing was not the primary occupation or main source of income, because European regulations prohibited the use of commercial gear in non-commercial fishing categories, the accession process necessitated a change in Croatian legislation. After the Marine Fisheries Act

(Official Gazette 62/2017, 14/2019) introduced the category of "small-scale artisanal coastal fisheries" as a commercial activity in 2015, transferring these fisheries to the commercial fishing fleet, license holders in this segment have received permits based on social criteria, such as unemployment, disability, age, retirement, or veteran status. Furthermore, the catches made by this specific fleet segment, along with their ability to market the fish and the permitted gear, are subjected to stringent technical regulations, effectively limiting the scope of their activities: they can sell their catches only in their place of residence and the sale is subject to compliance with the regulations governing food trade and circulation, such as issuance of fiscal invoices and registration of economic activity. Considering these constraints, we treat this fleet segment as functionally subsistence-oriented rather than commercial. This approach is consistent with earlier analyses of Croatian fisheries using the same dataset (see Cepić et al. 2026a, b).

To provide a clearer understanding of the scale and economic impact of each fleet and segment, the following provides a breakdown of the 2021 fisheries landings by type of fleet. Although Croatian fisheries landings totaled 61,138.97 metric tonnes, with a total value of €61.19 million, of this, purse seiners landed 55,663 metric tonnes, valued at €34.85 million; bottom trawlers contributed 3825 metric tonnes, worth €15.9 million; commercial SSF contributed 1551 metric tonnes, with a value of €10.02 million; and the subsistence fleet accounted for 99 metric tonnes, valued at €0.44 million (Directorate of Fisheries 2022).

Finally, recreational fishing is likely to have a significant impact on stocks in Croatia because of the high number of domestic and international anglers. Recreational and sport fishing are only allowed with the possession of daily, multi-day, monthly, or annual licenses. According to the Directorate of Fisheries and Institute of Oceanography and Fisheries (2021), in 2019 there were a total of 73,266 annual (yearly), half-year, daily, and multi-day permits. This included: 46,178 annual licenses and 27,088 licenses valid for 1, 3, 7, or 30 days. Due to the sheer dispersion of individual recreational fishers, this category is the least regulated.

Hypotheses
Despite extensive literature on conflicts in fisheries, blame attribution has remained insufficiently recognized in scholarship, as well as empirically under-explored. This is especially true for quantitative analyses. Although numerous (predominantly qualitative) studies pointed out the importance of normative framing for developing moral justification for respective types of fisheries (Cepić and Nunan 2017, Bennett et al. 2021), there has been a lack of empirical data that could illuminate this issue. We seek to fill this gap using survey data, testing two hypotheses.

First, the focus of our analysis is to establish empirically whether the responsibility for harmful actions is attributed primarily to competing groups, while the fleet to which respondents belong are absolved from blame. This pattern is established in social psychology by the concept of in- and out-boundaries, and the tendency for ingroup members to attribute positive characteristics to fellow members while the out-group receives less charitable and often negative attributions (Ruback and Singh 2007, Halabi et al. 2015; M. R. Joslyn and D. P. Haider-Markel 2010, *unpublished manuscript*). In the event of direct competition for resources between fishing fleets and segments, and in line with the findings

from the fisheries literature (Muawanah et al. 2012, Howard 2017, Gómez et al. 2021), we hypothesize that such a tendency will be especially pertinent.

H1: ingroup vs. outgroup blame attribution
Belonging to a specific fishing fleet or segment influences blame attribution, with individuals attributing less blame to their own group and more blame to other fishing fleets or segments.

Our second goal is to analyze blame attribution related to the direction of the criticism and grievances for harmful activities, to decipher the main axes of conflict. This involves examining which groups show the greatest or smallest distance in perceptions of harmful actions and illegal behavior. The second hypothesis is therefore more abstract and pertains to the composition of the broader coalitions between fishing fleets and segments. We hypothesize that structural proximity of the respective fishing fleets and segments results in lesser attribution of blame and vice versa.

