

# SCALAR POLITICS AND THE CO-EVOLUTION OF SOCIAL AND ECOLOGICAL SYSTEMS IN COASTAL SOUTHERN CHILE

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## ABSTRACT

Coastal southern Chile includes a set of territories in a continuous process of bio-social construction which cannot be understood without considering scalar politics. Environmental concerns, included in broader neoliberal frameworks of governance, play a central role in the performance of such scales. Thus, this case shows some of the patterns of relations between scalarity and the management of key ecological features. Additionally, territorial governance and scalar production occur in a geographical context over which the State has low effective degree of direct control. Consequently, such processes also need group and individual internalisation of new rules through the creation of mechanisms of self-interest that allow agents' 'conduct of the conduct' Thus, scales act as sources and key elements in the generation of governmental instruments that frame and influence individual actions.

**Key words:** scalarity, co-evolution, governmentality, social construction, artisanal fishing, Chile

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## INTRODUCTION

Southern Chile is composed of an ensemble of territories where human spatial occupation and capital accumulation have historically been concentrated in a set of interior valleys (Alfonso 1900). Consequently, Southern Chile's coastline is sparsely populated and weakly connected to other areas (Aburto *et al.* 2009; Saavedra 2011), and it is characterised by a large degree of subsistence production, reduced levels of capital accumulation, and a focus on economic activities that are directly related to the exploitation of natural resources (Saavedra & Macías 2012).

Artisanal or small-scale fishing is a central activity in Southern Chile that helps to

understand the occupation, exploitation and management of these coastal spaces. These spaces are the product of spatial distribution of fish populations, but also of specific patterns of territory production resulting from a dense network of coastal settlements or coves (in Chile referred as *caletas*). The *caletas* are legally recognised artisan fisher villages that have at least some small vessels, but in some cases have more than 100 boats. The objective of this paper is to identify some of the most salient features of the process of territory production in coastal Southern Chile and, in particular, in the region of Los Lagos, where artisanal fishing is one of its major economic activities. The choice of the Los Lagos region is justified by the richness of its coastal occupation. For instance, in

2009 there were 216 legally recognised *caletas* in this region, representing 44.7 per cent of total *caletas* in Chile.<sup>1</sup>

The social production of the coastal territory cannot be understood without considering socio-territorial power relationships. Hence, the governance of artisanal fishing is analysed as a case of scalar politics in which there is a confluence of political economy and poststructuralist arguments (MacKinnon 2011).

In some respects, the political-economic and poststructural perspectives can be seen to offer complementary insights into the construction of scale, focusing attention on processes of material production and capitalist restructuring, on the one hand, and social practice and discourse, on the other. ... I am seeking to promote increased cross-fertilization by bringing together elements of each approaches' treatment of scale through the concept of scalar politics. (MacKinnon 2011, p. 28)

Political economy approaches consider scales as the result of previous processes of social reproduction and capital accumulation. In this sense, they are broadly inherited as the socio-territorial embodiment of actually existing hierarchies and power relations. At the same time, scales, as territorial scenarios and institutional frameworks of broader social conflicts, are central elements in the definition of actors' strategies. In this sense, they are broadly used, but they are also resisted and contested (Brenner 1997, 1998, 2004; Swyngedouw 2000). Nevertheless, post-structuralist approaches insist on 'the significance of scale as a representational device or discursive frame ... to gain particular forms of recognition and advantage' (MacKinnon 2011, p. 26). Thus, they emphasise that the social perception of reality is framed by prevalent scalar classifications, and scales are always understood as being emergent (Marston *et al.* 2005; Moore 2009).

In the case of coastal Southern Chile, scalar politics is related to a set of confluent processes. From a political economy perspective, two elements must be emphasised. First, the production of space is heavily conditioned by a complex set of inherited scales,

including the State, the region, strategic zones, fishermen's federations, coves, vessels and households (Brenner 1997, 1998; Marston 2000; Castilla 2010; Gelcich *et al.* 2010; Saavedra & Macias 2012). Second, scalar production occurs in a neoliberal context. Beginning in the 1970s, Chilean socio-economic governance adopted strong neoliberal features (Wynn 2004; Harvey 2005). Because the scale production and rescaling of the State are closely associated with neoliberalisation processes, this case offers an opportunity to analyse scalar dynamics in a peripheral but deeply neoliberalised context (Swyngedouw 1997; Zunino 2001; Brenner 2004).

From a post-structural perspective, two other points are particularly relevant. First, the processes of scalar production could, in this case, be deeply emergent because of the incompleteness of the settlement process (Delaney & Leitner 1997; Moore 2008). In this sense, as we show below, the structure of the coves is far from completed, and the possibilities for change in the compared relevance of the coves are relatively high. Second, particularly in Chile, environmental elements have an increasing role in fishing and coastal planning policies (Schumann 2007; Gelcich *et al.* 2010; Marin & Berkes 2010). Specifically, co-management policies have been widely applied (Castilla & Fernández 1998; Gelcich *et al.* 2009). Such relevance of environmental issues can be considered to be an emergent process.

Three scales will be analysed that have an explicit territorial element in their definition (McCarthy 2005): the national-regional, the sub-regional and the coastal settlements (*caletas*). These scales are conceived in a fluid manner. For instance, the logics of the central State are clearly perceptible on the regional scale. Additionally, other scales, such as fishing craft (which are territorially ascribed to certain places for administrative reasons) or households, converge with the scale of the coastal settlements. In terms of reinforcing their ecological content, certain scales (particularly the sub-region or the coves) can also be understood as the construction of social-ecological systems, which are the result of the co-evolution of social

systems and ecosystems (Berkes 2009; Gelcich *et al.* 2009; Gual & Norgaard 2010).

This paper is organised as follows. First, it presents the theoretical framework, which revolves around power dynamics, Foucauldian governmentality and scalar politics. Next, the geographical context and the methodological basis of the research are briefly presented. This is followed by an analysis of the scalar politics of artisanal fishing along the coastline at the national-regional, sub-regional, and *caleta* scales. The final section presents the conclusions.

### SCALARITY IN ARTISANAL FISHING

The governance of fishing activities is an intrinsically territorial process in which State and different social actors interplay at different geographical scales (Berkes 2006). A political economy approach is essentially concerned with the construction of scales as material entities to consider complex interactions between fixity and motion (Harvey 1982; Brenner 1998). Scales have a strong element of fixity because they are partially the result of past rounds of capital accumulation and the territorial embodiment of the prevailing social relations. In addition, the State and its associated public policies provide certain fixity to the existing scalar structure (Brenner 1998). Nevertheless, some of the key elements in the production of scale (such as capital accumulation or the State's structure) are understood as processes that are in a perpetual state of change or rescaling (Swyngedouw 2000; Zimmerer 2000; Brenner 2004). Accordingly, '[s]patial scales are ... perpetually redefined, contested and restructured' (Swyngedouw 1997, p. 141).

