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RESOURCE GRABBING AND THE BLUE COMMONS

The Evolution of Institutions in Scallop Production in Sechura Bay, Peru

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Introduction

About 3.3 billion people rely on marine resources for their protein intake (FAO, 2020). Aquaculture provides an ever larger share of this supply. With an annual growth rate of 5.3% (for the period 2001–2018), world aquaculture production progressively overtakes that of the wild fisheries sector. For many countries, it contributes to food security and/or provides a valuable export commodity. Aquaculture is a sector on the rise. Aquaculture is a space-intensive activity, which hardly allows for any alternative activity in the area where it takes place (Schlüter et al., 2020). Therefore, its development very much pushes forward the enclosure of the sea. Particularly in coastal areas, where much of mariculture is currently taking place (Ertör and Ortega-Cerdà, 2019), it is in huge competition with other activities or uses which either might be economically more lucrative and often run by more powerful actors, like tourism or ship routes, or they might be, depending on the perspective, equally important, but having less economic potential when competing with mariculture, like small-scale fishing and mangrove conservation or use.

This chapter aims to embark on an analytical journey to understand the privatization process of the sea floor which has been taking place in the last thirty years in bottom scallop farming in Sechura Bay in Peru. Starting from an open access situation in the 1990s, it converted into a private property regime, with the concentration of more than 150 licences to operate in the hands of a few affluent actors. Such a process seems to represent a process of resource grabbing (Bavinck et al., 2017). Without doubt, it is a process of enclosure with important social and economic consequences. Due to the low intensity of scallop bottom culture – juvenile scallops are distributed on the sea floor and without additional feed grow to optimal harvesting size (i.e. to min. landing sizes of 65 mm shell height). What happened in Sechura when the sector emerged has been described as a gold rush (Kluger et al., 2019b), producing lucrative livelihoods to (poor and often migrant) fishers. Those fishers managed to get a law passed, which allowed only small-scale fishing associations to hold licences for space. However, over time the main production assets are informally in the hands of potential and big investors, including most of the licences. While analysing the case, we realized that the outcome

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of privatization in the hand of few affluent actors has a nuanced set of reasons, where an intensive, detailed case study analysis helps us to better understand grabbing in general, particularly in the marine field, and to recognise clear patterns, which can be found in many cases.

For analysing our case, we used two analytical tools, the Institutional Analysis and Development framework (IADF) (Ostrom, 2005, 2011) and the list of criteria for analysing privatization processes in the sea lately presented by Schlüter and colleagues (2020). The list of criteria for assessing privatization is used as a complement to the IADF, as it has been developed differently to the IADF with the specific aim of understanding privatization processes in the marine field. The list is an interdisciplinary endeavour of scholars, providing comprehensive assessment criteria.

For this, we first describe the two analytical tools and how we used and combined them. We then lay out the research method applied and present the results of our study: the observed changes of property rights to the sea space for bottom culture. After that, we aim to understand the observed process, using our analytical tools. We close the chapter with some conclusions.

The IADF and Marine Privatization

The IADF is a broadly used tool to structure and understand collective action problems and the institutions (in the sense of rules and norms) existing around them in relation to environmental resources (Ostrom, 2005, 2011). At its centre is the action situation in which "two or more individuals are faced with a set of potential actions that jointly produce outcomes" (Ostrom, 2005). The action situation is influenced by biophysical and socioeconomic conditions and the existing institutional arrangements. In this action situation, actors are interacting, learning, evaluating outcomes and will aim to improve their situation, which again leads to an altered action situation (see Figure 20.1).

The IADF has been used in sectors like forestry (Andersson, 2006; Sanches et al., 2020; Wilkes-Allemann et al., 2015), irrigation (Nigussie et al., 2018) and land tenure (Yang et al., 2020). For the marine realm, there are various applications (e.g. Beitl, 2011; Chadsey et al., 2012; Cole et al., 2019; Mathevet et al., 2018). Beitl (2011) uses the IADF with a social

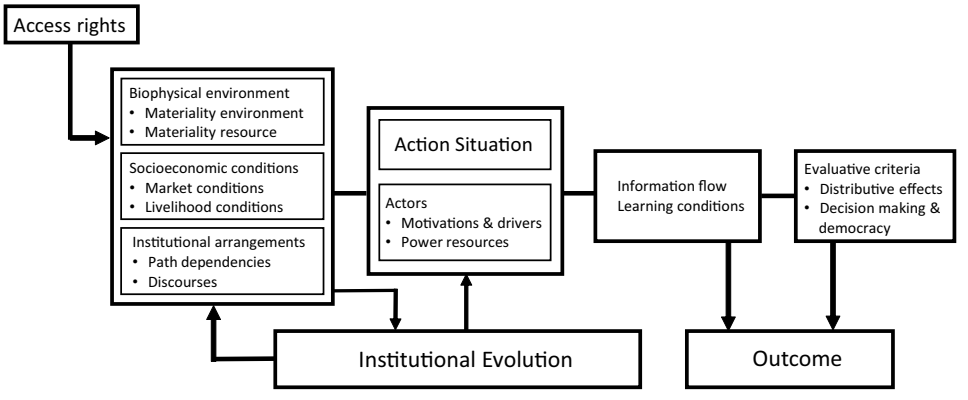

Figure 20.1 The adapted institutional and development framework.
(*Sources:* Ostrom, 2005; Schlüter et al., 2020) as used in this work.

ecological approach to analyse the sustainability of community concessions. Chadsey and colleagues (2012) use the IADF to analyse the emergence of a science society partnership for an early warning system of algal blooms. Mathevet and colleagues (2018), pointing out the importance of constructed realities, building an ontology with the help of IADF, analyse management regime shifts. Cole and colleagues (2019) combine the IADF with the Social-Ecological System Framework (SESF) (Ostrom, 2007) and exemplify this framework by describing, building on secondary data, the change of lobster fisheries in Maine. Like our study, they explain various historical phases of the fishery and how and why the system has evolved. Many applications used the tool to understand the configurations of actors, ecosystems, and institutions from a snapshot perspective (Clement, 2010; Nigussie et al., 2018). However, due to the cyclical nature of the framework, one can also find dynamic applications which aim to understand the evolution of institutions (Barton et al., 2017; Mathevet et al., 2018). Understanding the evolution of institutions in our case study is the aim of this paper.

