



Insight

Broadening the perspective on ocean privatizations: an interdisciplinary social science enquiry

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ABSTRACT. Privatization of the ocean, in the sense of defining more exclusive property rights, is taking place in increasingly diverse ways. Because of more intensive and diversified use patterns and increasing sustainability challenges, it is likely that this process will continue into the future. We argue that the nature of privatization varies from one oceanic domain to another. We differentiate four ideal-typical domains: (1) resources, (2) space, (3) governance control, and (4) knowledge, and nine criteria for the assessment of privatization. We apply those criteria to a selection of examples from the realm of marine life (from micro-organisms to fish) to highlight similarities and differences and establish foundations for broader analysis. We aim hereby to develop the groundwork for a balanced, interdisciplinary perspective on ocean privatization. Our analysis demonstrates that privatization has multiple dimensions and cannot be condemned or embraced in its entirety. Instead it requires more nuanced assessment and deliberation.

Key Words: *ocean; privatization; property rights; sustainability*

INTRODUCTION

The oceans cover more than 70% of our planet but are arguably still the least privatized asset of humankind. Policies of blue growth, new economic opportunities (and therefore interests), technological advances, and politics all suggest that privatization of the oceans and adjacent land areas will accelerate in the future (Arbo et al. 2018). These may generate damages (Bavinck et al. 2017, Barbesgaard 2018) and benefits (Kompas and Che 2005, Anderson et al. 2011, Arnason 2012). Such processes occur in a context of accelerated anthropogenically induced change, which in itself prompts new governance responses. Ecosystem service provisions will most likely be reduced (Rockström et al. 2009). This will increase scarcity, which in history has often fostered the establishment of private property regimes (Demsetz 1967, Ensminger 1996, Alston et al. 1999).

We see privatization as a process that transfers exclusive property rights over valuable goods, spaces, and processes to private actors (Eggertsson 1990, Bromley 1991), be they individuals, corporations, or nongovernmental entities. Little study has gone into privatization of oceans in comparison to land. We therefore formulate a conceptual perspective that allows us to identify, in broad strokes, the nature of the phenomenon. The normative assessment of privatization processes we leave for another occasion because it will take us into the realm of values, norms, and principles.

We explore the distinguishing features of coasts and oceans relevant to privatization. Then, we present a set of criteria, stemming from multiple disciplinary perspectives, so as to understand potential implications of ocean privatization. We realize that each instance of ocean privatization is unique and context dependent. However, from a conceptual perspective, several domains of privatization may be distinguished. We highlight four oceanic domains: (1) resources, both renewable (e.g., fish) and nonrenewable (e.g.,

minerals) alike; (2) space, such as for establishing wind parks, aquaculture farms, or marine protected areas (MPA); (3) knowledge items, such as patents over bioactive compounds; and (4) governance processes, such as certification, or the outsourcing of conservation management to private entities.

Each of these domains inevitably contains a range of variations. Thus, the privatization of, for instance, the rights to marine life such as fish raises other challenges than mineral exploitation does. In addition, some privatization processes traverse multiple domains: e.g., the establishment of private rights to a particular resource, such as fish, often also includes a spatial dimension (i.e., one acquires rights to fish in territory A or B) and may be accompanied by the privatization of governance too (e.g., if an industry does not only get the right to catch but also the right to govern a stock according to its own rules). Our domains can therefore be said to provide more analytical than empirical purchase. However, privatizing governance, the right to set operational and potentially collective choice rules (Ostrom 1990) is distinct from the other categories. Privatizing space brings particular challenges because of ocean characteristics and changing technologies, which open up new dimensions. The latter holds true especially considering knowledge, in which genetics opens up a new field of property to aspects of the sea.

Our examples derive mainly from the human use of marine living organisms (from microorganisms to fish). Thus, capture fisheries illustrate the resources domain, aquaculture the domain of space, certification of seafood the governance domain, and patenting of genetic material the domain of knowledge. These examples are not necessarily typical for the oceanic realm as a whole, and further research will be needed, allowing for more systematic analysis. The examples do, however, provide inroads into the topic. We dissect each example according to the list of nine criteria.

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WHAT IS SPECIAL ABOUT OCEAN PRIVATIZATION?

Many of the characteristics of the ocean relevant for a discussion of property rights pertain also to terrestrial realms. However, the aspects portrayed here are particularly pronounced in the marine sphere and therefore require special attention.

The most distinctive material characteristic of the ocean is the fluidity of water. Ecosystem boundaries fluctuate and social system boundaries are often difficult to define in a context of fluidity (Schlüter et al. 2013, Steinberg and Peters 2015). It's not possible to fence the ocean like it's possible to fence a piece of land, although modern technology like GPS trackers do make it easier to define spatial borders and therefore rights (Pauly et al. 2014, Kroodsma et al. 2018). However, many marine organisms and substances are crossing borders constantly, along with the water itself. The ocean is the place in which boundaries between jurisdictions intersect (van Tatenhove 2017, Schlüter et al. 2019, Van Assche et al. 2020). It can therefore be characterized as a site of legal pluralism (Jentoft 2011), riddled with confusion and struggles over rights and responsibilities (Bavinck et al. 2018). As a consequence, many privatization issues are of a transboundary nature, concerning multiple communities, nations, or even continents with important questions on the most appropriate regulatory structure remaining unanswered.

Fluidity relates to what is recognized as a third spatial dimension in the ocean realm (Van Assche et al. 2020). After all, oceanic space extends horizontally, but also vertically in the water column; it is therefore not only about space but also about volume (Steinberg and Peters 2015). Property rights with regard to one matter in a three-dimensional grid can easily interfere with other ocean uses. The same is of course true on land, in which air space or wave spectrums for wireless data transfer add other layers of property rights. However, the intensity of externalities, or interdependencies, indicating a less static relationship among uses (Paavola and Adger 2005) is often of higher intensity in the ocean than on land.

Time adds a fourth dimension to the study of oceans. Steinberg and Peters (2015) argued that “the chaotic movement” or “churnings” that characterize ocean waters defy easy, linear approaches toward territorialization. Environmental feedback loops occur over long time periods, making it difficult to assign private owners with liabilities for damages incurred. Hence, the risk prevails that privatization of the ocean leads to a collectivization of the damage costs resulting from private activities.

Those three aspects lead necessarily to strong interdependencies between spaces, activities, and ecosystem services (Craig and Ruhl 2010, Lebel 2012, Schlüter et al. 2019), a handicap when it comes to the establishment of atomistic property rights because those property rights toward a particular asset of the system will necessarily not have considered consequences for other people, externalities, e.g., in the form of pollution (Bromley 1991). This is even more aggravated considering the still existing higher monitoring and enforcement problems in the ocean as opposed to on land, resulting frequently in a huge distance between *de jure* and *de facto* rights (e.g., paper parks).

Finally, we note important differences in the history of marine in comparison to terrestrial privatization. Privatization on land was

a relatively slow, evolutionary process that took place along with transitions to, for example, agriculture and industry. The technological possibilities of humans to explore, and the demand for goods and services on land, thus developed over a very long period of time. However, the technological possibilities to use the ocean are accelerating at a much faster pace, which shortens the time frame for institutional evolution. Institution building, as a second order collective dilemma, generally requires time (Ostrom 1990) and is, because of its inherent uncertainty, prone to mistakes and necessary readjustments. This indicates that it is rather unlikely that sustainable solutions, in the broad sense of the term, will be immediately put on the agenda, found, and agreed upon.