To analyze relationships between fleet segments, we frame "structural proximity" as an ordinal scale in which fleet segments were positioned relative to one another based on their similarity along three key dimensions: industrialization, regulatory oversight, and market integration. Industrialization is framed in terms of vessel size, engine power, and technology. The Directorate of Fisheries (2022) data for Croatia support this distinction, showing that purse seiners and bottom trawlers operate with significantly higher kilowatt (KW) ratings and larger vessel sizes compared to SSF and subsistence fleet. No comparable data exist for recreational fishers because this segment is not systematically reported in official fisheries statistics. Nevertheless, their position on the industrialization scale can be inferred conceptually. Although some own high-powered vessels used for recreational fishing and are equipped with advanced navigation and fish-finding technology, others fish from small boats or the shore, with minimal technological inputs. However, even when technologically sophisticated, recreational fisheries remain fundamentally distinct from commercial fleets in function and intensity of use.

Regulatory oversight was framed in terms of the extent of monitoring, reporting, and control mechanisms applied to each fleet segment. Purse seiners and bottom trawlers are subject to the most stringent systems of vessel monitoring systems. Subsistence fleets and SSF experience lower levels of monitoring intensity, but as part of the commercial fleet in Croatia, they are nonetheless subject to seasonal closures and reporting requirements. Finally, recreational fishers as private users are regulated only in basic terms (e.g., daily catch limits), with little systematic oversight.

Market integration was framed in terms of the degree of supply-chain participation, access to formal markets, and the share of landings sold for commercial value. Purse seiners and bottom trawlers are fully integrated into domestic and export-oriented market circuits, often supplying processing companies or wholesalers through established first-sale systems. Small-scale fishers, although commercially active, operate in more localized and less formalized markets. Subsistence fishers, by contrast, even though de jure part of the commercial fleet, harvest primarily for household consumption, while recreational fishers are legally entirely disconnected from market exchange.

H2: structural proximity and blame attribution
Blame attribution will increase with the structural distance between fishing fleets and segments.

METHODS

Data
Our work is based on data collected through the research project "Sustainable fisheries: social relations, identity and co-management of Adriatic fishing resources" (SOCFISH), which was financed by the Croatian Science Foundation under the grant number UIP-2020-02-2238. The survey was carried out via field interviews as well as through an online survey. Field interviews (PAPI or CAPI) were carried out in the seaports on the Croatian part of the Adriatic coast or as telephone interviews (CATI) in cases when respondents were interested but were not available for the field interviews. Online surveys (CAWI) were carried out with the LimeSurvey program, an open-source survey tool. Data collection was conducted in 2022.

Based on a non-probability quota sample for field and non-probability availability sample for online data collection, units of analysis were individuals sampled from the universe of individuals who practiced fishing activities in the Adriatic Sea in the year preceding the completion of the survey. The sample of respondents consisted of residents of the Republic of Croatia engaged in fishing around the Croatian part of the Adriatic Sea, including captains of the fishing vessels (some of whom were also the boat owners) and the employees. This included professional fishers (LSF and SSF), recreational fishers, and subsistence fishers.

The sampling procedure used for the field data collection was based on five geographical areas of the Croatian Adriatic Sea: Istria, Kvarner Gulf, Northern Dalmatia, Middle Dalmatia, and Southern Dalmatia. Within each region, it was planned to include 3 fishing ports, or 15 in total. The total number of respondents was 567 (N = 567) with a total of 185 variables. Differentiated by categories, there was a total of 240 respondents from recreational fishers, 93 from LSF, 98 from SSF, and 136 from subsistence fishers. Although the sampling design was non-probabilistic due to the lack of a comprehensive sampling frame for Croatian fisheries, the distribution of respondents by fleet category closely mirrored the official figures reported by the Directorate of Fisheries for 2022. Thus, although probabilistic inference is not possible, the sample provides a structurally balanced representation of the sectoral composition of the Croatian fishing community.

As for recreational fishers, this category referred to residents of the Republic of Croatia; therefore, foreign (non-resident) tourists were excluded from the sampling frame. However, domestic tourists, i.e., Croatian residents who may have fished recreationally while visiting the coast, could be included if they reported fishing activity within the previous year.

The survey questions were piloted and altered prior to the field research. A structured questionnaire with 67 questions and a number of sub-questions was used. The complete database is a publicly available dataset (Cepić et al. 2024).

