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Marine Indigenous Areas: Conservation Assemblages for Sustainability in Southern Chile

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ABSTRACT

Globally, Indigenous Marine Areas are contributing to ocean sustainability by protecting key habitats and species whilst safeguarding customary uses for local communities. They are emerging as one of the key political mechanisms that can counteract the ravages of the blue Anthropocene. Nevertheless, their contributions are threatened by the accelerating expansion of economic activities, and exclusionary marine governance systems, affecting both marine biodiversity and human wellbeing. In southern Chile, indigenous communities have been countering the expansion of the salmon farms by promoting the establishment of *Espacios Costeros Marinos para Pueblos Originarios* (here called Indigenous Marine Areas or IMAs). These IMAs are being developed by coastal communities to protect traditional or customary coastal uses, and revitalizing culture whilst contributing to marine conservation. Using a relational theoretical approach and mixed methods, the paper presents the major trends in the implementation of IMAs in Chile. Through the case of the Los Lagos Region, it shows how the action-network that pursued the designation of IMAs is continuing today. The paper stresses the role of conservation assemblages to lead collective actions, showing how these constellations of agents have been interacting during the decision-making process and institutional building, whilst promoting the establishment of IMAs as place-based democratic mechanism to promote the sustainability of the southern Chile.

KEYWORDS

Action-network; conservation assemblages; marine indigenous areas; Southern Chile

1. Introduction

Chile has a coastline of at least 6435 km stretching from the northern deserts to the humid forested islands and glacier carved archipelagos of the south. Contemporary spatial demand for aquaculture in this coastal zone has been accelerating, expanding the salmon and mussel farms across southern Chile through the blue economic growth paradigm (Bustos-Gallardo 2017). Since the late 1970s, Chilean neoliberal policy has focused on the privatization of the commons and the exportation of commodities. This led to the boom of industrial and artisanal fisheries at the 1980s and 1990s - and the

consequent overexploitation of several species (Gelcich et al. 2010). In response, Chilean marine efforts have been to amplify aquaculture. Currently, Chile is the second largest exporter of salmon and mussel, and about 90% is concentrated in the Regions of Los Lagos, Aysén and Magallanes (Anbleyth-Evans et al. 2020).

While still riding a wave of potential economic success in the mid-1990s and 2000s, the aquaculture industry's impacts began to show demonstrate ecological deterioration (Bustos-Gallardo and Román 2019). Subsequently, several studies have revealed the socio-environmental impacts of the industry. This includes the excessive use of antibiotics, nutrient loading and eutrophication (Buschmann and Fortt 2005); subsequent die off of cold water corals from harmful algal blooms (Försterra et al. 2014); the escape of salmon and their incorporation into wild trophic chains (Niklitschek et al. 2013); the accumulation of garbage on beaches and the seabed (Thiel et al. 2011) and the identification of these ecological impacts by IMA communities (Anbleyth-Evans et al. 2020). Additional socio-economic changes include intra and extra-regional migration processes due to new job offers, alteration in local livelihoods and conflicts over natural resources (Amtmann and Blanco 2001; Saavedra 2013; Román et al. 2015).

The ISA (Infectious salmon anemia) outbreak of 2007 and the subsequent sanitary crisis, was a key moment, exposing globally the negative impacts of the industry and crashing the confidence of the citizens about the promises of the industry (Bustos-Gallardo and Irarrazaval 2016). Hence, southern Chile is a classic example of the blue Anthropocene (Anbleyth-Evans 2018), where a vast and biodiverse marine space is subject to multiple overlapping economic interests: fishing and industrial aquaculture, urban and port development, mass tourism, with negative impacts over the socioecological systems.

Across the world, different indigenous or stateless nations marine communities are in contestation with states with human rights abuses, discrimination and environmental injustice (Jentoft, Minde, and Nilsen 2003; Kymlicka 2007; Stacey et al. 2017). Some may lack either spatial access, or resource rights to the sea and coast (Bennett et al. 2018; Craig 2018), others lack parity of participation in decision making over development (Anbleyth-Evans 2018), while others lack concrete recognition (Raymond-Yakoubian and Daniel 2018) and are unable to voice their concerns and interests effectively (Jentoft et al. 2019). However, some groups are alternatively progressively taking back their rights supporting a resurgence of conservation of the marine environment (Von der Porten et al. 2019; Bennett et al. 2018; Luque and Doode 2007). Indigenous Peoples often express deep cultural and spiritual ties to their seascapes, and their sea tenures in some cases represent some of the oldest forms of marine conservation, such as in Fiji and around the Pacific (Govan 2015), and many other places (Sejersen 2004; Poepoe, Bartram, and Friedlander 2007; Nursey-Bray 2011; Davies et al. 2018; Prasetyo, Carr, and Filep 2020).

In Chile, the overexploitation and contamination brought on by overdevelopment through aquaculture and fisheries sees limited enforcement, through market enabling, rather than regulating environmental laws (Tecklin, Bauer, and Prieto 2011). Given these anthropogenic activities disruptions continue to accelerate, seeing the disturbance of the majority of the planet's marine ecosystems (Angus 2016). Alternative mechanisms such as IMAs need greater attention, to evaluate how their marine spatial planning for conservation is emerging and can be strengthened.

Responding to these sustainability challenges, *Espacios Costeros Marinos para Pueblos Originarios* (ECMPOs, herein called Indigenous Marine Areas - IMAs), have been requested by various original or indigenous communities over the last twelve years, while attempting to counteract the ravages of the blue Anthropocene. Many of these indigenous communities aim to engage with IMAs as a marine conservation tool (Hiriart-Bertrand, Silva, and Gelcich 2020; Araos et al. 2020; Anbleyth-Evans et al. 2020).