CHARACTERIZING DIFFERENCES IN OCEAN PRIVATIZATION

To understand and assess the trends and features of ocean privatization, we suggest the following nine criteria (see Table 1). These have been selected from a broad range of social-science perspectives, with the goal of providing a holistic assessment tool that moves beyond disciplinary and ideological borders. The first criterion relates to the “motivations and drivers” for privatization brought forward by stakeholders. These may be embedded in broader narratives or discourses. Do stakeholders point out “a tragedy of the commons problem” (Hardin 1968), and do they suggest that negative externalities, either by overappropriation or by over polluting, demand the establishment of private rights? Has scarcity and therefore the value of the goods, services, or conditions increased, thereby creating a push toward privatization? Are possible rents appearing and investments taking place that give private actors a strong incentive to demand private property rights? Drivers such as the above are sometimes interlinked and different actors might have varying motivations for or against privatization. Identifying these drivers might help us judge which governance concerns require addressing (Yang et al. 2009).

The drivers are generally linked to “actors” in the privatization process; this is criterion two. It makes a difference whether big private corporations, NGOs, or states are the ones pushing toward more exclusive rights and privatization. Analyzing the degrees and types of power held by different actors involved, and if and how they use it, constitutes an important step in understanding the privatization process at hand.

Criterion three is the “materiality” (the physical and ecological characteristics and function) of a good (Vogt et al. 2015, Van Assche et al. 2017). It is easier to establish and enforce exclusive property rights for nonmigratory species, a fixed stretch of coast, or a geographically defined space of the ocean surface. It is more difficult to privatize highly migratory fish species that are often crossing ecological and social boundaries. This criterion also points to the narrowly defined characteristics of goods usually applied in environmental economics, like excludability and rivalry.

Criterion four: “the institutional starting points” of a privatization process can be very different. Some privatizations take assets directly out of the public domain because nobody used them before or did not see any value in them. This might be related to bioactive compounds or to earning a price premium by offering a certification scheme that did not exist before. For coastal fisheries, a common property regime often precedes state

intervention and transfer to more private entities. Privatizing a harbor or the operation of a MPA is a move from a state to a private regime. We argue that the starting point of privatization makes a difference, for example in the assessment of historical justice, or in relation to the potential efficiency gains to be achieved.

Table 1. Criteria for assessing ocean privatization.

(1) Motivations and drivers
Scarcity, overexploitation, rent securitization, incentivize innovations
(2) Main pushing actors and their power
States, NGOs, big business, small-scale fishers, ...
(3) Materiality, the physical and ecological characteristics and function
Excludability, rivalry, high mobility, non-migratory, ...
(4) Institutional starting point
Open access property, state, or common property regime, availability of legal pluralism
(5) Attributes of property rights
Access, withdraw, manage, exclude, alienate
(6) Institutional repertoire
Existing transferable institutional structure vs. starting from scratch venturing in new property realms
(7) Path dependencies
Degree of vested interest, time period property granted, institutional dependencies
(8) Distributive effects
Winners and losers, distribution of power resources of actors before and after privatization
(9) Effects on decision making and democracy
Move away from state or collective decision making, which actors are excluded from decision-making process

Different “attributes of property rights” can also be distinguished. Property rights come in a variety of bundles, each of which requires detailed analysis (von Benda-Beckmann et al. 2006). Schlager and Ostrom (1992), for example, distinguished the right to access, i.e., having the right to enter a particular area, for example; the right to withdraw, i.e., extracting resources from a particular area; to manage, i.e., to decide on management rules and to engage in active management, e.g., of a fish stock; to exclude others from any benefit of the resource; and to alienate, meaning to be allowed to transfer/sell the right to another person or entity.

The starting points of privatization are also related to criterion six, the “institutional repertoires” for privatizing a particular asset. Selling a piece of ocean space requires adjustment of laws, which are already available for property on land. It can largely build on these earlier legal constructs, which have been developed over centuries. Compare this with the establishment of the first tradable quota system for fish. Here, the right to property is not granted, but the right to extract a particular good. Often, but not always, this right is granted for a particular period of time only. For trading, a new market had to be established. Such markets did not exist when the first individual tradable quota scheme was established. Many institutional innovations were therefore required.

Privatization usually creates “path dependencies” or more severe lock-in effects. This is criterion seven. Deprivatization and moving back to a more public property regime is often blocked as vested interests emerge. However, the degree of lock-in varies

substantially between different forms of privatization. A private license for a certain number of years is different than creating property rights in perpetuity. Some privatizations are strongly supported by other institutions, values, and norms, others only loosely so. In the former case, reversals may be more difficult to achieve.

Privatization creates changes in access to resources, goods, and services, and therefore has “distributive effects” (McCormack 2017, Partelow et al. 2019): criterion eight. Who the winners and losers of privatization are is an important question for judging privatization from social, economic, and ecological sustainability perspectives (Carothers 2010, Himes-Cornell and Hoelting 2015, Kokorsch and Benediktsson 2018). The societal context also plays a role. Privatization taking place in a society in which professional opportunities are many and well-being is widely spread is different from the same process happening in which many poor people depend strongly on common-pool oceanic resources. In the first case, privatization might solve a sustainability challenge and not create new social disabilities. In the latter case, it might exclude significant numbers of people from a livelihood and also create new social sustainability challenges.

Combining this with the lock-in effect, one has to finally analyze the effects of privatization on “decision making and democracy” (procedural justice; criterion nine; Knight and Johnson 2007, Menon et al. 2018). To what extent does privatization shift what used to be public goods to the private realm, thereby having an impact on the scope and the content of societal decision-making processes? Who is now making decisions about a particular asset, and are these people still the ones who bear the main consequences of decision making?

EXEMPLIFYING THE FOUR DOMAINS OF OCEAN PRIVATIZATION

We use the structure developed in the previous section to further characterize the differences between privatization practices, using an example from each domain.

Resources: the example of capture fisheries

Capture fisheries provide a prime example of privatization. The topic is very controversial and scholars of various disciplines disagree on its benefits and costs (Acheson et al. 2015). Precipitated by the environmental crisis in fisheries, many governments in the Global North have introduced systems of exclusive rights (Hannesson 2004, Mansfield 2004a, Olson 2011, Pomeroy et al. 2015). For many, privatizing the right to catch is a neat solution to the overfishing challenge (DeLuca 2005, Costello et al. 2008, Craig and Ruhl 2010, Whitmarsh 2013). Many others, however, stress the negative distributive effects that arise from the privatization of a common pool resource (Mansfield 2004b, Knott and Neis 2017, Said et al. 2017), also highlighting the consequences that arise for the social functioning of coastal communities (McCormack 2017).

The ostensible motivation and driver for establishing clearer property rights in fisheries is the ambition of reversing the overfishing crisis. Commonly referred to as the tragedy of the commons (Hardin 1968), the need to curb overexploitation is at the forefront of the fisheries governance agenda, with fisheries privatization discussions having commenced as early as 1956 (Mansfield 2004b).

The institutional starting point of privatization depends on the fishery being looked at. Coastal fisheries that take place within exclusive economic zones (EEZ) frequently have histories of customary tenure and various forms of state regulation. These arrangements have increasingly made space for state-led privatizations especially through the introduction of individual transferable quotas (ITQ). With the drive toward privatization in fisheries, we now find an institutional repertoire on various scales and levels across the globe. This includes customary tenure mixed with state input regulations in the Global South (Bavinck et al. 2005, Basurto and Nenadovic 2012) and more codified arrangements in the Global North (Hilborn et al. 2015). The latter systems operate through vessel licenses and permits, total allowable catches (TACs), and ITQs; each instrument displaying different levels of privatization. For instance, in the case of TAC, which limits the total amount of fish that can be caught, governments give equal access of the available resources to a limited number of vessels, thus restricting newcomers. On the other hand, through ITQs, resources are individually assigned to a vessel or enterprise and can be bought/transferred through market-based governance systems (Høst 2015).

