Maritime Studies (2023) 22:19
https://doi.org/10.1007/s40152-023-00306-4

REVIEW

Understanding and analysing the complex causality of conflicts over marine environments through process tracing

Wiebren Johannes Boonstra[1] · Lol Dahlet[2] · Björn Eriksson[1] · S. A. Selim[2] · E. I. van Putten[3,4]

Received: 18 July 2022 / Accepted: 10 April 2023 / Published online: 1 May 2023

Abstract

As economic activity in marine environments accelerates and expands, conflicts may increase following increased demand over marine resources, unequal distribution of benefits, as well as fluctuating resource availability and quality due to climate change. Anticipation and resolution of these conflicts require understanding of the causal mechanisms through which they originate and persist. Process tracing is a promising social science method that allows producing this knowledge by sequentially ordering events that produce conflict. The aim of this paper is to introduce process tracing as a method for the study of conflicts over marine environments and to assess how the method so far is used in previous studies of conflicts over marine environments. Our review of these studies reveals that scholars of conflicts over marine environments tend to apply process tracing using a deductive approach and a probabilistic understanding of causal mechanisms. The causal mechanisms that are identified to understand the dynamics that drive conflicts over marine environments often include power dynamics between states, institutions, movements or communities. Less articulated is how local social dynamics drives conflicts and how scholars select their cases to represent a wider population of conflicts. We conclude that applying a micro-sociological approach, more attention to case selection, and the interaction between contexts and mechanisms are promising ways forward for further use of process tracing in maritime studies.

Keywords Marine conflict · Causal mechanisms · Geopolitics · Case studies · Power

Introduction

In classical thought, oceans were often seen as sacrosanct. God(s) filled half the world with water to form a natural barrier between societies. This barrier kept societies and cultures intact because it avoided conflicts between them (Muthu 2009: 194). In practice, however, seas and oceans were not so formidable obstacles, as some thinkers, such as Horace, admitted already then: 'All to no avail did God deliberately separate countries by the divisive ocean [Oceano dissociabili] if, in spite of that, impious boats go skipping over the seas that were meant to remain inviolate' (Muthu 2012: 201).

Looking at human history since Horace's time, the 'impious boats' have grown in number and continued 'skipping' further. The use of the sea for trade and appropriation of resources has grown exponentially during human history. We are now present in all seas and are using them not only for food and transport, but also energy, minerals, genetic resources, tourism and recreation, and waste disposal, amongst other things (Jouffray et al. 2020). These new and old bounties of the sea attract people and—this the classics got right—incite social conflicts about claims and use (Sheikh 2019).

Conflicts over marine environments are distinct in form and dynamic compared to conflicts over terrestrial environments. For one, because boundaries are much harder to draw at sea than they are to draw at land. Nevertheless, a number of institutions have been initiated to help prevent, mediate or resolve social conflicts over marine environments. One key example is the Exclusive Economic Zone (EEZ), adopted

✉ Wiebren Johannes Boonstra
wijnand.boonstra@geo.uu.se

1 Department of Earth Sciences, Uppsala University, Uppsala, Sweden

2 Leibniz Centre for Tropical Marine Research, Bremen, Germany

3 Commonwealth Scientific and Industrial Research Organisation, Environment, Hobart, Australia

4 Centre for Marine Socio-Ecology, University of Tasmania, Hobart, Australia

by the 1982 United Nations Convention on the Law of the Sea. Within the EEZ, which extends up to 200 nautical miles from territorial baselines, coastal nations can claim use and exploration of marine resources. The idea of *Mare Liberum* lost much of its relevance with the acceptance of this boundary.

Yet, despite the steady increase in regulation and management of marine environments, a number of recent studies suggest that social conflicts over marine environments are increasing and that more can be expected (Mendenhall et al. 2020; Spijkers et al. 2021; Tafon et al. 2022). The reason for this increase is a coming together of climate change (Pinsky et al. 2020); growing demand for goods and services (Rotter et al. 2021) also due to declining quality and quantity of terrestrial resources (Díaz et al. 2019); unequal distribution of resources and derived benefits (Österblom et al. 2020); and technological innovations that make it possible to access the deep sea and sea floors[1] that until recently were out of our reach (Hannigan 2016).

In the wake of these new marine conflicts comes a need for adapting, transforming old and designing new governance of marine environments. This has created a demand for knowledge about both the diversity of marine conflicts as well as their underlying causality. Knowing what different conflicts over marine environments exist, and how these conflicts unfold over time, is crucial to design governance strategies that can de-escalate existing conflicts and anticipate future ones.

Relevant studies so far mostly focus on descriptive questions, i.e. analysing the frequency and type of conflicts that exist over marine environments (e.g. Spijkers et al. 2019; Dahlet et al. 2021). Studies about the causal mechanisms that disclose the origin and dynamics of these conflicts are less common (for an example, see Spijkers & Boonstra 2017). This lack of knowledge is alarming because the prevention, anticipation, mediating and resolution of conflicts over marine environments requires that we understand why and how these conflicts originate and persist over time.

The aim of this article is twofold. It first covers the methodological challenges involved in studying the causality of underlying marine conflicts. This causality is complex because it includes a multitude of different factors, both social and environmental. We will introduce and discuss process tracing as a case-based method that can be used to uncover causal mechanisms. We discuss its ontological and epistemological foundations and how one can use process tracing in a comparative case study design to arrive at findings that have general relevance. Particular attention will be paid to the causal role that timing, historical legacies, and events have for the interactions and relations that drive marine conflicts. Our second aim is to identify and compare existing maritime studies that have used process tracing (even if they have not called their method as such) to try to arrive at a set of causal mechanisms that can be expected to operate in marine conflicts.

The paper is organised as follows. First, it will provide an overview of current knowledge of conflicts over marine environments. A special focus will be given to how scholars explain the occurrence and future risk of these conflicts in relation to global environmental change. Second, using these insights, we will present social science theory to help understand the complexity and dynamics of the causality driving conflicts over marine environments. Third, we present and discuss process tracing as a method to interpret complexity through a focus on causal mechanisms. In the fourth section of the paper, we present a number of cases of marine conflicts that have used process tracing to identify causal mechanisms. Finally, in the fifth section, we discuss our findings in relation to this literature and draw conclusions and recommendations for future research.

Conflicts over marine environments

There is an inherent tension between the legal geographical boundaries and the interconnected, interdependent nature of biosphere resources (Morgera & Kulovesi 2016). This tension is especially clear in relation to marine environments where boundaries often cannot be linked to physical features in the landscape, and where resources are highly mobile and dynamic. A paradigmatic case in this regard are conflicts over access to and control over fish stocks (Bavinck et al. 2018; Grip and Blomqvist 2020). As a dynamic, common-pool resource, fisheries have featured prominently in the literature on collective management, common property arrangements and sustainable management (McEvoy 1986; McGoodwin 1990; Lövin 2007).

Traditionally, conflicts over fisheries take place between fishers competing over who gets the biggest share of a stock. At the same time, we know that in many places communities have devised institutions to regulate their internal competition to ensure the long-term sustainability of the stock as well as a fair division of its share. Yet, the workings and effect of these institutions is socially limited. As soon as fishers from outside the community claim fish stocks, the institutional arrangements tend to break down (Ostrom 1990), and new and other arrangements are needed.

Fishery disputes are said to become more frequent and intense due to persistent overfishing, which leads to scarcity (Boonstra and Österblom 2014), and ocean warming,

[1] The seafloor contains earth metals that can be used for the manufacture of new technologies, such as solar panels and mobile phones, which further stimulates the exploration of mining operations under the seabed (van Putten et al. 2022, this special issue).

which disrupts the distribution and productivity of marine organisms contributing to altering locations and availability of fish (Miller 2007; Cheung et al. 2010; Pinsky et al. 2018; Spijkers and Boonstra 2017). Scholars also expect an increase due to heightened interest of nation states that want to expand and secure their territorial rights, and use fisheries as a pawn in geopolitical struggles (Spijkers et al. 2021; Stokke 2022). But although fisheries conflicts are expected to become more frequent, there is still no consensus on the fundamental causes or mechanisms that connect natural resources to conflict (Spijkers et al. 2021). Scarcity of fish resources is often pointed out as an underlying factor, while its relationship with marine conflict is greatly debated in the literature (e.g., Le Billon & Duffy 2018). Conflicts are generally triggered by many problems and through the concatenation of different intervening variables (Boonstra and Österblom 2014; Abdurrahim et al. 2020). Moreover, fishery conflicts nowadays include not only different communities of fishers, but also various national and international governing bodies as well as environmental organisations (Grip & Blomqvist 2020), and alternative economic sectors that also wish to exploit marine environments (Dahlet et al. 2021).

Immobile resources in marine environments also have been the subject for social conflicts. Control over certain islands, rocks or other physical structures like tectonic plates has been claimed for various geopolitical motives (Sheikh 2019), but more recently people also compete over earth minerals found in the deep sea (Santos 2018; van Putten et al. 2022, this special issue). With technological breakthroughs enabling better access to the sea floor, states sometimes take aggressive actions to legally extend their EEZs outward, rapidly dividing the ocean space into a patchwork of zones (Steinberg 2018) (see Box 1).

Box 1:Examples of geopolitics at sea

- On 2 August 2007, a Russian deep-sea expedition planted a titanium Russian flag on the Arctic seabed. The flag symbolised the highly disputed Russian claim on half of the Arctic ocean floor, including the oil and mineral resources that it contains (Chivers 2007).
- The South China Sea, host to more than half the world's fishing vessels, has seen an increase in competing territorial claims in the last decades as regional countries seek and contest sovereign rights over islands, natural resources and fishing grounds (Jouffray et al. 2020).
- The Indian Ocean may become an arena for future tensions, as major powers are pioneering deep-sea exploration in the region (Agarwala 2021). Some of these tensions already led to conflict, as when in the Pacific Ocean, Nautilus, the now liquidated company behind the failed pioneer project Solwara 1 in Papua New Guinea, was met with opposition from international NGOs and failed to receive support from the relevant local community (van Putten et al. 2022, this special issue).

This brief and simple distinction between traditional and new conflicts over mobile and immobile resources in marine environments is meant to clarify how conflicts over marine environments are becoming more frequent with enduring scarcity and climate change, and how they are changing with the inclusion of more, and more diverse, stakeholders and targeting of new resources that, until recently, were well beyond our reach (Steinberg 2018). And, finally, nowadays there is also a growing regulatory context that influences the dynamics of conflicts over marine environments. Just as the frequency of conflicts has gone up, so has the number of institutions and regulations aiming to govern the human use of marine environments increased. This tendency can be illustrated well with the development of the Law of the Sea that took place in the UN conventions since the 1950s, and the provisions installed since then, which include EEZ but also various conventions for settlement of disputes (Nemeth et al. 2014). In the next section, we consider how scholars have tried to study the causality underlying these conflicts.

The causality of social conflicts: processes and mechanisms

Recent efforts to scrutinise the complex causality that underlies conflicts over marine environments highlight how changes in environmental conditions—the quantity and quality of marine resources—can trigger stress and conflict between resource-dependent individuals and groups, sometimes even leading to violence and war (Homer-Dixon 1991; Cullen et al. 2000; Haug et al. 2003; Zhang et al. 2007; Spijkers and Boonstra 2017).

The complex causality of the environmental change–social conflict nexus has often been studied through a systems perspective that is ahistorical (e.g. Ostrom 2009). Yet, in recent decades, the attention to the temporal dynamics of these interactions has been growing. Through ideas about 'system dynamics', 'transformation', 'cross-scale interactions' and 'regime shifts', scholars are trying to analyse how so-called social–ecological systems are changing gradually and abruptly over time (deYoung et al. 2008; Walters and Vayda 2009; van Putten et al. 2019).