Measures
The dependent dimensions of blame attribution in this analysis were operationalized through two key indicators: perceived illegality and perceived environmental harm. Each was measured using a set of survey items that asked respondents to evaluate various categories of fishing based on illegal practices and ecological impact. Perceived

illegality was measured with the question: Estimate how often illegal fishing occurs in the following categories. Respondents rated the following categories: surrounding nets (e.g., purse seine); dragging gear (e.g., bottom trawl, beam trawl, dredge); small-scale commercial fishing (passive gear); small coastal fishing (holders of licenses for small-scale coastal fishing); and recreational fishing. Responses were provided on a five-point scale: 1-never, 2-rarely, 3-sometimes, 4-often, 5-always.

Perceived environmental harm was measured with the question: Estimate how harmful the following categories of fishing are to the environment (organisms and habitats). Respondents rated the same five categories listed above. Responses were recorded on a four-point scale: 1-not harmful at all, 2-slightly harmful, 3-harmful, 4-very harmful.

The two scales differ in range: illegality was measured on a five-point frequency scale, consistent with other frequency-based items across the survey instrument to ensure internal coherence in response structure, whereas environmental harm used a four-point severity scale designed to capture gradations in perceived impact without offering a neutral midpoint, thereby encouraging respondents to take a clear evaluative stance. Nevertheless, these complementary measures enabled a direct comparison of how respondents attributed blame across regulatory and ecological dimensions of fishing activity. Because both variables are ordinal, and all analyses employed nonparametric and ordinal logistic models, which do not assume equal intervals or identical ranges, the differing scale lengths do not affect their comparability or statistical interpretation. These measures formed the basis for comparative analysis across fishing fleets and segments, enabling examination of patterns in how blame is attributed for both regulatory violations and ecological degradation.

Fleet categories were operationalized by combining respondents' self-identified fishing fleet with their reported dominant gear type. First, respondents classified themselves as belonging to one of four main groups in the questionnaire: LSF, SSF, subsistence (i.e., license for small-scale artisanal coastal fisheries, which we classify as the subsistence fleet), or recreational. Within the LSF segment, additional differentiation was introduced based on the reported gear type to distinguish between purse seiners and bottom trawlers. This procedure produced a composite variable with five analytically distinct categories: (1) LSF-bottom trawlers, (2) LSF-purse seiners, (3) SSF, (4) subsistence fishers, and (5) recreational fishers.

Analysis
The analysis was conducted in two main stages. In the first stage, descriptive statistics and mean comparison were used to explore blame attribution across groups. This provided an initial overview of how different fishing categories were perceived in terms of both environmental impact and frequency of illegal activities. Differences in group level perceptions were then examined using the Kruskal-Wallis test, a non-parametric test that is suitable for comparing ordinal data across more than two independent groups.

In the second stage, to further explore the predictive and relational dimensions of the data, ordinal logistic regression was employed. This allowed for the testing of how fleet membership influences the likelihood of assigning blame, while controlling

for structural characteristics. Spearman's rank-order correlation was used to assess the relationship between structural proximity and the level of blame attribution across fleets and segments. These methods were selected to accommodate the ordinal nature of the dependent variables and to account for non-linear relationships. The analysis also tested for interaction effects between fleet types, aiming to identify potential coalition patterns or alignments in blame attribution (e.g., commercial vs. recreational activity). All statistical analyses were conducted using IBM SPSS Statistics, version 26. Statistical significance was set at $p < 0.05$ for all tests.

RESULTS

General perceptions across fishing fleets and segments
Table 1 reports the average perceived illegality and environmental harm associated with each fishing category, as evaluated by all fishers, regardless of their own fleet membership. This approach allowed for a comparison of how fishers perceive different fishing practices, ranging from large-scale bottom trawlers (LSF) and purse seiners (LSF), through commercial small-scale and subsistence fishers, to recreational fishers.

Table 1. Perceived environmental harm and illegality for each fishing fleet (Mean ± SD, with sample sizes). Note: LSF = large-scale fisheries, SSF = small-scale fisheries.

Fishing fleet	Environmental harm (Mean ± SD)	n	Illegality (Mean ± SD)	n
LSF-bottom trawlers	3.13 ± 0.95	551	2.86 ± 1.20	459
LSF-purse seiners	2.44 ± 0.98	523	2.58 ± 1.17	441
SSF	2.12 ± 0.86	536	2.99 ± 1.16	481
Subsistence fishers	1.91 ± 0.85	537	2.90 ± 1.22	468
Recreational fishers	1.67 ± 0.81	555	3.06 ± 1.18	522

The results show a clear and consistent pattern across fishing fleets and segments. Bottom trawlers are perceived as the most environmentally harmful (M = 3.13), followed by purse seiners (M = 2.43), whereas recreational, subsistence, and SSF are viewed as having the lowest ecological impact. In contrast, perceived illegality does not follow the same gradient. The highest mean scores are reported for recreational fishing (M = 3.06), SSF (M = 2.99), and subsistence (M = 2.90), while purse seiners (M = 2.85) and bottom trawlers (M = 2.80) received comparatively lower illegality ratings.