This article examines the major spatial and social trends of IMAs focusing particularly on Los Lagos in the south of Chile, a region of similar size to Scotland. It explores the tension with other property rights and socio-political process related with its implementation. Focusing in the Los Lagos Region, where 70% of the IMAs have been requested, the analysis stress the role of conservation assemblages to lead collective actions. The paper shows how this constellation of agents have been interacting during the decision-making process. How they have been working to promote the establishment of IMAs, as a place-based and democratic mechanism to deal with environmental damage and political exclusion of indigenous peoples.

Hence, the paper contributes to current debates on ocean transformations by identifying emergent actions and the action-network of marine indigenous areas of southern Chile.

2. Theoretical framework: marine indigenous areas as conservation assemblages

As with many other environmental challenges, conservation is a sociopolitical phenomenon framed by a constellation of agents embedded in “glocal” networks (Haller et al. 2019), rooted on the disputes over natural resources and shaped by specific institutional systems (Araos and Ther 2017). Considering this, diverse socio-ecological system’s approaches have been revising classical theories of human/environment interactions. They have been introducing relational concepts to deal with the uncertainty and the heterogeneity of the ecosystems, to explain this socio-ecological complexity. Assemblage is one key concept in such “relational turn” in social science (Latour 2008; Donati and Archer 2015), which can be understood as a non-linear process of composition of multiple agents, discourses and institutions, the result of which is the emergence of social entities that shape social reality in a given time and space (DeLanda 2006).

Assemblage emphasizes the process of composition (Anderson et al. 2012), working on “gathering heterogeneous elements, forging connections between them and sustaining them against tensions” (Li 2007, 264). The concept of assemblage has been used in the environmental field in attempts to understand how multiple agents - including human and non-human - respond to environmental degradation (Briassoulis 2017); and how this collective action shapes common pool resources disputes and uses (Haller 2017). Briassoulis (2017) proposed the concept of “response assemblages” as “an open, geographically and historically located, provisional concept that emerges from a process of aggregation of heterogeneous components: human, biophysical, material and immaterial, mobile and immobile, in a useful set for a specific time and place, which conforms in a process of permanent feedback, the specific responses that humans give to

environmental degradation” (p. 174). For Briassoulis the assemblage approach contributes to the analysis of the environmental degradation by the recognition of the role of actor’s agency in policy-making, by facilitating or obstructing institutional interventions.

On the other hand, Haller (2017) discusses the Briassoulis’s assemblage approach recognizing the contribution of the concept to open the analysis to “diving deeper into individual and group-related perceptions and decision-making” (p. 208); however, criticizing the notion that in the assemblage process “people accidentally mix institutional aspects as they see fit and without much reflection” (p. 210). For this author, an assemblage approach should consider strategic and deliberative actions of the actors, as a way to understand power and bargaining relations in the decision-making process.

Haller et al. (2019) introduced institutional analysis into the “relational turn”, proposing the New Institutional Political Ecology (NIPE) approach, a framework which addresses the multiplicity, heterogeneity, emergency and uncertainty inherent to human/environment relations. NIPE stress the process of institutional building within socioecological complexity. It highlights the power dynamics and agents’ interactions shaping the “policy driven ideas to support the protection of local resources users from the commons grabbing and to strengthen resilience of their livelihoods and their cultural landscape ecosystem” (Haller et al. 2019, 115).

Hence, we propose “conservation assemblages” as a combination of Brasoullis and Haller relational approaches. It is as a way to understand the constellation of agent/network interactions in the institutional building of common pool resources. Beyond the formal institutional analysis of the evolution of a specific conservation rule (such as those found to fisheries in an IMA) the concept of conservation assemblage allows the reader to appreciate why actors with ethnic, class, ideological or ontological difference converge on a common collective action.

3. Methodology

The research was carried out using mixed methods combining document analysis, ethnography, interviews and social network analysis, focusing on the implementation process of IMAs in the Los Lagos Region. The first stage of the research concentrated on the analysis of documents containing spatial and sociodemographic data available from public sources as Geospatial Infrastructure Data Service (IDE), Undersecretary of Fisheries (SUBPESCA), National Indigenous Development Corporation (CONADI), Municipal governments, and national and regional newspapers. Additional data including reports on customary use, management plans and the identification of documents relating to the indigenous communities, were requested through transparency channels.

Anthropological research was carried out over 27 days of ethnographic fieldwork in diverse coastal communities around the Provinces of Osorno, Llanquihue, Palena and Chiloé, during 2019. We conducted 54 in-depth interviews with diverse actors involved in the IMAs implementation process (35 community leaders, 12 NGOs and civil society agents, and 7 public officials). The interviews contained open questions about the decision-making process, and a closed questionnaire of social networks. The qualitative information was organized and analyzed through Atlas.Ti software.

Table 1. Methodology Summary.

IMAs implementation process		Institutional Building	Social relations
Methodological instruments		<ul style="list-style-type: none"> • Review of public information • Ethnographic observation • In-depth interview 	<ul style="list-style-type: none"> • In-depth interview • Questionnaire
Unit of analysis / Approach		NIPE	SNA
Conservation assemblage	Geographic distribution		X
	Collective action	X	X
	Institutional dynamics	X	
	Decision-Making process	X	X

To analyze the action-network we use social networks analysis (SNA). This methodology is a socio-anthropological strategy that uses quantified operations to describe how agents (o nodes) form relationships between them (links or ties), and allows analyzing the qualities or characteristics of these relationships, such as the structure of the network, subgroups within it, and the position or role that agents play (Hanneman and Riddle 2005). This perspective arises from the consolidation of the relational and stakeholder approaches in social theory, applied to natural resource management and marine conservation (Bodin, Crona, and Ernstson 2006; Alexander and Armitage 2015).