The IADF was conceptualized by scholars who had/have a particular perspective on institutions (political economy, collective action). However, the framework as such does not yet use any theory (Ostrom, 2011; Schlager and Cox, 2018). Various theories and models can be incorporated to help us understand the observed phenomena (Ostrom, 2007). Various authors have criticized that issues of power, and, related to this, discourses have not been addressed in the framework (Brisbois et al., 2019; Clement, 2010; Whaley and Weatherhead, 2014). Therefore, Clement (2010) expanded the framework and added power and discourses as important aspects of the socio-economic conditions. Issues of power asymmetries are in circumstances of small-scale production often of utmost importance. As will be shown later, this also holds true for our case. Power issues are also emphasized in Schlüter and colleagues (2020). Following Clement (2010), power and discourses have been added as analytical categories (see Figure 20.1). Power is understood as the ability of an actor to impose in an action situation their will on another actor. It might be that the less powerful actor is coerced and has no other option than to act according to the will of the more powerful actor. However, in economic situations of exchange with asymmetric distribution of power, the powerful actor can alter the pay-off structure of the weaker actor so that it is in the best interest to "voluntarily" agree under the given circumstances, despite getting much less benefit than the powerful actor. Power over somebody else results from a different endowment of power resources between different actors (Knight, 1992). This has two implications. First, we need a broad understanding of power: it could result from material endowments, like the availability of capital; it could result from different options available or the possibility to simply wait (e.g., not being hungry) (Knight, 1992); it could be the result of (dominant) discourses in the society (Hajer and Versteeg, 2005), or resulting from symbolic power (Bourdieu, 1991), ingrained in culture and norms or other institutional properties of a society that lead to an asymmetric action space for the various actors. Second, different from Clement, we see power as a property of an actor. It only manifests in relation to another actor, who has a different endowment of power resources. Therefore, we see it as a property of an actor and not as a socio-economic condition. Discourses exist in the social realm and might only be used by certain actors as a power resource. However, they are not a property of an actor. Therefore, we follow Clement by making them a part of the institutional arrangements.

Most often, the IADF is used to analyse the various sets of institutions governing an action situation. The aim is to understand the boundary, position, choice, information rules, etc. (Barton et al., 2017; Clement, 2010; McGinnis, 2011a). In our case, we focused on the evolution of governing access to space. A sub-part of the IADF is the Grammar of

Table 20.1 The evolution of institutional statements about space of the sea bottom in Sechura Bay, following the institutional Grammar

Year	*Emerging institutional statement*	*Formal/informal*
Initial situation	Everybody (small-scale fishers) may take a certain area to start bottom culture in Sechura Bay (de facto open access)	Informal
1990–2009	Everybody who has a plot can culture, new entrants have problems as space is defended (de facto enclosure)	Informal
2009	Only small-scale fisher cooperatives are permitted to get a licence for bottom culture in Sechura Bay (de jure common property regime)	Formal
~2000–2020	Affluent (financially, knowledge, processing) investors may take over the production process and eventually (informally) the licence (de facto evolving towards private property)	Informal
2020	Only small-scale fishers organized through companies are permitted to get a licence for bottom culture and/or suspended culture in Sechura Bay (de jure private property regime)	Formal

Source: Crawford and Ostrom (1995).

Institutions which provides a common syntax for understanding institutional statements (Basurto et al., 2010; Crawford and Ostrom, 1995). We use the Grammar here to describe the changes in the institutional statement in relation to the sea bottom (see Table 20.1). To our knowledge, there are two applications of the Grammar of Institutions to the aquaculture sector (Siddiki, 2014; Siddiki et al., 2012). Both look at the policy level and only use the Grammar and do not relate in more detail to the entire IADF.

The list of criteria provided by Schlüter and colleagues (2020) emerged, first, due to the perceived urgency to better understand processes of privatization in the marine realm on its way at an unprecedented speed, and second, due to the perceived lack of scientific reflection, which, third, is so far done with simplistic views, seeing privatization either as salvation or as evil. The chapter is built on sparsely emerging literature. We use the diagnostic criteria to enrich the IADF. They can be understood – following the terminology of the SESF – as second-tier variables (see bullet points in Figure 20.1). For consistency and to avoid repetition, some wording has been changed. It particularly informed the semi-structured interviews further described in the method section.

To summarize, we were using the adapted IADF (see Figure 20.1) to diagnose and understand the dynamic evolution of the institution(s) granting property rights. We do so by dynamically applying the framework below to understand the emergence of the changing institutions governing access to space.