The main actors pushing for privatization usually include: (1) governing authorities including governments and regional organizations that control the fishing opportunities at multiscale levels (Sumaila 2010); (2) scientists who seek to overcome sustainability challenges through privatization schemes; (3) conservation organizations; and (4) private enterprises that expect to benefit from privatization. The political economy plays a central role in how privatization schemes are initiated and maintained (Mansfield 2004a). In many cases, such systems are initiated by the state with the aim of eliminating excess capacity and “increase the rate of profit by permitting the redeployment of proceeds from disinvestment to more profitable activities” (MacLachlan 1992:130). Thus, authorities strive to allocate resources to the most economically efficient cohorts within a system and to deter the race to fish, thus benefitting conservation.

Scholars have criticized ITQs for their distributive effects. In two special issues on neoliberalism and the politics of enclosure, Pinkerton and Davis (2015) and Pinkerton (2017) demonstrated how the problems of small-scale fishing fleets in the Global North originate from rationalization efforts that suffocate the survival chances of fishing communities. Family-run enterprises are constantly being displaced by corporations through processes of industrial structuration in an endeavor to make fishing sectors more competitive in the global marketplace (Walsh 2011); small-scale fleets are frequently dubbed as an anomaly to efficiency and an obstacle to capitalistic expansion (Sabau and de Jong 2015). Such policies, which legalize the process of what, following Harvey (2003), is termed accumulation by dispossession (Veuthey and Gerber 2012), create a path dependency of vested interests that is difficult to reverse. Not only are small-scale fishing communities suffering exclusion from the livelihood itself, they are also excluded from the decision-making systems that govern the fisheries (Gibbs 2009).

Space: the example of mariculture

Although territorial use rights have a long history (Johannes 1978), the allocation of private rights to a particular space in the ocean is a rather recent phenomenon. However, in certain regions,

it is happening at such a rapid and uncontrolled pace that many authors are referring to the phenomenon as ocean or coastal grabbing (Franco et al. 2014, Bennett et al. 2015, Bavinck et al. 2017, Hadjimichael 2018). The privatization of ocean space is usually linked to the rise of new economic sectors with specific spatial requirements. Examples include off-shore wind parks, the coastal tourism industry, deep sea mining, or intensive mariculture; each of which makes more or less exclusive demands on available space. Mariculture is, in many parts of the world, the most prominent expression of the privatization of ocean space and fits into our focus on marine life.

The main driver of the privatization of marine space for mariculture is probably the aim to secure rents of investments. The privatization of marine space gives a higher control over both the production process and the use of the marine space (Ertör and Ortega-Cerdà 2017).

The main actors pushing for the privatization of marine space are private enterprises, which can and are investing heavily in the new mode of production. Bigger companies are better positioned to push for the privatization of marine space because they possess the political and economic power to influence government decisions as well as to make the production more profitable through vertical integration (Ertör and Ortega-Cerdà 2019). From a state perspective, helping mariculture to emerge by providing secure property rights might be a favorable strategy because the sector helps to create jobs and livelihoods. However, fisher organizations, communities, NGOs, local administrations, and researchers complain because there are clear conflicts of interest (Hadjimichael et al. 2014, Ertör and Ortega-Cerdà 2015). This links to the effects of privatization of ocean space on decision-making and democracy.

The institutional starting point is usually the state's allocation of marine zones for mariculture and their leasing for specific periods of time. Thus, marine spaces, which were under state jurisdictions, but have often been used under open access property regimes, are converted into private property regimes. In this institutional setting, even though property rights are often not allocated in perpetuity, aquaculture companies are given exclusive use rights for 10 to 50 years (FAO 2010, 2018, European Union 2016). Within the period of tenure, mariculture frequently creates environmental change through increases in sedimentation, eutrophication, and nutrient enrichment (Holmer et al. 2008, Perdikaris et al. 2016), as well as negative externalities for other users, and over time what might create problems of liability if combined with a leasing scheme. Institutional and socioeconomic path dependencies in the use of marine areas also result. Other users of the marine space are, under current conditions of intensive coastal use, often displaced. Regional economies adjust to new circumstances after such a long period of time.

Privatization of ocean space can lead to inequalities in the distribution of goods and bads (e.g., pollution; resources with negative values), risks and benefits (Huong and Berkes 2011, Galappaththi and Nayak 2017). Mariculture often results in the exclusion of fishers from their fishing grounds (Said et al. 2017). Nonmariculture users are often affected by the externalities of production caused by fish feed or chemicals including antibiotics resulting in pollution (Ertör and Ortega-Cerdà 2015). Moreover, sicknesses that farmed fish and escapees might have incorporate

a certain degree of risk to all sharing the interconnected marine space. These effects are particularly strong in the marine realm because of the fluidity of water.

Although in many places a public consultation is required for the privatization of a marine space, such consultations do not always reflect participative and democratic decision-making processes. Different levels of power of influence, access to information and knowledge, and organization capacities have to be considered (Hadjimichael et al. 2014, Ertör and Ortega-Cerdà 2015). Mariculture and the necessarily linked form of privatization sometimes bring about benefits, however, because of the characteristics of the sea and the particular production process looked at, precaution is appropriate. In view of manifold complicating factors, careful trade-offs need to be made.

Knowledge: the example of marine patents

The importance of knowledge rights is amplifying in the marine realm. With increasing investments in ocean research, the demands for securing those investments (and creating the initial incentives to invest) is rising (Arrieta et al. 2010). Knowledge has thus become important relative to production processes (e.g., in aquaculture or deep-sea mining), data (e.g., about vessels, fish stocks, currents, or winds), and new organisms, whose rents from discovery can be secured with the help of patents. Because the number of marine patents is increasing exponentially (Blasiak et al. 2018), it must be considered.

Patents, in general, help to secure the investments of companies in search of new market opportunities, providing the motivation to establish such rights. Therefore, big corporations, that already have the necessary technology and want to get the right to potentially valuable innovations, are generally the actors driving knowledge privatization in the marine field. Blasiak and coauthors (2018) have calculated that a single corporation (BASF) has registered 47% of all marine sequences included in global gene patents, and that this exceeds the share of the 220 other companies jointly owning 37% of the patents. Universities and their commercialization partners own the remainder. Striking is the fact that 98% of all patented sequences have been registered by companies from only 10 countries, all belonging to the Global North (Blasiak et al. 2018). This concentration of patents is linked to the materiality of the ocean realm and the fact that only few companies can meet the technological preconditions necessary for operating therein.

If patents are granted for new knowledge (e.g., a gene sequence), then the institutional starting point is open access or the public domain. Patenting of marine organisms is not much different from that of other living matter. Therefore, an institutional repertoire is broadly available. However, this brings controversial path dependencies. After all, although public opinion tends to accept patents and copyrights on music and film, as well as on technological innovations, it is different with patents on forms of life, with patenting of the human genome, and of seeds dominating the debate (Ossorio 2007). As one author has argued: “biotechnology” [...] “has made it possible to colonize and control that which is autonomous, free and self-regenerative” (Shiva 1994:154). The ethical debates on such patenting persist and carry over into the marine domain.

Because the values that are to be created by marine genetic resources (MGR) have in most cases not yet materialized,

distributive issues are speculative, but do deserve attention. An important difference in patenting of MGRs with that of other forms of life such as seed material lies in their inconspicuousness. Marine biotechnology corporations make a hidden form of life available to the public. There is usually no traditional knowledge associated with them; as a result, the issue of access becomes an issue only when a product hits the market.

Even if access and benefit sharing agreements are implemented, there are further distributive issues to consider, such as what has been described as underuse in an anticommons (Heller 2013). In this setting, an individual or corporation holding a strategic property right can impede others from using a valuable resource. This can block the production of new, potentially important medicinal products or the development of cheaper alternatives.

As noted, there are huge knowledge asymmetries and concentrations of rights in relation to MGR, but also many fields in which consensus over such rights is lacking. This underlines the importance of facilitating inclusive mechanisms of decision making and democracy.