Scales, which are understood as material entities, are also increasingly concerned with environmental issues (Swyngedouw 1997, 2007). However, social and ecological scales have different ontological natures (Sayre 2005). The former are conceived as historically contingent results because they are simultaneously a limit of actors' activities and a set of institutional frameworks that allow their actions (Marston 2000; Marston & Smith 2001). In contrast, ecological scales

refer more clearly to specific spatial environments in which the interactions among variables are clearly defined; that is, they are basically fixed for long periods. Therefore, the inclusion of environmental sensitivity in the analysis implies the strengthening of fixity over motion (Worster 1994; MacCarthy 2005).

Conversely, post-structural approaches have emphasised the construction and fluidity of scales through a set of social practices and discourses (Moore 2008). Such understandings are strongly influenced by Foucauldian analysis of power (Kaiser & Nikiforova, 2008). Power is understood as being unevenly distributed among actors due not only to different levels of material assets but also to social contacts and discursive capabilities (Dean 1999; Gordon 2002; Jessop 2007). Simultaneously, general power structures are embodied in the design of the State. In both dimensions, power dynamics contribute to shaping individual behaviours (the conduct of the conduct) and promoting what Foucault labels governmentality (Foucault, 2004, 2009). The production of knowledge and truth and the promotion of specific ethics are essential features of governmentality (Dean 1999; Gordon 2002; Jessop 2007).

Scalar politics is understood as an arena of struggle among a set of regimes of practices that are supported by different actors' ethics and rationalities (Dean 1999). In this sense, the contestation of the existing scales, scalar jumps and the generation of new scales are considered to be essential means to channel governmentality. In this context, scales are considered to be broadly emergent processes in which actors' strategies can modify pre-existing scalar fixes (Moore 2008). Particularly in the case of environmental governance in the current neoliberal context, scales are frequently considered to be fluid and deeply emerging (Bulkeley 2005; Dressler 2014). Consequently, scales are key elements in the visualisation of conflicts (Boyle 2002; Lebel *et al.* 2005; MacCarthy 2005; Sayre 2005; Kaiser & Nikiforova 2008). Such conflicts are characterised by relevant discursive features. On the one hand, scales are powerful classification tools that allow

agents to present their own interests and choices as being natural and legitimated by the existing scalar structures (González 2006). On the other hand, the use of scales in discursive constructions allows for the visibilisation and invisibilisation of different social and material features (Marston *et al.* 2005).

Neoliberalism is associated with new discursive repertoires in the visibilisation and invisibilisation of environmental issues. In this sense, there is a 'neoliberal turn' in the management of nature (McCarthy & Prudham 2004; Castree 2008; Adams *et al.* 2014). Thus, some kinds of sustainability discourses, which attempt to bridge profit-oriented private actions, local social welfare and nature conservation, have played an important role in environmental governmentality (Agrawal 2005). There is a broad set of mechanisms, public and private encounters, monitoring, and regulatory discretionary decisions, with discursive and material effects, to promote the sustainability perspectives of neoliberal States (Adams *et al.* 2014). All of these repertoires and sets of governance practices have been labelled as 'eco-governmentality' (Goodman 2001), 'green governmentality' (Dressler 2014) or 'environmentality' (Agrawal 2005). In some cases, 'environmentality' has been strongly associated with an increasing devolution of power and the responsibility to lower scales (Bulkeley 2005). One progressive form of devolution in a broader neoliberal context has been co-management, which is particularly relevant in fisheries' governance (Schumann 2007, 2010; Berkes 2009; Marin & Berkes 2010).

Coastal territories are expressions of co-evolutionary interaction patterns among social organisations, modes of economic exploitation and environmental traits of concrete ecosystems (Norgaard 1981, 1984; Kallis 2007; Gual & Norgaard 2010; Kallis & Norgaard 2010; Rios-Núñez *et al.* 2013). Therefore, they are privileged places for the application of co-management policies (Berkes 2006; Marin & Berkes 2010; Schumann 2010). In certain cases, littoral territories are characterised by forms of 'strong' or 'localised' co-evolution, in which fisher activities are almost exclusively based

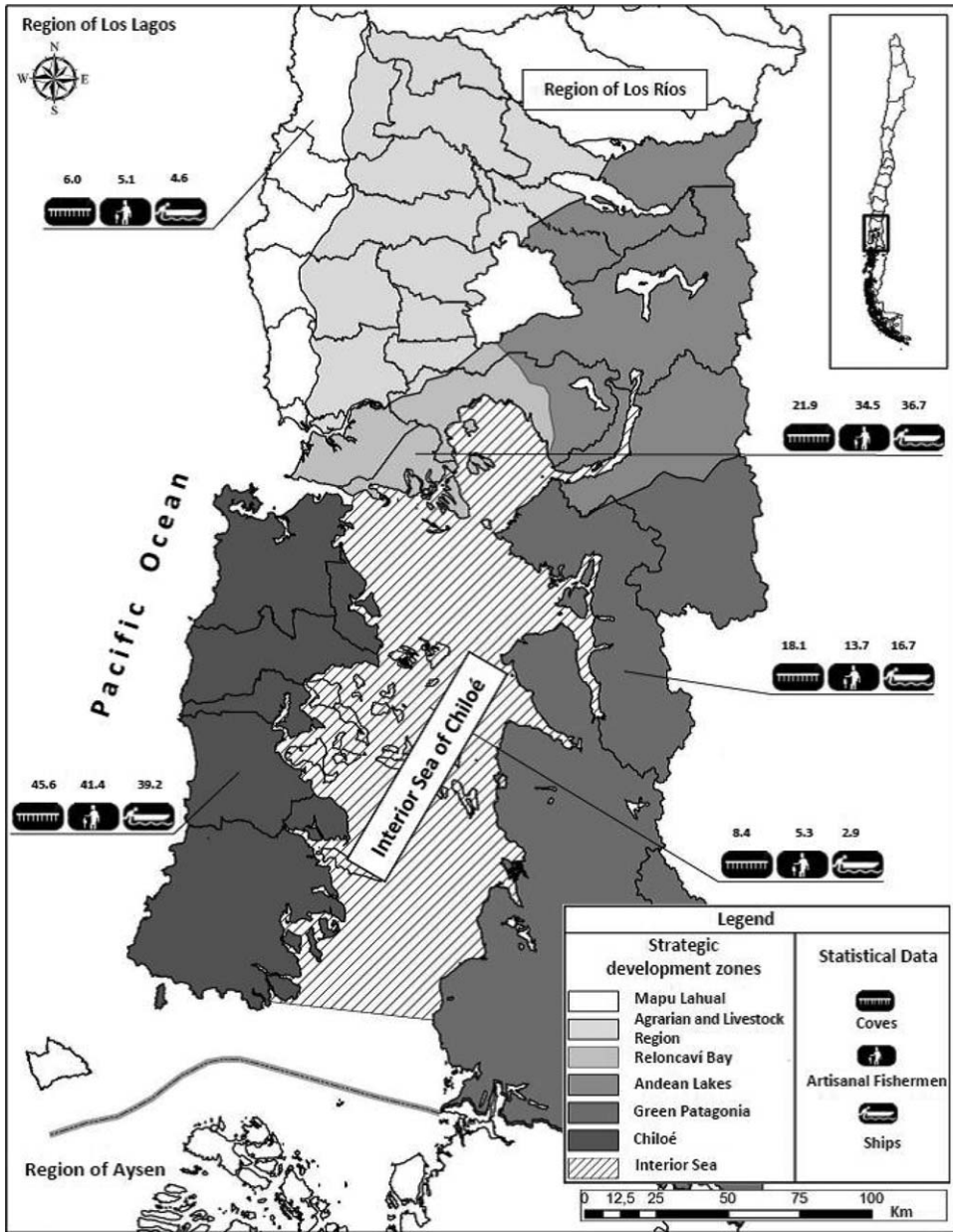
on local resources. Consequently, there is a direct relationship between resource conservation and human exploitation (Winder *et al.* 2005).