SNA uses a special kind of information, called *relational data*, which refers to information associated with links between agents of a network, instead of attributive information about them. This information was consulted through the in-depth interviews and focuses to find the IMAs support network. Each interviewee, especially the leaders of the indigenous communities, was asked about what agents or organizations assisted them in the application process. Also, what kind of support they received (or provided in the case of NGOs and other activists). In this paper we present the SNA of 28 IMAs from Los Lagos Region. Our interest was focused on identifying: i) the type of actors that make up the network; ii) the most influential actors in the network (i.e., considered here as those with the most relationships); iii) the structure of relationships that make up the network (particularly, modularity or the presence of subgroups within the network). Responses were systematized as nodes and edges tables, which were later processed by Gephi (Bastian, Heymann, and Jacomy 2009), a specialized software, capable to use this quantified information to generate the sociograms or network diagrams. Table 1 summarizes the elements of the methodology.

The analytical integration of the diverse sources and methodological instruments allowed us to identify the major trends of the IMAs in Chile and Los Lagos Region, and to analyze both the process of institutional building and the action-network that support the conservation assemblage.

4. Results: indigenous marine areas in Chile and Los Lagos region

Since the neoliberal dictatorship Chile has seen the perpetuation and privilege of private property over marine commons, leading to private profit and ecological impacts. It has led to the zonation of 80% of areas within 5 nm as appropriate for aquaculture over other uses (Tecklin 2015) such as traditional/customary harvesting of shellfish banks, small-scale fisheries and cultural practices (Anbleyth-Evans et al. 2020).

Table 2. Total IMA's area requested and declared by each region of Chile.

Total Areas (hectares)	Atacama	Biobio	Araucanía	Los Ríos	Los Lagos	Aysén	Magallanes	Total Chile
Requested	87,81	285990,11	62146,65	235155,21	1629998,26	1081474,12	319617,59	3.614.469,75
Declared			26453,9		17614,03			44.067,93

Source: Elaborated by the authors based on data from SUBPESCA, at March 2020.

Following this “ocean grabbing” (Bennett, Govan, and Satterfield 2015) indigenous communities and social movements pushed for the development of IMAs through the Lafkenche Law in 2008 (Law 20.249). It was a way to contest the privatization of the commons, and at the same time to promote legal recognition of the historical, socio-cultural and ecological relationships of indigenous peoples’ with the sea and their natural resources (Araos et al. 2020; Gissi et al. 2017; Nahuelpan 2016; Espinoza 2016; Outeiro et al. 2015; De la Maza and Flores 2012).

In the Lafkenche Law, customary use is defined as any practice and behavior by an indigenous community or a group of indigenous people that are regularly performed and recognized by an ethnic group as an expression of their culture (Law 20.249/2008). In practical terms, arguments on customary use have been used to protect traditional subsistence activities, such as algal and seafood gathering; religious beliefs and sacred places, such as where *ngen*¹ exist or *menoko*;² and to protects local biodiversity hot spots, such as islands, wetlands and fjords.

At the beginning of the implementation of the IMAs, the Mapuche-Lafkenche indigenous communities settled in the southern regions were the first to request IMAs. Over the last years there are also requests and IMAs under development from Huilliches, Kaweskar and Diaguitas communities, turning the implementation of the IMA policy a national marine issue.

The first IMA declared by the government was Punta Capitanes in 2012, requested by Altué Indigenous Community, on the coastal zone of the Municipality of Fresia, Los Lagos Region. This IMA protects 10 hectares of the Capitanes Bay, an isolated place where the indigenous community settled around 100 years ago. Altué Indigenous Community is composed by 14 mapuches-huilliches families and currently approximately 10 persons live permanently at Punta Capitanes. After this year, the amount of IMAs requested expanded in number and size, bringing together more communities. For instance, IMA Carelmapu, at the Municipality of Maullín, aims to protect 28563 hectares, including beaches, islands and wetlands. This IMA was requested at 2019 by an association of six indigenous communities, including approximately 160 persons. Hence, IMAs implementation process is beginning to show an incremental trend in terms of number, size, aims and social complexity.

At the national level, 96 IMAs have been requested (3.614.469,75 ha), with only 12 declared, corresponding to 1.22% of the total (44.067,93 ha). Eleven of them are located in the Los Lagos Region, with 17,614 out of a total of 1.629.998 hectares requested during the ten years of approval of the law (see Table 2).

From 2009 to 2019, 70 IMAs have been requested in the Los Lagos Region by different indigenous communities (see the historical evolution in Figure 1). It is the region with the largest number of applications in Chile.