A number of scholars still argue that theorisation of the environmental change–social conflict nexus needs to closer examine and identify the causal mechanisms that drive the temporal dynamics over time (Boonstra and de Boer 2014). For example, some of the dominant conceptualisations of systems perspectives—such as the 'adaptive cycle' (Sundstrom and Allen 2019) and 'the ball-and-cup metaphor' (Lamothe 2019)—refer to a high level of abstraction whereby causal mechanisms are at best defined as very general processes or, at worst, left implicit. Moreover, most analyses of the environmental change–social

conflict nexus are conducted through variance-based, large-N research (e.g. Zhang et al. 2007; Hsiang 2013; Burke et al. 2015). This type of research is criticised for drawing simplistic conclusions about causality due to a lack of in-depth analyses of causal mechanisms and the contextual conditions that triggered them (e.g. Buhaug et al. 2014; Nordås and Gleditsch 2015). Lacking detail and depth, large-N research consequently has difficulty moving claims or conclusions about causal interference beyond the image of history as 'just one damned thing after another' (Toynbee 1957: 267; see also Mahoney 2008: 420; Beach and Pedersen 2013: 27).

An alternative to system perspectives and methodologies is formulated using inspiration from philosophies and social scientific theories (such as American Pragmatism, Process Sociology and Practice Theory) where reality is considered and analysed as a process: the dynamic interaction between entities through time (e.g. Walters and Vayda 2009; Boonstra and Nhung 2012; Boonstra and de Boer 2014; Boonstra and Österblom 2014; Hertz et al. 2020; Mancilla García, 2020). With these approaches also come distinct ontological and epistemological assumptions regarding what proper objects of study are; what causes are; how we can understand, study and theorise about reality and causality.

The objects of scientific investigation in process approaches are instances or 'cases' of causal processes playing out through which a cause (or set of causes) are linked with an outcome of interest (Beach and Pedersen 2016: 5). Causation in this perspective is often understood as a mechanism, uncovered by closely analysing causal processes in real-world settings (Mahoney 2001; Schlüter 2019). Yet, what constitutes a mechanism is heavily debated (Machamer et al. 2000; Gerring 2008; Hedström and Ylikoski 2010). There is discussion, amongst others, over whether mechanisms refer strictly to the causal pathways that connect cause and outcome, or if they also include the antecedent conditions triggering the mechanism (Beach and Pedersen 2016: 35).

To tease out different interpretations of mechanisms, Beach and Pedersen (2016: 33–41) distinguish a minimalist and systems understanding. In the former, mechanisms are described as intervening variables or factors that link the occurrence of a cause with a certain outcome. This understanding implies a deterministic conception of causality, such that a causal mechanism in operation will always generate the outcome of interest (Trampusch and Palier 2016: 442).

In the systems understanding, no variables can be distinguished apart from the mechanism—they are integral parts of a causal complexity that produces an outcome. Mechanisms are thus 'sometimes true' (Stinchcombe 1991: 375); they refer to certain, general patterns of causality occurring under specific contextual (or 'scope') conditions (Beach and Pedersen 2016: 89–90). This understanding in contrast implies a probabilistic view of causality, where outcomes cannot be determined or assumed on the basis of knowing the mechanism at play. Instead, the mechanism operates on the basis of its interaction with the context in which it is situated. Important here to point out is that time and timing is considered part of this context. Put differently, the order of events, i.e. their occurrence in time and in relation to other events, is causally consequential (Falleti 2016: 4; Trampusch and Palier 2016: 445).

To further operationalise this process-relational approach, we consider in what follows the potential of process tracing and assess how this method is currently applied in maritime studies.

Process tracing

Process tracing is a method to discover and understand causality and builds on a very old idea of 'doing history backwards' (Geertz 1963: 70–71). Process tracing is, in other words, a sequential ordering of causal events and the outcome of interest. Reasoning from outcome to cause through reversing chronology, forces one to be precise about the times and places of events taking place.[2]

The method of process tracing is especially suited when it is impossible to control for intervening variables, i.e. when causality is complex (Goldstone 1991: 50). Complex causality is characterised by low proximity (many intervening variables between cause and effect), high multi-causality (many variables operating together to produce the outcome), interactivity (none of the causes alone is sufficient to produce the outcome), non-linearity (a process exhibiting threshold effects) and equifinality (the same cause is linked to the same outcome through different causal mechanisms depending on the contextual conditions present) (Homer-Dixon 1996; George and Bennett 2005; Beach and Pedersen 2016).

Process tracing is mostly used for within-case analysis—single case studies—for various reasons. Users of process tracing are often very attentive to the influence of context on the causal process playing out and are therefore predisposed to observe differences over similarities between cases. They find it hard, in other words, to identify a population of cases and/or to trade off attention to context against parsimonious explanations (Hay 2002: 36).

[2] For this reason, process tracing is often used for solving crimes and questioning suspects in police interrogations: *'That's how we interrogate suspects. We start in the here-and-now and then walk backwards in time. It makes it harder to lie'* (Franssen 2021: 60).

Nevertheless, a number of scholars are now developing guidelines for how process tracing can be used in combination with cross-case analyses (Beach and Pedersen 2016; Bennett and Checkel 2015; Trampusch and Palier 2016; Beach 2017; Saylor 2020; Waldner 2015; Garcia-Montoya and Mahoney 2020; Beach et al. 2022) with the aim of distinguishing between case-specific or non-systematic mechanisms and their parts from systematic ones (Beach and Pedersen 2016: 309). Crucial in these endeavours is to pay attention to contextual conditions and causal homogeneity (Beach and Pedersen 2016: 89–90). Summarising these suggestions, there are four theoretical and methodological aspects which process tracers would need to consider. These aspects include:

- **Focus of the study**, which refers to two traditions of doing social scientific work. The first tradition includes studies that focus on institutions and how they structure social life. This macro-perspective typically considers abstractions, such as 'the state' or 'the market', and how these change over time (Tilly 1984). The second tradition takes as analytical starting point the interactions of social life in time and space. In this micro-perspective, focus lies with people and situations. Collins' (2009a, b [1975]; 2009; 2012; 2004) studies of violence and ritual exemplify this tradition.
- **Theorisation**, which refers to ideas of scholars on the relation between empirical material (or data) and theory. The classic distinction here is between inductive and deductive reasoning. But other styles of theorisation, such as abductive reasoning, are also included (Tavory and Timmermans 2014).
- **Perspective on causal mechanisms**, which refers to the distinction between deterministic or probabilistic understanding of causal mechanisms, as we introduced in the previous section. To reiterate, a deterministic perspective assumes that when causal mechanisms are in place and operate, they will always generate the outcome of interest. With a probabilistic perspective, there is more attention to the influence of conditions on the working of causal mechanisms. It leaves open the possibility that conditions can impede or change the working of causal mechanisms.
- **Generalisability**, i.e. is casing and case selection made explicit or left implicit. At stake here is whether or not the scholar of conflicts over marine environments considers and argues how the case under consideration relates to a larger population of cases ('casing') and how this relation can be qualified, i.e. for which reasons is the case selected (Ragin 2009). Is it selected because it is a typical or extreme case, or because the characteristics of the case allow logical deduction (Flyvbjerg 2006).

In what follows, we use these four aspects to compare relevant publications in maritime studies that have analysed relations between change in marine environments and social conflicts. An assessment and comparison of a small number of studies that use process tracing, or a similar approach, offers an opportunity to observe the ways in which this method can be used to understand the causality of conflicts over marine environments. Moreover, the comparison of these examples also allows us to take stock of how they relate to recommendations for best practices and to discuss possibilities for further improvement (Waldner 2015: 126).

Methods

Here, we first explain how we identified relevant studies from within the scientific literature and arrived at a shortlist of publications. Next, we will analyse how these studies applied process tracing, using the four theoretical and methodological aspects outlined earlier (focus; theorisation; perspective on causal mechanisms; generalisability).

To investigate the causal links between change in marine environments and social conflicts, we first undertook a systematic literature review using a protocol design from Moher (2009). We searched for marine conflict-related publications for the period 2000–2020 using the Web of Science (WoS; Clarivate Analytics, 2017) database. Four search strings were performed and combined in October 2021: (1) survey* OR interview* OR questiona* OR network analys* OR empirical OR case stud* OR participatory; (2) conflict OR resolution*; (3) marine OR ocean* OR sea OR fish*; (4) marine protected area* OR MPA OR Marine conservation area*. Each search string has been defined based on a previous literature search that allowed to define keywords relevant to the marine conflict research. The fourth search string was aimed at capturing additional marine protected areas–related research articles that the previous search had missed.

The searches were posteriorly combined, and duplicates were removed. A total of 682 titles and abstracts were screened. Those articles which verified the inclusion criteria were kept for further analysis. The inclusion criteria used to filter the results were (1) only peer-reviewed publications; (2) the timeframe 2000–September 2020; (3) written in English; and (4) relevant research domains related to the marine, coastal and social–ecological. Thereafter, a total of 109 relevant publications, with conflict as their central focus, were fully read. In an iterative process (Haddaway et al. 2020), scoring categories were defined to assess the methods used in the papers. For the present study, we purposively sampled 19 publications where we observed the analysis of temporal dynamics. We then checked which of these papers (1) included a within-case study of marine

conflict and (2) used a description of the historical process of the conflict to reveal causal complexity. Based on these criteria, we selected seven papers for our final set (Appendix 1).

We systematically compared these seven publications using the theoretical and methodological aspects that characterise various approaches to process tracing (Table 1) focus of the study; theorisation; perspective on causal mechanisms; and generalisability.

Three pathways leading to conflicts over marine environments

We identified seven publications only that use process tracing or a similar method to discuss conflicts in relation to marine environments. Considering the small number of papers from our literature search that explicitly use process tracing to explain conflicts over marine environments, it is perhaps not surprising why there is relatively little knowledge about the causal mechanisms driving these conflicts. We outline how these publications together represent three different causal pathways that lead to conflicts over marine environments. The first causal pathway describes conflicts over marine environments as the outcome of the struggles taking place between the 'great powers' of the geopolitical order. From our set, Goldstein (2007), Blanchard (2009), and Wiegand and Beuck (2018) represent this pathway. The second causal pathway analyses conflicts over marine environments as the outcome of a deterioration of livelihoods of local communities who directly depend on having access to marine resources and ecosystems. From our set, Afroz et al. (2017) and Muralidharan and Rai (2020) represent this pathway. The third causal pathway describes conflicts over marine environments as the outcome of a change in the specific conditions of these environments. Publications representing this pathway from our set include Spijkers and Boonstra (2017) and Bustos and Román (2019). It should be noted that some publications include characteristics from more than one of these pathways. Bustos and Román (2019), e.g., also discusses livelihood impoverishment of local users. When we discuss our results, we will highlight some of the characteristics that all publications share.

Conflicts over marine environments as outcome of geopolitical struggles

During much of human history, marine environments have provided the backdrop for struggles between social groups, whether these are nation-states, bands (pirates), tribes or coalitions of countries (Sheikh 2019). As such, seas and oceans are also featuring in the literature as little more than a background for geopolitical shifts. Islands but also water bodies and parts of continental shelves are often used as pawns in greater struggles between governments to strengthen their influence in structuring global relations and interdependencies between countries. This trend and the literature analysing it is also present in our set of publications. The outcome these publications aim to explain is not conflicts over marine environment per se, but rather changes in the geopolitical order. Scholars turn to marine environments simply because that is where these changes often become visible; geopolitical struggles have a tendency to *'flash up'* (Waddington et al. 2021) in marine environments.

