



# A review of how we study coastal and marine conflicts: is social science taking a broad enough view?

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Received: 7 July 2022 / Accepted: 5 June 2023  
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## Abstract

Conflict in the marine environment is of increasing relevance as blue growth boundaries are pushed and resource access and use are in dispute. Social science disciplines have a long history and a wide range of approaches for studying conflict. However, understanding the approaches used to study marine conflict is challenging since the literature is large, broad, difficult to navigate, and there is little connection between conflict themes and the associated methods used to analyze these conflicts. In the present study, we take a first step to address this by systematically reviewing 109 peer-reviewed articles that employ empirical social science methods to study marine conflict. We find that studies on marine conflicts have centered on disputed space, mainly at local scale, and natural resources, such as fish. The main parties at the center of the conflicts are small-scale fisheries and public authorities, although with a growing presence of blue growth sectors. Most studies employed qualitative approaches to study marine conflicts. Current gaps in the understanding of marine conflict include gaps in understanding relational interactions and historical causal events. The need for social science research into marine conflict and the application of multiple social science methods is ongoing as different constellations of conflict actors emerge and as disputed ocean spaces expand beyond EEZs, to include polar regions, and the sea floor.

**Keywords** Conflict · Empirical methods · Social-ecological systems · Systematic literature review

## Introduction

Finding ways to address conflicts between people, groups and societies has been the topic of research for many centuries (Wieviorka 2013). Conflict comes in many different

forms (Picard and Marc 2015), can be of different durations (Collier et al. 2004), and can have diverse causes (Kriesberg 1982), including resource access and scarcity (Homer-Dixon 1991).

Spatially, conflicts are not limited to land but extend to coastal and marine environments as marine uses increase and, subsequently, so do anthropogenic pressure from human activities (Jouffray et al. 2020). As the frontiers of exploitation of marine resources shift, an increasing number of actors seek to occupy new spaces opening up at sea and in negotiation arenas (Stojanovic and Farmer 2013). Growing interests in the marine environment and the new focus on the blue economy creates increasingly complex governance issues (e.g., Voyer et al. 2018). New types of conflicts over the marine environment emerge, sometimes reshaping, or amplifying ones that already exist (Bax et al. 2021; Silver et al. 2015). The existence of conflicts may hinder efforts to advance ocean sustainability by, for example, exacerbating social injustices and the loss of biodiversity worldwide (Bennett 2019). Marine conflicts are therefore becoming an eminent

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field in the science of sustainability, invariably defined as problem-driven and interdisciplinary (Kates et al. 2001). Transdisciplinary sustainability sciences account for the need of a transformational approach that tackles root causes of social-ecological conflicts<sup>1</sup> (Tafon et al. 2021). This includes embracing research methods that facilitate cross-fertilization from different disciplines (Lang et al. 2012) and methodological approaches.

The interdisciplinary and multifaceted nature of marine conflicts is associated with a vast, dispersed, and ongoing literature. This literature draws from diverse academic disciplines and methodological approaches. For example, recent work on territorial disputes in the South China Sea, and the more abundant literature on disputes between industrial and small-scale fishing fleets often appear in non-marine discipline-based journals (i.e., criminology; see Goyes 2021) and apply widely varying methodological approaches.

To our knowledge, no systematic review exists on coastal and marine conflicts in terms of approaches and methods. Haddaway et al. (2015) recommend a systematic review that summarizes knowledge advancements and gaps to apprehend growing bodies of literature, in order to make informed suggestions on possible developments. Our aim was thus to gain insights into previously used approaches that could help other researchers venturing into the abundant but dispersed field of marine conflicts, identify gaps, and find new ways forward. The impetus for this review arose from the international project “Negotiating Ocean Conflicts among Rivalry for Sustainable and Equitable Solutions” (NO CRISES)<sup>2</sup> that aims to develop generally applicable social science methods to assess the origin, drivers, and mitigation strategies of ocean conflicts. When commencing this project, it soon became apparent that there was no previous study that had investigated the different social science methods that had been applied to studying conflict.

This review addresses this gap by conducting a comprehensive and systematic analysis of the ways that social sciences have approached the study of coastal and marine conflict. We explore the use of different methods and the conflict context in which they have been applied. Our results can facilitate an informed choice of research design and provide critical evidence to enhance conflict analysis capabilities. This understanding is especially relevant for a mostly problem-oriented research field such as the coastal and marine conflict, which may lead to the formulation of policy recommendations.

<sup>1</sup> Conflict transformation/resolution is however out of our scope of analysis.

<sup>2</sup> The NO CRISES project is funded by the Belmont Forum over the period 2020–2023 and brings together an interdisciplinary group of scientists.

## Social conflicts and the environment

The conflict literature is abundant and conflicts are defined in different ways. It is therefore useful to first provide a brief outline of conflict theories, paradigms, and where conflict sits with respect to sustainability research, followed by a brief overview of conflicts in the marine realm.

Conflict has been defined as resulting “from a purposeful interaction among two or more parties in a competitive setting” (Oberschall 1978, p. 291) or as a “relational situation structured around an antagonism”<sup>3</sup> (Picard and Marc 2015, p. 7). Several approaches see conflicts as inherent to the social relationships that constitute and shape our societies (Simmel 1904a). Conflict paradigms emerge from a number of foundational theories that describe the causes, functions and dynamics of social conflicts. Marx’s (Marx and Engels 1848) and Simmel’s (Simmel 1904a; 1904b) contributions are acknowledged for their particular influence on the field of sociology of conflict (Turner 1975). According to Marx’s theory of class struggle (1850), social conflicts arise as industrial societies draw from power and wealth accumulation of an elite. The social dynamics would therefore be directly attributed to conflicting interests between the one who subjugates and the one subjugated. Simmel’s theory of stratification (1908) instead advocates that social conflict is also constituted by a combination of associative and dissociative impulses driven by humans’ instinct (Turner 1975). Both thinkers agree that conflicts create social change (Harvey 1993). However, since the 1990s, social conflict theory broadened its scope to the field of natural resource exploitation and management (Boonstra et al., this collection). Homer-Dixon (1991) linked environmental stress and conflict and was the founder of the scarcity hypothesis. According to the author, increasing resource scarcity derived from a combination of an increasing environmental degradation, resource depletion, unequal resource access, and population growth will lead to conflict, and such conflict can be expressed in violence.

Sustainability research which also gained momentum since the 1990s was another field that recognized conflict as an important aspect of sustainability. Sustainability research aims to address complex social-ecological problems in an era where anthropogenic forces have become the main drivers of bio geophysical change (Glaser et al. 2012). A growing focus on social-ecological systems (SES), which are “complex, adaptive systems consisting of a bio-geophysical unit and its associated social actors and institutions surrounding a particular issue or problem” (Glaser et al. 2012, p. 4), stresses the complexity of human-nature relations. This SES framework frames a conflict as emerging from a particular combination

<sup>3</sup> Free translation of LID from original text in French.

of social-ecological actors and institutions across multiple societal levels and dimensions. Importantly, Ostrom's SES framework (Ostrom 2009) considers conflicts among users as one key variable that affects the system. Since the 1990s, the fields of Political Ecology and Ecological Economics have also played a prominent role in analyzing the political drivers that shape resource conflicts (e.g., Rocheleau 1995; Le Billon 2001; Martinez-Alier 2006; Harper et al. 2018); with an increasing acknowledgement of social movements and struggles to mobilize against social and environmental injustices (Scheidel et al. 2020). Simultaneously, new knowledge and theories that focus on the dynamics of violent conflicts have been advanced by Peace and Conflict studies (Webel and Galtung 2007). The SES and other perspectives are all relevant to studying coastal and marine systems (Turner 2000; Aswani 2019) particularly with the growing vulnerability of these systems.