Governance: the example of certification

The motivations and drivers for private governance are typically formulated in response to state failures to achieve societal goals (Cashore et al. 2005, Auld and Gulbrandsen 2010, Foley and McCay 2014). State insufficiencies leave an institutional void, in which private actors can set new institutional rules, either driven by market demands, the need for transboundary regulation, the procurement of financing/capacity, or required increases in efficiency. Two important mechanisms of emerging privatization can be identified. Either (1) where the state or society believes private actors are more efficient in governing resources or entire ecosystems and therefore hands over certain governance rights, like the management of an MPA, fish stock, or oil reserve, to different private actors and (2) where private actors create new and previously nonexistent institutions such as certification schemes. As the latter has largely influenced the fishery sector and fish markets, we use it to exemplify how privatized governance emerges in this sector.

In fisheries, it has been argued that state governments have largely failed to provide functional institutional solutions for sustainable fisheries (Wilson 2010, Pauly and Zeller 2016). The materiality of the sea (e.g., species mobility, fluidity) creates intergovernmental difficulties for regulation. Building legitimacy within the public (i.e., trusted and sufficient procedures) can be difficult when efficiency or institutional transparency is lacking (i.e., urgent or unclear responses; Gupta 2008, Auld and Gulbrandsen 2010, Wilson 2010). Meanwhile, consumer demand for sustainable seafood products has increased (Sampson et al. 2015, Bush and Roheim 2019). Within this space lies an institutional void, the starting point for private organizations to procure investments and to develop institutional capacity for alternative governance solutions to supplement governance efforts by states.

There are various certification schemes, but the largest is the Marine Stewardship Council (MSC). Therefore, our analysis basically draws on it. It is a pertinent example of an organization filling the void with an institutional repertoire, mainly copied and adapted from the Forest Stewardship Council. It started through a partnership between a major civil society actor, the World Wide Fund for Nature (WWF; an environmental nongovernmental

organization) and the Unilever company (private corporation). The attributes of property rights established by MSC to fill the void are collective choice and operational rules for certifying (i.e., governing) fisheries that volunteer to participate. Market mechanisms are used to incentivize linkages between fisheries and consumers through supply chains, e.g., price incentives or overall market access for fishers on the supply side and a diversified product, which now also entails, in the case of the MSC, some ecological standards moving beyond state regulations and therefore adds a value to the product for certain consumers.

Institutional voids are opportunities for certification schemes to emerge as private forms of governance. Gupta (2008) and Auld and Gulbrandsen (2014) have referred to certification schemes as governance by disclosure. Although what is disclosed is often only the label itself; for further information, consumers must search, imagine, or trust what it means. Further examples include the Aquaculture Stewardship Council, Fair Trade, ethical, or organic certification schemes. Whether or not certification schemes are actually moving society toward sustainability is an open question (Jacquet et al. 2010), requiring further examination into the procedural and distributive effects as well as path dependencies and effects on democratic decision making (Partelow et al. 2019).

Privatized ocean governance, even when framed as an institutional solution to social problems, requires critical analysis insofar as it influences broader notions of sustainability (Partelow et al. 2019). Path dependencies, in which past governance largely sets deterministic properties on future governance, and the costs of maintaining the path are lower than changing, need to be considered. Private, not state actors, build required capacity to govern important sustainability issues.

Ultimately, privatization removes decision-making rights from the public domain, a move away from traditional Western/Northern conceptualizations of democratic processes, but also a move toward Western/Northern market-based solutions that incentivize individuals and groups to more effectively provide goods and services. When decision-making rights are exclusively held by a well-known and trusted environmental NGO, public opinion may remain favorable, but if it's a large corporation taking control, opinions may diverge.

The distributive effects of private decision making may not align with all societal goals. For example, market driven certification schemes put the power to choose sustainability on the market. Consumers can pay for more sustainable products if they want, or if they can afford it (Partelow et al. 2019). Certification also raises costs for producers. In fisheries, only large-scale operations can afford certification processes or have the administrative capacity. Small-scale fisheries, ~50% of the global catch and ~90% of fishing livelihoods (Kurien 2015), can usually not participate and are thus disadvantaged in terms of price premiums and market access, although ironically they are often seen as performing more sustainably in ecological, economic, and social terms (Smith and Basurto 2019).

COMPARING DIVERSITIES OF PRIVATIZATION

How do the four examples of privatization discussed differ from each other according to the nine criteria (see Table 2)? And how does the present set of criteria help us get a holistic frame to scrutinize privatization processes? Motivations and drivers and

actors (criteria 1 and 2) pushing for privatization appear to be closely interlinked. For fisheries, the main challenge to overcome is the problem of overexploitation. This means that privatization is brought forward to solve the sustainability challenge, though as exemplified above, powerful actors make use of the privatization process to exclude others from the use of the resources. For mariculture, we established that the main driver for privatization is to secure investments of private actors. Securing these rights obviously requires the state as an important ally. The patenting of marine organisms is strongly motivated by private actors, so that they can secure potential rents from their investments. It must be noted, however, that governmental agencies with blue growth ambitions frequently strive to facilitate private initiatives. In the case of certification, it is, on the one hand, civil society actors, who realized that states are not able to address certain sustainability challenges and, on the other hand, private actors, who have seen the potential of earning money through product differentiation.

Materiality (criterion 3) plays an important role in each of the cases. Because of the roaming nature of marine life, in fisheries ITQs do not privatize the fish themselves, as is the case in mariculture, but just the right to withdraw a certain quantity thereof, with all the implications this might have for stock maintenance and provisioning (Bromley 2016). Transferability of rights, as is the case with ITQs, is said to help allocate rights to the most economically efficient producer; however, it also allows for speculation to take place. Privatizing marine space is more difficult than on land because of its three dimensionality and the fluidity of water. It leads to strong effects on other parties, might it be due to external effects from pollution or due to exclusion of actors, who followed other activities in the same or a closely connected space prior to privatization. We concluded that patents on ocean organisms are largely concentrated in a few hands. This is mainly because of the substantial material and technological conditions required to be able to acquire such knowledge. The emergence of certification occurs because of the international nature of seafood value chains and the failure of governments to regulate those in a sustainable manner. It remains to be seen if market parties are more successful in securing sustainability than governmental action (Costanza 1999).

The institutional starting point (criterion 4) for open ocean capture fisheries was recently or still is open access. For many coastal fisheries, privatization often means getting into conflict with precepts of customary law (Bavinck 2005, Cinner 2005). This is different from rules emerging in mariculture. Those rights are emerging in a highly dynamic and competitive market, in which powerful actors look to secure big investments. Often the private rights emerging in the marine realm differ from those on land because only property licenses for a particular time period are issued. The latter might be of economic advantage to the proprietor because aquaculture might leave behind a degraded environment. Once the period of the license has ended, the damage then needs to be taken care of by society. Privatizing ocean knowledge through patents is very similar to privatizing any knowledge; from this perspective no new institutions are required. The emergence of private certification for governance happened because of societal sustainability ambitions on the one hand, and an institutional void on the other. There was a need for regulation, and this void was filled by private actors.

Table 2. Comparison of ocean privatizations according to the nine criteria.