In other cases, there can be a wide difference between the area of resource extraction and consumption (Moreno-Peñaranda & Kallis 2010). Because socio-economic scales are supported by 'ecologies at a distance', that is, by larger ecological scales, it is possible to refer to 'non-localised' or 'weak' co-evolution between the local socio-environmental territories in which natural resources are extracted and the broader global spaces in which they are consumed (Campbell 2009; Rios-Núñez *et al.* 2013). In both situations, co-evolution is correlated with the dynamics of the construction of social-ecological systems in a continuous production process of space and nature (Norgaard 1994; White & Wilbert 2006; Swyngedouw 2007; Kallis & Norgaard 2010). The concept of co-evolution also implies the understanding of ecological scales in a more fluid manner, not because of their own internal dynamics, but as a result of the interactions between bio-physical and socio-economic elements (Neumann 2009; Rangan & Kull 2009).

## TERRITORIAL ENVIRONMENT AND METHODOLOGY

Los Lagos is one of Chile's fifteen administrative regions. This region borders in the North with the region of Los Rios, in the South with the region of Aysen, in the East with Argentina and in the West with the Pacific Ocean. The region has a surface area of 48,583.6 km<sup>2</sup> and an estimated population of 834,714 inhabitants in 2014 (INE 2014). In the context of a Chilean model of economic growth that is based on the export and exploitation of natural resources, the economic activities in the region have reproduced such traits (Rehner *et al.* 2014). Forestry and agricultural activities are important economic sectors.

However, settlement patterns along the coast are basically explained by artisanal fishing, because this activity is essential to the



Source: Prepared by the authors from data supplied from Fishing and Aquaculture Census (2009).

Figure 1. Coastal settlements (caletas), fishermen and vessels in the different Strategic Zones (regional percentage).

production of the littoral territory (Saavedra & Macías 2012). This production will be analysed in this paper at three different scales, which are simultaneously strongly inherited

and, in some aspects, deeply emergent. First, the regional scale is analysed. This scale is broadly influenced by the central State's activity. It is not easy to establish precisely

where one scale begins and the other scale ends, which reveals the fluid character of scales, which frequently have deeply discursive features and strong political economic effects.

Second, the region of Los Lagos has different productive specialisations, which are generated in different territories, with diverse socio-economic structures and distinct identities. Therefore, the Regional Strategy of Development of the Region of Los Lagos, 2009–2020 identifies seven strategic zones (as is shown in Figure 1). Each zone has different productive, but also social, bio-physical and eco-systemic features. For instance, Mapu-Lawal or Green Patagonia feature more pristine landscapes and lower human population levels. However, Chiloé or Reloncaví Bay have a long settlement history and, consequently, more populated landscapes. Such dissimilar landscapes, which are shaped by different historical processes, should be taken into account in the analysis of eco-governmentality. In this paper, the strategic zones are considered to be sub-regional scales.

Finally, the effective occupation of the coastline and the exploitation of fishing resources cannot be understood without considering the basic unit of coastal settlements, which is the *caleta*. Such territorial organisation is explained by the semi-nomadic origin of artisanal fishermen. In this sense, it is not exclusive to the region of Los Lagos, but rather it is typical of Chile (Aburto *et al.* 2009). *Caletas* may possibly be the most heterogeneous and complex scales.

The research is supported first by 40 in-depth interviews with actors of five different profiles: academic experts and consultants, artisanal fishermen, vessel owners, vessel builders and fish buyers. The relevant aspects of artisanal fishing were described in those interviews as, for instance, the forms in which the activity is organised, the effects of public regulation, the forms of governance, the labour activities of artisanal fishermen and their effective levels of income. However, as it is impossible to summarise all of this information in the space of this paper, only the facts that are directly related to the production of scale are presented. Additionally,

several statistical sources have been analysed, and the most important are the micro-data of the Chilean Fishing and Aquaculture Census of 2009. This statistical source has allowed, for instance, the calculation of the number of fishermen and vessels in each of the strategic zones and for each of the existing 216 *caletas*.

## THE CENTRAL STATE AND THE REGIONAL SCALE

Artisanal fishing is a basic occupation in Chile's coastal territories. Nearly all mollusc, crustacean and algal extraction comes from artisanal fishing; however, this fishing activity accounted for only 30 per cent of the total captures in 2013 despite uninterrupted growth of its share since 1998, when it was only 10 per cent. This means that the fish captures are concentrated in the industrial sector and that the depletion of fish stocks is mainly the consequence of the activity of industrial vessels.

The Central State has a key role in the regulation of the fishing activities in Chile (Castilla 2010; Gelcich *et al.* 2010). The 1991 Fishery and Aquaculture Law No. 18,892 (FAL) enacted the distinction between artisanal and industrial fisheries, each with their own territorial rights (Gelcich *et al.* 2010). This law defined artisanal fishing based on the technologies that are used and the levels of capital accumulation. In terms of technology, the law distinguishes five categories of vessels: rowboats, motor boats and three types of longboats from 8 to 18 metres in length. Small boats only allow for the exploitation of nearby resources. However, the capture capacity and mobility of the larger longboats is substantially higher.

It is difficult to exactly compare the capture capacity and the autonomy of different types of vessels; however, some indirect data could help to approximate them. For instance, the captures of sardines and anchovies in the region of Los Lagos by artisanal fleet were 77,531 tonnes in 2009, that is, 81.9 per cent of total captures of fish and 42.6 per cent of total marine captures (also considering algae, molluscs and crustaceans).