These results indicate that respondents clearly differentiate between ecological harm and regulatory non-compliance: large-scale industrial fishery is seen as most damaging to marine ecosystems, whereas rule breaking is perceived as more common among smaller-scale and recreational practices. Although this analysis does not distinguish respondents by their own fleet membership, it offers a valuable baseline of how different fishing categories are collectively perceived in terms of blame, serving as contextual groundwork for the group-based analyses in the following sections (H1 - ingroup bias; H2 - structural distance).

Ingroup favoritism
To test the first hypothesis (H1), that fishers tend to attribute less blame to their own group (ingroup) and more to others (outgroups), we analyzed how respondents from each fleet segment rated the perceived environmental harm and illegality in all five fishing categories. The disaggregated approach made it

Table 2. Perceived environmental harm by fishing fleet (mean values, by fishing fleet). Note: LSF = large-scale fisheries, SSF = small-scale fisheries.

Fleet categories	Environmental harm assessment of the following fishing fleets				
	LSF-bottom trawlers	LSF-purse seiners	SSF	Subsistence	Recreational
LSF - bottom trawlers	1.97	1.89	1.94	1.97	1.95
LSF - purse seiners	2.37	1.42	1.88	1.65	1.71
SSF	2.67	2.18	1.87	1.91	2.19
Subsistence fishers	3.10	2.34	1.78	1.34	1.48
Recreational fishers	3.68	2.95	2.49	2.30	1.50

Note: Each cell represents the mean environmental harm score assigned by members of a given fleet or segment to a particular fleet or segment. Responses were recorded on a four-point scale (1 = not harmful at all, 4 = very harmful). Higher values indicate greater perceived ecological impact.

Table 3. Perceived illegal fishing by fishing fleet (mean values, by fishing fleet). Note: LSF = large-scale fisheries, SSF = small-scale fisheries.

Fleet categories	Illegalities assessment of the following fishing fleets				
	LSF-bottom trawlers	LSF-purse seiners	SSF	Subsistence	Recreational
LSF - bottom trawlers	2.35	2.00	2.74	2.66	2.68
LSF - Purse seiners	2.02	1.81	2.69	2.69	2.64
SSF	2.52	2.18	2.91	3.19	3.17
Subsistence fishers	2.52	2.27	2.25	2.17	2.22
Recreational fishers	3.63	3.36	3.60	3.34	2.56

Note: Each cell represents the mean illegality score assigned by members of a given fleet or segment to a particular fleet or segment. Responses were recorded on a five-point scale (1 = never, 5 = always). Higher values indicate greater perceived frequency of illegal fishing practices.

possible to detect patterns of ingroup favoritism in blame attribution. Table 2 presents the mean values of perceived environmental harm across all fishing fleets and segments, as rated by members of each respondent group.

The results indicate a consistent pattern of ingroup favoritism, with groups assigning lower harm ratings to their own fleet or segment while attributing higher levels of harm to other categories. For example, recreational fishers rated recreational fishing as least harmful (1.50) while assigning the highest harm ratings to industrial segments such as bottom trawlers (3.68). A broadly similar pattern is observed across most respondent groups, although bottom trawlers exhibit notably uniform ratings, perceiving their own activity as almost equally harmful as other gears, with only marginal differences (0.08–0.01 points). The Kruskal-Wallis test confirmed that perceptions of environmental harm differ significantly between fishing groups (H = 193.521, p < 0.001), supporting H1 by demonstrating that group membership systematically influences assessments of ecological impact.

Perceptions of illegality show a similar pattern. Table 3 displays mean scores of perceived illegal fishing activities across fleets and segments, disaggregated by respondent group. Most respondent groups tended to rate their own fleet or segment as least involved in illegal fishing, suggesting a general tendency toward ingroup bias. However, this pattern was not universal: both small-scale commercial fishers (SSF) and bottom trawlers attributed slightly lower illegality to purse-seine fisheries than to their own.