Tellingly, all three publications in this strand focus on conflicts over the South and East China Sea. For Goldstein (2007), this sea forms the context where China's growing influence manifests itself: '[…] *China's rise in this theatre is linked with Beijing's drive to establish a blue water navy, to secure vital sea lanes far from its homeland, and to control potentially valuable natural resources*' (Goldstein 2007: 652). The struggle over marine environments allow for the proliferation of a nation's military strength outside its own territorial space; they are important for transport and hence economic development; and they (can) contain important energy resources, such as minerals, fossil fuels, but also fish and other '*hydrocarbons*' (Wiegand and Beuck 2018: 3). Notice how these scholars are not intrinsically interested in the South and East China Sea but rather view it as a décor for the dynamics of geopolitical struggle. For Wiegand and Beuck (2018: 3), the conflict in the South and East China Sea offers an opportunity to study the dynamics of international conflict resolution when such resolution is hard to achieve. For Blanchard (2009: 682), the conflict is '*a visible part of the tapestry of Asia–Pacific Region international relations*'.

Appendix 2 includes our detailed assessment of how Goldstein (2007), Blanchard (2009), and Wiegand and Beuck (2018) analyse conflicts over marine environments as outcomes of geopolitical struggles. The comparison of these publications illustrates how power struggles can explain geopolitical shifts. The balance of power, which refers to the interdependence between countries (often in terms of trade) as well as their relative military strength, is interpreted by these authors as both cause and mechanism for the occurrence of conflicts. The changing balance of power between China versus the USA and other East-Asian countries incites the former to act more boldly in its claims in the South and East China Sea. At the same time, changes in the balance of power can also prevent conflicts when states come to realise that they are interdependent. When this happens, (equalising) power balances create a mechanism that prevents conflict, often because it leads countries to develop and accept institutions to mitigate their interdependence. Balances of power from social interdependence are manifest at different levels or fields in society; they constitute relations between

Table 1 Comparison of the set of papers analysing conflicts over marine environments concerning focus, theory, causal mechanisms and generalisability

	Focus (place; time; actors)	**Theory** (deduction/induction)	**Causal mechanisms** (deterministic/probabilistic)	**Generalisability** (what is the case a case of)
1. Goldstein 2007	South China Sea; 1976–2006; Governments of China, Taiwan, Vietnam, Philippines, Malaysia, Indonesia, Brunei	Deduction: power-transition theory and institutionalist theory	When the power of a state is growing through economic growth and technological development, it aims to also exert greater influence over an international order. The growing influence of powerful states comes in conflict with claims of other states. These conflicts can be prevented when the state that is growing more powerful recognises mutual interests and builds associations with other states	Competition between a government that tries to increase its control over natural environments and in this effort comes to meet the claims and ambitions of other governments
2. Blanchard 2009	East China Sea and Diaoyu/Senkaku islands; 1968–2008; Governments of China and Japan and their nationalist movements	Deduction. Economic dependency dampens conflicts	Economic dependency will dampen conflicts, but only when (1) their stimuli are compounded by political forces; (2) when a leader desiring compromise has stateness to surmount domestic actors opposing the compromise; (3) when a leader opposing settlement lacks stateness to stand up to domestic actors favouring compromise	Test if the thesis holds for the ECS/islands controversy. This controversy is puzzling because Japan and China are very much economically dependent Competition between government that tries to increase control over natural environments (energy; food; transport) close to their borders, and in this effort come to meet the claims and ambitions of other governments
3. Spijkers and Boonstra 2017	North Atlantic; 1999–2015; Island, Faroe Islands, European Union, Norway	Deduction. Social factors influencing conflict: (a) institutions; (b) power; (c) knowledge	Power shapes knowledge: in the effort to solve conflicts states rely in (scientific) information. The states with greater power have better opportunities to influence what knowledge is deemed legitimate and valid	Case is example of environment change leading to social conflict Distribution of shifting location of mackerel stock
4. Afroz et al. 2017	South-west coastal region Bangladesh (Laxmikhola); 1990–2013; Bangladesh government; large landowners; small-scale tenants Conflict occurs due to competing interests between powerful group that wants more and less powerful group that is in their way	Deduction. Success in power struggles depends on control over power sources: (a) market; (b) regulations; (c) force; (d) legitimation	They discuss four powers of exclusion but do not theorise the conditions in which these 4 work. Economic power and force are associated with the power of large landholders, while regulation and legitimation as power sources are associated with smallholders	Case is part of so-called boom crops in Asia, and that replace older systems of cultivation Control over coastal land used for economic profits

Table 1 (continued)

	Focus (place; time; actors)	**Theory** (deduction/induction)	**Causal mechanisms** (deterministic/probabilistic)	**Generalisability** (what is the case a case of)
5. Wiegand and Beuck 2018	South China Sea; 1999–2016; Governments of the Philippines and China; UN; UNCLOS	Deduction. Role of arbitration in international conflicts depends on (a) military imbalance; (b) perceived benefits of arbitration; (c) probability of winning arbitration	States perceive and interpret differences in international power balances, benefits of arbitration and the likelihood of winning arbitration. These aspects together determine decide if they want to engage in arbitration or not	Unique case. Arbitration seldom occurs when there is a large difference in power between two states Conflict between government that tries to increase control over natural environments and in this effort come to meet the claims and ambitions of other governments
6. Bustos and Román 2019	Chiloé (island southern Chile); 1826–2016; Chilean government; islanders; salmon industries	Deduction. Conflict is explained with reference to (a) collective identity and (b) feelings of resentment	After algae blooms in 2016 (possibly due to salmon aquaculture) deteriorate local marine environments, fisher livelihoods in Chiloé are threatened. The local population of the island comes in conflict with the Chilean government and demands financial compensation. The mechanism that underlies the conflict consists of: (a) long history of extraction of resources by outside authorities; (b) a collective identity of islandness, i.e. feelings of exclusion, marginalisation and confrontation with outside authorities; (c) neoliberalist interventions that come with a lack of concern and loyalty from aquaculture companies; (d) a 'fever-driven component of Chilote culture' (2019: 103) to seize new economic opportunities to exploit island resources	The case is an example of local communities facing the destructive legacy of neoliberalism. It is also an example of an island that struggles with their relation with outside actors. On the one hand, outsiders offer new opportunities for economic activity; on the other hand, they rarely get locally involved and attached to the wellbeing of the islanders. The island remains far away geographically and socially

Table 1 (continued)

	Focus (place; time; actors)	Theory (deduction/induction)	Causal mechanisms (deterministic/probabilistic)	Generalisability (what is the case a case of)
7. Muralidharan and Rai 2020	Gulf of Mannar; 1947–2013; Indian government; Tamil resistance; artisanal Indian fishers; Indian trawlers	Increasing militarisation of conservation in defence of natural environment produces violence (pp. 2) Green wars Conservation by war are practices whereby the state legitimises the use of warfare techniques to bring populations and resources under its control with reference to conservation objectives	'Violent political conflict provided the justification of securitization of conservation' (Idem: 1) 'The materiality of the sea and the conservation-security nexus results in the creation of a violent maritime space' (Idem: 1) Political conflict incentivises the establishment of conservation by war. This limits access of local people to marine environments. Their lack of food security leads them to become involved in poaching and international criminal networks	The case is an example of 'conservation by war […] a fitting case of the nexus of conservation and security in a marine context' (idem: 1) 'Marine environments escape geopolitical control as they are fluid, making them much more challenging to monitor, conserve or secure compared to terrestrial landscapes thereby increasing the need for surveilling and monitoring people' (idem: 3)

social groups within countries, as well as relations between countries. As a motive for countries to lay claim on marine environments, these authors mention the discovery of natural resources, but also sentiments about national geography and sovereignty, as well as desires to enlarge influence in the global economy and society.

Conflicts over marine environments as outcome of livelihood insecurity of local users

For fishers, fish farmers and other local users, resources and ecosystems of marine environments provide direct income and livelihood security (Roscher et al. 2022). When these groups lose access to and control over marine environments, it can have immediate repercussions for their wellbeing and security. This direct dependence increases incentives to react when such access and control is diminished or lost. In many cases, these reactions will result in conflicts within local user groups, or between local users and external actors which can be other users, companies or states.

This strand of the literature is represented in our set by two publications. Afroz et al. (2017) details a conflict between local fish farmers and a group of large land owners in Bangladesh. The latter tries to expel the former to be able to turn land used by smallholders for mixed rice and fish farming into large-scale aquaculture ponds. Here, the Bengal government only plays a background role. Muralidharan and Rai (2020) analyse a conflict that ensues between the Indian state and local fisher communities during the civil war in neighbouring Sri Lanka. The Indian government installs a Marine Protected Area in the Gulf of Mannar as a way to legitimise relocation of local populations suspected of smuggling and collaborating with Sri Lankan rebels. In both these cases, the increase of state control results in a diminished access of local fishers to maritime species that they consume and harvest to maintain a livelihood. Both these studies, focusing on livelihood insecurity, demonstrate in detail how local communities depend on marine environments and how this dependence motivates resistance against attempts to limit their use of local marine resources. As such, these publications pay much more attention to the marine environment itself, compared to the literature that analyses conflicts over marine environments as outcomes of geopolitical struggles.

Appendix 3 includes our detailed assessment of how Afroz et al. (2017) and Muralidharan and Rai (2020) analyse conflicts over marine environments as outcomes of changes in the livelihood security of local users dependent on these environments. The comparison of these publications also reveals how power is used as a major causal mechanism, i.e. to explain how changes in the interdependence between social groups can generate conflicts. These groups include different types of local users (e.g. large and small landowners) as well as states.

Conflicts over marine environments as outcome of environmental change

As discussed previously, marine environments are experiencing more and more changes in their biological and ecological structures due to climate change in combination with various human pressures (Pereira et al. 2010). A number of studies have analysed how these changes have repercussions for the ways in which social groups depend on and use these environments (Perry et al. 2011; Aswani et al. 2018; Tafon et al. 2022). Typical for these studies is that the process leading to conflict begins with changes of the marine environment, which means that relatively much attention is given to the marine ecological and biological structures and dynamics, compared to the other two strands we identified who focussed on geopolitical and livelihood changes, respectively. Two publications from our set represent this literature strand: Spijkers and Boonstra (2017) and Bustos and Román (2019).

Spijkers and Boonstra (2017) analyse how abrupt and rapid changes in the distribution of the northeast Atlantic mackerel stock after 2007 caused an interstate conflict between Iceland, the Faroe Islands, Norway and the European Union that lasted several years (their analysis ends in 2015). Bustos and Román (2019) consider the deterioration of marine ecologies around the island Chiloé situated at the west coast of Chile. Marine environments around this island changed due to algae blooms and so-called red tides that result from intensive salmon farms (Idem: 98). We grouped these publications together because they both consider environmental changes as a cause for social conflict. At the same time, we also noticed how the publications connect with the other publications in our set. Spijkers and Boonstra (2017), for example, also consider how, in the struggle over access and control of the mackerel stock, countries try to expand and secure their geopolitical claims. Bustos and Román (2019), on the other hand, clearly connect to the literature that analyses conflicts over marine environments as outcome of livelihood insecurity of local users. In their case, the algae blooms and so-called red tides impact the possibilities of islanders to fish and so doing to secure their livelihoods.

Just as with the two previous groups of publications, power and inequality are also invoked here as causal mechanisms to explain how environmental change can produce conflicts. In Spijkers and Boonstra (2017), power is manifest in the different knowledge claims that the competitors make concerning the ecology and biology of the mackerel stock. This knowledge is used to justify and legitimise a certain division of the mackerel quota. For Bustos and Román (2019), power is manifest in the long history of colonialism and exploitation that characterises the relation between Chiloé island and mainland Chile. More details on how power works as causal mechanism in these cases can be found in Appendix 4 where we compare both publications.