In the marine realm, two major conflict triggers are typically debated: competition for resources (Bavinck et al. 2014) or space (e.g., Seto et al. 2023). Conflict may also be linked to diverging interests and perspectives over the use and management of ocean resources between direct and indirect users of coastal and marine resources, and public authorities (Stepanova and Bruckmeier 2013). At the international level, marine conflicts are mainly between two or more countries claiming rights and/or sovereignty over marine resources such as fish (Spijkers et al. 2019), oil and gas (Stocker 2017), and more broadly, maritime territory (Sakuwa 2017). At the national level, conflicts are reported for key blue economy sectors such as fisheries (e.g., Spijkers and Boonstra 2017; Dahlet et al. 2021), renewable energy (Hooper et al. 2017), mining, tourism (Kinseng et al. 2018), large-scale fishing (Link and Watson 2019), local livelihoods, and conservation (e.g., Harper et al. 2018). Industrial and touristic mega projects have been a source of conflict in Bangladesh (Abdullah et al. 2017), Peru (González Velarde 2019), and elsewhere (Andrews et al. 2021) through the "privatization" of coastal areas, thus preventing traditional use of natural resources.

### Empirical social science approaches to ocean conflict

There is growing recognition of the role of social sciences in informing solutions that help societies move toward more sustainable SES. Through a broad range of disciplines (Bennett et al. 2017), social sciences provide tools that can help in characterizing highly complex and evolving human-nature relations, while also acknowledging intrinsic multi-level and multi-scale dynamics (Aswani et al. 2018). Yet, the choice for a particular method is also a choice to explore certain features of the system under study. Preiser et al. (2018) argue that acknowledging the complex nature of SESs has strong implications on the choice of methodological approaches. For example, the authors demonstrate that to account for the relational aspects of complex adaptive systems, network

analysis and cognitive maps can be used. Agent-based modeling helps identifying feedback structures, which relate to the dynamic aspect of complex adaptive systems, while the openness of the system is better captured using qualitative comparative case studies analysis, or participatory mapping among others. This study analyzes the methods used to study marine conflict and the context in which they have been applied by performing a systematic literature review. In particular, we aim to:

1. Diagnose how marine conflicts are represented in the literature, based on main descriptive characteristics of the conflicts (geographical location, stakeholders, conflict scale and conflict level)
2. Present the methods that are used to study marine conflicts
3. Consider the links between the methods and the descriptive characteristics of the conflict
4. Suggest possible further avenues of research based on identified knowledge gaps and yet little explored potentialities

### Methods

Introduced in the 2000s in the field of conservation (Pullin and Stewart 2006), the literature review is a powerful method to take stock of progresses made within a research field (Haddaway et al. 2015). Different approaches exist to undertake literature reviews (including rapid reviews, literature reviews, narrative reviews, and scoping reviews). Generally, researchers systematically follow a methodological protocol (Moher et al. 2015; Grant and Booth 2009).

We use a systematic literature review approach based on the best-practice guidelines for systematic reviews (e.g., Collaboration for Environmental Evidence 2013). This approach allows us to analyze a large, complex, and heterogeneous body of literature. A systematic literature review further provides a high degree of transparency and methodological rigor to ensure that results are reliable within acknowledged limitations.

### Data collection

The online databases used for the search were Web of Science (WoS) and Scopus in October 2020 and March 2021 respectively. A preliminary literature search was done as a first step to detect key papers on oceans conflicts based on related keywords. This ensured that the strings defined for the database search would be comprehensive and robust. We developed the search strings (named A, B, C, and D, c.f. Figure 1) on the basis of the team's scientific expertise and keywords related to three basic components of the research question: social science methods, conflict, and marine:

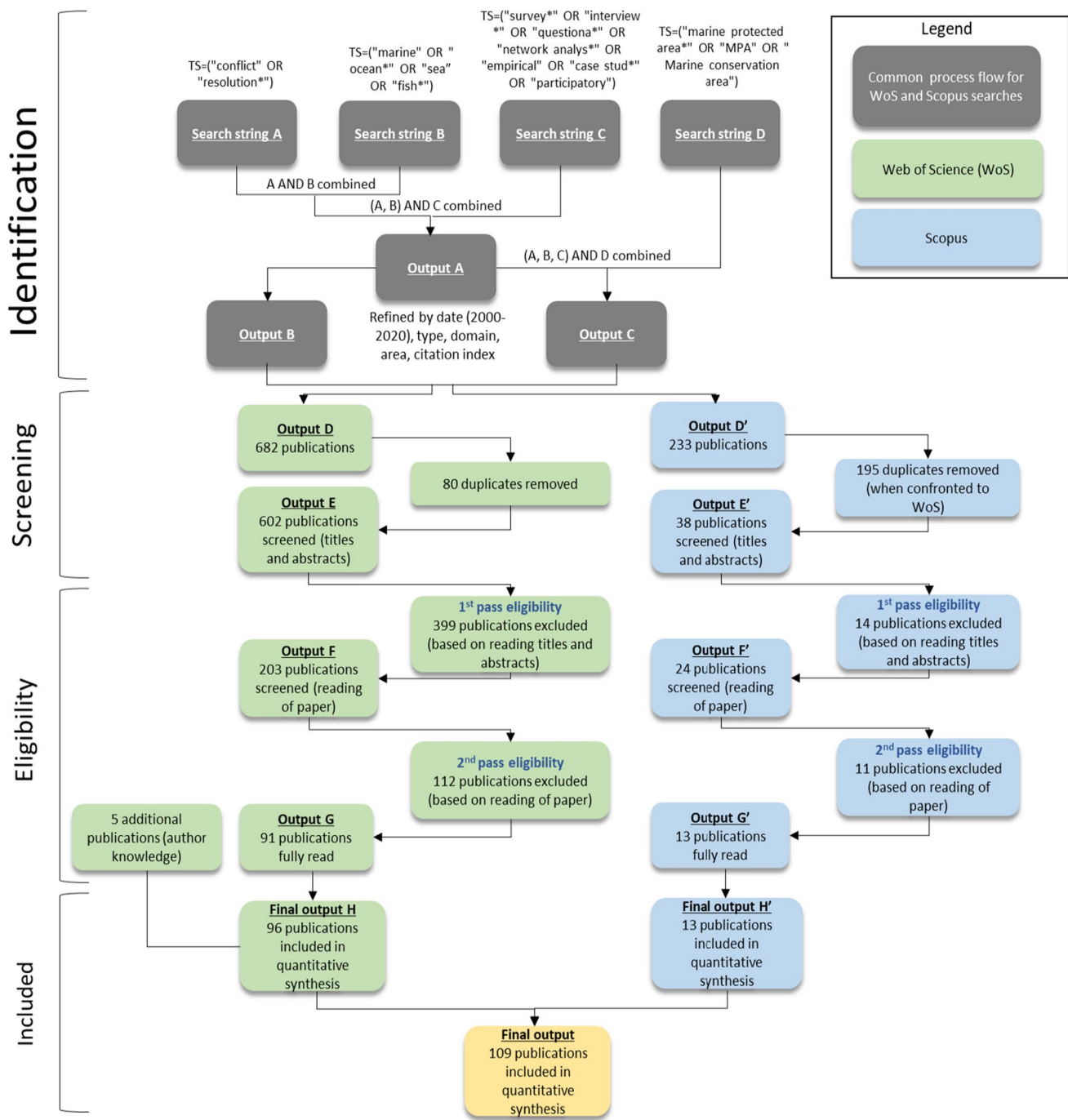


Fig. 1 Decision tree used to conduct a systematic literature research on Web of Science. Based on (Moher et al. 2009)

A. conflict OR resolution<sup>4</sup>

B. marine OR ocean\* OR sea OR fish\*

C. survey\* OR interview\* OR questiona\* OR network analys\* OR empirical OR case stud\* OR participatory

D. marine protected area\* OR MPA OR marine conserva-tion area\*

<sup>4</sup> There are various synonyms for the word “conflict” which is however the most widely used to study the topic. We thus decided to only focus on articles that use the term “conflict” to gain insights on how conflict is conceptualized. To focus our analysis, papers only addressing “resolution” were subsequently excluded.