Method

Governance of aquaculture is understudied (Partelow et al., 2022). This holds even more true for the aspect of property rights on space within aquaculture, where according to our knowledge, only a few papers have been recently published (Belton et al., 2020; Bottema et al., 2021; Ertör and Ortega-Cerdà, 2017; Ertör and Ortega-Cerdà, 2019; Hadjimichael et al., 2014; Kluger et al., 2022). This chapter addresses the questions of how and why the privatization process of space took place as it unfolded. The IADF requires detailed descriptive information. This

indicates the need for a qualitative case study approach. The study uses document analysis (of scientific articles, grey literature, and laws) and semi-structured interviews with a broad range of stakeholders. Those stakeholders include other small-scale fishers, their representatives and respective leaders of their cooperatives, larger producers and processors, and regulators on the local, regional and national levels, dealing either with the fishery-aquaculture sector or the environment. A snowball sampling strategy with various entry points was applied. The field-work during which the primary data for this study was collected took place in 2019 and lasted six weeks. However, the work also builds on continuous social-ecological research conducted in Sechura since 2013 by one of the authors (LCK), which did provide not only a solid fundament but also a huge network for field access for the present work. The data have been analysed with the help of MAXQDA, using an abductive coding approach (Timmermans et al., 2012), starting with a diagnostic coding tree built on the adapted IADF (Figure 20.1). Depending on the data, free codes were added.

Results: The Evolution of Institutional Arrangements in Relation to Sea Bottom Access

This section describes the evolution of institutions from a historical perspective. Table 20.1 summarizes this development using the Grammar of Institutions. The Peruvian bay scallop (*Argopecten purpuratus*) is a high-value benthic species occurring from Paita (5 °S) in northern Peru to Valparaíso (33 °S) in Chile, and records for its extraction date back to colonial times (Cobo 1653, cited in, Gonzalez, 2008). Since the 1950s, the species was (and still is) targeted by small-scale hookah-diving fishers as one of many resources through an open access regime. Peruvian legislation defines marine living resources as the heritage of the nation, open to all.[1]

In the 1980s and 1990s, the region of Ica (Pisco province, S-Peru, *cf.* Figure 20.2) experienced two boom and bust cycles related to the El Niño (EN) dynamics in 1983/84 and

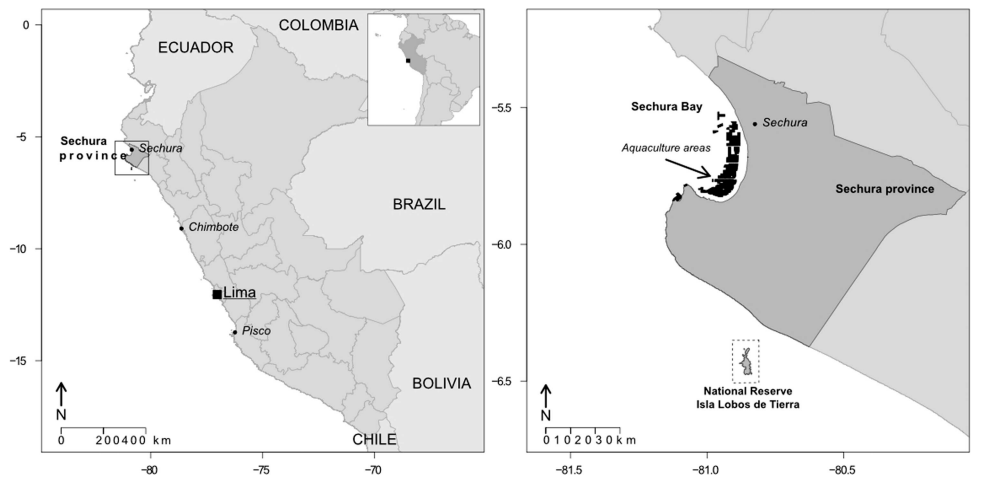

Figure 20.2 Left panel: Situating the study setting Sechura Bay in Sechura province in Peru; The square indicates the map section as shown in the panel to the right. The subplot indicates the location of Peru in the Latin American context. Right panel: Sechura Bay in the province of Sechura, indicating the aquaculture concession areas (as of February 23, 2021); Isla Lobos de Tierra = ILT.[4]

1997/98 (Wolff, 1987; Wolff et al., 2007). In the north, scallop banks were discovered at the island Lobos de Tierra (ILT, Figure 20.2) in the early 1990s and attracted the attention of migrants (first from Pisco and later from all over the country) and local (from Sechura) fishers extracting the resource. The EN 1997/98, with its heavy rains and rising sea temperatures in the north of the country – causing a die-off of scallops – brought an abrupt end to the evolving fishery, with many fishers migrating (back) to the south (Kluger et al., 2020). Soon after the EN 1997/98, the trend was reversed, with fishers returning to Sechura. Those migrant fishers who had experimented with scallop (bottom) cultures back in Pisco (first culture attempts date back to the late 1970s in Paracas, Pisco (Wolff, 1984)) now started to make use of the available area in the large bay of Sechura (*cf.* Figure 20.2) by installing their own culture plots, initially without formal recognition (Kluger et al., 2019b). This culture technique is based on the grow-out of scallops seeds on the sea bottom. Scallop seeds are predominantly extracted at the island ILT. However, natural extraction of seeds also includes pickup lines and extraction in places of Sechura Bay. In addition, hatchery production is increasingly important.