Discussion and conclusion

In the previous sections, we have provided an overview of the literature that uses process tracing to study conflicts over marine environments. Although we argue for a distinction between three different strands in this literature related to the causal pathways they theorise and study, there are also more differences that together can give an understanding of the breadth and focus of this field. In this section we highlight some of the most apparent commonalities and differences to then formulate new avenues for studies of conflicts over marine environments.

First, the conflicts over marine environments that are analysed in this set of papers are conflicts over access to and control over resources. These resources include energy sources (Goldstein 2007; Blanchard 2009; Wiegand and Beuck 2018), fish stocks (Spijkers and Boonstra 2017), and land and water (Afroz et al. 2017; Bustos and Román 2019; Muralidharan and Rai 2020). The interactions involved in these conflicts take place between national governments (Goldstein 2007; Blanchard 2009; Spijkers and Boonstra 2017; Wiegand and Beuck 2018; Muralidharan and Rai 2020), between national governments and their constituencies (Blanchard 2009; Bustos and Román 2019; Muralidharan and Rai 2020), and between the various user groups that comprise national constituencies (Afroz et al. 2017). Some publications study conflicts that involve several of these respective interactions (Muralidharan and Rai 2020). But the degree of geographical specificity of the conflicts over marine environments that the seven publications in our set aim to explain differs considerably, going from studies that focus on islands (Blanchard 2009; Bustos and Román 2019), seas (Goldstein 2007; Spijkers and Boonstra 2017; Wiegand and Beuck 2018; Muralidharan and Rai 2020) and coastal plots of land (Afroz et al. 2017). Most studies analyse the development of conflicts over 2–8 decades. The exception here is Bustos and Román (2019) who go back to 1826 to explain the conflict between the island population of Chiloé and the Chilean government.

Second, the publications all share a deductive approach. For some papers, this approach is very clearly articulated, e.g., when Goldstein (2007), Blanchard (2009), and Wiegand and Beuck (2018) set out to test theories and hypotheses about the effect of economic interdependencies on the prevalence of conflict between China and other Asian states over sovereignty in the East and South China Seas. Other studies are less explicit and their use of theories is rather to identify the causal mechanisms that can help to explain the outcome of interest (Afroz et al. 2017;

Spijkers and Boonstra 2017; Muralidharan and Rai 2020). Of the set, Bustos and Román (2019) offer the most inductive approach when they use their findings to compound the factor 'islandness' to explain the conflict they investigate. A prevalent theoretical concept in the whole set is, unsurprisingly, power differences (see Boonstra 2016 for a theoretical overview). Some studies unpack what power (in)differences consist of: Afroz et al. (2017) locate power in the control over markets, regulations, force and legitimation. Or they link power to other important factors like institutions and knowledge (Spijkers and Boonstra 2017). Interestingly, most studies leave implicit what, how or where power consists in, even though shifting power balances clearly play an important causal role in the conflicts described. A final characteristic for all the publications is a macro-perspective, with a focus on institutions, such as states, communities or social movements. No publication from the set focuses on interactions between specific individuals to explain conflicts. The lack of this micro-perspective is distinct and, we think, currently characterises studies of conflicts over marine environments that use process tracing.

Third, we noticed that all studies in the set maintained a probabilistic understanding of causal mechanisms since all studies paid considerable attention to contextual complexities. They differ though as to how much impact they assign to these contextual factors to influence the outcome under consideration. Afroz et al. (2017), e.g., highlight that for the smallholders' resistance in Laxmikhola to succeed, they were dependent on changes in the central Bangladesh government. Likewise, Bustos and Román (2019) assign the long history of island resource exploitation by extra-local actors as a causal force in mobilising conflict between island communities and the Chilean state. Blanchard (2009) presents another highly cogent case of how the dampening effect of economic interdependencies on conflict only works under certain conditions (for which the author introduces the compound variable 'stateness').

Fourth, the studies differ to what extent they make explicit casing and case selection. Some studies note that their case is atypical and therefore puzzling and interesting. For example, Afroz et al. (2017) explain that the conflict between smallholders and large landowners in Laxmikhola is counterintuitive because the smallholders prevail (idem: 694). In many other areas in Bangladesh, the large landowners prevail in conflicts due to their greater power resources or because the smallholders fail to mobilise (idem: 710–713). Likewise, Wiegand and Beuck (2018: 1) present their case as unique and 'unprecedented'. The majority of scholars in our set, however, present their case as 'typical' for a specific population of cases. Muralidharan and Rai (2020: 1), for example, argue that the conflict they study is '[…] a fitting case of the nexus of conservation and security in a marine context'. Spijkers and Boonstra (2017: 1835) argue that their case represents an example of the 'environmental change–social conflict nexus' taking place in the global North. Bustos and Román (2019) present their case as an example of local communities facing the destructive legacy of neoliberalism, and as an example of an island that struggles with the legacy and everyday reality of exploitation by outside actors. By way of conclusion, we will use the above characterisation of studies on conflicts over marine environments to propose avenues for future studies.

As is generally typical for studies using process tracing, the publications that we considered are highly attentive to the dynamic interaction of social actors through time. The focus on the temporality of social interaction is underpinned by the ontological assumption that reality is what it is because it developed in a certain way.[3] As we pointed out, such an assumption matches with a methodology that allows taking account of the causal effects of temporality, concatenation, contingency, etc. Here, we would like to notice how different this approach is compared to other recent analyses of marine conflict that work within an interpretative tradition and that locate the causes of these conflicts in social constructions of the people involved (e.g. Nightingale 2013; Brennan 2018). An important ontological assumption in these studies is that reality is what it is because it is interpreted in a certain way. Here, the final explanation of marine conflicts lies uncovering the intentions, emotions, motives, values and subjectivities of individual or collective actors. This is not to say that process tracers dismiss people's interpretations as explanans for maritime conflicts, or that scholars working in the interpretative tradition turn a blind eye to history and institutions. But rather that these two strands of social science emphasise different causes of conflict. Yet, both are equally relevant for understanding what causes conflicts over marine environments.

Our analysis demonstrates that several studies of conflicts over marine environments exist that rely on some form of process tracing to identify and study the causal mechanisms that can explain these conflicts. We have described the diversity of these studies using three different ideas about how conflicts over marine environments develop. The first idea emphasises that these conflicts are a result of a broader and longer geopolitical struggle between countries, the second idea sees them as the result of declines in the livelihood security of local users, while the third idea highlights that conflicts can arise when the ecological and biological structures of marine environments change. By way of conclusion, we will summarise

[3] Kenneth Boulding once phrased this assumption pithily: *'Things are the way they are because they got that way'* (Rapoport 1997: 426).

how we can characterise the causal complexity which these different studies discovered and how they studied it.

When it comes to the causal complexity driving conflicts over marine environments, all studies identify changes in control over and access to natural resources that exist in marine environments as a major cause. As a causal mechanism, the studies put forward changing interdependencies between social actors and their different degrees of power. Interestingly, all studies predominantly analyse these social actors from a macro-perspective, i.e. the focus is on abstract social entities (states, movements, economic sectors) rather than individual persons or even small social groups. As for the application of process tracing as a method to study complex causality, all studies rely on a deductive approach and probabilistic understanding of causal mechanisms, while little attention is paid to the generalisability of the results. Using these conclusions about the state-of-the-art of maritime studies on conflicts relying on a process-relational approach, we end with a reflection on how we believe the field can progress.

First, the studies presented here are relatively strong on pointing out mechanisms at a macro-social level, and less clear on how the thinking and doing of certain persons has been causally relevant for the origin and development of conflicts over marine environments. Therefore, we suggest that there is potential of using micro-sociological theory with process tracing to further unpack the causalities that drive conflicts over marine environments. Conflicts can be analysed on both the micro- and macro-level of social life. A micro-sociological approach matches especially well with the identification of causal mechanisms that drive conflicts over marine environments and that we identified in this paper. A promising avenue for such an effort would be to consider Randall Collins' conception of conflict sociology (Collins 2009a [1975], b). Collins has developed a micro-sociological theory of conflicts where conflicts are produced through face-to-face interaction, shared attention and a shared emotional mood (Collins 2012: 1–3). The analytical starting point in his theory are chains of situations, i.e. subsequent events in time and space where people with their different emotions and interpretations interact (Collins 2004: 3–4). These events are of course connected to each other across space and time, which leads into a consideration of macro-sociological dynamics of conflicts. But the agency of people, the energy or power that they have and use, is always situated. How their agency is 'structured', i.e. generated and shaped in relation to situations that occurred earlier in time and elsewhere, is a question for macro-sociology (Collins 2004: 6). A micro-sociological approach would also facilitate integration between studies that work within the interpretative tradition to explain conflicts over and in marine environments—emphasising the subjectivities, values and identities of stakeholders—with studies that focus on historical processes—emphasising the role of social institutions and structures.

A recurring critique of micro-sociological studies—which are always local or case studies since they focus on people interacting in time and place—is that their findings do not contribute to general theory because the empirics of everyday social life are caused by long processes and large structures that lie beyond the here-and-now. This easy dismissal forgets that *'everything macro is made up of micro-situations'* and that these situations thus contain the *'micro-causality of macro-patterns'* (Collins 2019: 253). It follows that macro-phenomena, such as social structures or institutions, empirically exist as processes of repetitive micro-interactions (Collins 1981: 985). Knowledge of these micro-interactions can thus contribute to general theory about the origin, persistence and change of social dynamics, such as social conflicts.

Yet, such a contribution also implies attention to the contextuality of the micro-situations under investigation, and how this contextuality compares to micro-situations situated elsewhere in time and place. Which brings us to our second and final point. To account for the generalisability of findings, studies of conflicts over marine environments would do well to reflect on what is called 'external validity', i.e. to what populations, settings and variables the causal mechanisms that have been identified can be generalised. External validity refers to both generalising to a distinct set of cases (these can be persons, populations, setting and times) as well as generalising across sets of cases (Lucas 2003). To improve external validity, scholars can articulate the scope conditions, i.e. conditions under which (theoretical) propositions about causality between environmental change and social conflict would hold (Cohen 1989; Foschi 1997). Alternatively, scholars can more clearly distinguish between contextual conditions and causal mechanisms. Contextual conditions determine whether a causal mechanism will occur (as theorised). While causal mechanisms 'trigger' an outcome, contextual conditions 'enable' it and do not provide an active causal contribution (Beach and Pedersen 2016: 89; see also Boonstra and Österblom 2014 for an application in marine studies). Likewise, drawing a distinction between non-contingent and contingent causes can help to identify which causes have been anticipated (and confirmed) in theory and which have not.

Appendix 1

List of selected papers.