Such captures were made almost exclusively by 145 vessels that range between 15 and 18 metres, which were only 3.4 per cent of the artisanal vessels of the region (Fishing and Aquaculture Census, 2009). Such vessels not only have larger holds, but they also have greater territorial autonomy. For instance, the Calbuco sardine fleet usually fishes in the area of Valdivia, which is approximately 140 nautical miles to the North.<sup>2</sup> A high level of concentration of catches in a small number of vessels has been observed. Thus, it could be asserted that artisanal fishing is a highly heterogeneous sector; in some sense, it is a discursive construction.

In terms of territorialisation, a zone for exclusive use by artisanal fishermen (within the first 5 nautical miles or 9.3 km) was enacted by the FAL (Castilla 2010). This exclusive area was regionally divided. 'Artisanal fishers must be registered in one of the administrative regions of Chile, and their fishery activities are legally restricted within that space' (Castilla 2010, p. 223).

Thus, the national and regional scales are closely related. However, fishermen are continuously complaining about the effectiveness of the exclusive artisanal area because the State often authorises industrial vessels to fish inside what artisanal fishermen call 'perforations' (De Laire 2001).

State perforates (the exclusive artisanal area), State allows industrial vessel to go inside (the exclusive artisanal area) and that is why the quarrels of artisanal fishermen and the State. You are always going to listen, they (industrial ships) perforated us.<sup>3</sup>

Beyond the general legislation that was instituted by the FAL, the national-regional scale has four main regulatory instruments. The first is the control of who can legally be considered an artisanal fisherman. In this respect, the Artisanal Fishing Register was established, and registration is compulsory to obtain the legal right to exploit resources. In practical terms, this register has been closed to many fisheries for years, and it is opened for short periods to allow for some inscriptions and actualisations. Without these permits, it is very complicated, and frequently

impossible, to introduce fish into marketing chains and particularly to export them.

A second instrument is the declaration of the full exploitation of fisheries and the enactment of capture limits. A fishery is considered to be fully exploited when scientific studies assert that the extraction of one species is behind the regeneration levels in a specific area. Administrative elites and independent biological consultants with university degrees in marine sciences play an important role in this regard (Schumann 2007, 2010). Such limits are species-specific and may sometimes refer to a single area, and sometimes to several regions. However, these studies do not take the artisanal or industrial origins of depletion into account. From the beginning of the 1990s, the region's main fish resource from an economic perspective, southern hake (*Merluccius australis*), has been considered to be fully exploited. Subsequently, other species, such as the golden kingklip (*Gerypteris chilensis*), skate (*Zearaja chilensis*), Pacific pomfret (*Brama australis*), and small pelagic fishes such as common sardines (*Strangomera bentincki*)<sup>4</sup> and anchovies (*Engraulis ringens*), were included in this category. This means that the current extraction levels of the main fisheries are legally restricted. For other species, such as algae or some molluscs, captures have not been limited; however, their economic relevance is relatively low.

The third policy instrument is the territorial distribution (zoning) of capture limits (quotas). Some additional fishing captures are enacted under the general legal umbrella of exploratory fishing and fisheries research.<sup>5</sup> Exploratory fishing is a legal figure that allows additional captures for assessing the commercial potential of new resources. Likewise, fisheries research enables extra captures in order to obtain better knowledge about the evolution of biomass in different extraction scenarios (Bernal *et al.* 1999). Fourth is the legal recognition of new *caletas* through specific decrees, which make them a subject of public intervention. In the context of the Southern Chilean coastal border, recognition is the first step to promote the State's involvement in terrestrial accessibility, electricity, health or educational facilities.

All of these regulatory instruments include strong disciplinary elements that are related to Foucault's notion of governmentality. The regulations allow public agencies to establish discretionarily with regard to who can be considered artisanal fishermen, the set of technologies that are available to them, the fisheries that they can exploit and to what extent. Given that the State does not have the capacity to directly control the fishermen's activities along a 2,500-km wide and frequently isolated coastline, the control of the fish that arrives at the processing centres plays a major role. As foreign markets are the main source of monetary income, the exclusion of access to those channels has a major impact on living conditions. In any case, disciplinary instruments have substantially transformed the fishermen's conduct. Before 1991, they were basically nomads, and their operations were essentially unregulated (Aburto *et al.* 2009). At present, they are not only territorially attached to specific regions, but their activity also depends on a set of registers, permits and quotas. All of these elements illustrate broader eco-governmentality dynamics.

Although regulatory and control tools are supported by discourses that are highly technical, the real reasons are not always strictly scientific (Schumann 2007, 2010). Some interviewees were particularly critical in this respect and considered the allocation of exploratory fisheries and fisheries research rights a bargaining chip between lobbyists and public authorities.

For instance, as noted above, in 2009, sardines and anchovies represented more than 80 per cent of captures in the region of Los Lagos. In fact, the levels of extraction were multiplied by 7.5 between 1999 and 2009. Such evolution is difficult to explain with strictly biological reasons because of the close connection among different species in the trophic chains. However, the policy definition is based on scientific discourse that supported the relatively high levels of biomass of those species. Specifically, it was justified in the Technical Report 85 of the Fishing Subsecretary – called the Annual global quote for the anchovy (*Engraulis rigens*) and common sardine (*Strangomera*

*bentincki*) V to X regions, 2009. The same report in 2012 continued to support the statement of the existence of high levels of biomass for the sardine, but not for the anchovy, whose population was significantly reduced.

In any case, this dramatic increase in the catches of those species coincides with the interests of other actors, such as fishmeal processors, their clients and the salmon industry, which is the most important economic activity in the region and one of the most relevant export sectors of Chile (Barton & Floydsant 2010; Rehner *et al.* 2014). Thus, beyond strictly scientific management, there is a broad set of socio-political factors.

The Region of Los Lagos is a particularly interesting case of how the central State's general guidelines for action are applied in a territorially diverse manner, which generates clear territorial asymmetries. As a result, the contribution of the Los Lagos Region to Chile's total artisanal catches was reduced to 9.4 per cent of the total artisanal catch which is far behind the leader regions in Chile, such as Bio-Bio (52.6%) (Sernapesca, Yearbook of Fisher Statistics, 2009). However, Los Lagos's share in the number of artisanal fishermen (34.9%) (Fishing and Aquaculture Census, 2009) and the number of *caletas* that are legally recognised (216 of the 447 existing in Chile, that is, 44.7%) is much higher. In other words, the territorialisation of catching does not correspond with the relevance in terms of the fishermen or the *caletas*.