From 1995 to 2005, the number of fishers increased by 43% (Estrella Arellano et al., 2010), leading to what Kluger and colleagues (2020) described as a "wild west" environment (Administrator, 5)[2]: In many years, the returns have been substantial, and a small fortune could be made. At the same time, it was a space without rule of law, in which individual fishers fought (sometimes physically) for obtaining the greatest share of scallop seed occurring in the wild, and space (Small scale scallop producer, 16; Kluger et al., 2020). The rise in the number of fishers led to an increased scarcity of space and created the need to secure rights of access. The installation of culture plots was no formal process at first but was driven by those groups who were able to secure an area and protect it from intruders. Scallop farmers installed guardian boats on top of their cultured scallops, where one or two members of their group permanently observed the activity to prevent poaching (a practice that is still in place). Most of those early fisher groups that informally protected their plot were migrant fishers from the Pisco area (*cf.* Figure 20.2), introducing the required knowledge for bottom culture to the region of Sechura. This new activity, in particular the exclusive use of the space related to it, created tensions with the traditional catch fishers in the area (Kluger et al., 2020). De facto, the scallop fishers enclosed the area and prevented other uses.

In 2001, the first aquaculture law[3] was passed, which was implemented in Sechura Bay with an ordinance in 2009 granting concessions for sea ranching to social organizations of fishers (OSPAs, Span. *Organización Social de Pescadores Artesanales*). This created a de jure common property regime. The concessions entailed the right to manage the resource (scallops) in an assigned area while not transferring rights over the sea territory itself (neither sea floor nor water column). Thus, the water column remained – in theory – open to other coastal-marine activities (e.g., fisheries and marine traffic), though, in practice, scallop farmers reportedly exerted exclusive powers, pushing fishers out of "their" areas (Kluger et al., 2020). Ever since the implementation of the first law, the number of concessions grew exponentially to 158 in 2015 (Mendo, 2015), and more people moved to the region to take part in this lucrative activity – either through an active part in the cultures or through engaging in other, related works (e.g., processing scallops, transport, labour at harbour or sea). An important step to secure access to international markets was achieved in 2009 after issuing formal licences, establishing sanitary measures, and constructing a landing site exclusively for scallops (Kluger et al., 2019b). Sechura became the hotspot for scallop culture

in Peru: in 2013, 80% of national production (Mendo et al., 2016) and 3.7% of world scallop production stemmed from this bay (FAO, 2016).

In the beginning, scallops were solely grown in bottom cultures in Sechura by placing scallop juveniles on the sea floor. This had practical reasons, almost resembling capture-fisheries and not requiring a huge investment in nets or other infrastructure at sea (in these bottom cultures, scallops are typically monitored by divers and brought back to the centre of plots in case currents or individual movements get them too far away). Nevertheless, private investors always played a role in financing the start of cultures (i.e., providing the money people needed to either collect scallop seed or to buy it from someone) (Medium Producer, 15). Later, larger-scale firms started to use suspended culture in distinct types of concessions. Those larger companies were the ones that – until today – process and export the final scallops, also from small-scale holders. Moreover, the larger firms also work through contracts (Span. *convenios*) with small-scale producers, providing money for the initial costs of a grow-out cycle (i.e., costs for scallop seed) or other production costs, to then require the producers to sell to them, with pre-set revenue shares of 30:70, 40:60 or 50:50 (Large producer7). Over the years, these contracts developed in favour of the larger firms, towards handing more rights over to them (Administration, 10). According to large producers (Large producer, 7; Administration,10), this facilitates better control of the process and of the decision-making process, for example, about the optimal harvesting time. This process is a move towards a de facto private property regime. In 2019, three quarters of the concessions were informally or formally (see next paragraph) in the hands of private investors (Small scale scallop producer, 12).

In 2015, a second aquaculture law[5] was passed. It modified the access rights to the concession areas in the sense that concession holders needed to have the legal form of a private company for commercial extraction. Rather, to produce scallops for commercial purposes, concession holders were now required to be micro- /small-sized (span. *AMYPE*) or medium-/large-scale companies (span. *AMYGE*). The law was not specified for Sechura Bay until 2020; again, through an ordinance in which the content was influenced by the struggle of the small-scale fishers. The concession areas of Sechura were kept exclusively for small-scale fishers but organized under the mentioned categories. Since this transition from a small-scale fishers' organization to a more formalized company is potentially challenging for some actors, this new legislation could provide ground for pushing out small-scale holders who are not able to fulfil all legal requirements and organizational capacity to cope with the administrative burden.

In this section, we use the extended IADF (Figure 20.1) to understand the privatization process in Sechura. After having described the social-ecological system of scallop farming, the biophysical and socio-economic conditions, and actors more generally, the following subsections explain each of the four steps from open access to de jure private property identified in the last section (see Table 20.1). Those steps are summarized in Figure 20.3.

From a physical perspective, scallop bottom culture needs a lot of space, as the scallops are filter feeders that live from the nutrients (i.e., plankton) existing in the water column; no external feeding is required. Too high grow-out densities will lead to a reduction in growth rate. Scallops are sensitive with respect to water conditions. Whenever it gets too hot or a (toxic) algal bloom occurs, or other environmental changes deplete oxygen in their surroundings, they are in severe danger and need to be harvested immediately to save the product. After harvest, only an uninterrupted cold chain and quick processing will ensure qualities that can still be commercialized. Final markets (EU) ask for compliance with high