1. Goldstein, A. (2007). Power transitions, institutions, and China's rise in East Asia: theoretical expectations and evidence. *Journal of Strategic Studies* 30: 639–682.
2. Blanchard, J. M. F. (2009). Economics and Asia-Pacific Region territorial and maritime disputes: understanding the political limits to economic solutions. *Asian Politics & Policy* 1: 682–708.
3. Wiegand, K. E., & Beuck, E. (2018). Strategic selection: Philippine arbitration in the South China Sea dispute. *Asian Security* 16: 141–156.
4. Afroz, S., Cramb, R., & Grünbühel, C. (2017). Exclusion and counter-exclusion: the struggle over shrimp farming in a coastal village in Bangladesh. *Development and Change* 48: 692–720.
5. Muralidharan, R., & Rai, N. D. (2020). Violent maritime spaces: conservation and security in Gulf of Mannar Marine National Park, India. *Political Geography* 80: 102–160.
6. Spijkers, J., & Boonstra, W. J. (2017). Environmental change and social conflict: the northeast Atlantic mackerel dispute. *Regional Environmental Change* 17: 1835–1851.
7. Bustos B., & Román A. J. (2019). A sea uprooted: islandness and political identity on Chiloe Island, Chile. *Island Studies Journal* 14: 97–114

Appendix 2 Conflicts over marine environments as outcomes of geopolitical struggles

- Goldstein, A. (2007). Power transitions, institutions, and China's rise in East Asia: theoretical expectations and evidence. *Journal of Strategic Studies* 30: 639–682.
- Blanchard, J. M. F. (2009). Economics and Asia-Pacific Region territorial and maritime disputes: understanding the political limits to economic solutions. *Asian Politics & Policy* 1: 682–708.
- Wiegand, K. E., & Beuck, E. (2020). Strategic selection: Philippine arbitration in the South China Sea dispute. *Asian Security* 16: 141–156.

Goldstein analyses geopolitical struggles over claims and rights to the South China Sea to determine whether or not China's growing international influence will lead to greater conflict and possible war, or whether it will contribute to a peaceful international order. The outcomes Goldstein thus considers are conflict and peace. The cause producing these outcomes is the equalising power balance between China and the USA (Goldstein 2007: 642–644). The causal mechanisms that lead from cause to outcome Goldstein derives from Power-Transition theory and Institutional theory. Power-Transition theory argues that when the difference in power between an established dominant nation state and a new upcoming nation state diminishes, the chances for conflict will increase. This is so because *'when the power gap narrows, the dominant state becomes increasingly desperate to forestall, and the challenger becomes increasingly determined to realize the transition to a new international order whose contours it will define'* (Idem: 648). This mechanism is driven by the desire to maximise power. Institutional theory argues that a narrowing of the power gap might pressure states to create and sustain cooperation that they both benefit from. The mechanism here involves a growing interdependency between a dominant and challenger state for which institutions are established to regulate. These institutions in turn raise the chances that states might come to agree over potential future conflicts (see also Blanchard 2009). Using these mechanisms, Goldstein argues that the conflict over the South China Sea underwent two distinct phases. During the first phase that ran from the early to the mid-1990s when China asserted expansive and unequivocal claims in this body of water through e.g. their Law on the Territorial Sea and the Contiguous Zone (1992): '[China's] *behaviour was defiant and uncompromising*' (idem: 654). As a reaction, several Southeast Asian states who considered this behaviour as a challenge of the status quo increased their ties to the USA with new political and economic agreements. The coalition building between the USA and Southeast Asian states initiated the second phase in the conflict over the South China Sea because it forced the Chinese government to change course. Although its power continues to increase, since the mid-1990s China *'backed away from its previously assertive posture* [in the South China Sea] *and began to express surprisingly strong support for accelerating regional efforts at institutionalized multilateralism'* (655). This second, more peaceful, phase ran from mid-1990s to early-2000s. Interestingly, Goldstein speculates in 2007 (when the paper was published) how strong China adheres to a less assertive strategy. He suggests that the cooperative behaviour might be a 'temporary shift to buy time' because China's capacity to assert its claims was still limited, and at that time it needed to prioritise other concerns (657–658). The validity of this speculation is strengthened in hindsight with the knowledge of China's more aggressive positioning in the South China Sea in more recent years (2010s–2020s).

Blanchard (2009) focuses on the conflict between China and Japan over the East China Sea and the Diaoyu/Senkaku Islands that takes place between 1968 and 2008. The outcome

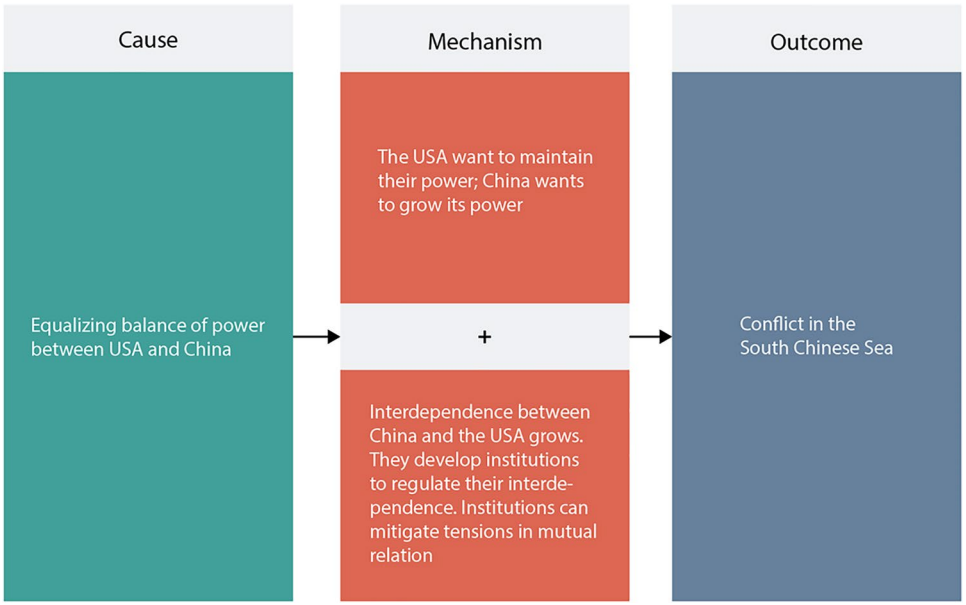

Fig. 1 Causal mechanisms Goldstein (2007) uses to explain the conflict between China and other South-East Asian states

Blanchard wants to explain is the conflict itself, and more specifically why growing economic interdependencies between China and Japan were not able to dampen or resolve the conflict. As cause for the conflict Blanchard mentions *'potential energy resources and fishing grounds'* in these areas, but also the Chinese nationalist perspective that its continental shelf is part of the area where it can claim sovereignty and expand its Exclusive Economic Zone (Blanchard 2009: 686). Likewise, Japan's claim is also driven by economic and nationalist interests. In the analysis of the dynamics of the conflict from when petroleum deposits were discovered under the East China Sea until 2008 when China organised the Olympic Games in Beijing, Blanchard describes how economic cooperation and interdependence grew between Japan and China. Yet, several other conditions or events during this process neutralised or disrupted the positive effect growing economic interdependencies can have on conflict mitigation and resolution. Both Japan and China had to accommodate strong nationalist movements in their respective countries that wanted their governments to more aggressively claim ownership of East China Sea and the Diaoyu/Senkaku Islands. The domestic national sentiments prevented Chinese and Japanese leaders to seek a peaceful settlement of the conflict. Why a settlement was reached eventually in 2008 was not so much due to economic interdependencies. China needed to settle to have free hands to attend to domestic affairs, and to avoid the image of an

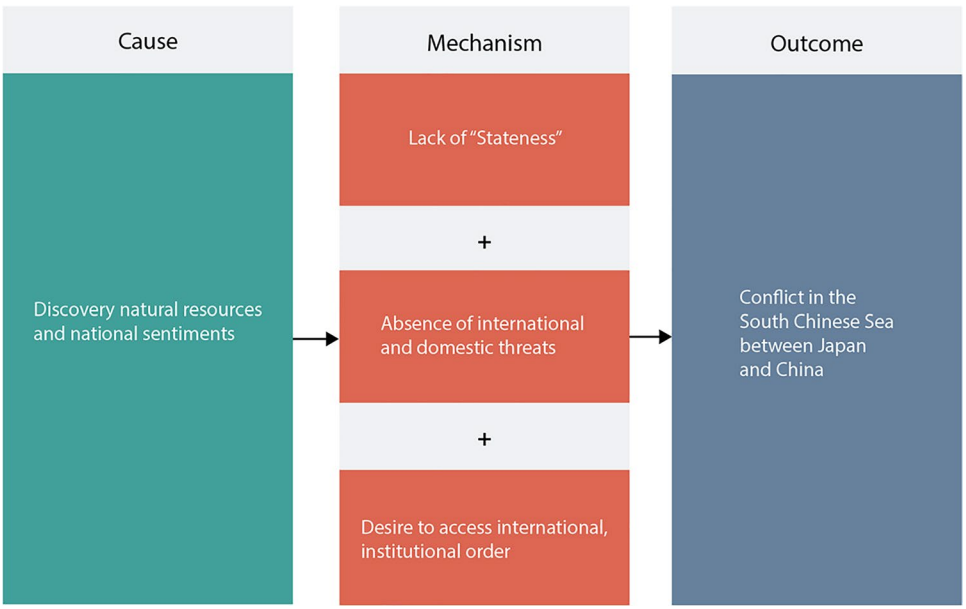

Fig. 2 Causal mechanisms Blanchard (2009) uses to explain the conflict over the East China Sea and islands between China and Japan

expansivist state driving other Asian countries towards the USA for help (Idem: 690–691). Blanchard concludes: 'With respect to the East China Sea and Islands dispute, this study shows that economics did not drive the 2008 East China Sea settlement, solved no part of the Islands dispute, and, in fact, was more often a source of friction than cooperation' (Idem: 683). Whether or not the 'pacifying force of economic stimuli' occurs depends according to Blanchard (2009: 683) on (a) the power national leaders have to oppose domestic interests (what Blanchard calls 'stateness'); (b) the need for international alliances to confront security threats; (c) a desire to gain access to an international institution; (d) a desire for peaceful international order to focus on domestic issues.

Wiegand and Beuck (2018) focus on the conflict between China and the Philippines over the Spratly Islands in the South China Sea (known in the Philippines as Kalayaan Islands and West Philippines Sea, respectively). The outcome these scholars set out to explain is why in 2016 the government of the Philippines submitted a claim against the government of China about the control over these areas for arbitration by United Nations Convention on the Law of the Sea (UNCLOS). In the light of existing theory, this event is surprising. This publication differs from the other two in the set because it analyses the conflict over the Spratly Islands in the South China Sea not as an outcome but rather as the cause for the Philippines to seek international arbitration (which is the outcome). The authors then consider three causal factors that can explain why the Philippines choose this strategy. The first factor is the great difference in military power between China and the Philippines. This means that for the Philippines the option to resist China's claims with military power does not exist. They simply do not have the military forces to do so. As such, it forces the Philippines to consider other strategies, such as international arbitration: '[…] *because of their relatively weak status militarily, the Philippines needs to use the binding nature of arbitration or adjudication in an attempt to bind the hands of China*' (idem: 6). The second factor consists of the benefits that arbitration can give over other conflict resolution strategies, such as mediation or bilateral negotiations. The benefits of arbitration include a relatively short duration, low cost, transparency, confidentiality and larger degree for states to influence the arbitrage as well as procedures, and deep expertise of the arbitrage (Idem: 7). Wiegand and Beuck (2018: 8) explain how bilateral negotiations between China and the Philippines and mediation had proved unsuccessful due to an unwillingness from China to take part. Arbitration as well as adjudication, however, can be sought unilaterally. The third factor involves the probability of winning which was higher with arbitration than with adjudication.

Appendix 3 Conflicts over marine environments as outcome of livelihood insecurity of local users

- Afroz, S., Cramb, R., & Grünbühel, C. (2017). Exclusion and counter-exclusion: the struggle over shrimp farming in a coastal village in Bangladesh. Development and Change 48: 692–720.
- Muralidharan, R., & Rai, N. D. (2020). Violent maritime spaces: conservation and security in Gulf of Mannar Marine National Park, India. Political geography, 80, 102,160.