A higher specificity was adopted for search string C to reflect the focus of our study on empirical social science methods. Separate searches were implemented for each

search string. The results from all the searches were then combined and duplicates were removed (Fig. 1). This approach is equivalent to the AND function in both databases. We also included five relevant studies of our knowledge that were not picked up in the search. Identifying additional studies from other sources is also part of data collection for systematic literature reviews (c.f. Liberati et al. 2009).

### Inclusion criteria

To refine the search and ensure a manageable number of publications, we only included studies that fit the following criteria:

1. Peer-reviewed publications
2. Within the timeframe 2000–2020
3. Written in English language; and
4. Research relevant to domains related to the marine, coastal and social-ecological contexts

This resulted in a total of 915 publications. All files were exported to the reference management platform Mendeley (Elsevier, 2020). An Excel table was generated with the title, abstract, authors, date of publication, and name of the journal, for each of the 682 references imported from WoS and 233 from SCOPUS.

A first screening of the titles and abstracts was used to decide which articles would be included in further analysis. Three criteria were then applied to determine eligibility for inclusion in the systematic review: The papers had to (1) be related to the coastal and/or marine environment(s) (e.g., not inland or freshwater); (2) have a central focus on conflict and/or conflict resolution between humans and between humans and non-humans (i.e., wildlife); and (3) be empirical. If any one of these criteria was not met, the article was excluded from the analysis. If an abstract was not available, the entry was either rejected based on the title or the full text was screened. When doubts remained on whether the article met the criteria, those were classified as “unsure” and taken to the next step of analysis.

The three co-authors reviewed the articles and applied the inclusion criteria. To assure consistency between the reviewers, a randomly selected sub-sample of the 128 papers were scored by at least two different co-authors. The average consistency between co-authors was 69% indicating they largely understood and implemented the inclusion criteria in the same manner.

### Defining the categories

Explanatory categories were pre-defined based on the key-articles (Charles 1992; Warner 2000), but as literature reviews are an iterative process (Haddaway et al. 2020), the

categories were complemented or modified as the reading of the full articles progressed. In particular, the choice of the sub-categories under “Method(s) applied” was supported by a previous short literature search.

In our study, we use the word “**methods**” to designate a range of techniques and approaches for data collection and data analysis. For the category “Method(s) applied” (c.f. Table 1), previous literature research on empirical environmental social sciences research informed the initial definition of sub-categories. Empirical environmental social sciences research can be classified as experimental, observational or synthetic, and all build upon empirical data (Cox 2015). Synthetic research is based on a literature review or a meta-analysis. And while experimental research specifically designs and executes experiments, observational studies consist of natural experiments, case studies, and correlational studies. The empirical methods used in marine social sciences adopt qualitative, quantitative, or mixed methods approaches (Bennett 2019). Mixed-method approaches have developed over the past 20 years and are now regularly adopted in social sciences (Timans et al. 2019). By employing both qualitative and quantitative science methods, this approach can be helpful, particularly when addressing complex real-world problems. Thus, assessing these categories in our corpus of articles was particularly relevant given their focus on coastal and marine conflicts.

Typically, when involving human participants, data collection can be done through different types of interviews (structured or semi-structured interviews, informal conversations), focus group discussions, survey and questionnaires, participant or direct observation (Pellowe and Leslie 2020; Chakraborty et al. 2020; González Velarde 2019) generating primary data. Secondary data are also needed to support methodologies such as case studies (see for example Scobie et al. 2020 and Saint-Paul 2006) and process-tracing analyses (Collier 2011). These latter draw from a robust corpus of data gathered from different sources (either primary and/or secondary data) and create an in-depth picture of the situation in focus (Merriam 2009). In particular, the process-tracing analysis focuses on understanding causal mechanisms or connections that help explaining the emergence of a determined event (Collier 2011). Content analysis is a key method in social sciences to analyze the construction of realities and meanings through narrative (Preiser et al. 2022). Content analysis can be applied to analyze interviews (primary data) and other types of text-based document (secondary data). Because conflicts are mostly about relationships between groups of people, we included stakeholder analysis and network analysis as methods which were also found in our literature review. Quantitative empirical methods using modeling approaches, such as agent-based modeling (ABM), are also employed in marine social sciences (Glaeser et al. 2015; Schulze et al. 2017; Schill et al. 2016; Glaser et al. 2012).



**Table 1** Categories and sub-categories defined to account for the types, characteristics, as well as methods used to study the marine and coastal conflicts found in the 109 articles selected in the literature review

Category name	Reason for inclusion	Sub-categories
Central focus of the research	Classify the aim of the studies addressing conflicts in the marine and coastal environment	(a) Conflict is the central focus; (b) Conflict is a finding; (c) Conflict management is the central focus; (d) Humans vs. non-humans <sup>a</sup>
Data source	Describe the methodology used in the selected studies	(a) Primary data; (b) Secondary data
Method(s) applied	Determine what social science techniques are currently used by marine scholars to study conflicts	(a) Survey; (b) Stakeholder analysis; (c) Interview; (d) Group discussion; (e) Observation; (f) Network analysis; (g) Content analysis; (h) Process tracing; (i) Case study; (j) Model; (k) Mental map (mind mapping); (l) Mapping (GIS); (m) Other
Study approach	Describe the methodology used in the selected studies	(a) Qualitative; (b) Quantitative; (c) Mixed methods
Study area	Contextualize the geographical location of the conflicts studied	(a) Country; (b) Region; (c) Body of water
Spatial extent of the study area	Contextualize the type of ecosystem where the study of the conflict(s) takes place	(a) Exclusively sea; (b) Sea and land; (c) Exclusively land
Sampling	Describe the methodology used in the selected studies	(a) Sample size; (b) Period of data collection; (c) Studied period
Conflicting parties	Information on the characteristics of the conflict(s)	(a) Small-scale fisheries (including artisanal); (b) Semi-industrial and/or large-scale fisheries; (c) Fish traders and supply chains; (d) Recreational boating/fisheries; (e) Industry; (f) Tourism; (g) Aquaculture; (h) Local communities; (i) Public authorities; (j) Conservation (no party specified); (k) Non-Governmental Organization (conservation); (l) Non-Governmental Organization (not conservation); (m) Scientists; (n) Political parties; (o) Other
Conflict scale <sup>b</sup>	Information on the geographical scale of the conflict(s)	(a) Local; (b) Regional; (c) National; (d) Between multiple countries
Conflict indicator	Information on the modality of manifestation of the conflict(s)	(a) Not evident (latent conflict); (b) Verbal disagreement but no physical harm; (c) Physical harm to people and/or assets
Conflict impact	Information on the consequences of the conflict(s)	(a) Damage to livelihoods; (b) Damage to assets; (c) Damage to culture or person; (d) Damage to natural environment
Effect of conflict <sup>c</sup>	Information on the outcomes of the conflict(s)	(a) Positive and creative; (b) Negative and destructive
Conflict-related power issues based on (Charles 1992)	Information on the characteristics of the conflict(s)	(a) Control over access to the resource; (b) Control over the resource in post-harvest phase; (c) Control over how the activity is carried out; (d) Other
Conflicting relationships based on (Charles 1992)	Information on the characteristics of the conflict(s)	(a) Relations within the group of actors; (b) Relations between different groups of actors; (c) Relationship with/between non-users; (d) Relationship external to the group of actors
Conflict level based on (Warner 2000)	Information on the characteristics of the conflict(s)	(a) Intra micro-micro (within the user group directly involved in resource use); (b) Inter micro-micro (between the user groups directly involved in resource use); (c) Micro-macro (between groups directly and indirectly involved in resource use); (d) Macro-macro (between groups indirectly involved in resource use); (e) Other
Conflict stage	Information on the characteristics of the conflict(s)	(a) Potential / pre-conflict; (b) Ongoing conflict; (c) Post-conflict
Other	Remaining issues	

<sup>a</sup>Human versus non-humans conflicts happen when wildlife negatively impacts human groups and vice-versa (Nýhus 2016)