Fishing	Mariculture	Patents	Certification
(1) Motivations and drivers Overexploiting, excludability, and rivalry problem, appropriation problem resource	Securing investments, exclusive access, blue growth	Creating new products, incentivizing innovation, creating market advantage/niche	Inability of state, efficiency/privatization from state activity, mobility of resources beyond borders, governance void
(2) Main pushing actors and their power State initiated	Investors and state	Private and state	Private
(3) Materiality, the physical and ecological characteristics, and function Mobility, individual resource units easily identified	Three dimensions, fluidity leads to external effects	Investment needed/difficult to access or do	Solutions due to multinational and/or multiple ecosystems
(4) Institutional starting point Open access, customary tenure, state regulation	State, open access, or common property	Open access	Institutional void
(5) Attributes of property rights to be privatized Access withdrawal	Access, management, exclusion	Use right of unknown, potential future uses and values	Agenda setting, operational and collective choice rules
(6) Institutional repertoire 40 years of experience	Hardly done before in the marine realm, but very developed on land	General intellectual property rights, well elaborated but new in marine realm	Recent solution; copy of other certification scheme
(7) Path dependencies Access predominantly based on historical records	Clustering effects, building on other licensing schemes	Similar than in nonmarine fields	Moving from private governance back to state governance difficult
(8) Distributive effects Often excludes the most needed from resource use	Exclusion of other users of the space, risks affect more vulnerable	Key knowledge which allows for high profits	Pay-to-play incentive schemes, purchasing power as “voting”
(9) Effects on decision making and democracy Rights taken away from customary level, state and lobbyists decide	Powerful investors exclude other actors from decision making	Concentration of rights in very few hands	Nondemocratic, often run by markets or interest groups

The attributes (criterion 5) privatized are different in the four examples given. Fishing quotas are giving the right to access and withdraw a resource to those holding a quota. If it is a tradable quota, one has the right to sell it. For mariculture, the right to access and use a space is privatized, excluding others from any rights to this marine area. The management right of the area is given to a private owner. In many places, the owner still has the right to add as much feed, excrement, or antibiotics to the environment as wished, despite the potential current or long-term effects to others. In other places, more regulations of the private right have already evolved. For patents, the future use and value of the privatized knowledge is not yet clear. The privatized attributes might block future developments in the sense of an anticommons (Buchanan and Yoon 2000). Privatization of governance transfers different attributes into private hands. The certifier determines what sustainability means and how it is measured; from this perspective, the operational rules are privatized. Also, the rules on how to set the rules, so the collective choice rules are in the hands of the private certifier.

Privatization of fish now draws on several decades of experience and an extended institutional repertoire (criterion 6) on how rights can be distributed, traded, etc. This is different for mariculture because this is a relatively new phenomenon in marine space, and the effects of any institution are not yet well understood. Patents are a well elaborated field but there exists little experience in the marine realm. Governance privatization through certification is also a recent phenomenon. However,

private governance, as certification, has emerged in many sectors of the economy, allowing for the sharing of institutional blueprints.

Path dependencies (criterion 7) in fisheries often arise when distributing quotas to users. They often build on historical catches and therewith maintain a certain category of actors in the field. In mariculture, there is a clustering effect; an area, which is devoted to aquaculture tends to attract more production. Patents on ocean knowledge follow the same path as any other patents on natural resources and might have the same shortcomings, e.g., seed patents. However, patents on marine organisms usually do not conflict with traditional uses. New certification institutions build on other licensing schemes and might therefore be path dependent. If private actors enter the business to govern, they create organizations and structures and it is hard to imagine that they would easily hand this over, for example, to a supranational organization. However, if states came up with rules as strict as the certification schemes, or if no one would be willing to pay the premium anymore for the certification process, then the private governor would become obsolete.

Negative distributive effects (criterion 8) are most obvious in relation to fishing and mariculture. Privatization of access to fish resources and marine space tends to deprive those with the lowest financial means and sometimes the greater livelihood needs. It also tends to concentrate property rights in a few hands. Mariculture often brings high risks, which society's more

vulnerable are less able to cope with. Patents might give certain right holders a positional power, which allows them to earn much higher profit margins. Certification schemes are often costly, which small and poor fisheries often cannot afford. This excludes them from certain high-end markets. Certification also means that only people with purchasing power can consume sustainably.

Fishing quotas often transfer decision-making rights (criterion 9) from fisher kitchen tables and community halls to corporate meeting rooms and the offices of scientists and policymakers often located at a distance from the fishing activity. Mariculture is an important investment, which creates a strong vested interest of the investors to shape the institutions in the desired direction. Patents of marine organisms are in the hands of very few actors because of substantial knowledge asymmetries. Those knowledge asymmetries might have substantial implications on how rules are set. How can one decide on rules, if much is not understood? The privatization of governance through certification transfers the most fundamental right of the collective into the private domain, the right to govern. Whether the certifier applies more democratic collective choice rules than the state or any community previously, is at the discretion of the private certifier.

CONCLUSION

We commenced by observing that oceanic privatization processes, in the sense of defining more exclusive property rights, are pervasive yet underexposed in the academic literature. Our purpose has therefore been to identify criteria that could serve as building blocks for assessing the phenomenon.

We first examined the special features of marine environments and the possible implications for processes of privatization. We noted three aspects that are particularly pronounced in the oceanic realm: (1) the fluidity of oceans and their four-dimensional nature, which create other patterns of interdependency between users; (2) the size and fluidity of marine ecosystems lead most often, first, to intersections and overlaps of socio-legal boundaries, and second, to time delays until the moment that interdependencies or externalities of (private) activities are observed; and (3) the accelerated pace of human colonization and therewith privatization, which give less time for appropriate institutional structures to emerge. These aspects affect the privatization process in multiple ways, but largely convey a need for precaution.

We presented a set of nine criteria, which allow for the assessment of marine privatization in a systematic and more holistic way. The criteria stem from a combination of social science disciplines. As a proof of concept, we applied these criteria to prominent examples of the four analytical domains, limiting ourselves to the realm of marine life.

The discussion has shown that privatization processes have advantages and challenges in very different domains. Some might bring a significant benefit in terms of ecology, but might come at a huge social cost; for others, it might be the other way around. Some might altogether have dire consequences and therefore, should be either avoided or made conditional on substantial institutional innovation. Others might be beneficial in relation to most of the criteria mentioned. Whatever the case may be, the assessment of privatization processes should be comprehensive and thorough, with the viewpoints of multiple stakeholders

considered and through a detailed understanding of the interlinked dimensions.

A final comment on the desirability of privatization is in order. To obtain a complete picture and to analytically uncover all advantages and disadvantages of a process of change of property rights in the marine realm, it seems appropriate to move toward careful analysis of multiple dimensions stemming from a broad range of perspectives. Therefore, we have argued that it is worthwhile to diagnose such processes by means of a comprehensive set of criteria. The interdisciplinary effort made, constituted an attempt to surmount the impasse that privatization discussions have had in the literature, either seeing privatization as salvation or condemning it. Next steps could develop this set of criteria further into a proper framework that allows for the systematic analysis of privatization processes. A framework could serve as a tool to create more system understanding, to help society assess processes of privatization from a value perspective, and to understand ways of moving toward a desired configuration of property rights.

Responses to this article can be read online at:

<http://www.ecologyandsociety.org/issues/responses.php/11772>

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Data Availability Statement:

As an insight paper the relevant data on which the paper builds are literature, which is properly cited according to good scientific practices.