Kruskal-Wallis tests confirmed that these differences are statistically significant across all five fleet categories for both environmental harm and illegality, with all p-values < 0.001 (see Table 4).

These results strongly support Hypothesis 1, indicating that fishers exhibit ingroup favoritism when attributing blame. Differences in perception are not randomly distributed, but rather align with group affiliation, reinforcing the idea that social identity and fleet competition play a key role in shaping views on sustainability and compliance.

Structural distance and blame attribution
To test Hypothesis 2, that blame attribution increases with structural distance between fishing fleets and segments, we analyzed whether perceptions of environmental harm and

Table 4. Kruskal–Wallis test results for differences in blame attribution across fishing fleets. Note: LSF = large-scale fisheries, SSF = small-scale fisheries.

Fishing fleets	Environmental harm H	p-value	Illegality H	p-value
LSF-bottom trawlers	193.521	0.001	178.453	0.001
LSF-purse seiners	136.819	0.001	128.214	0.001
SSF	76.436	0.001	84.231	0.001
Subsistence fishers	124.793	0.001	112.678	0.001
Recreational fishers	48.557	0.001	52.743	0.001

illegality varied systematically with the structural characteristics of the assessed fleet and segments. Structural distance was operationalized as an ordinal variable reflecting the fleet's level of industrialization, regulatory oversight, and market integration. For example, bottom trawlers and purse seiners were considered structurally distant from other three segments due to their large-scale, industrial nature, while recreational and subsistence fishers were coded as structurally proximate due to their small-scale, informal, or non-commercial nature. Commercial SSF fishing is placed in the middle, due to sharing small-scale scope of fishing operations with the latter and commercial profile with the former fleets and segments.

Two forms of analysis were conducted. First, we used Spearman's rank-order correlation to assess whether perceived environmental harm and illegality increased with structural distance. These nonparametric tests were appropriate given the ordinal nature of the structural distance coding and perception measures. Second, we ran a series of ordinal logistic regressions (PLUM procedure) to test whether fleet category significantly predicted perceived harm and illegality. For illegality, we included the corresponding harm score as a covariate to control for its influence and isolate the effect of structural identity.

The results for environmental harm are presented in Table 5. Spearman correlations between structural distance and harm perception were statistically significant for all fleet segments (p < 0.001). The strongest correlations were observed for the industrial fleets, i.e., bottom trawlers ($ρ$ = -0.591) and purse seiners ($ρ$ = -0.487), indicating that respondents from fleets that are more structurally distant were more likely to view each other as environmentally harmful. Ordinal logistic regressions confirmed this trend, with statistically significant model fits (e.g., χ² =

Table 5. Statistical analysis of perceived environmental harm by fishing fleet. Note: LSF = large-scale fisheries, SSF = small-scale fisheries.

Fleet	Spearman ρ	*p*-value	χ² (model fit)	*p*-value	Regression coefficient	*p*-value
LSF-bottom trawlers	-0.591	0.001	208.2	0.001	-0.996	0.001
LSF-purse seiners	-0.487	0.001	123.868	0.001	-0.749	0.001
SSF	-0.309	0.001	34.404	0.001	-0.38	0.001
Subsistence fishers	-0.257	0.001	17.849	0.001	-0.274	0.001
Recreational fishers	0.199	0.001	20.824	0.001	0.299	0.001

Table 6. Statistical analysis of perceived illegality by fleet and segment. Note: LSF = large-scale fisheries, SSF = small-scale fisheries.

Fleet	Spearman ρ	*p*-value	χ² (model fit)	*p*-value	Regression coefficient	*p*-value
LSF-bottom trawlers	-0.548	0.001	168.324	0.001	-0.452	0.001
LSF-purse seiners	-0.467	0.001	140.567	0.001	-0.308	0.001
SSF	-0.299	0.001	38.776	0.001	-0.278	0.002
Subsistence fishers	-0.251	0.001	28.341	0.001	-0.108	0.005
Recreational fishers	0.188	0.001	79.212	0.001	0.019	0.62

208.200 for bottom trawlers) and negative regression coefficients (e.g., -0.996), indicating a higher likelihood of assigning blame to more structurally distant fleets.