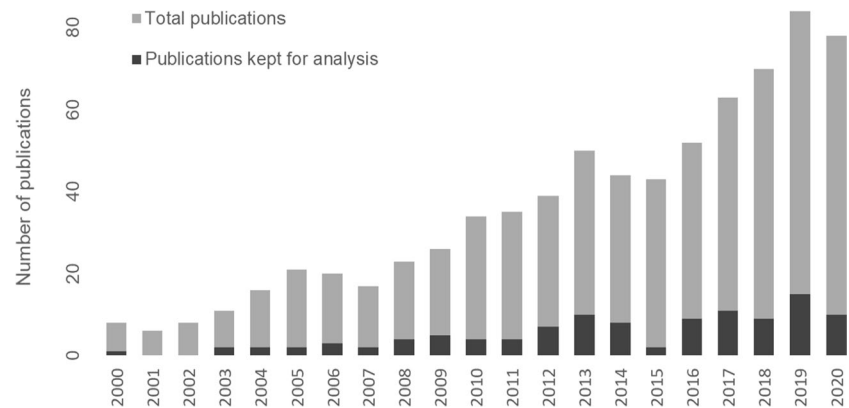
<sup>b</sup>The local scale encompasses one municipality/community, whereas the regional scale includes two or more municipalities. Both local and regional categories correspond to the sub-national scale

<sup>c</sup>When the information was not explicitly given, our normative judgment was used to score the effect of the conflict



**Table 2** Occurrence of the most used words (number of times cited higher than 80) in the 203 abstracts representing Output F from the Web of Science search

Word	Number of times cited
Management	251
Local	165
Social	160
Coastal	97
Resources	93
Stakeholders	89
Policy	83
Environmental	81

**Fig. 3** Absolute frequency of publications that study marine conflicts from 2000 to 2020 analysed in this study

focus (see Supplementary material for an overview of the 109 articles reviewed). The number of publications focusing on marine conflicts has increased over the course of the past 20 years (Fig. 3).

An average number of 30.4 publications per year was obtained from the search for 2000–2020. The average number of publications that were included in our analysis was 2.8 per year in the early period (2000–2010) increasing to 8.4 between 2011 and 2020. In 2000, only one publication was kept for analysis out of 8, while in 2020 a total of 10 publications were retained for analysis.

### Characterization of marine conflicts in the literature

Coastal and marine conflicts were mostly related to “Control over access to the resource” ( $n = 76$ ) and/or to “Control over how the activity is carried out” ( $n = 74$ ). A total of 46 conflict cases fitted under both categories. The main objects of dispute were space (e.g., over coastal land in Thompson et al. 2016, and over the ocean space in Usher and Gomez 2017) and natural (living) resources such as fish (Maya-Jariego et al. 2017), when access of one group was hampered or compromised by the physical presence, activity, or political influence and interference of another group.

### The geographic scope

The continents most often represented in the 109 publications are Asia ( $n = 34$  studies), followed by America ( $n = 32$  studies) and Europe ( $n = 25$  studies) (Fig. 4(a)). Southeast Asia accounted for 56% of Asian-located studies, Northern America accounted for 53% of American studies, Northern Europe accounted for 36% of European marine conflict publications, and Eastern Africa accounted for 50% of African studies.

A total of 67.9% of the publications are about marine conflicts, while 29.4% report conflicts encompassing both

land and sea, and 2.7% cover coastal land only (Fig. 4(b)).

### Conflicting parties, conflict scale, and conflict level

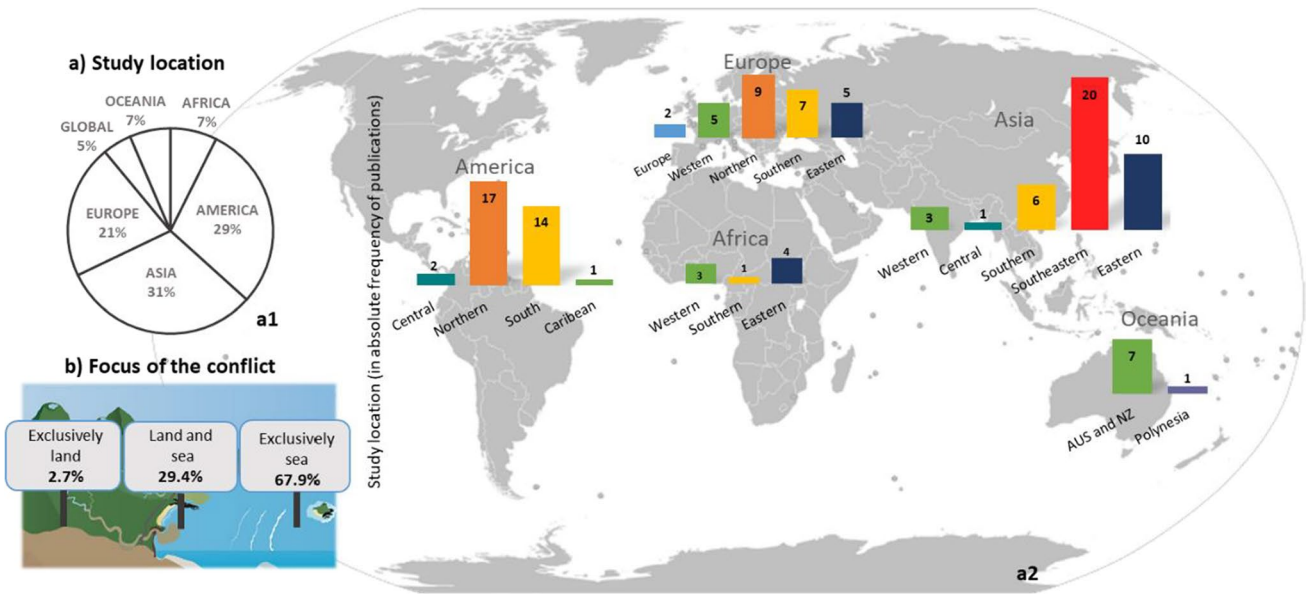
Small-scale fisheries (SSF) were part of a conflict in 60.6% ( $n = 66$ ) of the 109 studies, while public authorities and political parties were cited in 57.8% ( $n = 63$ ) of the selected articles (Fig. 5(a)). A total of 37.6% ( $n = 41$ ) and 31.2% ( $n = 34$ ) of the studies reported local communities<sup>5</sup> and conservation<sup>6</sup> respectively as conflict parties. Fish traders and supply chain actors are the least cited together with science and scientists ( $n = 6$  publications for each group).

Temporally, conflicts including the fishing sector were present over the whole period (2000–2020). However, the frequency of citation for each conflict party varied over time (Fig. 5(b)). The small-scale fishing sector was cited in 76% of the publications in the early period (2000–2010)

<sup>5</sup> Local communities correspond to any social group other than SSF, belonging to local communities.