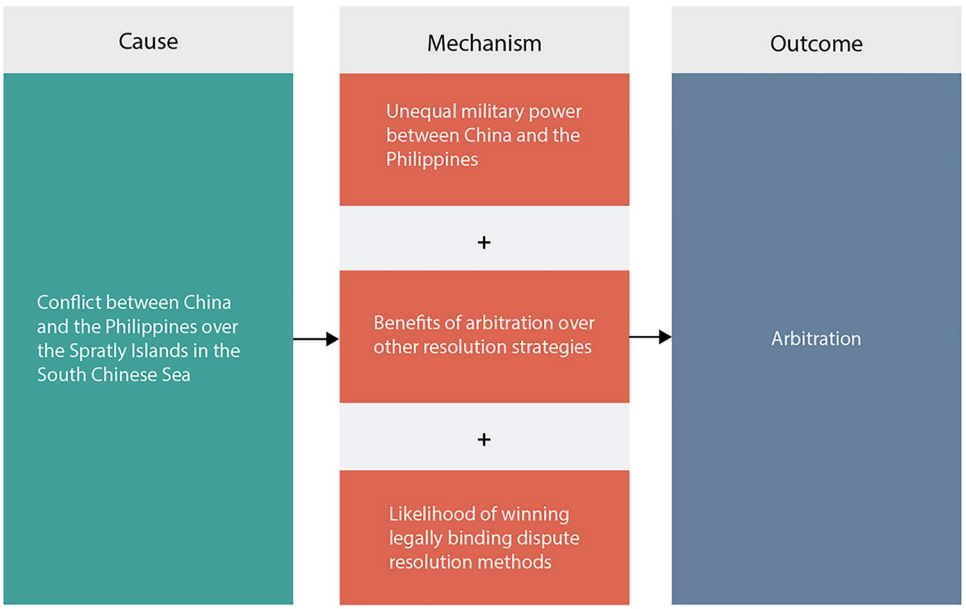

Fig. 3 Causal mechanisms Wiegand and Beuck (2018) use to explain why the Philippines seek arbitration

Afroz et al. (2017) analyse a process, starting in the 1990s in the south-west coastal region of Bangladesh (Laxmikhola), where large landowners try to evict smallholders from their lands leading to protests from the latter during the 2000s, and eventually leading to smallholders reclaiming their mixed farms in 2013. The authors are particularly interested in this case because the outcome—the successful reclamation of smallholders—is unusual: large landowners mostly win (Idem: 694). A major driver in this process is the increase in international prices of seafood during the 1970s and 1980s (Idem: 697). Due to the increase, large landowners become interested in purchasing or leasing land that until then was used for rice production in combination with aquaculture. These owners aim to turn these lands into permanent aquaculture ponds for shrimp production. To do this requires considerable funds to purchase the land but also to erect dykes. The authors refer to this as 'market power' (Idem: 713). Moreover, the large landowners were also successful inducing the central government to institutionally support the expansion of year-round shrimp farming. This capacity is dubbed 'regulatory power' (Idem: 714) by the authors. To gain access to more and more land, large landowners also make use of thugs and the police to intimidate smallholders to sell and refrain from protesting their eviction. The authors label this capacity as 'force' (715). Lastly, the landowners legitimised their claims and behaviour by creating stories and positive images of themselves and shrimp farming. This is called 'legitimate power' (Idem: 716). A decisive turn in this process comes in 2007 when a new so-called caretaker government (Idem: 711) is elected in Bangladesh, and when during the previous years smallholders have become more organised and aware of their rights (Idem: 717). These changes enable smallholders to also mobilise regulatory and legitimate power. With this analysis, Afroz et al. (2017) pay explicit attention to the role of critical events and timing. An important causal mechanism in their explanation for the successful mobilisation of smallholder resistance is a national political change in 2007 and local collective action that built during 1995–2009.

Muralidharan and Rai (2020) analyse conflicts over marine environment as a cause leading to the impoverishment of local fisher livelihoods. The case they consider is the intensification and militarisation of management of the Marine Protected Area (MPA) in the Gulf of Mannar. While the Indian government initiated the MPA already in 1989, the management become more violent as a reaction to the civil war taking place in neighbouring Sri Lanka between 1983 and 2009. During these years, the Gulf was used by the Tamil rebels to transport people and goods from the Indian mainland to Sri Lanka. The authors argue that the militarisation of conservation management resulted in local fishers no longer able to access their traditional fishing grounds, and being portrayed as environmentally destructive and criminals (Idem: 7). Moreover, while artisanal fishers were denied access, modern fisheries was stimulated in the areas surrounding the MPA which destroyed the habitat of sea cucumbers, and thereby a crucial resource that local fishers use to secure their livelihoods (Idem: 5): 'The ban on shore seining left several hundred families jobless and led to the intensification of near-shore fisheries due to lack of alternate opportunities' (Idem: 7). As already mentioned, Muralidharan and Rai identify the armed conflict between Tamil rebels and the Sri Lankan government as an important distant cause for the impoverishment of local Indian fishers. As proximate causes for this outcome, they further discuss the implementation and military management of the MPA as a way for the Indian government to policy coastal regions and populations and to *'continue its capital accumulation efforts in the form of mechanized fisheries'* (Idem: 8).

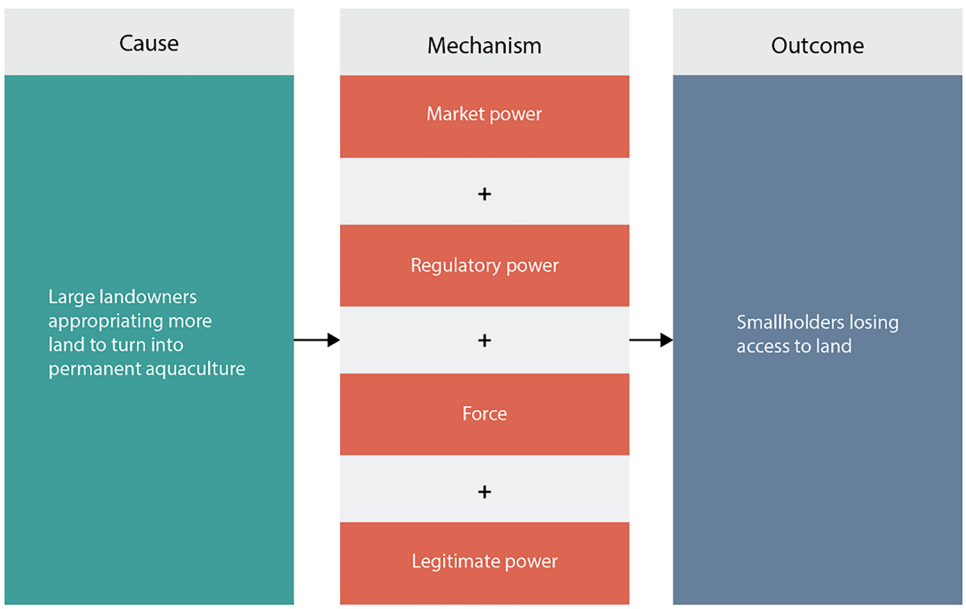

Fig. 4 Causal mechanisms Afroz et al. (2017) use to explain why smallholders in Laxmikhola lose access to their land from the 1980s to 2007

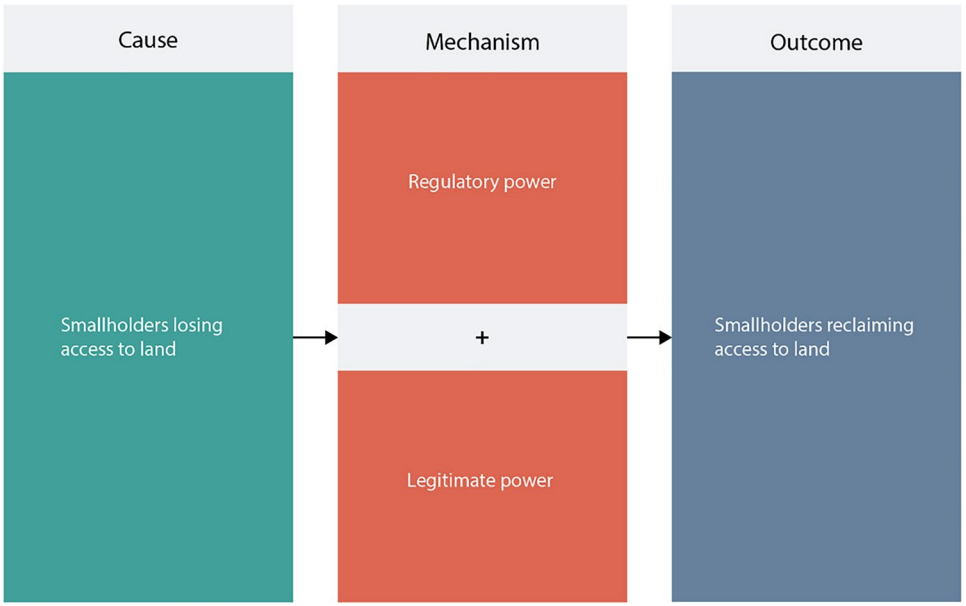

Fig. 5 Causal mechanisms Afroz et al. (2017) use to explain why smallholders in Laxmikhola reclaim access to their land from 2007 to 2013

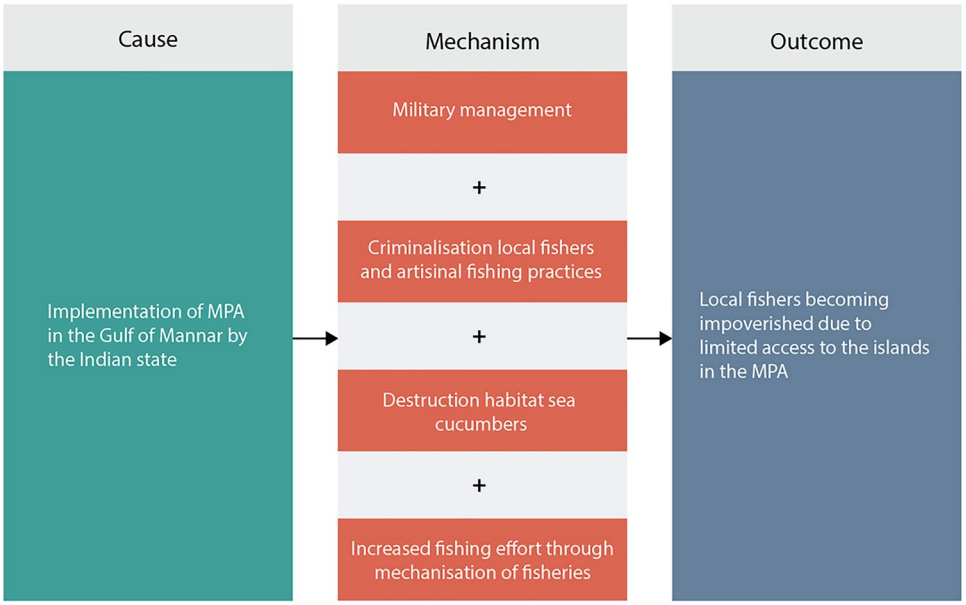

Fig. 6 Causal mechanisms Muralidharan and Rai (2020) use to explain why conflict in the Gulf of Mannar impoverishes local Indian fishers livelihoods

Appendix 4 Conflicts over marine environments as outcome of environmental change

- Spijkers, J., & Boonstra, W. J. (2017). Environmental change and social conflict: the northeast Atlantic mackerel dispute. Regional Environmental Change 17: 1835–1851.
- Bustos, B., & Román, A. J. (2019). A sea uprooted: islandness and political identity on Chiloe Island, Chile. *Island Studies Journal* 14: 97–114