A similar pattern emerged for illegality (Table 6). Perceptions of illegal activity were significantly and negatively correlated with structural distance for all commercial fleets, with the strongest correlations again observed for bottom trawlers ($\rho = -0.548$) and purse seiners ($\rho = -0.467$). Logistic regression models confirmed these associations, with significant model fits and negative regression coefficients. In contrast, the coefficient for recreational fishing was not statistically significant ($p = 0.620$), suggesting that perceptions of illegality in this category were more variable and less dependent on structural distance.

To add nuance to these findings, we examined three relational blame patterns that further illustrate how structural identity and perceived competition inform group dynamics. These patterns draw on group-specific means for environmental harm and illegality, presented in Tables 2 and 3. First, solidarity within large-scale fleets was evident: bottom trawl respondents rated purse seiners low in both environmental harm (M = 1.89) and illegality (M = 2.00), and this was reciprocated by purse seiners' ratings of trawlers (harm M = 2.37; illegality M = 2.02). These mutual evaluations were substantially more lenient than those of recreational fishers, who rated trawlers and seiners as far more harmful (M = 3.68 and M = 2.95, respectively). This suggests a pattern of mutual legitimization between industrial fleets.

Second, a somewhat opposite trend is noticeable within small-scale fisheries. Contrary to expectations of affinity, commercial SSF fishers rated subsistence fishers as more illegal (M = 3.19) than any other group, including industrial fleets (e.g., trawlers M = 2.52). This did not extend to environmental harm, in which SSF fishers rated subsistence fishers (M = 1.91) nearly similar to themselves (M = 1.87) On the other hand, from the perspective of subsistence fishers the blaming was not reciprocated because their perception of harm done by commercial SSF fishers (M = 1.78) and their assessment of SSF illegalities (M = 2.25) was relatively low.

Third, a commercial-recreational divide was to some extent visible. As for perceived environmental harm, recreational fishing was rated high by commercial SSF (M = 2.19), bottom trawlers (M = 1.95), and purse seiners (M = 1.71), whereas subsistence fishers rated recreational fishers even lower than the recreational respondents rated themselves (M = 1.48). With regard to illegalities a similar trend emerged, with three commercial fleets and segments being critical toward the recreational fishers, while subsistence respondents rated recreational fishers more benevolently than

recreational respondents themselves. In both dimensions (perceived environmental harm and degree of illegalities) the commercial SSF fishers were the most critical toward recreational fishing. As for animosity of recreational fishers toward commercial fleets and segments, the blame attribution was even more pronounced because recreational respondents assigned the highest blame to others, particularly trawlers (harm M = 3.68; illegality M = 3.63).

Together, these findings offer strong empirical support for Hypothesis 2. The consistent alignment between structural distance and higher levels of attributed harm and illegality suggests that fishers tend to blame fleets that differ from them in scale, governance, or market orientation.

DISCUSSION

While conflicts in fisheries have been studied in various dimensions, such as between national fleets (Muawanah et al. 2012, Nyman 2013, Spijkers et al. 2021b) or between boat owners, captains, and boat crew (Davis and Ruddle 2012, Nunan et al. 2020), the relations between fisheries fleets and segments made one of the most salient axes of conflict in fisheries literature. However, although the scholarship showed strong evidence of the widespread animosity between them, in the literature there exists a double gap. First, although most studies tended to focus on separate relations, such as between SSF and LSF, systematic research on a broader spectrum of fishing fleets and segments is lacking, especially survey data. And second, the literature lacks a more comprehensive theoretical explanation thereof. We addressed these gaps through studying mutual perceptions and assessments of five different fishing fleets and segments in Croatia, through the intergroup blame attribution model (Halabi et al. 2015; M. R. Joslyn and D. P. Haider-Markel 2010, *unpublished manuscript*), which to our knowledge is the first attempt to apply this model in the realm of fisheries research.

We were first interested in whether belonging to a certain group of fishers relates to attributing less blame to one's own group and more blame to other groups of fishers. This hypothesis (H1) was confirmed because the responsibility for harmful actions and illegalities was attributed primarily to competing groups. Each of the fleets and segments tended to see themselves as less harmful and illegal than the others see them, while downplaying the role of their own group in damaging the marine environment. Following Jean-Paul Sartre's famous saying, it seems that "Hell is other people" also applies to fisheries.