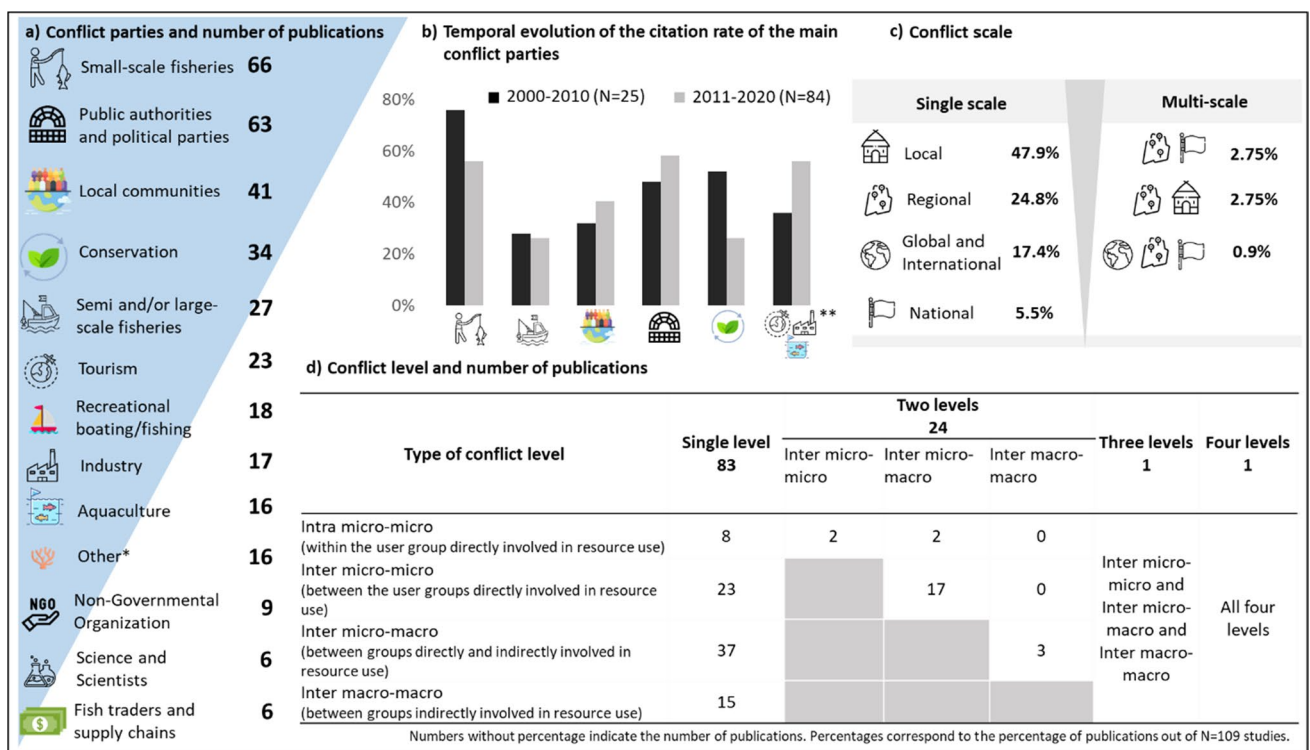
<sup>6</sup> The “conservation”: category refers to entities with no party specified, but that relate to coastal and marine conservation, e.g., mostly Marine Protected Areas. Instead, conservation parties linked to public authorities were categorized as “Public authorities and Political parties,” while those belonging to Non-Governmental Organizations were marked under the category of the same name.





**Fig. 4 (a1)** Percentage of studies focusing on different continents ( $N=109$ ). Studies classified as Global encompass at least one country from each continent. One study included in this category encompasses America, Europe, Middle East, and Asia only. **(a2)** Absolute frequency of study location, as per the United Nations’ world subre-

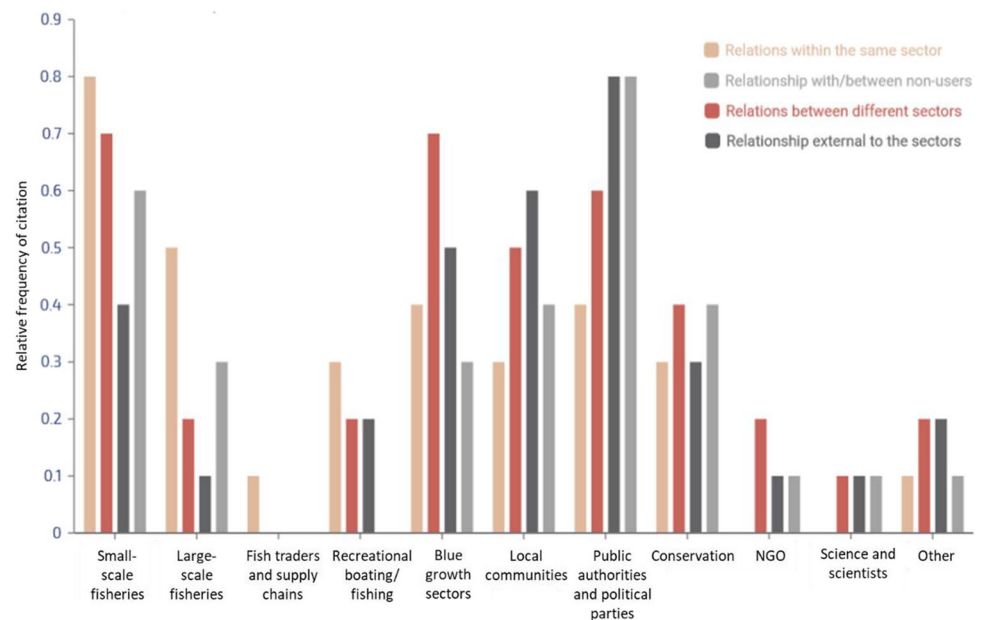
gions definition. A total of eight studies encompass two to four subregions, and among those, two encompass subregions from different continents. **(b)** Spatial extent of the conflict studied (in percentage of publications,  $N=109$ )



**Fig. 5** Identified conflict parties and number of publications (out of  $N=109$ ) citing each party. In (a), Other\* includes local investors, pirates, the recreational diving sector, UN naval peacekeeping missions, land invaders, coral mining activity, marine fauna, mili-

tary actors, paramilitaries, activists, migrants, surfers, recreational beach uses, civil society. In (b), \*\* refers to blue growth sectors and includes tourism, industry and aquaculture

**Fig. 6** Types of conflict relationship per conflict party ( $N=109$ ). Blue growth sectors combined include tourism, industry, aquaculture



decreasing to 56% for the latter period (2011–2020). The same decreasing trend is observed for conservation, cited in 52% and 26% of the total publications for 2000–2010 and 2011–2020 respectively. The opposite trend is observed for blue growth sectors consisting of industry, tourism and aquaculture, public authorities and political parties, and local communities. For those conflict parties, the average citation rate increases in the publications across decades.

Scale wise, 47.9% ( $n=45$  publications) of the conflicts studied are situated at the local scale (Fig. 5(c)), followed by 24.8% at the regional scale ( $n=33$  publications), and 17.4% at the international or global scale. The national scale is the least represented with only 5.5% of the publications. Studying conflict at the local scale also reflects the analytical focus. For example, we found that more than half of the small-scale fisheries (SSF) conflicts are at the local scale, with 38.1% focusing on the regional scale. The exception is for conflicts involving the semi- and/or large-scale fishing sector, where conflicts are studied more frequently at the regional scale. Political authorities are the most recurrent party in studies that analyze conflicts on a global or international scale.

Conflicts are more commonly studied at the single level, with most studies focusing on inter micro–macro interactions ( $n=37$ ) (Fig. 5(d)). Micro–macro interactions are between a group of direct resource users with a group of indirect resource users. The second most commonly found interactions were micro-micro interactions ( $n=23$ ). A total of 17 publications addressed conflicts happening both at the inter micro-micro and inter micro–macro levels. Only two publications looked at conflict interactions at three or more levels.

Interactions between different groups of actors are most often the topic of the studied conflicts ( $n=57$  publications). The fishing sector stands out when it comes to conflicts within the same sector (Fig. 6), whereas blue growth sectors are mainly involved in conflicts with different sectors. Public authorities and political parties are also part of conflicts involving relationships external to the sectors (e.g., corruption).