To summarise, central-regional scale is an essential element in the broader dynamics of scalar politics in a political-economy and post-structural sense. First, it produces a complex set of materialities, regulating and promoting different types of fisheries, which are associated with different levels of income. In this sense, national-regional scale also plays a central role in environmental governance. In a post-structural sense, its discursive justification is supported by social arguments (the reservation of the first five nautical miles for artisanal fishermen) and environmental arguments (the risk of depletion of fisheries). In such discourses, there is a process of production of knowledge and 'truth' through a set of technical reports.



### ARTISANAL FISHING AT THE SUB-REGIONAL SCALE: THE CASE OF THE LOS LAGOS REGION

At the sub-regional scale, different strategic zones have been established. Such zones must be understood as the result of different rounds of occupation and settlement, which, in some cases, have radically modified the landscape. Therefore, they must be understood as scales that are socially constructed as a consequence of the path-dependent processes of historical evolution (Swynge-douw 2007; Gelcich 2010). The urban zone of Reloncaví Bay (which is composed of the *caletas* that are located around the city of Puerto Montt) and the Grand Island of Chiloe have higher levels of human population numbers, landscape transformation and artisanal fishing development. Combined, the two represent approximately 76 per cent of the vessels and fishermen population of the Region of Los Lagos (Fishing and Aquaculture Census 2009). Particularly relevant is the position of Chiloé, with a proportion of approximately 40 per cent of both fishermen and vessels.

The prominent position of Chiloé cannot be understood without considering the continuous generation of maritime knowledge, which is related to higher levels of capital accumulation and to the existence of populations that specialise in fishing activities. Chiloé not only has a higher number of vessels, but these vessels are also larger, which permits a larger action radius. This goes together with longer trips and higher costs.

In ecological terms, the catching strategies in areas such as Chiloé imply that the dominant socio-economic scales are significantly distanced from the ecological scales that regulate the biological reproduction of fish populations. Thus, patterns of eco-governmentality tend to be accompanied by a weakening of the relationship between local resources and human activities (Winder *et al.* 2005; Campbell 2009). Although higher catch levels make the sustainable management of resources more difficult, they facilitate economic circulation processes and, therefore, the realisation of a surplus. Thus, Chiloé and, to a lesser extent,

the urban zone of Reloncaví have differentiated territorial patterns that are more oriented towards the utilisation of distant resources.

In contrast, the sub-regions of Green Patagonia, the interior Sea of Chiloe and Mapu-Lahual, are characterised by less intense processes of occupation and capital accumulation, which results in higher levels of pristinity of the natural environment. Accessibility in these sub-regions is limited: there is no main paved road in Green Patagonia; there is no coastal road in Mapu Lahual; and the majority of the *caletas* are difficult to reach. The Interior Sea is composed by a set of small, sparsely populated islands that are also difficult to reach. Thus, the landscape is very different from that of the more urban and better connected areas. As a consequence, in Green Patagonia, the interior Sea of Chiloé, and Mapu-Lahual, economic activities are based on the exploitation of nearby natural resources, and fishing is done by a lower number of smaller vessels. Therefore, strong or localised co-evolutionary dynamics prevail, which are characterised by an overlapping of socio-economic and ecological scales (Sayre 2005; Winder 2005). In turn, the level of development of artisanal fishing cannot maintain large human populations. The activity of artisanal fishermen must be understood in a context of multi-activity, in which artisanal fishing, small-scale aquaculture, small and peasant-oriented agriculture and, in certain cases, livestock, are combined as sources of income. Thus, each area is tied to different historical patterns of constructed social-ecological systems. In this sense, sub-regions are strongly fixed and inherited scales that act as stabilisers of emergent actors' strategies.

### CALETAS AS LOCAL SCALES IN ARTISANAL FISHING

As stated above, the *caleta* is the basic unit of coastal settlement and territorial organisation of the artisanal fishing sector in Chile. However, *caletas* are heterogeneous because they have simultaneously high levels of fixity and motion. They are related to historical paths

Table 1. *Classification of caletas in the Region of Los Lagos*

Type	Number of vessels*	Number of fishermen
Minor settlements	1 to 9	1 to 257
Low/medium settlements	10 to 29	30 to 300
High medium settlements	30 to 69	100 to 500
Large settlements	70 to 345	More than 200

Notes: \*Vessels are the key element for classifying *caletas* because these villages depend heavily on the number of legally recognised vessels. However, the number of fishermen can vary greatly depending on different factors. For instance, the exploitation of algae is associated with a high number of workers.

Source: Prepared by the authors from data supplied from Fishing and Aquaculture Census (2009).

of capital accumulation, but they can also be deeply emergent, as they go through spontaneous processes of creation and growth. To understand such a complex relationship, it is necessary to approach the various existing classes of *caletas*. Table 1 shows a typology that is based on statistical information (number of vessels and fishermen).

The typology allows us to approach the complexity of the existing network of 216 *caletas* in the Region of Los Lagos. Not only do *Caletas* have different functions, but they also have very different areas of territorial influence. Thus, the influence of the major settlements, such as Calbuco, Carelmapu,

Quellón and Ancud, can extend to the overall region of Los Lagos. Contrastingly, minor settlements with fewer than 10 vessels, have areas of influence that barely reach a few kilometres. Minor settlements are specialised in the exploitation of nearby coastal (land and maritime) resources, as a result of which socio-economic and ecological scales coincide. In contrast, the socio-economic scale of major *caletas* exceeds the carrying capacity of local ecosystems. Thus, *caletas*, as essential elements in the processes of production of space, generate different co-evolutionary processes and result in diverse social-ecological systems and concurrent geographies of concentration and dissemination.

Table 2 shows a high concentration of the artisanal fishing activity in the major settlements. In fact, the minor settlements are dominant from a territorial perspective because they account for 113 of the 216 *caletas* that exist in the region, that is, 52.4 per cent. However, the economic relevance of the minor settlements is limited, with a contribution of 4.8 per cent to the total value added in the Los Lagos Region (Fishing and Aquaculture Census 2009). Conversely, the nine largest settlements, with more than 70 vessels in each, that is, 4.9 per cent of the total *caletas*, have a percentage of nearly 75 per cent of the value added in artisanal fisheries (Fishing and Aquaculture Census 2009).

Additionally, the *caletas*, particularly in the minor and low medium settlements, are unavoidable locations for the promotion of co-management practices (Schumann 2007).

Table 2. *Proportion of different categories of caletas in diverse indicators in the Region of Los Lagos*

	<i>Caletas</i> (N=216)	Vessels (N=5,137)	Fishermen (N=26,578)	Gross production	Value added*
Minor settlements	52.4	10.1	21.1	4.5	4.8
Low medium settlements	31	28.5	25	13	10.7
High medium settlements	12.5	30.8	25.5	13.7	9.6
Large settlements	4.2	30.7	28.4	68.9	74.8

Notes: \*Monetary indicator estimated from data from the Fishing and Aquaculture Census of 2009.