This can have important repercussions on the fishers' behavior. Because opposing user groups are seen as more harmful and prone to illegalities, the true responsibility for resource depletion, in the

eyes of fishers, can lie primarily with the competing groups. This again can help fishers to morally justify their own harmful and illegal behavior or minimize their sense of responsibility for the state of resources, and thereby contribute to perpetuating negative behavior (Hardin 1968, Cepić and Nunan 2017).

Next, we were interested in whether blame attribution would increase following the structural distance between fleets. This hypothesis (H2) was confirmed both for perceived environmental harm and illegality. To provide a more nuanced understanding of the relations between segments, this was examined regarding three specific relational blame patterns. First, solidarity within large-scale fleets was evident because bottom trawl respondents and purse seiners rated each other low in both environmental harm and illegality. Second, tensions within small-scale fisheries were pronounced as opposed to the relations between LSF segments, but only from the perspective of commercial SSF fishers who rated subsistence fishers as more illegal than any other group and gave them relatively high harm scores. As for the third specific relational pattern, our results to some extent point to the commercial-recreational divide, with three fully commercial segments (commercial SSF, bottom trawlers, and purse seiners) grouping together against recreational fishing.

In both dimensions, the commercial SSF fishers were the most critical toward recreational fishing, indicating competitive friction in the nearshore, passive-gear sector, overlapping in gear use and target species. Hence, in line with Gómez et al. (2021), our results suggest that the main axis of conflict is between commercial and recreational fishers, with commercial fishers mobilizing together against the recreational intruders. On the other hand, recreational fishers demonstrated a higher average level of blame attribution with regard to all types of commercial fishing, recalling instances when recreational fishers mobilized against commercial fishing (e.g., the 1994 case in Florida when, after the public and lobbying campaign organized by recreational fishers, voters approved an amendment to the state constitution banning the commercial use of nets, which effectively eliminated most commercial fisheries, described in Hilborn and Hilborn 2019).

The findings pointing to the commercial-recreational divide is interesting in the light of the conventional wisdom that relations between SSF and LSF are characterized by competition, conflict, or feelings of animosity (e.g., reported in Carvalho et al. 2011, Howard 2017, Jimenez et al. 2019, Fabinyi 2024). Numerous papers reported on the relations between SSF and LSF noting the jeopardized position of the former due to the privileged LSF approach to capital, political connections, and other valuable resources (Schubauer et al. 2020, Cánovas-Molina and García-Frapolli 2022, Gray et al. 2023, Korda et al. 2023, Skerrit et al. 2023). Even though it would be reasonable to assume that this would lead to grievances toward the competing fleets and segments, the respondents from all fractions of the sample were generous with regard to harmfulness and the degree of illegalities of their counterparts. This finding is potentially important for understanding and predicting the composition of broader coalitions between fishing fleets and segments.

Although the attempt to understand these dynamics requires a comprehensive and multilayered approach, which exceeds the frame of this paper, one factor which can contribute to it concerns the competition for fishery resources. This can be exemplified with

the position of commercial SSF fishers. From their perspective, the purse seiners can rarely be seen as direct competitors because they catch small pelagic fish and often work in more remote fishing grounds. On the other hand, recreational fishers target the same highly valued demersal species as SSF fishers. Furthermore, in this sense it is relevant to recall the blame attributed by the commercial SSF fishers to the subsistence fleet, which uses the same gears and targets the same species in the near-coastal fishing grounds. Is this a consequence of commercial SSF fishers perceiving the recreational fishers and subsistence fleet as their direct competitor for resources?

On the other hand, it is interesting that subsistence fishers attributed less blame to the recreational fishers than the commercial SSF did. The key to the explanation may be that even though the subsistence fishers target the same fisheries as the recreational fishers, they are, in comparison to commercial SSF fishers, assumably less dependent on their catches because fishing does not represent their primary livelihood. Even though the term "subsistence" may connote a higher level of dependence from fishing for survival, in reality, these fishers have other sources of income and fishing represents more of a hobby and a tradition. In context of the struggle for the existing scarce resources, this potentially explains why the commercial SSF fishers attribute more blame to the recreational fishers.