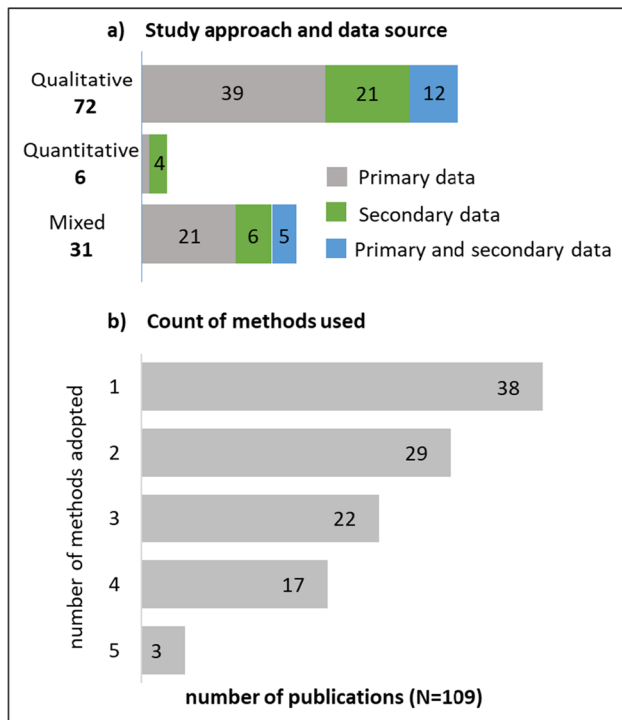
### Social science methods used to understand marine and coastal conflict

Primary and secondary data have been used in 56% and 28.4% of the studies respectively, while 15.6% of the publications encompass both primary and secondary data together (Fig. 7(a)). A qualitative approach was employed in 66% of the publications, while 28.4% applied a mixed approach. Only four articles applied quantitative methods. A single-methods approach was used in 38 studies, whereas 71 studies used two or more, five being the maximum number of methods used by one study (Fig. 7(b)).

Among the methods used to study marine conflicts, the most frequent one was interviews, employed by 70 studies (Fig. 8) followed by observations, including ethnographic observation and participant observation, which were used in 40 studies. Content analysis and case studies were undertaken in 38 (34.9%) and 31 (28.4%) studies respectively.

Interviews, observation, case study, and surveys are mainly applied at the local level, while content analysis is applied more frequently to regional, international, and global studies.

For studies using content analysis and case study, the most frequent conflicting parties are public authorities



**Fig. 7** (a) Data type per study approach. (b) Number of methods used by number of publications

and political parties, with 26 and 20 publications respectively. Mapping and modeling is particularly important for conflicts that include small-scale fisheries and conservation.

We investigated further details on the methodologies used, such as date of data collection, period of study, and sample size. However, assessing these results turned out to be challenging. More than 45 cases did not explicitly inform on the date of data collection, nor on the period under study. Regarding the sample size, a variety of units are used to report on the number of participants (e.g., number of participants, number of households, number of focus group discussions, and interviews) and/or of observations (e.g., number of observations, time spent observing). We found no evidence of a shared approach to the definition of these parameters.

## Discussion

This study summarizes the state of marine conflict scholarship by comprehensively reviewing the social science methods applied in the study of coastal and marine conflict. We divide the discussion of our results into three Sects. (4.1 to 4.3). In each section, we highlight the relationship between conflict themes and the use of social science methods, and we highlight topics that could benefit from further research.

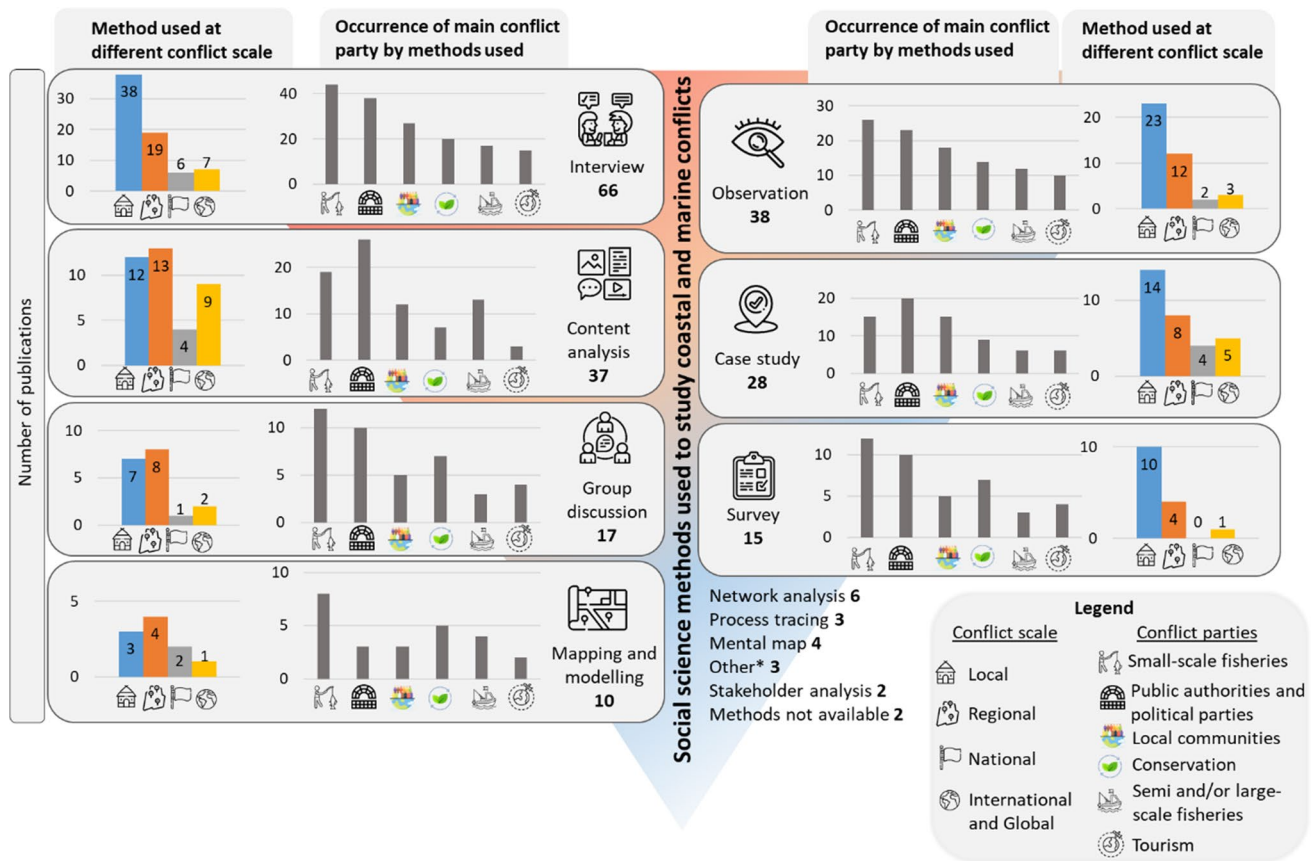
## A growing field of research

In the last 20 years, conflicts have been the increasing focus of marine sustainability research (Bennett 2018) evidenced by the increasing number of publications on this topic over the period 2000–2020. This increasing trend is mirrored in related topics such as marine SES research (Refulio-Coronado et al. 2021), and more broadly SES (De Vos et al. 2019) and sustainability sciences (Bettencourt and Kaur 2011). Increases in the number of publications can be driven by an increase in the relevance of the topic but also, for example, due to greater data availability, enhanced digital means, or greater collaboration and communication among scientists and other stakeholders (Dalton et al. 2020; Bettencourt and Kaur 2011).

The main themes in marine conflict research relate to keywords such as “management,” “social,” “local,” “coastal,” “resources,” “stakeholders,” “policy,” and “environmental.” The local scale perspective and the specific actors of the conflict who operate at this scale were key<sup>7</sup> (e.g., “local” was often related to “local communities”). Analysis of the management system in place, or the advice provided through policy recommendations and frameworks for more sustainable resource management were also key at the local scale but also at larger scales.

Causal connections between local social processes and marine resource management (Aswani et al. 2018) are an important focus for environment social scientists. For a number of studies that simultaneously address social and environmental spheres, descriptions of *coastal* social-ecological systems are central for determining conflict situations. We found that marine conflicts predominantly had an ocean-based focus and that the scope of focal conflicts mostly related to fisheries. This may have been due to the inclusion criteria used in the literature search. Nevertheless, from a SES perspective, this is a key finding for developing further understanding of the processes and dynamics shaping the ocean-land interface, particularly when it comes to coastal and marine systems governance and institutions (Tafon et al. 2021; Refulio-Coronado et al. 2021; Manlosa et al. 2022). This is also pertinent at the international level where marine disputes touch upon geopolitical issues (Daniels and Mitchell 2017). For instance, the bulk of the studied Asian marine conflicts focused on the South China Sea conflict where China’s activities are in opposition to Taiwan, Indonesia, Malaysia, Philippines, and Vietnam (Rahman and Tsamenyi 2010). From these articles, the marine environment in the South China Sea conflict is less an object of contention than a scene where different countries dispute their power

<sup>7</sup> This emphasis on a local-based perspective is further discussed in the next section.