In the Los Lagos Region, the IMAs are distributed in 29 in the continental Provinces of Osorno, Llanquihue and Palena and 41 in the Province of Chiloé. They are

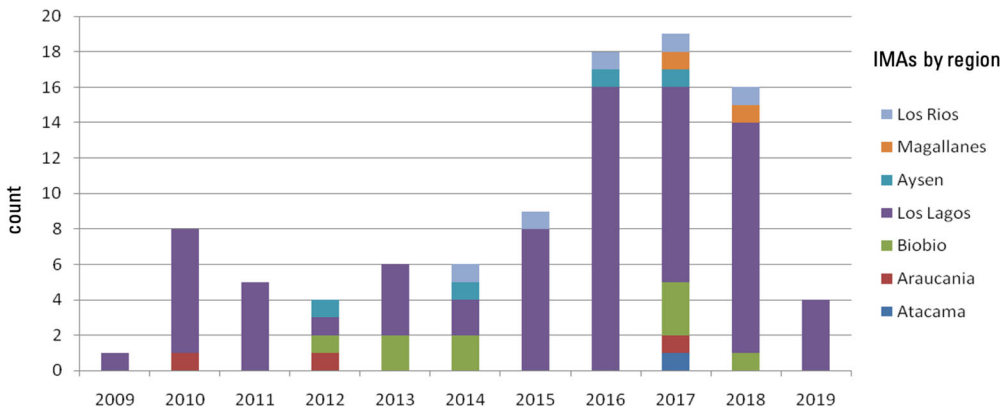


Figure 1. Historical evolution of IMAs applications at national level and distributed by region. *Source:* Elaborated by the authors based on data from SUBPESCA at March 2020.

distributed along the entire regional coastline, from the municipality of San Juan de la Costa in the north, to the Municipality of Quellón in the south. The eleven IMAs decreed are: Huentetique, Buta Lauquen Mapu and Caulin in the Municipality of Ancud; Pucatue in the Municipality of Chonchi; Punta Capitanes and Punta San Luis in the Municipality of Fresia; Bahía San Pedro, Manquemapu and Mahuidantu in the Municipality of Purranque; Trincao in the Municipality of Quellón; and Córdor in the Municipality of Rio Negro.

During the IMAs implementation process there have been several conflicts and territorial tensions. The co-existence of indigenous communities with artisanal fishers and aquaculture entrepreneurs, and the overlapping of diverse territorial rights, as MEABRs,³ AAAs⁴ and MPAs⁵ (see Figure 2), put IMAs at the center of many disputes.⁶ For some of the artisanal fisher organizations IMAs represent the loss of the open access areas and new restrictions to their productive activities, whilst for aquaculture industry IMAs are seen as a barrier to the development of southern Chile. A fisherman from Cochamó explained and complained about IMAs in the region:

“(IMAs) brought a lot of problems, stopped all the marine concessions: maritime concessions, aquaculture concessions, so we saw it as a problem” (Fisher, July 12th 2019)

These tensions have been identified in national and regional newspapers, specifically when IMAs were reviewed, *e.g.*, the government could reduce the size of the polygon and authorize other users. The narrative of the “barrier to development” has been a powerful frame mobilized by the critics of IMAs (Musquiz 2017, 2018; Schnaltdt 2019), which have encountered the political support of the industrial aquaculture association (Salmon Chile), some fishers leaders, local mayors, and other regional politicians.

However, there are cases where these actors have reached agreements about IMAs size, overlapping areas and uses. One of this case is IMA Mañihueico-Huinay at Palena province. This IMA cover a surface of 90.000 hectares including island, bays and fjords, a zone with several salmon and mussels’ farms, artisanal fishers *caletas*, and a high marine biodiversity (Anbleyth-Evans et al. 2020). The agreement between the indigenous communities, artisanal fishers and aquaculture companies, recognize the potential contribution of the IMA for the protection of this high productive and biodiverse