The subsistence fleet in Croatia is probably the least defined of all the fleets and segments used as main units of analysis, starting from their ambiguous legislative status (legally recognized as commercial, but not fully commercial in reality) and complicated historical trajectory, to the lack of their social embeddedness in vocational associations, communication groups, and corresponding identity formations. As a potential limitation of our results, we should note the possibility that, due to their relative lack of recognition, some respondents confused them with the commercial SSF fleet or failed to clearly distinguish between the two. Hilborn and Hilborn (2019) noted the difficulties in distinguishing these three fleets and segments, i.e., commercial SSF, subsistence, and recreational fishers, in the Global South, but parsing out recreational fishing from SSF and subsistence fishing, or vice versa, can be troublesome also in the Global North context.

To continue the previous line of argumentation pertaining to the relation between blame attribution and competition for fishery resources, it is possible to interpret the relations between bottom trawlers and purse seiners. The results indicated a high degree of solidarity between the two LSF segments about blame attribution. Purse seiners and bottom trawlers share a number of common traits (e.g., use of industrial methods, working far-shore, being subject to similar monitoring schemes), and thus, it is reasonable to assume that this translates to identity formation. At the same time, with regard to the struggle over resources, it is relevant to point out that, targeting different species, they for the most part do not represent direct competition to each other.

Thus, the politics of blaming between fisheries fleets and segments, which resulted in solidarities between some and in perpetuating the blame-game between others, seems to be explainable from different angles related to a shared identity or interest based. Whether these pertain to competing theories or are mutually compatible should be illuminated in future research based on longer-term conflict histories and a more systematic

approach related to spatial competition. Although detailed historical and contextual analysis are beyond the scope of the present study, these represent promising directions for future research.

Finally, we highlight two key policy implications derived from our findings. First, there is a need to strengthen local co-management arrangements as arenas for dialogue, negotiation, and joint action among fishing fleets and segments (Berkes 2009). Although in the European context, Fisheries Local Action Groups (FLAGs) offer one example of such mechanisms, established to enhance stakeholder participation in fisheries governance (Linke and Bruckmeier 2015), co-management can take many institutional forms, ranging from formal partnerships to more flexible community-based collaborations. Such arrangements can help reframe blame dynamics by enabling fishers to voice grievances, agree on shared rules, and cooperate on initiatives such as habitat restoration and monitoring. Over time, these locally grounded forms of cooperation can foster trust relations between different user groups, as shown in successful co-management cases (Grafton 2005). Second, and more broadly, policy design should explicitly account for how regulatory measures may trigger or reinforce blame dynamics. Building on successful applications of participatory modeling through stakeholder involvement (Maravelias et al. 2018) and incorporating participatory testing and iterative feedback into fisheries management can help ensure more legitimate and equitable implementation.

CONCLUSIONARY REMARKS

Resource depletion of marine ecosystems is highly visible in Croatian public discourse, with different fishing fleets and segments receiving different assessments. For instance, while SSF are sometimes pointed out as champions of sustainability thanks to the use of selective tools and their importance for cultural heritage, bottom trawling is the most susceptible to criticism. This is relevant in the context of research limitations because the fishers' responses may have reflected strategies of promoting their fleet- and segment-bound image. In this respect, "perceptions" of the harmfulness and illegalities may be difficult to distinguish from an intentional strategy to criticize others, and to promote one's own group. However, we believe that these data are nonetheless relevant for understanding conflicts and relations because such self-presentation can crucially shape extractive practices of the fishers.

In line with that, one of possible avenues for further research may be to explore the attempts of fisheries fleets and segments to have an impact on public and expert opinion via media outlets, social media, and lobbying campaigns. Conflicts between different types of fisheries in the context of competition for resources can have far-reaching consequences, in the political and ecological senses, resulting in legislative shutdowns or the inclination of fishers to play "the blame game," with negative ecological consequences. Although the relations between fishing fleets cannot be viewed in isolation from the broader social field and the ways in which they are interpreted in public, this underscores the policy relevance of further research on blame attribution in fisheries.

As for other limitations of the research, we believe that our sample was well-composed and allowed for robust quantitative analysis. Although the study relied on a non-probability sample, the distribution of respondents across fleet categories closely corresponded to official statistics from the Directorate of

Fisheries (2022), indicating that the sample was structurally representative of the overall fisheries sector. However, as with all single-country case studies, the findings should be followed with replications in other countries to allow for a comparative perspective.

Data Availability:

The data that support the findings of this study are openly available in CROSSDA at https://doi.org/10.23669/TTB7HV.

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