The causes that Spijkers and Boonstra discuss include institutions, power and knowledge (Idem: 1837). Institutions included are the United Nations Convention on the Law of the Sea (UNCLOS) and the UN Fish Stocks Agreement (UNFSA); knowledge refers to the science which the governments involved use to legitimise their claims; power refers to the influence of governments to control the negotiations (Idem: 1838–1846). Using these causes the authors single out two causal mechanisms. The first concerns how governments use their power to produce scientific knowledge that is

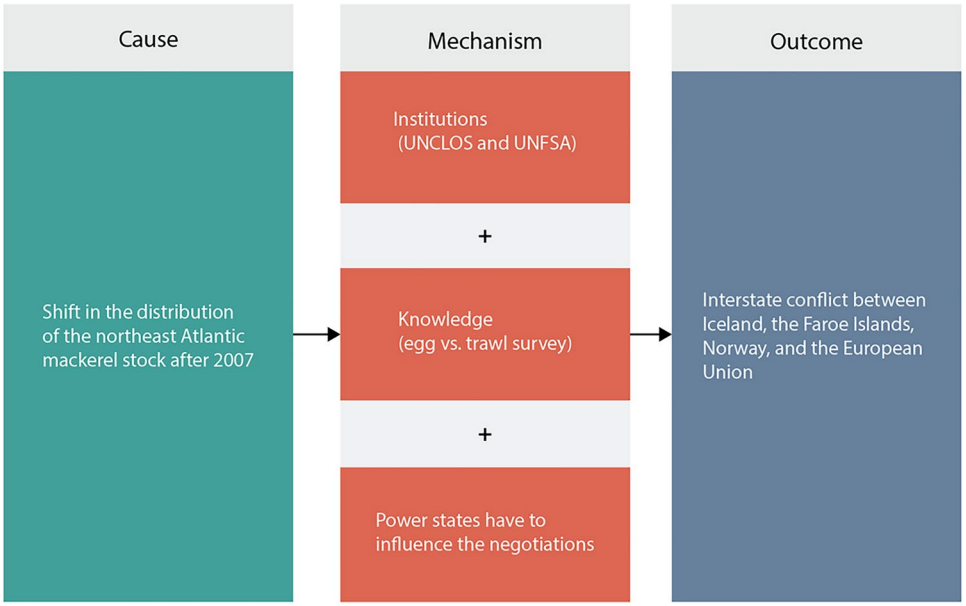

Fig. 7 Causal mechanisms Spijkers and Boonstra (2017) use to explain why the shift in the distribution of the northeast Atlantic mackerel stock after 2007 caused an interstate conflict between Iceland, the Faroe Islands, Norway and the European Union

favourable to their claims, but also what knowledge is deemed valid, appropriate and legitimate in the negotiations (Idem: 1846). The second causal mechanism is how the indetermination of the existing institutional and legal framework allows governments to use their power to try to steer the negotiations to outcomes that are supportive of their claims (Idem: 1847).

The environmental change that led to conflict in the case Bustos and Román (2019) consider is the deterioration of marine ecologies around the island Chiloé situated at the west coast of Chile. These ecologies changed due to algae blooms and so-called red tides that are the result of intensive salmon farms (Idem: 98). These aquaculture operations were started on the island during the 1990s and 2000s, and the first signs of pollution become visible in 2016 (Idem: 104). As a reaction to these changes, the Chilean government introduced bans on harvesting shellfish and provided only limited monetary compensation to local communities (Idem: 106). Together, these events led to a conflict between local island communities and the central Chilean government because the government interventions and the deterioration of local marine environments is impoverishing the livelihoods of island communities. According to the authors, the mechanism that underlies this conflict consists of (a) long history starting in the nineteenth century of extraction of island resources by outside authorities; (b) a collective identity of 'islandness' (Idem: 99–100), i.e.

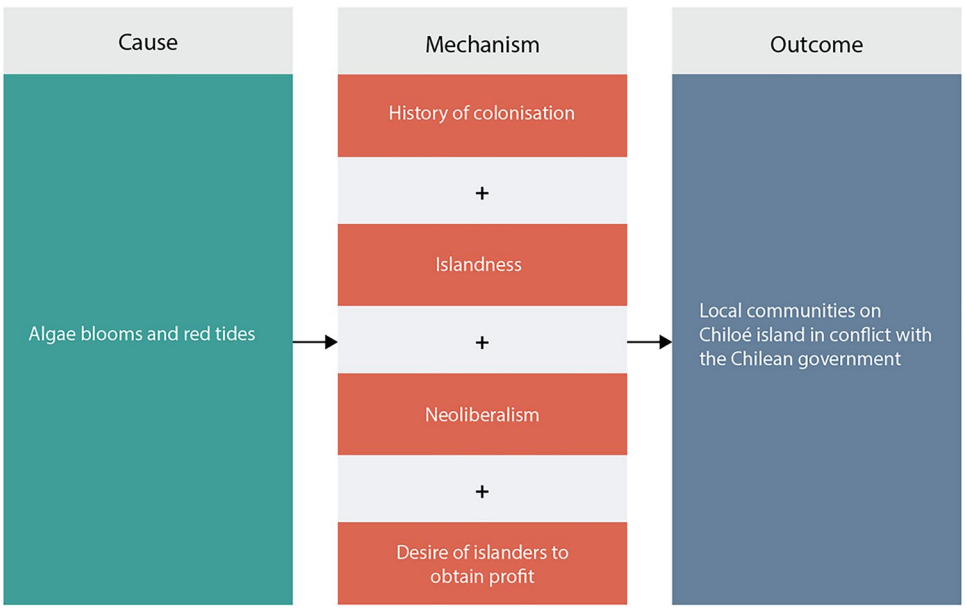

Fig. 8 Causal mechanisms Bustos and Román (2019) use to explain why local communities on Chiloé island come into conflict with the central Chilean government in 2016

feelings of exclusion, marginalisation and confrontation with outside authorities; (c) neoliberalist interventions that come with a lack of concern and loyalty from aquaculture companies; (d) a 'fever-driven component of Chilote culture' (Idem: 103) to seize new economic opportunities to exploit island resources.

Acknowledgements The authors thank Ivan Martins and the reviewers and editors of MAST for helpful comments and suggestions on an earlier version of this article. This paper is a deliverable for NOCRISES project (Negotiating Ocean Conflicts among RIvals for Sustainable and Equitable Solutions) funded by Belmont Forum.

Funding Open access funding provided by Uppsala University.

Data availability All the data associated with this article is to be found in the appendices.

Declarations

Conflict of interest The authors declare no competing interests.

References

Abdurrahim, A.Y., H. Ross, and D.S. Adhuri. 2020. Analysing fisheries conflict with the FishCollab 'conflict mapping' toolkit: Lessons from Selayar, Indonesia. *IOP Conference Series: Earth and Environmental Science*. https://doi.org/10.1088/1755-1315/420/1/012001.

Afroz, S., R. Cramb, and C. Grünbühel. 2017. Exclusion and counter-exclusion: The struggle over shrimp farming in a coastal village in Bangladesh. *Development and Change* 48: 692–720.

Agarwala, N. 2021. Advances by China in deep seabed mining and its security implications for India. *Australian Journal of Maritime and Ocean Affairs* 13: 94–112. https://doi.org/10.1080/18366503.2021.1871810.

Aswani, S., X. Basurto, S. Ferse, M. Glaser, L. Campbell, J.E. Cinner, T. Dalton, L.D. Jenkins, M.L. Miller, R. Pollnac, and I. Vaccaro. 2018. Marine resource management and conservation in the Anthropocene. *Environmental Conservation* 45: 192–202.

Bavinck, M., S. Jentoft, and J. Scholtens. 2018. Fisheries as social struggle: A reinvigorated social science research agenda. *Marine Policy* 94: 46–52.

Beach, D. 2017. Process-tracing methods in social science. *Oxford Research Encyclopaedia of Politics*. https://doi.org/10.1093/acrefore/9780190228637.013.176.

Beach, D., and R.B. Pedersen. 2016. *Causal case study methods: Foundations and guidelines for comparing, matching, and tracing*. Ann Arbor: University of Michigan Press.

Beach, D., and Pedersen, R.B. 2013. *Causal case study methods. Foundations and guidelines for comparing, matching, and tracing*. Ann Arbor: University of Michigan Press.

Beach D., Camacho G. & Siewert M.B. 2022. Going beyond the single case: comparative process tracing as a tool to enable generalizations about causal processes from case studies. *APSA Preprints*. https://doi.org/10.33774/apsa-2022-fpx3v.

Bennett, A., and Checkel, J.T. 2015. Process tracing: from philosophical roots to best practices. In: Process tracing. From metaphor to analytical tool. (eds. A. Bennett and J.T. Checkel) pp. 3–38. Cambridge: Cambridge University Press.

Blanchard, J.M.F. 2009. Economics and Asia-Pacific Region territorial and maritime disputes: Understanding the political limits to economic solutions. *Asian Politics & Policy* 1: 682–708.

Boonstra, W.J., and F.W. de Boer. 2014. The historical dynamics of social–ecological traps. *Ambio. Journal of Environment and Society* 43: 260–274.

Boonstra, W.J., and P.T.H. Nhung. 2012. The ghosts of fisheries management. *Journal of Natural Resources Policy Research* 4: 1–25.

Boonstra, W.J., and H. Österblom. 2014. A chain of fools: Or, why it is so hard to stop overfishing. *Maritime Studies* 13: 1–20.

Brennan, R.E. 2018. The conservation "myths" we live by: Reimagining human–nature relationships within the Scottish marine policy context. *Area* 50: 159–168.

Buhaug, H., et al. 2014. One effect to rule them all? A comment on climate and conflict. *Climatic Change* 127: 391–397.

Burke, M., S.M. Hsiang, and E. Miguel. 2015. Climate and conflict. *Annual Review of Economics* 7: 577–617.

Bustos, B., and A. Román. 2019. A sea uprooted: Islandness and political identity on Chiloe Island, Chile. *Island Studies Journal* 14: 97–114.

Cheung, W.W.L., et al. 2010. Large-scale redistribution of maximum fisheries catch potential in the global ocean under climate change. *Global Change Biology* 16: 24–35. https://doi.org/10.1111/j.1365-2486.2009.01995.x.

Chivers, C.J. 2007. Russians plant flag on the Arctic seabed. The New York Times, 3.

Cohen, B.P. 1989. *Developing sociological knowledge: Theory and method*. Chicago: Nelson-Hall.

Collins, R. 2004. *Interaction ritual chains*. Princeton: Princeton University Press.

Collins, R. 2009a [1975]. *Conflict sociology. A sociological classic updated*. Abridged and updated by Stephen K. Sanderson. Boulder: Paradigm Publishers.

Collins, R. 2009b. *Violence: A micro-sociological theory*. Princeton: Princeton University Press.

Collins, R. 2012. C-escalation and D-escalation: A theory of the time-dynamics of conflict. *American Sociological Review* 77: 1–20.

Cullen, H., et al. 2000. Climate change and the collapse of the Akkadian empire: Evidence from the deep sea. *Geology* 28: 379–382.

Dahlet, L.I., A. Himes-Cornell, and R. Metzner. 2021. Fisheries conflicts as drivers of social transformation. *Current Opinion in Environmental Sustainability* 53: 9–19. https://doi.org/10.1016/j.cosust.2021.03.011.

deYoung, B., et al. 2008. Regime shifts in marine ecosystems: Detection, prediction and management. *Trends in Ecology & Evolution* 23: 402–409.