LITERATURE CITED

- Acheson, J., S. Apollonio, and J. Wilson. 2015. Individual transferable quotas and conservation: a critical assessment. *Ecology and Society* 20(4):7. <https://doi.org/10.5751/ES-07912-200407>
- Alston, L. J., G. D. Libecap, and B. Mueller. 1999. *Titles, conflict and land use: the development of property rights and land reform on the Brazilian Amazon frontier*. University of Michigan Press, Ann Arbor, Michigan, USA. <https://doi.org/10.3998/mpub.16208>
- Anderson, T., R. Arnason, and G. D. Libecap. 2011. Efficiency advantages of grandfathering in rights-based fisheries management. *Annual Review of Resource Economics* 3 (1):159-179. <https://doi.org/10.3386/w16519>

- Arbo, P., M. Knol, S. Linke, and K. St. Martin. 2018. The transformation of the oceans and the future of marine social science. *Maritime Studies* 17(3):295-304. <https://doi.org/10.1007/s40152-018-0117-5>
- Arnason, R. 2012. Property rights in fisheries: how much can individual transferable quotas accomplish? *Review of Environmental Economics and Policy* 6(2):217-236. <https://doi.org/10.1093/reep/res011>
- Arrieta, J. M., S. Arnaud-Haond, and C. M. Duarte. 2010. What lies underneath: conserving the oceans' genetic resources. *Proceedings of the National Academy of Sciences* 107(43):18318-18324. <https://doi.org/10.1073/pnas.0911897107>
- Auld, G., and L. H. Gulbrandsen. 2010. Transparency in nonstate certification: consequences for accountability and legitimacy. *Global Environmental Politics* 10(3):97-119. https://doi.org/10.1162/GLEP_a_00016
- Auld, G., and L. H. Gulbrandsen. 2014. Learning through disclosure: the evolving importance of transparency in the practice of nonstate certification. Pages 271-296 in A. Gupta and M. Mason, editors. *Transparency in global environmental governance: critical perspectives*. MIT Press, Cambridge, Massachusetts, USA. <https://doi.org/10.7551/mitpress/9780262-027410.003.0012>
- Barbesgaard, M. 2018. Blue growth: savior or ocean grabbing? *Journal of Peasant Studies* 45(1):130-149. <https://doi.org/10.1080/03066150.2017.1377186>
- Basurto, X., and M. Nenadovic. 2012. A systematic approach to studying fisheries governance. *Global Policy* 3(2):222-230. <https://doi.org/10.1111/j.1758-5899.2011.00094.x>
- Bavinck, M. 2005. Understanding fisheries conflicts in the south - a legal pluralist perspective. *Society and Natural Resources* 18(9):805-820. <https://doi.org/10.1080/08941920500205491>
- Bavinck, M., F. Berkes, A. Charles, A. C. E. Dias, N. Doubleday, P. Nayak, and M. Sowman. 2017. The impact of coastal grabbing on community conservation - a global reconnaissance. *Maritime Studies* 16(1):8. <https://doi.org/10.1186/s40152-017-0062-8>
- Bavinck, M., R. Chuenpagdee, M. Diallo, P. Van Der Heijden, J. Kooiman, R. Mahon, and S. Williams. 2005. *Interactive governance for fisheries: a guide to better practice*. Eburon, Utrecht, The Netherlands.
- Bavinck, M., S. Jentoft, and J. Scholtens. 2018. Fisheries as social struggle: a reinvigorated social science research agenda. *Marine Policy* 94:46-52. <https://doi.org/10.1016/j.marpol.2018.04.026>
- Bennett, N. J., H. Govan, and T. Satterfield. 2015. Ocean grabbing. *Marine Policy* 57:61-68. <https://doi.org/10.1016/j.marpol.2015.03.026>
- Blasiak, R., J.-B. Jouffray, C. C. C. Wabnitz, E. Sundström, and H. Österblom. 2018. Corporate control and global governance of marine genetic resources. *Science Advances* 4(6):eaar5237. <https://doi.org/10.1126/sciadv.aar5237>
- Bromley, D. W. 1991. *Environment and economy: property rights and public policy*. Blackwell, Oxford, UK.
- Bromley, D. W. 2016. Rights-based fisheries and contested claims of ownership: some necessary clarifications. *Marine Policy* 72:231-236. <https://doi.org/10.1016/j.marpol.2016.07.002>
- Buchanan, J. M., and Y. J. Yoon. 2000. Symmetric tragedies: commons and anticommons. *Journal of Law and Economics* XLIII:1-13. [online] URL: <http://econ.ucsb.edu/~tedb/Courses/Ec100C/Readings/BuchananYoon.pdf>
- Bush, S. R., and C. A. Roheim. 2019. The shifting politics of sustainable seafood consumerism. Page 331 in M. Boström, M. Micheletti, and P. Oosterveer, editors. *Oxford handbook of political consumerism*. Oxford University Press, Oxford, UK. <https://doi.org/10.1093/oxfordhb/9780190629038.013.16>
- Carothers, C. 2010. Tragedy of commodification: displacements in Alutiiq fishing communities in the Gulf of Alaska. *Mast* 9(2):95-120. [online] URL: https://pdfs.semanticscholar.org/677e/99cb8db9ec5be99c1bf299696b6ac4c32812.pdf?_ga=2.219924252.442914004.1598373220-662601544.1598373220
- Cashore, B., G. C. van Kooten, I. Vertinsky, G. Auld, and J. Affolderbach. 2005. Private or self-regulation? A comparative study of forest certification choices in Canada, the United States and Germany. *Forest Policy and Economics* 7(1):53-69. [https://doi.org/10.1016/S1389-9341\(03\)00011-X](https://doi.org/10.1016/S1389-9341(03)00011-X)
- Cinner, J. 2005. Socioeconomic factors influencing customary marine tenure in the Indo-Pacific. *Ecology and Society* 10(1):36. <https://doi.org/10.5751/ES-01364-100136>
- Costanza, R. 1999. The ecological, economic, and social importance of the oceans. *Ecological Economics* 31(2):199-213. [https://doi.org/10.1016/S0921-8009\(99\)00079-8](https://doi.org/10.1016/S0921-8009(99)00079-8)
- Costello, C., S. D. Gaines, and J. Lynham. 2008. Can catch shares prevent fisheries collapse? *Science* 321(5896):1678-1681. <https://doi.org/10.1126/science.1159478>
- Craig, R. K., and J. B. Ruhl. 2010. Governing for sustainable coasts: complexity, climate change, and coastal ecosystem protection. *Sustainability* 2(5):1361-1388. <https://doi.org/10.3390/su2051361>
- Deluca, D. 2005. One for me and one for you: an analysis of the initial allocation of fishing quotas. *N. Y. U. Environmental Law Journal* 13:723-768.
- Demsetz, H. 1967. Toward a theory of property rights. *American Economic Review* 57(2):347-359. [online] URL: https://econ.ucsb.edu/~tedb/Courses/Ec100C/Readings/Demsetz_Property_Rights.pdf
- Eggertsson, T. 1990. *Economic behavior and institutions*. Cambridge University Press, Cambridge, UK. <https://doi.org/10.1017/CBO9780511609404>
- Ensminger, J. 1996. *Making a market; the institutional transformation of an African society*. Cambridge University Press, Cambridge, UK.
- Ertör, I., and M. Ortega-Cerdà. 2015. Political lessons from early warnings: marine finfish aquaculture conflicts in Europe. *Marine Policy* 51:202-210. <https://doi.org/10.1016/j.marpol.2014.07.018>