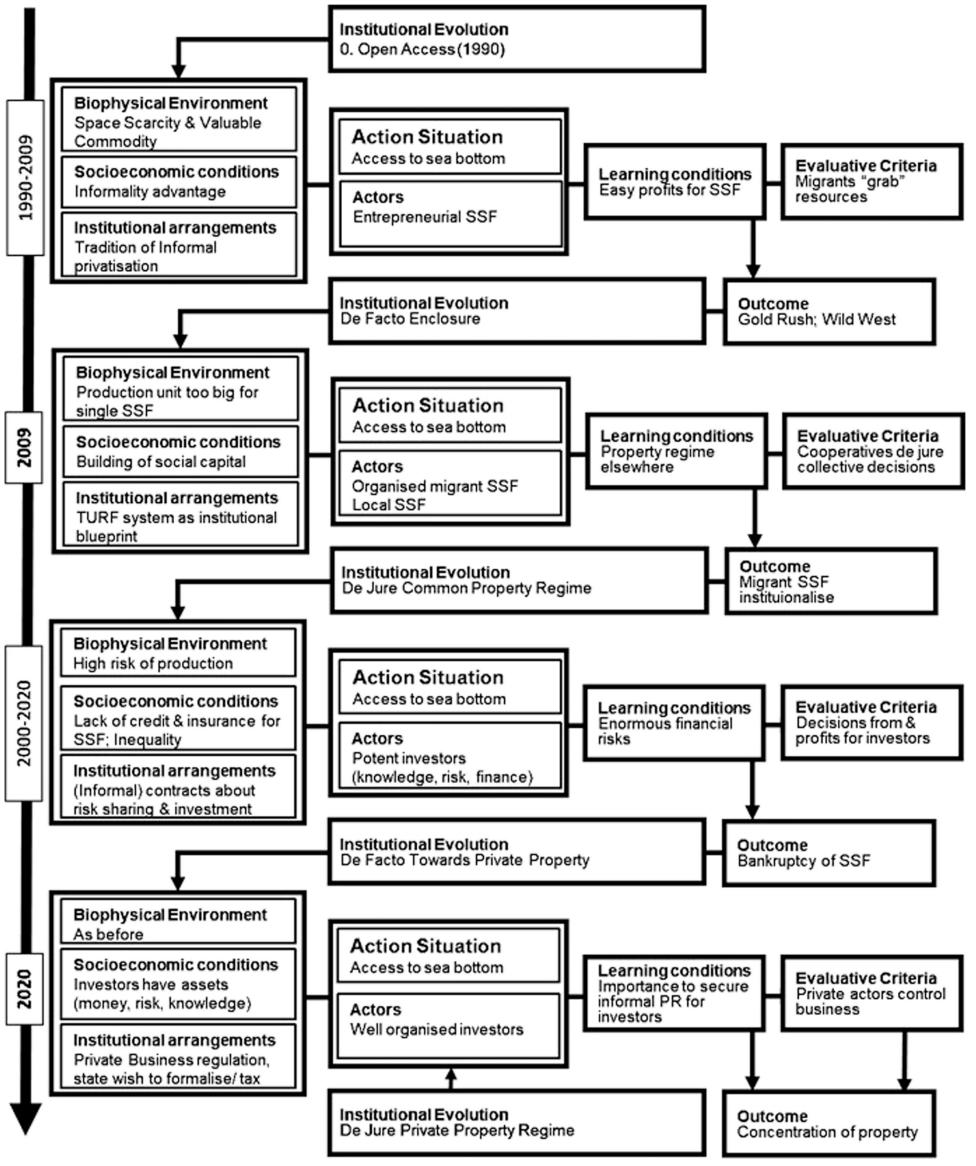

Figure 20.3 Dynamic Institutional and Development Framework (IADF) for scallop bottom farming in Sechura Bay 1990–2020.

hygiene standards. Therefore, scallop culture is a knowledge-intensive production process with substantial risks associated with it.

From a socio-economic perspective, scallop bottom culture is very labour intensive. First, the seeds are harvested in a time-consuming process at the bottom of the sea, most of the time at the island ILT (see Figure 20.2), which is a national reserve and an eight to ten hours boat ride away from Sechura Bay.[6] The diving is usually done in huge depths

(25 metres for seeds at ILT; 5–15 metres for grow-out in the bay) with a compressor and comes along with substantial health risks (including death). Extracting the seeds in the wild is typically cheaper than buying them from a hatchery. But with initial costs of between 90,000 and 150,000 Soles (USD 24,119–40,198) per concession, this is still a major investment for a group of small-scale fishers. To this initial investment, the running costs during the eight-month growth cycle and the financial risk related to the biophysical conditions described earlier must be added. Two guards, who are living on the sea on top of the plot in a boat, are needed 24/7. The permanent monitoring and the final harvesting are done by compressor diving, requiring teams of four: two divers (young and strong) and two persons on the boat managing the compressor, the motor, and receiving full bags of scallops, preparing them for further transport. During harvest season, huge scallop quantities are lifted – most of the weight consists of heavy shells, which are wasted after processing. Up to ten boats with respective personnel may be operating in each plot; the transport to the designated harbour for scallop landings is coordinated by various larger transport boats (Span. *madrinas*). This requires a well-established logistics. Despite being characterized by low capital intensity in comparison to suspended culture, the investments and risks are major, particularly from the perspective of small-scale fishers. They either require a lot of cooperation to join the necessary investments and assets, well-functioning credit, and insurance markets, which are not necessarily available, particularly for weak actors engaging in the business, or substantial sub-contracting.

At the beginning, small-scale fishers doing capture fisheries, originally from the region, and the scallop bottom farming small-scale fishers, most of them migrants, were the most important actors. Many of the migrants came from the Pisco area, where some of them had experimented with bottom scallop culture. Therefore, they had the necessary experience and knowledge to start this new business in Sechura. They used existing and newly forming networks with fishers of the Sechura region to get established in the area. Over time, both local and translocal emerging networks played a crucial role in tying the scallop culture activity to the place of Sechura. There were no larger producers, processors or affluent private investors yet going into the business. There was no scarcity and not yet major conflicts within the sector. The regime of that time can be described as an open-access regime.