Díaz, S., J. Settele, E.S. Brondízio, H.T. Ngo, J. Agard, A. Arneth, P. Balvanera, K.A. Brauman, S.H. Butchart, K.M. Chan, and L.A. Garibaldi. 2019. Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science* 366: p.eaax3100. https://doi.org/10.1126/science.aax3100.

Emirbayer, M. 1997. Manifesto for a relational sociology. *American Journal of Sociology* 103: 281–317.

Falleti, T.G. 2016. Process tracing of extensive and intensive processes. *New Political Economy* 21: 455–462.

Flyvbjerg, B. 2006. Five misunderstandings about case-study research. *Qualitative Inquiry* 12: 219–245.
Foschi, M. 1997. On scope conditions. *Small Group Research* 28: 535–555.
Franssen, A.G. 2021. Schrijver Alex Schulman komt niet los van zijn kindertijd: “Dat is mijn grootste angst – die erfenis doorgeven”. [Writer Alex Schulman cannot cut himself loose from his childhood: "It's my biggest fear - passing on that heritage] Interview with Alex Schulman. *Trouw Newspaper* 16 May.
Garcia-Montoya, L., and J. Mahoney. 2020. Critical event analysis in case study research. *Sociological Methods & Research* 52: 480–524. https://doi.org/10.1177/0049124120926201.
Geertz, C. 1963. *Agricultural involution*. Berkeley: University of California Press.
George, A.L., and A. Bennett. 2005. *Case studies and theory development in the social sciences*. Massachusetts: MIT Press.
Gerring, J. 2008. The mechanismic worldview: Thinking inside the box. *British Journal of Political Science* 38: 161–179.
Goldstone, J.A. 1991. *Revolution and rebellion in early modern world*. Berkeley: University of California Press.
Goldstein, A. 2007. Power transitions, institutions, and China’s rise in East Asia: Theoretical expectations and evidence. *Journal of Strategic Studies* 30: 639–682.
Grip, K., and S. Blomqvist. 2020. Marine nature conservation and conflicts with fisheries. *Ambio. Journal of Environment and Society* 49: 1328–1340.
Haddaway, N.R., et al. 2020. Eight problems with literature reviews and how to fix them. *Nature Ecology & Evolution* 4: 1582–1589.
Hannigan, J. 2016. *The geopolitics of deep oceans*. London: Wiley.
Haug, G., et al. 2003. Climate and the collapse of Maya civilization. *Science* 299: 1731–1735.
Hay, C. 2002. *Policy analysis. A critical introduction*. Basingstoke: Palgrave.
Hedström, P., and P. Ylikoski. 2010. Causal mechanisms in the social sciences. *Annual Review of Sociology* 36: 49–67.
Hertz, T., et al. 2020. From nouns to verbs: How process ontologies enhance our understanding of social-ecological systems understood as complex adaptive systems. *People and Nature* 2: 328–338.
Homer-Dixon, T.F. 1991. On the threshold: Environmental changes as causes of acute conflict. *International Security* 16: 76–116.
Homer-Dixon, T.F. 1996. Strategies for studying causation in complex ecological-political systems. *The Journal of Environment & Development* 5: 132–148.
Hsiang, S.M., et al. 2013. Quantifying the influence of climate on human conflict. *Science* 341. https://doi.org/10.1126/science.1235367.
Jouffray, J.B., et al. 2020. The blue acceleration: The trajectory of human expansion into the ocean. *One Earth* 2: 43–54.
Lamothe, K.A., et al. 2019. Linking the ball-and-cup analogy and ordination trajectories to describe ecosystem stability, resistance, and resilience. *Ecosphere* 10. https://doi.org/10.1002/ecs2.2629
Le Billon, P., and R. Duffy. 2018. Conflict ecologies: Connecting political ecology and peace and conflict studies. *Journal of Political Ecology* 25: 239–260.
Lövin, I. 2007. *Tyst hav. Jakten på den sista matfisken* [Silent sea. The hunt for the last fishfood]. Ordfront: Stockholm.
Lucas, J.W. 2003. Theory-testing, generalization, and the problem of external validity. *Sociological Theory* 21: 236–253.
Machamer, P., et al. 2000. Thinking about mechanisms. *Philosophy of Science* 67: 1–25.
Mahoney, J. 2001. Beyond correlational analysis: recent innovations in theory and method. *Sociological Forum* 16: 575–593.
Mahoney, J. 2008. Toward a unified theory of causality. *Comparative Political Studies* 41: 412–436.
Mancilla García, M., et al. 2020. Adopting process-relational perspectives to tackle the challenges of social-ecological systems research. *Ecology and Society* 25. https://doi.org/10.5751/ES-11425-250129.
McEvoy, A.F. 1986. *The fisherman’s problem. Ecology and law in the California fisheries 1850–1980*. Cambridge: Cambridge University Press.
McGoodwin, J.R. 1990. *Crisis in the world’s fisheries. People, problems, and policies.* Stanford: Stanford University Press.
Mendenhall, E., et al. 2020. Climate change increases the risk of fisheries conflict. *Marine Policy* 117: 103954. https://doi.org/10.1016/j.marpol.2020.103954.
Miller, K.A. 2007. Climate variability and tropical tuna: Management challenges for highly migratory fish stocks. *Marine Policy* 31: 56–70.
Moher, D., et al. 2009. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *PLoS Medicine* 6. https://doi.org/10.1371/journal.pmed.1000097.
Morgera, E., and Kulovesi, K. 2016. Preface. In Elisa Morgera, Kati Kulovesi (Eds.), Research handbook on international law and natural resources. pp. x-xiii. Edward Elgar Publishing. https://doi.org/10.4337/9781783478330
Muralidharan, R., and N.D. Rai. 2020. Violent maritime spaces: Conservation and security in Gulf of Mannar Marine National Park, India. *Political Geography* 80: 102–160.
Muthu, S. 2009. *Enlightenment against empire*. Princeton: Princeton University Press.
Muthu, S. 2012. Conquest, commerce, and cosmopolitanism in Enlightenment. In: (S. Munthu ed.) Empire and modern political thought. pp. 199–231. Cambridge University Press.
Nemeth, S.C., S.M. Mitchell, E.A. Nyman, and P.R. Hensel. 2014. Ruling the sea: Managing maritime conflicts through UNCLOS and exclusive economic zones. *International Interactions* 40: 711–736.
Nightingale, A. 2013. Fishing for nature: The politics of subjectivity and emotion in Scottish inshore fisheries management. *Environment and Planning A* 45: 2362–2378.
Nordås, R., and N.P. Gleditsch. 2015. Climate change and conflict. In *Competition and conflicts on resource use, natural resource management and policy 46*, ed. S. Hartard and W. Liebert, 21–38. Cham: Springer.
Österblom, H., et al. 2020. *Towards ocean equity*. Washington, DC: World Resources Institute. Available online at www.oceanpanel.org/how-distribute-benefits-ocean-equitably.
Ostrom, E. 1990. *Governing the commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press.
Ostrom, E. 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* 325: 419–422.
Pereira, H.M., et al. 2010. Scenarios for global biodiversity in the 21st century. *Science* 330: 1496–1501.
Perry, R.I., et al. 2011. Marine social–ecological responses to environmental change and the impacts of globalization. *Fish and Fisheries* 12: 427–450.
Pinsky, M.L., R.L. Selden, and Z.J. Kitchel. 2020. Climate-driven shifts in marine species ranges: Scaling from organisms to communities. *Annual Review of Marine Science* 12: 153–179.
Pinsky, M.L., et al. 2018. Preparing ocean governance for species on the move. *Science* 360: 1189–1191.
Ragin, C.C. 2009. Reflections on casing and case-oriented research. *The Sage Handbook of Case-Based Methods* 31: 522–534.
Rapoport, A. 1997. Memories of Kenneth E. Boulding. *Review of Social Economy* 55: 416–431.

Roscher, M.B., et al. 2022. Unpacking pathways to diversified livelihoods from projects in Pacific Island coastal fisheries. *Ambio. Journal of Environment and Society*. https://doi.org/10.1007/s13280-022-01727-x.

Rotter, A., et al. 2021. The essentials of marine biotechnology. *Frontiers in Marine Science* 8: 2296–7745.

Santos, M.M. 2018. The last frontier: Coupling technological developments with scientific challenges to improve hazard assessment of deep-sea mining. *Science of the Total Environment* 627: 1505–1514.

Saylor, R. 2020. Why causal mechanisms and process tracing should alter case selection guidance. *Sociological Methods & Research* 49: 982–1017.

Schlüter, M. 2019. Toward a methodology for explaining and theorizing about social-ecological phenomena. *Current Opinion in Environmental Sustainability* 39: 44–53.

Sheikh, H. 2019. *Hydropolitiek. Samenwerking en conflict op zeven zeeeën* [Hydropolitics. Collaboration and conflict at the seven seas]. Boom: Amsterdam

Spijkers, J., et al. 2021. Exploring the future of fishery conflict through narrative scenarios. *One Earth* 4: 386–396.

Spijkers, J., and W.J. Boonstra. 2017. Environmental change and social conflict: The northeast Atlantic mackerel dispute. *Regional Environmental Change* 17: 1835–1851.

Spijkers, J., G. Singh, R. Blasiak, T.H. Morrison, P. Le Billon, and H. Österblom. 2019. Global patterns of fisheries conflict: forty years of data. *Global Environmental Change* 57, https://doi.org/10.1016/j.gloenvcha.2019.05.005.

Steinberg, P.E. 2018. The ocean as frontier. *International Social Science Journal* 68: 237–240.

Stinchcombe, A.L. 1991. The conditions of fruitfulness of theorizing about mechanisms in social science. *Philosophy of the Social Sciences* 21: 367–388.

Stokke, O.S. 2022. Arctic geopolitics, climate change, and resilient fisheries management. *Ocean Yearbook Online* 36: 440–474.

Sundstrom, S.M., and Allen, C.R. 2019. The adaptive cycle: more than a metaphor. *Ecological Complexity* 39. https://doi.org/10.1016/j.ecocom.2019.100767.

Tafon, R., et al. 2022. Oceans of conflict: Pathways to an ocean sustainability PACT. *Planning Practice & Research* 37: 213–230.

Tavory, I., and S. Timmermans. 2014. *Abductive analysis: Theorizing qualitative research*. Chicago: University of Chicago Press.

Tilly, C. 1984. *Big structures, large processes, huge comparisons*. New York: Russel Sage Foundation.

Toynbee, A.J., 1957. *A study of history*. Abridgement of volumes VII-X by D.C. Somervell, Oxford: Oxford University Press.

Trampusch, C., and B. Palier. 2016. Between X and Y: How process tracing contributes to opening the black box of causality. *New Political Economy* 21: 437–454.

van Putten, E.I., et al. 2019. Perceptions of system-identity and regime shift for marine ecosystems. *ICES Journal of Marine Science* 76: 1736–1747.

van Putten, E.I., et al. 2022. History matters: lack of societal acceptance of deep-sea mining and incipient conflicts in Papua New Guinea, *Maritime Studies*. In review.

Waddington, D., K. Jones, and C. Critcher. 2021. *Flashpoints: Studies in public disorder*. London: Routledge.

Waldner, D. 2015. Process tracing and qualitative causal inference. *Security Studies* 24: 239–250.

Walters, B.B., and A.P. Vayda. 2009. Event ecology, causal historical analysis, and human–environment research. *Annals of the Association of American Geographers* 99: 534–553.

Wiegand, K.E., and E. Beuck. 2018. Strategic selection: Philippine arbitration in the South China Sea dispute. *Asian Security* 16: 141–156.

Zhang, D.D., et al. 2007. Global climate change, war, and population decline in recent human history. *Proceedings of the National Academy of Sciences* 104: 19214–19219.