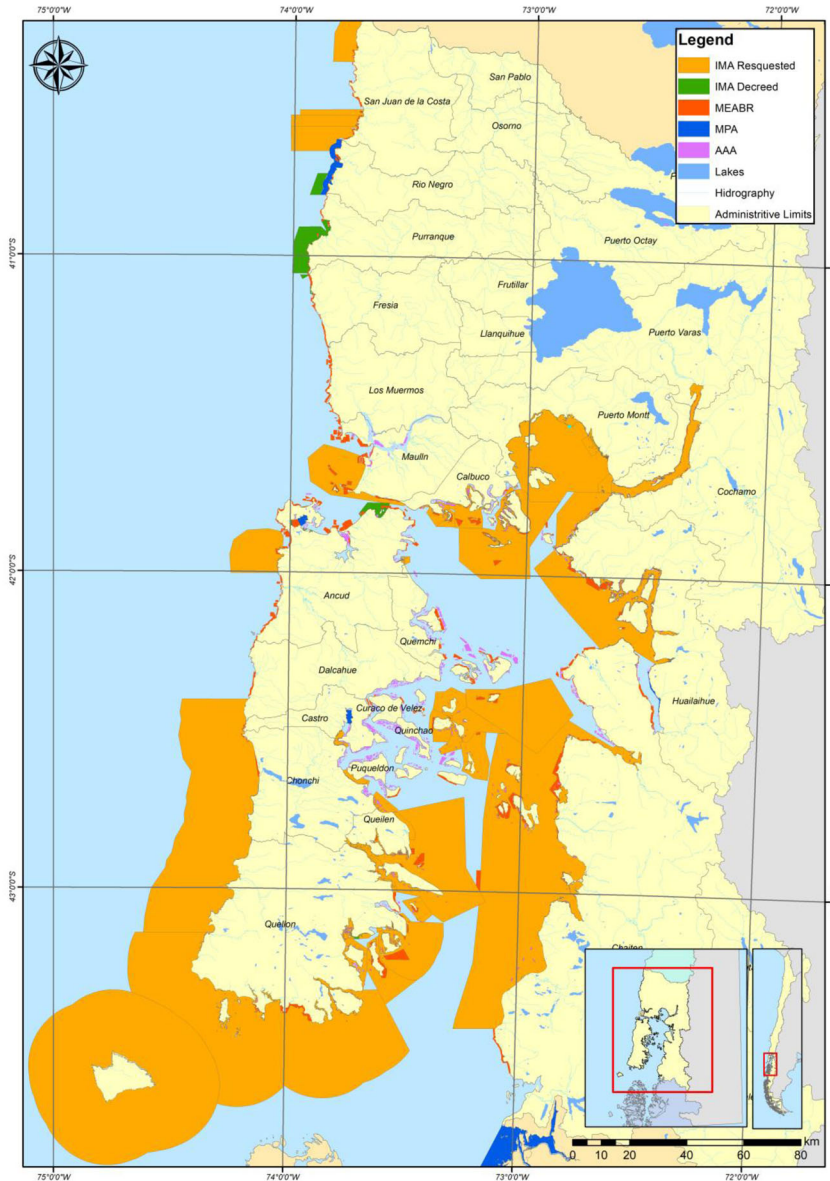


Figure 2. Map of the distribution and state of the Indigenous Marine Areas (IMAs), Management and Exploitation Area for Benthic Resources (MEABRs), Aquaculture Appropriate Areas (AAA) and Marine Protected Areas (MPAs) in Los Lagos Region at March 2020. *Source:* Elaborated by the authors based on data from SUBPESCA.

ecosystem and the economic activities of this zone. The agreement aims to recognize that dialogue between indigenous communities and other natural resources users is based on the mutual co-existence toward a sustainable common future.⁷

Additionally, the potential transformation of the marine zone through IMA is explored through the efforts of conservationist action-networks. In the cases of the

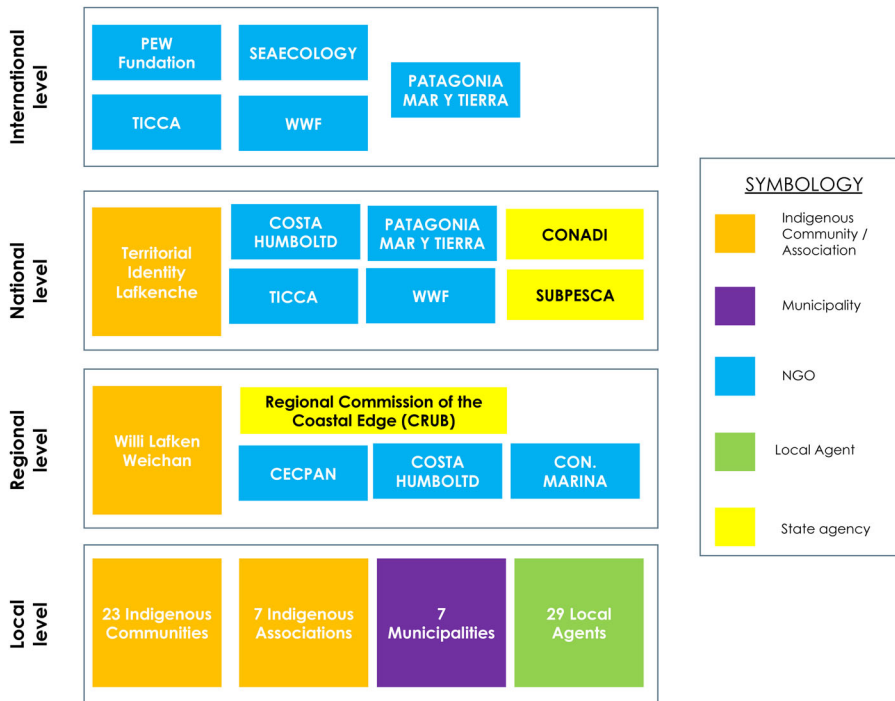


Figure 3. Indigenous Marine Areas's Actors map from Los Lagos Region.

IMAs Wafo Wapi in the municipality of Quellón, southern Chiloé, and IMA Chaitén, in the Palena Province, the process was supported by local activists, NGOs, international donors and scientists (WWF 2020; Qué Pasa 2019). These IMAs have conservation aims associated with emblematic species, such as blue whale feeding grounds around Guafo island, or migrant birds in the coast of Chaitén. These action-networks connect different uses and aims, steering indigenous tenures toward marine conservation.

4.1. IMA's action-network

The IMA's action-network is composed by multiple state and civil stakeholders. CONADI, the public indigenous affairs agency, plays a central role during the requesting phase. It assesses and validates the customary use report, and the spatial polygon of the IMA presented by the communities. Once the IMA's proposal is accepted by the government, it begins a long administrative process (usually taking five or six years) that could finish with IMA's approval, denial or a negotiation involving the revision of size and reflection on the potential users affected by the new restrictions.

During the first years after the Lafkenche Law's approval, CONADI played an important role mobilizing technical expertise (e.g., Anthropologists and GIS experts) and financial support (hiring private consultants to realize the management plans) to implement the law.