**Fig. 8** Social science methods used to study coastal and marine conflicts and summary of methods under different conflict scale and different conflict party recorded

(see Boonstra et al., this collection). European marine geopolitics were also addressed in some studies (e.g., Østhagen and Raspotnik 2018; Spijkers and Boonstra 2017) but not as frequently as the South China Sea conflict.

There were no studies showcasing international conflicts in Africa and America and no study focused on conflicts over the polar regions. Empirical research on marine conflicts in polar regions is a prospective gap, as already highlighted by Keil (2013). Under the current warming climate scenario, new maritime routes are opened up as the ice retreats for longer periods, and possibilities for marine resource exploitation increase. Thus, political interests and power constellations between states are (re-)configured, opening the path for new conflicts to emerge (Wegge and Keil 2018; Spijkers et al. 2021).

We acknowledge several shortcomings in this research with respect to regional findings. The results may ensue from the way our search strings were formulated, whereby search string B (see “Data collection” section above) contained key-words specific to the marine domain, although our subsequent selection criteria included the coastal realm. The use of Scopus and WoS may also introduce an intrinsic

bias, as these databases contain a disproportionate amount of Southeast Asian, European, and North American publications at the expense of academic productions coming from the Global South (Tennant 2020).

### Blue growth sectors are increasingly part of the marine conflict narrative

Understanding the number of conflicting parties involved in a dispute can give a sense of the complexity of the conflict. An average of 3.8 parties are cited per study, suggesting that most conflicts involve two or more stakeholder groups. Small-scale fishers, public authorities and political parties, and local communities are the most common actors in conflict. As also outlined in the previous section, marine conflict scholars have mostly focused on fisheries social-ecological systems (Dahlet et al. 2021). However, the diversity in the number and type of conflicting parties increases from 2005. Blue growth sectors are increasingly part of the conflict narrative while the small-scale fisheries sector is less of a focus. The proportionate decrease in focus on small-scale fishers’ conflict may have implications, given the context of poverty



and vulnerability in many of these fisheries (Béné 2003; Jentoft et al. 2018; Nayak et al. 2014). The reduced focus on SSFs could be a result of a switch toward an increasing attention to local communities as main parties of blue growth conflicts, as suggested by our results. Other possible explanations include that conflict is less of an issue in the SSF sector or that it has been resolved, but we have no evidence to support this assertion.

The growing complexity of marine conflict is evident in our data as the blue economy focus expands and advances (Silver et al. 2015). The blue economy agenda is a new turn in the development and intensification of activities based on the exploitation of ocean resources or ocean space. The blue economy may push the ocean's geological boundaries out and down, toward, for example, deeper water fish resources and mineral resources. By exploring further and deeper environments, that are beyond the limits of national jurisdiction, a new arena of potential conflict may be introduced (Carver 2019). This is particularly problematic due to weak institutional governance in high seas (Ardrón et al. 2013). A case in point may be deep seabed-mining where international exploitation regulations are not yet in place but where activities are planned (Carver 2019). Even though deep seabed-mining has already been a source of litigation (Levin et al. 2020), it does not appear in the marine conflict literature (as per our search).

In parallel to the blue growth push, there has also been a global growth of 4.6% per year (between 1984 and 2006) in conservation initiatives, mainly in the form of marine protected areas (MPAs) (Wood et al. 2008). Within areas of national jurisdiction (EEZs), protected area coverage increased up to 18.01% over the last 10 years (UNEP-WCMC, IUCN, and NGS 2021). Of the 34 publications we found where conflicts involve conservation parties, half of them are directly related to MPAs within areas of national jurisdiction, with only one publication mentioning the case of protected areas beyond national jurisdiction. As knowledge on local socio-ecological processes for MPA implementation has grown over time (Gallacher et al. 2016), and as MPAs are potentially increasingly legitimized by local communities (Ferse et al. 2010), conflict arising around conservation might be reduced. This would be in line with a decrease in the number of papers on conservation related conflict in our findings. However, if conservation efforts are to continue in the areas beyond EEZ, new conflict-related challenges may arise from their implementation and management in the future.

Overall, our results suggest that marine conflict research is moving into a new setting, where the oceans are squeezed between the expansion of the blue economy sectors and conservation initiatives beyond EEZs. Thus evolves the landscape of marine conflicts: different constellations of conflict actors are expected to emerge with diverse power relations,

and whose geographic area of contestation may move to more offshore zones or to the bottom of the seas.

### **Marine conflict research remains mainly local, context-based**

The literature on coastal and marine SESs focuses mainly on the relationship between local user groups directly involved in the resource use (Refugio-Coronado et al. 2021). This is mirrored in the literature on marine conflicts that is also mainly at the local and regional scales focused on resource user groups who are directly involved in the resource use. There appears to be a gap in marine conflict studies that address conflicts within one user group and conflicts between non-user groups.

Conflict complexity (i.e., the number of stakeholders) tends to be greater at the local scale. While acknowledging the limitations of our literature search, it may be that empirically based conflict research is more tractable at the smaller scale and less commonly applied at larger scales. Some sectors such as fish traders and recreational boating are simply not included in research addressing conflicts at the international or global scale. Small-scale fisheries and local communities in contrast are present in cross-national conflicts, albeit at a lesser extent than in sub-national conflicts. Small-scale fishers and local communities may not participate at international or global levels of decision-making, due to lack of inclusion, or due to capacity and logistical impediments. In contrast, NGOs and international bodies are key actors at the global and regional scales (Bennett et al. 2017) but are overall not much explored by marine conflict scholars based on our findings. Our conclusion is that overall, there is room for more cross-scale and cross-level analysis of marine conflicts to gain greater resolution on stakeholder participation at all levels.

### **Methods applied in marine conflict studies and implications for the results**

Marine conflicts are mostly explored qualitatively, rather than using a mixed or quantitative approach. The poor representation of the quantitative approach in our sample may be explained by the fact that we may have missed some quantitative-oriented publications due to our search criteria. In our corpus of publications, 31 studies adopt a mixed method approach, but only few included both qualitative and quantitative methods (e.g., Maya-Jariego et al. 2017). As in De Vos et al. (2019), we had few studies that draw on the collection of, for instance, biological or oceanographic data. Exceptions were found among the studies focusing on conflicts related to marine protected areas (e.g., Bloomfield et al. 2012). This is a potential gap, given the growing need to consider the environmental change-social conflict nexus



as the impacts of local anthropogenic activities are felt globally. We argue that efforts toward an interdisciplinary science that concatenates methodological approaches from the natural and social sciences may result in a more holistic and dynamic picture of the drivers of marine conflicts.

Multi-methods conflict studies often combine the output from interviews, observations, case study analysis, and content analysis (Harrison et al. 2017; Bennett et al. 2017). This choice of methods might indicate a primary interest in contextually grounded research that enlightens local particularities and complexities of the focal conflict. Interviews are the most recurrent method used by marine conflict scholars as it also is in sustainability science (Mielke et al. 2017). Interviews can provide foundational evidence to build a case study and offer an in-depth understanding of a context-based situation through an analysis of the complex social, ecological, political, and economic processes which precede and drive the emergence of conflict. Observation, case study, group discussions, and surveys, which are among the six most used methods in marine conflict research, are also mainly applied at the local level (Shackleton et al. 2022). The preference given to these methods might partly explain why marine conflicts are mostly pictured at the single and local-based level, as shown by our results and those in other resource management studies (De Vos et al. 2019). Marine conflict research places a great emphasis on the description of social, economic, and political variables that make up the studied conflict. On the other hand, an explicit spatial component is rarely included in the analysis, omitting an important dimension of marine conflicts related to resource use and spatial competition.