Source: Prepared by the authors from data supplied from Fish and Aquaculture Census (2009) (settlements, vessels and fishermen) and Fisher and Aquaculture National Service (2009) (Gross production and value added).

The diversity of ecosystems and a particularly long coastline require the territorial adaptation of environmental policies, which is only possible at this scale. There are four main mechanisms in which the scalar role of the *caletas* is particularly prominent. The first mechanism is the promotion of the collective forms of sea property through Management and Exploitation Areas for Benthic Resources (MEABRs) (Castilla *et al.* 1998; Gelchich *et al.* 2010, 2013). MEABRs are conservation entities that regulate mollusc and crustacean extraction in certain areas that are exclusively exploited by artisanal fishermen. The three remaining mechanisms are the development of private or communitarian sea farms that primarily cultivate mussels, the regulation of the sharing of the coastal border with the salmon industry (Saavedra 2015), and the implementation of social services and diversification projects, which mainly involve ecotourism (Gajardo & Ther 2011; Biggs *et al.* 2016).

Generally, those new sources of income are socially perceived as being environmentally friendly and, therefore, compatible with sustainable strategies for coastal development. To develop those new activities, the *caletas* are frequently engaged in 'projects', which are sources of income for fishermen and central elements in the actors' *conduct of conduct*. Today, particularly in the minor settlements, artisanal fishing cannot be understood without those complementary activities (Saavedra 2015).

## CONCLUSIONS

Artisanal fishing is an essential feature of the patterns of human occupation and economic specialisation along the southern coastline in Chile, and it contributes to the production of specific social-ecological systems in littoral territories. Scalar politics are not only central aspects in such a context but also highly paradoxical processes in many respects. First, scalar politics in the Southern coastline in Chile are the result of a particularly dynamic equilibrium between fixity and motion, that is, between inherited and emergent scales (Brenner 1998). For instance, the central-

regional scale has a long tradition of regulation and intervention. The legal creation of artisanal fishing, as an area of interest and regulation, began in 1991 with the enactment of the General Law of Fishing and Aquaculture. Similar arguments can be applied to the *caletas*. The element of fixity can be seen in the prevalent role of major settlements in the distribution of captures or in the existing territorial structure of the coves, which is extremely uneven. The element of emergence can be observed in other features, such as the systematic creation of new settlements or the involvement of the *caletas* in the generation of new activities such as tourism, small-scale aquaculture and Benthic Resources Management Areas.

Such tension between fixity and motion occurs in a deeply neoliberalised context. Thus, the prominence of strong processes of governmentality, in which the central State has developed different ways of moulding actors' behaviour (the conduct of the conduct), is not surprising. Such power is supported by the widespread development of disciplinary devices, such as the Artisanal Fishing Register, the declaration of over-exploitation of fisheries, the enactment of capture limits (location-specific quotas), exploratory fishing and fisheries research, the promotion of new projects and the recognition of new *caletas*. Simultaneously, the *caletas* are unavoidable scales in the exploitation and conservation of nearby resources (Schumman 2007, 2010; Castilla 2010; Marin & Berkes 2010). It is the confluence of the actions of different scales that generates effective devices for the actors' *conduct of conduct*.

In this context, environmental issues are increasingly relevant. In fact, there is a strong overlap of socio-economic and environmental scales for the minor settlements. However, in the largest settlements, the ecological scale of operation exceeds the socio-economic scale, which justifies national-regional intervention. The *caletas* of Calbuco, Quellón and Dalcahue have areas of influence that not only include nearby places but also the overall region of Los Lagos. Additionally, sub-regional spaces have developed differentiated forms of resource exploitation by mobilising

different historical, economic, and ecological repertoires, which generate different levels of capital accumulation. Therefore, it can be asserted that scalar politics and eco-governmentality are, in this case, two closely interconnected processes.

The use of discourse is highly relevant in the operation of the different scales. The national-regional scale is closely related to the prevalence of a technocratic-environmentalist discourse that is frequently the result of different pressures, as is shown in the case of the catches of small pelagic in the region of Los Lagos. In turn, *caletas*, particularly the smallest settlements, are strongly involved in the generation of a discourse in which they become active co-managers in the development of a set of alternative and environmentally-friendly activities.

Further, from a discursive and post-structural perspective, the prevalence of technical arguments is one the reasons that explains a paradoxical process of territorialisation. Decision-making is concentrated in the National-Regional scale in a mainly technocratic way. The *caletas* have been recognised; however, their activity is mostly focused on adjacent and complementary activities (MEARB, mussel aquaculture or tourism). Their role is based more on an 'imagined' future than on an effective transformation of inherited scalar fixes (Saavedra 2015).

To summarise, the social construction of coastal territories in Southern Chile cannot be understood without considering a vertical element that is concretised in scalar politics. In this sense, the existence of different ecological and social scales, which do not always coincide, is a critical factor in the emergent practices of co-management and construction of socio-ecological systems. This construction is simultaneously material and discursive, inherited and emergent.

#### Notes

1. Supreme Decree number 240 modified by Supreme Decree number 337
2. Information obtained from interviews to experts, public administration staffs and fishermen associations.
3. President of an artisanal fishermen association, man, 60 years old.

4. Austral sardine (*Sprattus fuegensis*) was under the regime of exploratory fisheries until 2012 (Subsecretaría de Pesca y Acuicultura, 2013).
5. It is the translation of the Spanish expressions *Pesca de Investigación* and *Investigación Pesquera*.

#### REFERENCES

- ADAMS, W. M., I. D. HODGE & L. SANBROOK (2014), New Spaces for Nature: The Re-territorialisation of Bio-diversity Conservation under Neoliberalism in the UK. *Transactions of the Institute of British Geographers* 39, pp. 574–588
- AGRAWAL, A. (2005), *Environmentality: Technologies of Government and the Making of Subjects*. Durham NC: Duke University Press.
- ALFONSO, J. (1900), *Un Viaje a Valdivia. La Civilización en Chile*. Santiago de Chile: Imprenta Moderna.
- ABURTO, J., M. THIEL & W. STOLTZ (2009), Allocation of Effort in Artisanal Fisheries: The Importance of Migration and Temporary Fishing camps. *Ocean & Coastal Management* 52, pp. 646–654.
- BARTON J.R. & A. FLOYSAINT (2010), The Political Ecology of Chilean Salmon Aquaculture, 1982–2010: A Trajectory from Economic Development to Global Sustainability. *Global Environmental Change* 20, pp. 739–752.
- BERKES, F. (2006), From Community-based Resource Management to Complex Systems. *Ecology and Society* 11, 45. Available at <<http://www.ecologyandsociety.org/vol11/iss1/art45/>>. Accessed on 2 November 2017.
- BERKES, F. (2009), Evolution of Co-management: Role of Knowledge Generation, Bridging Organizations and Social Learning. *Journal of Environmental Management* 90, pp. 1692–1702.
- BERNAL, P.A., D. OLIVA, B. ALIAGA, & C. MORALES (1999), New Regulations in Chilean Fisheries and Aquaculture: ITQs and Territorial Users Rights. *Ocean & Coastal Management* 42, pp. 119–142.
- BIGGS, D., F. AMAR, A. VALDEBENITO & S. GELCICH (2016), Potential Synergies between Nature-based Tourism and Sustainable Use of Marine Resources: Insights from Dive Tourism in Territorial User Rights for Fisheries in Chile. *PLoS ONE* 11. <https://doi.org/10.1371/journal.pone.0148862>.
- BRENNER, N. (1997), State Territorial Restructuring and the Production of Spatial Scale. *Political Geography* 16, pp. 273–306.