Understanding the Evolution Towards De Facto Enclosure

Luckily during the first years of the bottom culture, there have not been any adverse biophysical conditions, which would have destroyed the harvest. Therefore, the pioneer small-scale fisher entrepreneurs, who were willing to take the risk in the search for new livelihoods, made a small fortune. Their practices were quickly copied by others, most of them also migrating from outside Sechura. With increased production quantities, there was a need for more processing and for expanding the potential market. With the help of bigger investors who also came to the area, the attractive foreign market (especially the French) was accessed. Those actors just entered the scene, and helped the expansion of the activity, but did not yet play a bigger role in the production of scallops and the occupation of plots. They did not engage directly but concentrated on the processing and bought the scallops from the small-scale fishers. Nevertheless, their engagement in processing leveraged change in the primary production and the related property rights on the sea floor.

At that time, high demand for scallops on the global market met small supply. Therefore, prices allowed for providing for all actors along the supply chain including the primary producers. This money to be earned attracted yet again more fishers up to the point that most areas in the bay were occupied and informal property rights were enforced. The plots for grow-out had been distributed and the new entrepreneurs were able to de facto lock out the catch fishers (Administration, 5). This led to the first wave of enclosure, with the bottom scallop farming small-scale fishers having had a clear power and bargaining advantage. Those who ventured into the new business, who had the knowledge and made a small fortune and those who joined them in this business had much higher returns. They brought money and jobs into the region. Within a short amount of time, they outnumbered the people engaging in catch fisheries. When out in the sea, they had the physical power to defend their newly established claims, if necessarily violently. Due to network relationships, they have been able to get socially and politically well established in the region. Those excluded protested and used a discourse relating to fairness considerations (Large producer, 7). However, they have not been able to put their interests through. Those early entrants venturing into this new business were (mostly) informal, in the sense that they did not pay taxes, health or retirement contributions, nor did they adhere to any hygienic or environmental regulations. They took any risk on their own shoulders, which made them very agile, but also very vulnerable. It was a high gain/high risk situation, especially considering the health risk related to diving and the lack of appropriate health infrastructure. Establishing informal sectors and making informal claims, which in a next step are tried to be made formal has, not only in Peru, a long tradition (De Soto, 1986; Williams, 2017).

Understanding the Establishment of a Formal Common Property Regime

The biophysical, technological and economic conditions make bottom culture only feasible for small-scale fishers if they join forces and cooperate. For example, it costs so much money to culture a plot or it requires so many boats to harvest that one artisanal fisher would not have the necessary capital. This led to an increase in social capital (Farrell and Knight, 2003; Gehrig et al., 2019). Obviously, there have been also conflicts among the various groups, but some of them have been successful to sort those conflicts out and to get organized, particularly in the political sphere of the region responsible for the establishment of the licences and the details of the process (Small scale scallop producer, 12). Getting their voice heard particularly worked because it relied on an important global discourse in resource governance of the last decades, explained in the following: After the publishing of Hardin's tragedy of the commons in 1968 which advised strongly against any form of communal property a discourse emerged, combining, on the one hand, a property rights approach, praising the role of clearly assigned property rights and, on the other hand, a community and polycentric approach. The latter was backed up by empirical evidence, the theory of federalism, and the public choice approach and argued that if the community becomes a central governing body and property right holder, an effective resource management can result (Ostrom, 1990). After some hesitation, this discourse was also adopted by huge players within marine governance, like the Food and Agriculture Organization (FAO) or the World Bank. It found its expression in the establishment of Territorial Use Rights for Fishers (TURFs) (Afflerbach et al., 2014; Gelcich and Donlan, 2015). This property regime had already been tested in Chile (Arias and Stotz, 2020), where also much other knowledge about scallop culture in Peru stems from. TURFs, which give secure

property rights to mostly poor small-scale fishers, fit very well into a pro-poor and a social, economic, and ecological sustainability narrative. Important conservation NGOs around the world are fostering and distributing this institutional solution (RARE, 2018). This was also the case in Sechura, where a Canadian non-governmental organization (NGO) was active and helped the scallop fishers to promote cooperatively held concessions (Medium Producer 15). This discourse likely guided the establishment of the first national aquaculture law in 2001 and later on the regional ordinance which both gave some privileges to small-scale fishers. The law of 2001 allowed exclusive access to the mariculture activity for fisher cooperatives through granting concessions for restocking (bottom culture) (DS 030-2001-PE). This law favouring the small-scale sector was also in the interest of the local authorities, as small producers (fishers) are regulated by the local authorities and not the central government. As indicated earlier, it took the regional government until 2009 to implement the first law for Sechura Bay (DS 016-2009-PRODUCE). The implementation then was mainly driven by two distinct issues, one within and one without the direct action situation focussed here: First, the level of occupation had become so high and conflicts increased so that powerful and well-established small-scale fishers wanted to secure their rights. Second, informality, combined with an increasing number of plots in areas not suitable for production (e.g., near shore, where water is more likely to be contaminated), led to bad hygienic conditions so the EU was threatening to cancel the export licence to the EU. The importance of each factor is difficult to assess. Clearly, this change resulted in the legally authorized occupation of the bay by small-scale producers. This gave control over a key asset within the lucrative bottom scallop farming to small-scale fishers. At least on a formal level, those cooperatives had to have democratic decision procedures (and a representative board of president, vice-president and treasurer acting in turns). Legally, a common property regime was established.