From a complex adaptive systems (CAS) perspective, Preiser et al. (2018) demonstrate how the choice of methodological approaches influence how the results will reflect different features of CAS. The principal methods used by marine conflict scholars acknowledge the “contextual” (i.e., CAS are context-dependent) and “radically open” (i.e., the influence of external variables on the system) features of a system (Preiser et al. 2018). The fact that a higher diversity of methods is employed by studies at the local scales than at regional to global scales may either indicate that conflict complexity is enhanced at local scales, or that challenges are greater when collecting data at larger scales.

Generating primary data engages with ideals of participatory research needed to address sustainability challenges (Mielke et al. 2017; Campbell 2002). However, the rationale for the use, modalities (i.e., at what stage of the research are other stakeholders involved) and operationalization of such principles as well as those drawing from the transdisciplinary research approach (Lang et al. 2012) are seldom developed in marine conflict studies. Difficulties in implementing participatory approaches or in accessing data may explain why, according to our results, conflicts at the national and multinational scale are less frequent. Participatory approaches are

particularly challenging to implement in relation to certain actors like transnational corporations involved in the seafood industry and other blue industries. This is critical since transnational corporations play an incommensurate role over marine social-ecological systems’ dynamics (Österblom et al. 2015). However, mistrust and an unwillingness to share information may be a factor. Similar challenges for primary data collection relate to high-level public authorities. Interestingly, this group of stakeholders is among the most cited conflict actors, particularly when studies make use of content analysis techniques. Content analysis and case studies using secondary data prove to be important methods on which marine conflict scholars can rely to circumvent potential challenges associated with participatory data collection approaches. This holds particularly true for regional and (inter)national cases. Survey and content analysis find much relevance at this greater scale analyses—including during the COVID-19 pandemic, which hampered field trips and in situ data collection. Among the reviewed documents in such studies were public records of meetings and fishing management plans (e.g., Boucquey 2016), legislative (e.g., Clarke and Jupiter 2010; Tafon 2019), and media content (e.g., Scobie et al. 2020). In cases where participatory approaches are successfully applied, secondary data can provide further valuable perspectives on the conflict, enabling a better understanding of the different subjectivities that lie behind research participants’ perceptions.

### Potential and challenges of different research methods

Although a wide range of methods are used in marine conflict research, some remain under-explored. Marine conflicts are primarily about dynamic social and social-ecological relations. However, we find that methods that assess the “relational” feature of marine conflicts (Preiser et al. 2018) are not frequently used. Bodin et al. (2020) argue that environmental governance studies mostly focus on conflict as isolated phenomenon. Conflicts are less often analyzed in relation to the network of relationships, including collaboration, in which they are embedded.

Network analysis can help to understand relational features and has had extensive use within the social-ecological sciences (Sayles et al. 2019). Network analysis can provide an understanding of complex relationships between a set of different groups of actors, and between humans and their environment. Social networks were analyzed in three different small-scale fisheries catch zones to enlighten the power dynamics in a conflict opposing artisanal fisheries, to the industrial fisheries, oil extraction, and tourism sectors (Maya-Jariego et al. 2017). Social-ecological networks hold great potential to explore the causal complexity behind environmental change and social conflict.

Stakeholder analysis is also a method that can help discern the types of relationship that prevail. The usefulness of stakeholder analysis has already been acknowledged in relation to understanding natural resource management conflicts (e.g., Reed et al. 2009) but few marine conflict scholars have explored this, in particular in international conflicts. It is noted though that the process of stakeholder analysis can cause or exacerbate conflict in and by itself (Ramírez 1999). This may happen, for instance, if the convener is unaware of the dominant cultural norms and values, or power relationships. A sense of vulnerability or exposure may develop among participants, which in turn can exacerbate conflict.

In-depth historical accounts of the origin and/or causal mechanisms that lead to the emergence of the conflict were not frequently implemented (but see Afroz et al. 2017; Bustos and Román 2019; Blanchard 2009). Participant observation and social-ecological experiments are among the methods that allow capturing “complex causality” (Preiser et al. 2018). Furthermore, we suggest that a powerful tool to capture causal explanations, highlight non-linearity and thresholds in the process leading to the conflict, is the process-tracing method (Collier 2011). Process-tracing requires a theorization of the process(es) in focus, as well as an accurate explanation on how the empirical combined with meta data allow causality derivation (Beach 2017). By understanding the mechanisms that drive the emergence of conflicts, conflict management and prevention can be facilitated. Process tracing was used in only three publications (published in 2013, 2017 and 2018) out of 109. This low number may be due to (1) the recent introduction, or adoption of process-tracing to study marine conflicts (for an application, see, e.g., Spijkers and Boonstra 2017); or (2) the lack of a systematic framework for this approach which makes it difficult to operationalize the method (Boonstra et al., this collection).

It is important to be aware of potential biases in systematic reviews such as this one. For example, we analyzed only a limited number of publications that were selected according to criteria related to feasibility needs (see “[Methodological limitations](#)” section above). However, this method has proven effective as our findings seize important features and tendencies in the current empirical coastal and marine conflict scholarship. We hope this can serve as a baseline for future scholars to frame their research, cognizant of existing potentialities and gaps.

## Conclusions and recommendations for future research

The world’s oceans are changing at a rapid pace, along with related patterns of marine resource use, perceptions, power relations, and other variables. Marine conflicts emerge and

evolve, often negatively impacting the sustainability of social-ecological systems. This systematic literature review takes stock of the social science methods used in the burgeoning marine conflict scholarship. The in-depth analyses of 109 studies, published between 2000 and 2020, reveals that marine conflict empirical research is increasingly expanding to include blue economy conflict issues. Blue economy sectors, public authorities, and local communities are increasingly cited as marine conflict parties. There is less focus on the previously dominant fisheries sector in the empirical conflict literature. Some important blue economy actors, such as the deep sea mining industry, transnational sea food traders, and the global maritime transport, are under-researched but are likely to be important actors in future marine conflict (both in terms of space and resource access).

The marine and terrestrial realm are rarely approached as a continuum in conflict studies, and studies are mostly undertaken at the local and regional scales as opposed to the international or global scale. The strong engagement of marine conflict research with principles of participative research is reflected by the main methods used, namely interview, case study, group discussion, and survey. In contexts where a participatory research approach is challenging, for instance at the international and global scale, we suggest that content analysis of documents may be an important method for perspectives on a conflict. Marine conflict research would also benefit from a greater focus on the structure and dynamics of relationships between conflict actors (i.e., network analysis), and historical developments and causal mechanisms that lead to, and can explain, the conflict (i.e., process tracing).

Given the current sustainability challenges and global threats to our oceans, it would seem timely to increase our research efforts at multiple levels with broad stakeholder representation. Further insights on international conflict and power relationships dynamics are needed to ensure adequate international management of new blue economy activities (e.g., renewable energy, deep seabed mining). The techniques reviewed in this study will need to be complemented by new approaches that can deal with the growing complexity of coastal and marine conflicts.

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1007/s40152-023-00319-z>.

**Acknowledgements** LID is grateful to the Deutscher Akademischer Austauschdienst (DAAD) [Research Grants-Doctoral Programmes in Germany, 2021/22–57552340] for the doctoral scholarship granted. We would like to thank Marion Glaser, Nadine Heck, and Siddharth Narayan for their revision on an earlier version of this article. The authors thank Fred Saudners, Maaïke Knol-Kauffman, and the anonymous reviewer for their valuable comments and suggestions which helped to improve this manuscript.

**Funding** Open Access funding enabled and organized by Projekt DEAL. This work was elaborated in the frame of the Negotiating Ocean Conflicts among Rivals for Sustainable and Equitable Solutions

(NoCRISES) project, funded by the Belmont Forum [Belmont No Crises 03F0845A].

**Data Availability** The dataset generated by this study is available upon request from the corresponding author.

## Declarations

**Conflict of interest** The authors declare no conflict of interest.

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