- BRENNER, N. (1998), Between Fixity and Motion: Accumulation, Territorial Organization, and the Historical Geography of Spatial Scales. *Environment and Planning D: Society and Space* 16, pp. 459–481.
- BRENNER, N. (2004), *New State Spaces: Urban Governance and the Rescaling of Statehood*. Oxford: Oxford University Press.
- BOYLE, M. (2002), Cleaning Up after the Celtic Tiger: Scalar 'Fixes': The Political Ecology of Tiger Economies. *Transaction of the Institute of British Geographers* 27, pp. 172–194.
- BULKELEY, H. (2005), Reconfiguring Environmental Governance: Towards a Politics of Scales and Networks. *Political Geography* 24, pp. 875–902.
- CASTILLA, J.C. (2010), Fisheries in Chile. Small Pelagics, Management, Rights and Sea Zones. *Bulletin of Marine Science* 86, pp. 221–234.
- CASTILLA, J.C. & M. FERNANDEZ (1998), Small-scale Benthic Fisheries in Chile: On Co-management and Sustainable Use of Benthic Invertebrates. *Ecological Applications* 8, pp. 124–132.
- CASTILLA, J.C., R. MANRÍQUEZ, J. ALVARADO, A. ROSSON, C. PINO, C. ESPOZ, R. SOTO, D. OLIVA & O. DEFEQ (1998), Artisanal Caletas as Units of Production and Co-managers of Benthic Invertebrates in Chile. In: G.S. JAMIESON & A. CAMPBELL, eds. *Proceedings of the North Pacific Symposium on Invertebrate Stock Assessment and Management*, pp. 407–413. Ottawa: NRC Research Press.
- CASTREE, N. (2008), Neoliberalising Nature: The Logics of Deregulation and Reregulation. *Environment and Planning A* 40, pp. 131–152.
- DE LAIRE F. (2001), Está Chile o no por la Sustentabilidad de la Pesca Artesanal? Algunas Reflexiones Teóricas a Partir del Análisis de la Situación de la Primera Región. *Revista de Ciencias Sociales* 11, pp. 99–122.
- DELANEY D. & H. LEITNER (1997), The Political Construction of Scale. *Political Geography* 16, pp. 93–97.
- DEAN, M. (1999), *Governmentality: Power and Rule in Modern Societies*. London: Sage.
- DRESSLER, W. (2014), Green Governmentality and Swidden Decline on Palawan Island. *Transactions of the Institute of British Geographers* 39, pp. 250–264.
- FOUCAULT, M. (2004), *Society Must be Defended: Lectures at the Collège de France, 1975–1976*. London: Penguin.
- FOUCAULT, M. (2009), *Security, Territory, population Lectures at the Collège de France, 1977–1978*. Basingstoke: Palgrave MacMillan.
- GAJARDO, C. & F. THER (2011), Saberes y Prácticas Pesquero-artesanales: Cotidianidades y Desarrollo en las Caletas de Guabún y Puñihuil, Isla de Chiloé. *Chungará Revista de Antropología Chilena* 43: 589–605.
- GELCICH, S., G. EDWARD-JONES, M.J. KAISER. & E. WATSON (2009), Using Discourses for Policy Evaluation: The Case of Marine Common Property Rights in Chile. *Society & Natural Resources* 18, pp. 377–391.
- GELCICH, S., T.P. HUGHES, P. OLSSON, C. FOLKE, O. DEFEQ, M. FERNÁNDEZ & R.S. STENECK (2010), Navigating Transformations in Governance of Chilean Marine Coastal Resources. *Proceedings of the National Academy of Sciences* 107, pp. 16794–16799.
- GIBBS, D. & A.E. JONAS (2000), Governance and Regulation in Local Environmental Policy: The Utility of a Regime Approach. *Geoforum* 31, pp. 299–313.
- GOLDMAN, M. (2001), Constructing an Environmental State: Eco-governmentality and Other Transnational Practices of a 'Green' World Bank. *Social Problems* 48, pp. 499–523.
- GONZÁLEZ, S. (2006), Scalar Narratives in Bilbao: A Cultural Politics of Scales Approach to the Study of Urban Policy. *International Journal of Urban and Regional Research* 30, pp. 836–857.
- GORDON, C. (2002), Introduction. In: M. FOUCAULT. *Power: The Essential Works of Michel Foucault*, pp. xi–xli. London: Penguin Books.
- GUAL, M. & R.B. NORGAARD (2010), Bridging Ecological and Social Systems Coevolution: A Review and Proposal. *Ecological Economics* 69, pp. 707–717.
- HARVEY, D. (1982), *The Limits to Capital*. Oxford: Blackwell.
- HARVEY, D. (2005), *Brief History of Neoliberalism*. Oxford: Oxford University Press.
- INE (2014), Chile: Estimaciones y Proyecciones de Población por Sexo y Edad. Regiones 1990–2020. Available at <[http://www.ine.cl/canales/chile\\_estadistico/demografia\\_y\\_vitales/proyecciones/Informes/MicrosoftWordInforReg\\_T.pdf](http://www.ine.cl/canales/chile_estadistico/demografia_y_vitales/proyecciones/Informes/MicrosoftWordInforReg_T.pdf)>. Accessed on 20 April 2017.
- JESSOP, B. (2007), From Micro-powers to Governmentality: Foucault's Work on Statehood, State Formation, Statecraft and State Power. *Political Geography* 26, pp. 34–40.