Understanding the Evolution of De Facto Private Property Rights

As explained earlier, scallop bottom culture is a capital and knowledge intensive, and risky business. Particularly the latter has led to the destruction of a huge proportion of the investments on several larger and smaller-scaled occasions. As an example, the summer period is always potentially risky in the sense that temperatures may get too high, and/or cause oxygen depletion of the waters in areas of the bay where currents don't ensure permanent water circulation. Besides these small-scale events, the particularly hot years of 2016 and 2017 represented a threat to many producers (Kluger et al., 2019a). This hit small-scale fishers, who did not have sufficient means and could not rely on strong institutions helping to finance or provide risk coping strategies. Faced with this problem new forms of cooperation proliferated, some using formal private contracting and others informal means of contracting. Those agreements could, for example, still leave decision power and risk with the cooperative, but major investment came from venture investors (private individuals or bigger corporations), having substantial knowledge in the sector and substantial capital, to be able to take the risk. Different degrees of risk sharing emerged. The right to manage and therewith the de facto right to access moved steadily in the direction of the investors. Patron-client relationships emerged (based on what was described as contracts, *convenios*), where small-scale fishers often only play the role of cheap sub-contractors, sometimes bringing in their boat, more often only their health as a diver or their strength as a labourer.

The investment, the risk taking and the knowledge about the production were increasingly provided or taken over by affluent investors.

This process was accelerated additionally by, first, the dire need to process the scallops quickly after harvesting (they need to be shock-frozen within 24 h of harvesting to be approved for export), and second, by the structure of the processing industry, which is an oligopsony (many suppliers of scallops, few processors) and thereby determines, when and how quickly scallops are harvested and dictates prices, third, that international market prices plummeted due to bigger global supply and, forth, that processors increasingly became also main actors and investors involved in the primary production (Large producer, 7; Administration, 8; Small scale scallop producer, 12). Compared to the investment needed for processing and marketing the investments for primary production are minor. The big producers also have sufficient means to buy in the necessary production knowledge by employing competent fishery biologists, who can anticipate if emergency harvests must be done. Being in a close network with those powerful actors might not lead to huge autonomy or profit margins but might secure survival in challenging times. In fact, interviews with scallop producers in the aftermath of the 2017 El Niño suggested that only those small-scale farmer cooperatives working with larger processing factories in such contracts were able to re-initiate cultures relatively quickly after the event (Kluger et al., 2020). For those investors having to deal with a cooperative, where many people are jointly in charge of decision making (Small scale scallop producer, 12), but which holds a necessary asset in its hand can create problems from the perspective of the investor. Under the then prevailing legal conditions, this led to the informal tunnelling of cooperatives, by various means: (i) the control of fisher organizations by processors, for example, by bribing the leaders to expel unwanted members or to replace the entire membership with dummies, who are acting in the interest of those behind the scene, (ii) the renting of the concession area (illegal) for a particular time (typically 1–2 years), or (iii) by buying it (also illegal) (Medium producer, 4; Administration, 8).

While these contracts may reduce the negotiation power of small-scale producers, it also transfers – depending on the type of contract – part of the financial risk to the investor. If an environmental disturbance (e.g., small-scale heat waves, algae blooms, sediment loads from river runoff, and El Niño events) hits (parts of) the bay and causes a die-off of scallops during grow-out, the loss is absorbed by the company. Over time, a growing number of small-scale producers started working under these contracts with companies, which led to a progressive concentration of power.

In sum, the biophysical conditions, in particular, the risk involved in scallop production, the huge investment needs, and the knowledge intensity of the process, combined with many times precarious socio-economic conditions of small-scale fishers and the lack of hardly any institutional support to provide those capabilities to the small-scale fishers meant a power imbalance, which led to institutional change disadvantaging small-scale fishers, moving towards informality, earning a subsistence income, being exposed to considerable health risks and the inability to still participate from high returns. This process could be described as the second wave of enclosure in Sechura Bay and led to the de facto privatization of the access right.

Understanding the Establishment of a Formal Private Property Regime

As indicated earlier, big players wanted to secure the investments made, they wanted to stabilize the supply chain. In the long run, doing this by informal means is difficult. So, like

the small-scale fishers, who formalized their informal tenure, larger producers also wanted to formalize their de facto property rights. This was possible with the second aquaculture law (2015), as it granted that private entities can hold licences and even made it a pre-condition to become a formally registered private, not cooperative, entity to be allowed at all to engage in major scallop production. The theory of collective action would predict that a few affluent companies are much better able to organize collective action than a huge crowd of poor fishers, having less financial and knowledge resources. However, this change in legislation was also in the strong interest of the state, as it was observed that the scallop business is lucrative and it can be much better taxed if legal entities exist. So far, with the first aquaculture law, fisher associations were freed from paying for the right to conduct aquaculture (Article 20.1, First Aquaculture Law 27460, 2001) and had to pay only half of the taxes (Medium producer, 4). By obliging concession holders to be formalized companies not only the tax exemption was ended but the central government also took over regulatory power from the decentral regional government (responsible, as indicated above, for small-scale fisheries). There is strong and long-lasting competition between the national and the regional governments over the control of regulatory power. From this perspective, this observed institutional change might also be the result of a power bargain in the action arena, where the regional and the national government are interacting. Our study was unable to assess the particular drivers of this process. However, in other policy arenas of Peru, similar processes could be observed (Damonte, 2021a, b). Adding to those arguments, again the EU sanitary standards also played a role, with the formalization of the sector likely serving as an argument for better controlling the requirements and therefore not losing the (export) right.