However, with the advance of the IMA's implementation process, new actors and organizations have been integrated into the network. Local indigenous and civil activists, national and international conservationist NGOs, have begun to support the requests by

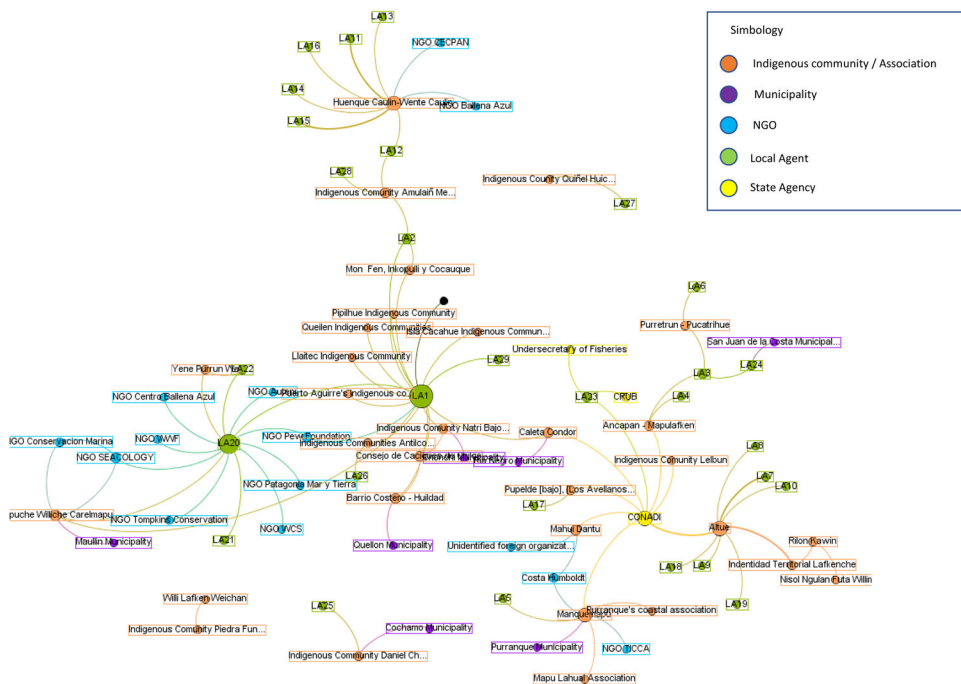


Figure 4. Social Network of 28 IMAs from Los Lagos Region. The colors of the nodes represent different type of actors and their size are correspondent to their out-degree.

preparing the customary use reports, biodiversity and marine resources baselines, IMA maps and other bureaucratic tasks.

The Chilean IMA process has seen collective action shift from an initial top-down policy implementation approach, to a multi-agent bottom-up institutional building process which now mobilizes resources through cross-scale dynamics. The Actor's Map of 28 IMAs of Los Lagos Region (Figure 3) identify five types of actors and four level of interactions, where indigenous associations and NGOs act as scale intermediaries.

The collaboration of this multi-agent action-network have been crucial to strengthen the applications and to connect the diversity of IMAs present in the region. As one of the leaders of IMA Chaitén says about the relationship with NGOs:

“when we talk with them, we said It's going to be a moment when you want to do your studies, and you must to talk with us and with other IMAs. The work of the NGOs is a good thing, but they have to adapt, they have to recognize the people who live in the places. So, it's important to be honest, nobody will say no to them if they want to do their study of whales or to conservation” (Leader of IMA Chaitén, July 15th, 2019).

Regarding the SNA, results show a total of 85 nodes (or actors in the network), of which 28 are the IMA applicants, and a total of 50 edges or ties. The nodes or actors of the network have been grouped into: i) indigenous organizations; ii) local agents (i.e., people/activists); iii) NGOs; iv) municipalities; v) state agencies. Figures 4 and 5 show the structure and the elements (nodes) of the network, and its distribution by type of actor. In Figure 4, the size of the nodes is adjusted to their out-degree, that is, to the number of relationships they declare to maintain when managing an IMA (the greater

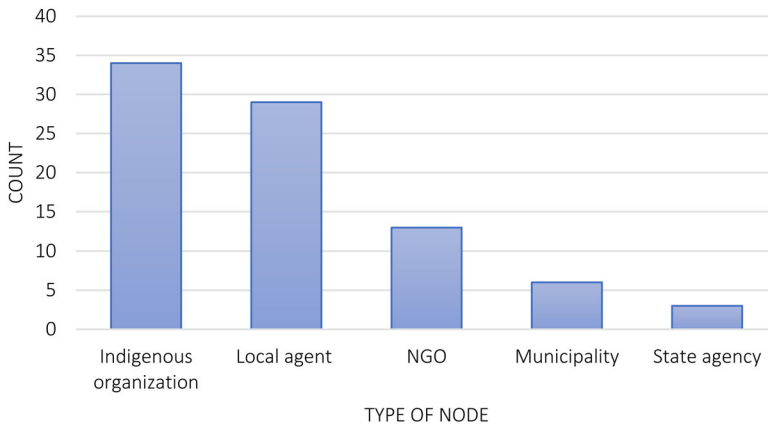


Figure 5. Disaggregation of types of actors in the Indigenous Marina Areas network.

the centrality of output, the larger the size of the node) and their color correspond to the mentioned groups.

As shown in [Figure 5](#), local agents have a major role in this network, as they constitute the second most frequent type of actor, after indigenous organizations which are the main actors, provided that they are the applicants. Contrastingly, state agencies are the least frequently actors mentioned in our interviews, with just three nodes. Another result of the SNA is the difference between indigenous organizations identified and IMAs applicants. Interviews showed that although this network has 28 IMAs applicants, there are 35 indigenous organizations on it, which implies that applicant organizations have declared ties or relationships with non-applicant indigenous organizations.