- KALLIS, G. (2007), When is Coevolution? *Ecological Economics* 62, pp. 1–6.
- KALLIS, G. & R. B. NORGAARD (2010), Coevolutionary Ecological Economics. *Ecological Economics* 69, 690–699.
- KAISER, R. & N. NIKIFOROVA (2008), The Performativity of Scale: The Social Construction of Scale Effects in Narva, Estonia *Environment and Planning D, Society and Space* 26, pp. 537–562.
- LEBEL, L., P. GARDEN, & M. IMAMURA (2005), The Politics of Scale, Position, and Place in the Governance of Water Resources in the Mekong Region. *Ecology and Society* 10. Available at <<http://www.ecologyandsociety.org/vol10/iss2/art18/>>. Accessed on 2 November 2017.
- MACKINNON, D. (2011), Reconstructing Scale: Towards a New Scalar Politics. *Progress in Human Geography* 35, pp. 21–36.
- MARIN A & F. BERKES (2010), *Network Approach for Understanding Small-scale Fisheries Governance: The Case of the Chilean Coastal Co-management System*. *Marine Policy* 34, pp. 851–858.
- MARSTON, S.A. (2000), The Social Construction of Scale. *Progress in Human Geography* 24, pp. 219–242.
- MARSTON, S., J.P. JONES III & K. WOODWARD (2005), Human Geography without Scale. *Transactions of the Institute of British Geographers* 30, pp. 416–432.
- MARSTON, S.A. & N. SMITH (2001), States, Scales and Households: Limits to Scale Thinking? A Response to Brenner. *Progress in Human Geography* 25, pp. 615–619.
- MCCARTHY, J. (2005), Scale, Sovereignty and Strategy in Environmental Governance. *Antipode* 37, pp. 731–753.
- MCCARTHY J. & S. PRUDHAM (2004), Neoliberal Nature and the Nature of Neoliberalism. *Geoforum* 35, pp. 275–283.
- MOORE, A. (2008), Rethinking Scale as a Geographical Category: From Analysis to Practice. *Progress in Human Geography* 32, pp. 203–225.
- MORENO-PENARANDA, R. & G. KALLIS (2010), A Coevolutionary Understanding of Agrienvironmental Change. A Case-study of a Rural Community in Brazil. *Ecological Economics* 69, pp. 770–778.
- NEUMANN, R.P. (2009), Political Ecology: Theorizing Scale. *Progress in Human Geography* 33, 398–406.
- NORGAARD, R.B. (1981), Sociosystem and Ecosystem Coevolution in the Amazon. *Journal of Environmental Economics and Management* 8, pp. 238–254.
- NORGAARD, R.B. (1984), Coevolutionary Agricultural Development. *Economic Development and Cultural Change* 32, pp. 525–546.
- OLSSON P., C. FOLKE, & F. BERKES (2004), Adaptive Comanagement for Building Resilience in Social-Ecological Systems. *Environmental management* 34, pp. 75–90.
- RANGAN H. & C. A. KULL (2009), What Makes Ecology Political? Rethinking Scale in Political Ecology. *Progress in Human Geography* 33, 28–45.
- REHNER, J., S.A. BAEZA & J.R. BARTON (2014), Chile's Resource-based Export Boom and its Outcomes: Regional Specialization, Export Stability and Economic Growth. *Geoforum* 56, pp. 35–45.
- RIOS-NÚÑEZ, S., D. COQ-HUELVA & R. GARCÍA-TRUJILLO (2013), The Spanish Livestock Model: A Co-evolutionary Analysis. *Ecological Economics* 93, pp. 342–350.
- SAAVEDRA, G. (2011), *Perspectivas Culturales del Desarrollo en las Costas Australes de Chile. Aproximación Antropológica a las Persistencias y Transformaciones de las Economías de Pesca Artesanal en el Litoral de Aisén* (PhD Dissertation). Available at <<http://eprints.ucm.es/12843/1/T33081.pdf>>. Accessed on 14 April 2017.
- SAAVEDRA, G. (2015), Los Futuros Imaginados de la Pesca Artesanal y la Expansión de la Salmonicultura en el Sur Austral de Chile. *Chungará Revista de Antropología Chilena* 47, pp. 521–538.
- SAAVEDRA G. & A. MACÍAS (2012), Transformaciones del Espacio Marino Costero en el Sur-austral de Chile. Actores, Desarrollo e Intervención Territorial In: M.T. AYLÓN, ed, *Conflictos de Poder Sobre el Espacio: Historia, Naturaleza y Gestión*, pp. 359–382. México City: Eumed y Conacyt-Uaslp-Sae.
- SAYRE, N.F. (2005), Ecological and Geographical Scale: Parallels and Potential for Integration. *Progress in Human Geography* 29, pp. 276–290.
- SCHUMANN, S. (2007), Co-management and Consciousness: Fishers' Assimilation of Management Principles in Chile. *Marine Policy* 31, pp. 101–111.
- SCHUMANN, S. (2010), A Tenuous Triumvirate: The Role of Independent Biologists in Chile's Co-management Regime for Shellfish. *Marine Policy* 34, pp. 133–138.
- SWNGEDOUW, E. (1997), Neither Global nor Local: 'Glocalization' and the Politics of Scale.

- In: K.R. COX, ed, *Spaces of Globalization*, pp. 137–166. New York: Guilford Press.
- SWYNGEDOUW, E. (2000), Authoritarian governance, power and the politics of rescaling. *Environment and Planning D: Society and Space* 18, pp. 63–76.
- SWYNGEDOUW, E. (2007), Technonatural Revolutions: The Scalar Politics of Franco's Hydro-social Dream for Spain, 1939–1975. *Transaction of the Institute of British Geographers* 32, pp. 9–28.
- TURNER, T. (2006), Shifting Scales, Lines and Lives: The Politics of Conservation Science and Development in the Sahel. In: K. ZIMMERER, ed, *Globalization and new geographies of conservation*, pp. 166–185. Chicago, IL: Chicago University Press.
- WHITE, D.F. & C. WILBERT (2006), Technonatural Time/Spaces. *Science as Culture* 15, pp. 99–104.
- WINDER, N., B.S. MCINTOSH & P. JEFFREY (2005), The Origin, Diagnostic Attributes and Practical Application of Coevolutionary Theory. *Ecological Economics* 54, pp. 347–361.
- WORSTER, D. (1994), *Nature's Economy* Cambridge: Cambridge University Press.
- WYNN, D. ed. (2004), *Victims of the Chilean Miracle: Workers and Neoliberalism in the Pinochet Era, 1973–2002*. Durham, NC: Duke University Press.
- ZIMMERER, K. (2000), Rescaling Irrigation in Latin America: The Cultural Images of Political Ecology of Water Resources. *Ecumene* 7, pp. 150–175.
- ZUNINO, H.M. (2001), La Planificación Urbana en el Chile de Hoy: Actores Sociales Estructurados y la Construcción de Redes de Gobernabilidad. *Revista de Geografía Norte Grande* 28, pp. 73–78.