- Ertör, I., and M. Ortega-Cerdà. 2017. Unpacking the objectives and assumptions underpinning European aquaculture. *Environmental Politics* 26(5):893-914. <https://doi.org/10.1080/09644016.2017.1306908>
- Ertör, I., and M. Ortega-Cerdà. 2019. The expansion of intensive marine aquaculture in Turkey: the next-to-last commodity frontier? *Journal of Agrarian Change* 19(2):337-360. <https://doi.org/10.1111/joac.12283>
- European Union. 2016. *Aquaculture in the EU: tapping into blue growth*. European Union, Brussels, Belgium. https://ec.europa.eu/fisheries/sites/fisheries/files/2016-aquaculture-in-the-eu_en.pdf
- Foley, P., and B. McCay. 2014. Certifying the commons: eco-certification, privatization, and collective action. *Ecology and Society* 19(2):28. <https://doi.org/10.5751/ES-06459-190228>
- Food and Agriculture Organization of the United Nations (FAO). 2010. *National aquaculture legislation overview Spain*. Food and Agriculture Organization of the United Nations, Rome, Italy. [online] URL: http://www.fao.org/fishery/legalframework/nalo_spain/en
- Food and Agriculture Organization of the United Nations (FAO). 2018. *National aquaculture legislation overview Viet Nam*. Food and Agriculture Organization of the United Nations, Rome, Italy. [online] URL: http://www.fao.org/fishery/legalframework/nalo_vietnam/en
- Franco, J., N. Buxton, P. Vervest, T. Feodoroff, C. Pedersen, R. Reuter, and M. C. Barbesgaard. 2014. *The global ocean grab: a primer*. Economic Justice Program of the Transnational Institute, Amsterdam, The Netherlands. https://www.tni.org/files/download/the_global_ocean_grab.pdf
- Galappaththi, E. K., and P. K. Nayak. 2017. Two faces of shrimp aquaculture: commonising vs. decommonising effects of a wicked driver. *Maritime Studies* 16(1):12. <https://doi.org/10.1186/s40152-017-0066-4>
- Gibbs, M. T. 2009. Resilience: what is it and what does it mean for marine policymakers? *Marine Policy* 33(2):322-331. <https://doi.org/10.1016/j.marpol.2008.08.001>
- Gupta, A. 2008. Transparency under scrutiny: information disclosure in global environmental governance. *Global Environmental Politics* 8(2):1-7. <https://doi.org/10.1162/glep.2008.8.2.1>
- Hadjimichael, M. 2018. The stealing of the seashore as a second wave of the enclosure movement: examples from the Mediterranean. *Ocean and Coastal Management* 162:151-157. <https://doi.org/10.1016/j.ocecoaman.2018.01.019>
- Hadjimichael, M., A. Bruggeman, and M. A. Lange. 2014. Tragedy of the few? A political ecology perspective of the right to the sea: the Cyprus marine aquaculture sector. *Marine Policy* 49:12-19. <https://doi.org/10.1016/j.marpol.2014.04.003>
- Hannesson, R. 2004. *The privatization of the oceans*. MIT Press, Cambridge, Massachusetts, USA.
- Hardin, R. 1968. The tragedy of the commons. *Science* 162:1243-1248.
- Harvey, D. 2003. The new imperialism: accumulation by dispossession. *Socialist Register* 40. [online] URL: <https://socialistregister.com/index.php/srv/article/view/5811>
- Heller, M. 2013. The tragedy of the anticommons: a concise introduction and lexicon. *Modern Law Review* 76(1):6-25. [online] URL: https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=2779&context=faculty_scholarship
- Hilborn, R., E. A. Fulton, B. S. Green, K. Hartmann, S. R. Tracey, and R. A. Watson. 2015. When is a fishery sustainable? *Canadian Journal of Fisheries and Aquatic Sciences* 72(9):1433-1441. <https://doi.org/10.1139/cjfas-2015-0062>
- Himes-Cornell, A., and K. Hoelting. 2015. Resilience strategies in the face of short- and long-term change: out-migration and fisheries regulation in Alaskan fishing communities. *Ecology and Society* 20(2):9. <https://doi.org/10.5751/ES-07074-200209>
- Holmer, M., M. Argyrou, T. Dalsgaard, R. Danovaro, E. Diaz-Almela, C. M. Duarte, M. Frederiksen, A. Grau, I. Karakassis, N. Marbà, S. Mirto, M. Pérez, A. Pusceddu, and M. Tsapakis. 2008. Effects of fish farm waste on *Posidonia oceanica* meadows: synthesis and provision of monitoring and management tools. *Marine Pollution Bulletin* 56(9):1618-1629. <https://doi.org/10.1016/j.marpolbul.2008.05.020>
- Høst, J. 2015. Governing through markets: societal objectives, private property rights and small-scale fisheries in Denmark. Pages 319-336 in S. Jentoft and R. Chuenpagdee, editors. *Interactive governance for small-scale fisheries: global reflections*. Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-319-17034-3_17
- Huong, T. T. T., and F. Berkes. 2011. Diversity of resource use and property rights in Tam Giang Lagoon, Vietnam. *International Journal of the Commons* 5(1):130-149. <https://doi.org/10.18352/ijc.236>
- Jacquet, J., D. Pauly, D. Ainley, S. Holt, P. Dayton, and J. Jackson. 2010. Seafood stewardship in crisis. *Nature* 467(7311):28-29. <https://doi.org/10.1038/467028a>
- Jentoft, S. 2011. Legal pluralism and the governability of fisheries and coastal systems. *Journal of Legal Pluralism and Unofficial Law* 43(64):149-172. <https://doi.org/10.1080/07329113.2011.10756673>
- Johannes, R. E. 1978. Traditional marine conservation methods in Oceania and their demise. *Annual Review of Ecology and Systematics* 9(1):349-364. <https://doi.org/10.1146/annurev.es.09.110178.002025>
- Knight, J., and J. Johnson. 2007. The priority of democracy: a pragmatist approach to political-economic institutions and the burden of justification. *American Political Science Review* 101(1):47-61. <https://doi.org/10.1017/S0003055407070062>
- Knott, C., and B. Neis. 2017. Privatization, financialization and ocean grabbing in New Brunswick herring fisheries and salmon aquaculture. *Marine Policy* 80:10-18. <https://doi.org/10.1016/j.marpol.2016.10.022>
- Kokorsch, M., and K. Benediktsson. 2018. Prosper or perish? The development of Icelandic fishing villages after the privatisation of fishing rights. *Maritime Studies* 17(1):69-83. <https://doi.org/10.1007/s40152-018-0089-5>
- Kompas, T., and T. N. Che. 2005. Efficiency gains and cost reductions from individual transferable quotas: a stochastic cost frontier for the Australian south east fishery. *Journal of*