[Figure 6](#) shows the social network diagram determined by their modularity, including indigenous organizations and other state and civil society agents. The diagram stresses the key role of indigenous/environmental activist alliances for the decision-making process of IMAs establishment in Chile. In this figure, the nodes identified as LA correspond to local agents, that is, to people and not organizations. The colors of the nodes account for the module to which they correspond, that is, a sub-community of the entire network. The color of the edges or relationships, meanwhile, account for the color of the sub-community of the relationship's output node.

Regarding the SNA we highlight:

1. There seems to be no high centralization of the network, as there are different identifiable subgroups (each one with different colors), and not a single central node of the network. These subgroups or communities assembles different IMAs requests, and each one is composed by different types of actors.
2. Each subgroup of the network has a central node or actor, who plays a key role in their community. These central nodes belong to different type of actors, from local agents (e.g., LA1 and LA20) to indigenous communities (e.g. Altue and Huenque Caulin-Wente Caulin), and even state agencies (like CONADI).
3. It is important that the majority of the network is connected, mainly by actors that play a broker role, considering that there are only three small subgroups (of two or three actors) that are not connected to the expanded network. This

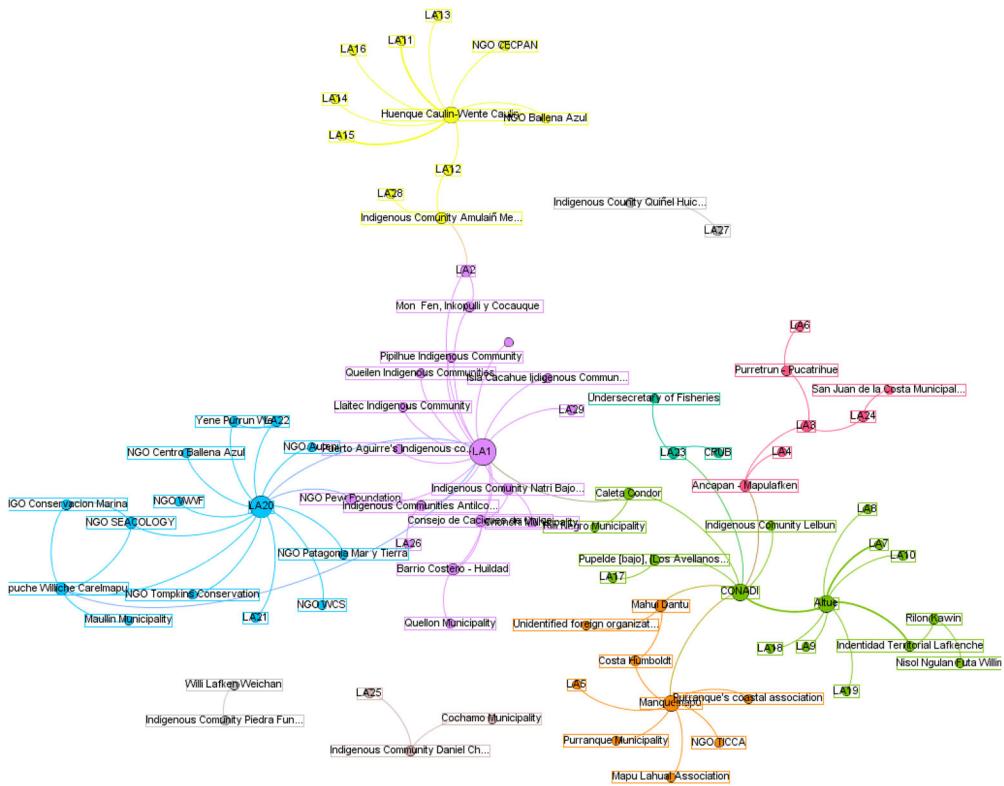


Figure 6. Social Network of 28 IMAs from Los Lagos Region. Nodes and edges colors are determined by their modularity. The size of the nodes is adjusted to their centrality. LA correspond to “Local Agent”.

property of the network would allow a more efficient or faster flow with respect to relevant information regarding the application process. Brokers can connect different groups and, therefore, disseminate experiences of the application process or technical advice for its management. On this network, brokers also belong to different types of actors, since local agents (LA1 and LA2), NGOs (Conservación Marina) and indigenous organizations (Caleta Córdor, Mapuche Willeche Carelmapu and Daniel Cheuqueman) are currently displaying this property.

5. Discussion

The exponential increase in the number of IMAs applications, their territorial breadth and the expansion to other regions indicate that they are probably the most important coastal zone social-ecological dynamic in Chile’s marine sustainability agenda. This phenomenon, unlike other initiatives for biodiversity conservation and natural resource management, such as MPAs and MEARBs, place people at the center of the governance model, and guide the conservation objectives toward ecosystem services and livelihoods (Araos et al. 2020; Anbleyth-Evans et al. 2020; Hiriart-Bertrand, Silva, and Gelcich 2020).

Hence, IMAs emerge as a powerful institutional tool to the legal recognition of marine indigenous tenures, recovering the collective control over common pool resources and maritime space. Following Haller et al. (2019), IMAs implementation can be understood as constitutional process, where indigenous communities embedded in action-networks formulate and implement “actions to manage common pool resources for their own collective benefit (...) (in a) conscious and reflexive processes of collective action leading to institution crafting under conditions of power asymmetries” (p. 1).