Despite this formalization of private property happening in aquaculture activities at a national level, in 2020, the law was differently implemented in Sechura. Still private property was de jure implemented but exclusively to small-scale fishers organized under AMYPEs or AMYGEs. However, property relations such as management under the influence of affluent investors persists. There is still a considerable interaction between formal and informal activities as indicated in the previous section. This interaction optimizes the supply chain from the perspective of powerful companies, but puts informal producers at various risks. For the powerful companies, it is important to formally control access to the sea floor, an important asset which holds the product. However, activities like harvesting the seed illegally in the nature reserve, or later the harvesting of the product by compressor diving, involving substantial health risks, or the labour-intensive transporting of the scallops, are better done via sub-contracts by the informal sector. Thinking about proper transitions between the formal and the informal is a necessary challenge, allowing for finally selling the product on the world market. However, this challenge pays off.

Conclusion

Within the process described earlier, we could see that biophysical and socio-economic properties, available institutions, and discourses which all provided actors with different power resources at certain moments within the process, played a significant role in how this privatization process has developed. The process took only a period of 30 years, in which the access rights to the sea bottom did not only evolve from an open access to a private property regime but four cycles of institutional evolution were identified (Figure 20.3). De facto property rights have been established twice within an informal process, before being legalized.

We concentrated on one single action situation: the negotiation about property rights on the seafloor. However, it could be clearly seen that this action situation is nested and requires an understanding of action situations connected (McGinnis, 2011b; Villamayor-Tomas et al., 2015). In the case of Sechura, these have been the more directly linked processing industry and the related world scallop market. Here, the standards and preference of the European market played an important role in locking out small-scale fishers. Yet also a seemingly unrelated field like the general power bargain between the national and the regional government about legislative and budgetary competencies or even global discussions and discourses around territorial use rights, conservation, or equity issues, played a role.

If the biophysical or socio-economic conditions do not change dramatically – climate conditions make it impossible to grow scallops in the bay, or the price plummets even more – one can expect that this once established private property regime will not revert back to common property or open access regime. A de-privatization is unlikely due to vested interests and power asymmetries (cf. Mansfield, 2004).

It was interesting to see that winners and losers changed during the process of privatization. Spuriously abstracting from the distributional conflict between the small-scale fishers engaging in the new activity of bottom culturing and the traditional catch fishers, the first wave of enclosure had, at least from the formal perspective, the notion of a fairy tale: a common property regime was established that should have helped (subsistence) small-scale fishers to establish a livelihood alternative. However, due to biophysical characteristics, the lack of institutional structures, like accessible credit or insurance schemes, due to asymmetries in capabilities – all these important power resources – the story ended like many grabbing or privatization stories not only within the blue but also the green economy, the urban sphere and other realms (Barbesgaard, 2018; Bavinck et al., 2017; Borras et al., 2011; Foley and Mather, 2018; Zoomers et al., 2017).

Agreed that structures like credit schemes, insurance policies or extension services provided either by the collective or the state, could have eased the hardship of the small-scale fishers and could have provided them with a chance to harvest the fruits of the entrepreneurial venture they undertook. However, under the biophysical (risky and knowledge intensive), socio-economic (unequal distribution of various assets), and institutional (unregulated market economy) properties of this social-ecological system, the logic of institutional evolution we observe seems to be consistent, but sad from a normative, pro-poor perspective. Only some small-scale fishers, who aligned closely with powerful players, have been able to survive this economic battle. But it is yet to be seen whether they are now well-prepared to thrive or survive at the beginning of the supply chain of the highly competitive market for scallops that caters for high-income countries' dinner tables.

Notes

1 (Third) General Fisheries Law N°25977 enacted in 1992; available at: https://www.peru.gob.pe/docs/PLANES/14303/PLAN_14303_2015_LEY_25977_LEY_GENERAL_DE_PESCA.PDF

2 When referring to an interview, the actor group is mentioned followed by an identification number.

3 N° 27460 (Ley de promoción y desarrollo de la acuicultura) enacted in 2001, available at: http://www2.produce.gob.pe/RepositorioAPS/1/jer/PROPESCA_OTRO/marco-legal/1.2.%20Ley%20Acuacultura%20l27460.pdf

4 The figure was constructed in the R environment (R Core Team, 2021), using the *maps* (Brownrigg, 2018), *sp* (Pebesma and Bivand, 2005; Bivand et al., 2013), *sf* (Pebesma, 2018).

Bordering countries and Peruvian administrative areas (region- and province-level) were retrieved from the Database of Global Administrative Areas (GADM, www.gadm.org, subdivision levels 0, 1 and 2). Geographic information for National Reserves and the Aquaculture areas was downloaded from the webpage of the Peruvian National Service for Natural Protected Areas (http://geo.sernanp.gob.pe/visorsernanp/) and the aquaculture cadastre of the Peruvian ministry for Production (http://catastroacuicola.produce.gob.pe/web/), respectively.

5 Law D.L. N° 1195 (Ley general de acuicultura), passed in 2015, available at: http://www.sanipes.gob.pe/archivos/biblioteca/N_8_DL_1195_Ley_General_de_Acuicultura.pdf

6 Harvesting in the nature reserve is formally forbidden with a maximum sentence of five years imprisonment, but informally perceived by many as a legitimate practice and enforcement of formal law is nearly absent (5).

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