- Productivity Analysis* 23(3):285-307. <https://doi.org/10.1007/s11123-005-2210-1>
- Kroodsma, D. A., J. Mayorga, T. Hochberg, N. A. Miller, K. Boerder, F. Ferretti, A. Wilson, B. Bergman, T. D. White, and B. A. Block. 2018. Tracking the global footprint of fisheries. *Science* 359(6378):904-908. <https://doi.org/10.1126/science.aao5646>
- Kurien, J. 2015. *Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication: summary*. International Collective in Support of Fishworkers, Food and Agriculture Organization of the United Nations, Rome, Italy. [online] URL: <http://www.fao.org/3/a-i4356en.pdf>
- Lebel, L. 2012. Governance and coastal boundaries in the tropics. *Current Opinion in Environmental Sustainability* 4(2):243-251. <http://doi.org/10.1016/j.cosust.2011.12.001>
- Maclachlan, I. 1992. Plant closure and market dynamics: competitive strategy and rationalization. *Economic Geography* 68(2):128-145. <https://doi.org/10.2307/144198>
- Mansfield, B. 2004b. Neoliberalism in the oceans: "rationalization," property rights, and the commons question. *Geoforum* 35(3):313-326. <https://doi.org/10.1016/j.geoforum.2003.05.002>
- Mansfield, B. 2004a. Rules of privatization: contradictions in neoliberal regulation of North Pacific fisheries. *Annals of the Association of American Geographers* 94(3):565-584. <https://doi.org/10.1111/j.1467-8306.2004.00414.x>
- Mccormack, F. 2017. *Private oceans: the enclosure and marketisation of the seas*. Pluto, London, UK.
- Menon, A., M. Sowman, and M. Bavinck. 2018. Rethinking capitalist transformation of fisheries in South Africa and India. *Ecology and Society* 23(4):27. <https://doi.org/10.5751/ES-10461-230427>
- Olson, J. 2011. Understanding and contextualizing social impacts from the privatization of fisheries: an overview. *Ocean and Coastal Management* 54(5):353-363. <https://doi.org/10.1016/j.ocecoaman.2011.02.002>
- Ossorio, P. N. 2007. The human genome as common heritage: common sense or legal nonsense? *Journal of Law, Medicine and Ethics* 35(3):425-439. <https://doi.org/10.1111/j.1748-720X.2007.00165.x>
- Ostrom, E. 1990. *Governing the commons: the evolution of institutions for collective action*. Cambridge University Press, Cambridge, UK.
- Paavola, J., and W. N. Adger. 2005. Institutional ecological economics. *Ecological economics* 53:353-368. <https://doi.org/10.1016/j.ecolecon.2004.09.017>
- Partelow, S., D. J. Abson, A. Schlüter, M. Fernández-Giménez, H. von Wehrden, and N. Collier. 2019. Privatizing the commons: new approaches need broader evaluative criteria for sustainability. *International Journal of the Commons* 13(1):747-776. <https://doi.org/10.18352/ijc.938>
- Pauly, D., D. Belhabib, R. Blomeyer, W. W. L. Cheung, A. M. Cisneros-Montemayor, D. Copeland, S. Harper, V. W. Y. Lam, Y. Mai, F. Le Manach, H. Österblom, K. M. Mok, L. van der Meer, A. Sanz, S. Shon, U. R. Sumaila, W. Swartz, R. Watson, Y. Zhai, and D. Zeller. 2014. China's distant-water fisheries in the 21st century. *Fish and Fisheries* 15(3):474-488. <https://doi.org/10.1111/faf.12032>
- Pauly, D., and D. Zeller. 2016. Catch reconstructions reveal that global marine fisheries catches are higher than reported and declining. *Nature Communications* 7:10244. <https://www.nature.com/articles/ncomms10244#supplementary-information> <https://doi.org/10.1038/ncomms10244>
- Perdikaris, C., A. Chrysafi, and K. Ganiats. 2016. Environmentally friendly practices and perceptions in aquaculture: a sectoral case-study from a Mediterranean-based industry. *Reviews in Fisheries Science and Aquaculture* 24(2):113-125. <https://doi.org/10.1080/23308249.2015.1112358>
- Pinkerton, E. 2017. Hegemony and resistance: disturbing patterns and hopeful signs in the impact of neoliberal policies on small-scale fisheries around the world. *Marine Policy* 80:1-9. <https://doi.org/10.1016/j.marpol.2016.11.012>
- Pinkerton, E., and R. Davis. 2015. Neoliberalism and the politics of enclosure in North American small-scale fisheries. *Marine Policy* 61:303-312. <https://doi.org/10.1016/j.marpol.2015.03.025>
- Pomeroy, C., M. Hall-Arber, and F. Conway. 2015. Power and perspective: fisheries and the ocean commons beset by demands of development. *Marine Policy* 61:339-346. <https://doi.org/10.1016/j.marpol.2014.11.016>
- Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. J. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. 2009. Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society* 14(2):32. <https://doi.org/10.5751/ES-03180-140232>
- Sabau, G., and M. V. Z. de Jong. 2015. From unjust uneconomic growth to sustainable fisheries in Newfoundland: the true costs of closing the inshore fishery for groundfish. *Marine Policy* 61:376-389. <https://doi.org/10.1016/j.marpol.2014.11.012>
- Said, A., D. MacMillan, M. Schembri, and J. Tzanopoulos. 2017. Fishing in a congested sea: what do marine protected areas imply for the future of the Maltese artisanal fleet? *Applied Geography* 87:245-255. <https://doi.org/10.1016/j.apgeog.2017.08.013>
- Sampson, G. S., J. N. Sanchirico, C. A. Roheim, S. R. Bush, J. E. Taylor, E. H. Allison, J. L. Anderson, N. C. Ban, R. Fujita, and S. Jupiter. 2015. Secure sustainable seafood from developing countries. *Science* 348(6234):504-506. <https://doi.org/10.1126/science.aaa4639>
- Schlager, E., and E. Ostrom. 1992. Property-rights regimes and natural resources: a conceptual analysis. *Land Economics* 68(3):249-262. <https://doi.org/10.2307/3146375>
- Schlüter, A., S. Partelow, L. E. Torres Guevara, and T. C. Jennerjahn. 2019. Coastal commons as social-ecological systems. In B. Hudson, J. Rosenbloom, and D. Cole, editors. *Handbook of the study of the commons*. Routledge, New York, New York, USA. <https://doi.org/10.4324/9781315162782-14>

- Schlüter, A., S. Wise, K. Schwerdtner Mánez, G. De Morais, and M. Glaser. 2013. Institutional change, sustainability and the sea. *Sustainability* 5(12):5373-5390. <https://doi.org/10.3390/su5125373>
- Shiva, V. 1994. The seed and the earth. Pages 128-143 in V. Shiva, editor. *Close to home: women reconnect ecology, health and development worldwide*. Earthscan, London, UK. <https://doi.org/10.4324/9781315070452-10>
- Smith, H., and X. Basurto. 2019. Defining small-scale fisheries and examining the role of science in shaping perceptions of who and what counts: a systematic review. *Frontiers in Marine Science* 6:236. <https://doi.org/10.3389/fmars.2019.00236>
- Steinberg, P., and K. Peters. 2015. Wet ontologies, fluid spaces: giving depth to volume through oceanic thinking. *Environment and Planning D: Society and Space* 33(2):247-264. <https://doi.org/10.1068/d14148p>
- Sumaila, U. R. 2010. A cautionary note on individual transferable quotas. *Ecology and Society* 15(3):36. <https://doi.org/10.5751/ES-03391-150336>
- Van Assche, K., R. Beunen, M. Duineveld, and M. Gruezmacher. 2017. Power/knowledge and natural resource management: foucaultian foundations in the analysis of adaptive governance. *Journal of Environmental Policy and Planning* 19(3):308-322. <https://doi.org/10.1080/1523908X.2017.1338560>
- Van Assche, K., A.-K. Hornidge, A. Schlüter, and N. Väidianu. 2020. Governance and the coastal condition: looking for new adaptation modes *Marine Policy* 112. <https://doi.org/10.1016/j.marpol.2019.01.002>
- van Tatenhove, J. P. M. 2017. Transboundary marine spatial planning: a reflexive marine governance experiment? *Journal of Environmental Policy and Planning* 19(6):783-794. <https://doi.org/10.1080/1523908x.2017.1292120>
- Veuthey, S., and J.-F. Gerber. 2012. Accumulation by dispossession in coastal Ecuador: Shrimp farming, local resistance and the gender structure of mobilizations. *Global Environmental Change* 22(3):611-622. <https://doi.org/10.1016/j.gloenvcha.2011.10.010>
- Vogt, J. M., G. B. Epstein, S. K. Mincey, B. C. Fischer, and P. Mccord. 2015. Putting the "E" in SES: unpacking the ecology in the Ostrom social-ecological system framework. *Ecology and Society* 20(1):55. <https://doi.org/10.5751/ES-07239-200155>
- Von Benda-Beckmann, F., K. Von Benda-Beckmann, and M. Wiber. 2006. *Changing properties of property*. Berghahn, New York, New York, USA.
- Walsh, D. 2011. What restructuring? Whose rationalization? Newfoundland and Labrador's memorandum of understanding on its fishing industry. Pages 81-97 in R. Chuenpagdee, editor. *World-small-scale fisheries: contemporary visions*. Eburon, Delft, The Netherlands.
- Whitmarsh, D. 2013. *Economic management of marine living resources: a practical introduction*. Routledge, New York, New York, USA. <https://doi.org/10.4324/9781849775502>
- Wilson, D. C. 2010. *The paradoxes of transparency science and the ecosystem approach to fisheries management in Europe*. Amsterdam University Press, Amsterdam, The Netherlands.
- Yang, X., A. Wilkes, Y. Yang, J. Xu, C. S. Geslani, X. Yang, F. Gao, J. Yang, and B. Robinson. 2009. Common and privatized: conditions for wise management of matsutake mushrooms in Northwest Yunnan province, China. *Ecology and Society* 14(2):30. <https://doi.org/10.5751/ES-03129-140230>