This is because the IMAs implementation process begins with the awareness of the indigenous communities of the potential threats for the future of the local territories and its customary practices. After this, the indigenous community can develop an institutional strategy for their local demands. This strategy works as an “institutional shopping” practice of natural resource management, where indigenous communities “choose, according to their power and knowledge, the most advantageous institutional framework in a given situation. Indigenous users strategically employed arguments of conservation, indigeneity, or long-term occupation to legitimize their claims based on the chosen institution” (Flurina, Haller, and Backhaus 2016, 2018). In the IMAs decision-making process indigenous communities recognize the best political context, the opportunities for financial or technical support, and the possible alliances with other agents in order to improve the requesting process and the opportunities to enhance their initial conditions.

SNA shows a network with multiple subgroups which are connected by key nodes/agents. The groups considered are listed in relation to the different territories where the IMAs have been requested: Chiloé island, Northern Patagonia and Osorno Province. Thus, Chiloé island shows more complex subgroups (yellow and purple module) and the participation of several local agents and activists. The social movement and protests of 2016 in the island could explain this activism boom, putting IMAs in the horizon of the claims for social and environmental justice (Mondaca 2017). Meanwhile, Northern Patagonia (blue module) shows a conservation-oriented network, where national and international NGOs are articulating “glocal” connections. In this territory, the ethno-political movement is more recent (Grimaldi 2019) and conservation have been the main issue over the last 20 years, with the emergence of private conservation projects during 90’ (Araos 2018). Finally, Osorno province (red, green and orange modules) show a network where public and State agents are well connected with the indigenous communities. This territory has historically enjoyed successful Mapuches-Huilliche social movement activity and autonomous political organization, and more recently state support (Cárcamo 2019). The presence of Identidad Territorial Lafkenche (an indigenous political organization), CONADI and Municipal governments in the network offers important evidence of these relationships. At the same time, this subgroup is also supported by conservationist NGOs, such as Costa Humboldt and TICCA, who work with the IMAs near to Lafken Mapu Lahual, the first indigenous people-oriented Marine Protected Area of Chile (Serra-Maggi 2018).

Regarding the less connected subgroups, such as groups of two or three nodes, it is possible to establish that within the different forms of management in the IMA process, there are indigenous organizations that have established more limited collaborative relationships and that are not part of the expanded network made up of different modules

connected by brokers. This implies that the processing of IMAs may or may not be carried out by establishing relationships with actors that are part of the expanded network. This also means that these more limited networks (with two or three nodes) are devoid of accumulated experiences and knowledge that circulate in the expanded network (of different modules and connected by brokers). Currently, there is no information available to assess whether this differentiated access to knowledge or experiences has been transformed into successful management of IMAs, given that most of these requests are still pending and have not been completed.

The modularity analysis also allows us to identify the types of conformation and relationship between different subgroups of the expanded network (that is, the network made up of different modules). It can be established that there is a large group made up of two sub-modules (controlled by actors LA20 and LA1). Another large group corresponds to the one made up of different modules and articulated around the State Agency CONADI. A significant difference between the two is that the first is made up of two large modules, while the second is articulated between more modules, but each with fewer nodes. A highly significant element is that both large groups are intermediated by few nodes, like Caleta C ndor, LA1 and LA2. This increases the value of the figure of these actors, since their nonexistence would suppose the disconnection of these two large groups. On the other hand, the dependence on both brokers indicates a certain fragility in terms of intermediation between the groups. Also relevant is the type of actor that are displaying intermediation, since they are mainly non-state agents: indigenous organizations and local agents are drivers of information and experience flow between different nodes and IMA applications. This highlights how IMA policy has turned into a bottom-up assemblage of multiple agents as stated earlier, where state agencies play supporting roles while organizations and people activate the network.

However, all these socio-political paths frequently are perturbed by environmental crisis or social clashes, adding uncertainty about the potential results. For instance, the harmful algal bloom of 2016 in Los Lagos Region is mentioned by many indigenous actors as one of the main reasons underpinning an IMA request, which accelerates the implementation process. Or the 18 O (October 18th) national social movement (Somma et al. 2020), which demanded, among others claims, the change of the natural resources extractive model, interlinked to the constitutional recognition of the indigenous peoples and territories. For instance, we observe the emergence of new alliances between IMAs and other social movements/activists (e.g., water rights movements in the Northern Patagonia and women/feminist activist in Chilo ), and the possibility to reform the marine resources users' rights in the new constitution. This would cause a major institutional change that could lead to reshaping all socio-environmental scenarios where IMAs have been introduced.

Therefore, beyond linear processes of implementation of global conservation or ethnic rights policies and agendas have shown that these IMAs in southern Chile demonstrate a non-linear assemblage process. These IMAs are being shaped by the aggregation and disaggregation of agents, social process and common pool resource institutions, which is orienting the political recognition of marine indigenous tenures and their contribution to marine sustainability.

6. Conclusion

The implementation of IMAs highlights the impacts of the accelerating blue Anthropocene in the coastal zone of Chile. The significant increase in applications in the south shows the tension between indigenous communities and the aquaculture industry, and the political strategies that are emerging to face coastal economic development. IMAs emerge as the most powerful tool to face this critical scenario, offering an opportunity to rethink the way people inhabit coastal territories, based on the protection of the marine indigenous tenures and the collective appropriation of the common pool resources. They are a starting point inviting the reorientation of natural resource use and governance, toward inclusive conservation and democratic decision-making practices.

The conservation assemblages that sustains the implementation of IMAs and their orientation toward marine conservation account for the incubation of a socio-ecological transition. They hold a potential to encourage transformation in the way people understand, inhabit and use the marine-coastal zone and its natural resources.

Notes

1. Spirit owners of sacred places (Grebe 2011).
2. Sacred wetland ecosystem, which sustain diverse natural beings and medicinal herbs (Guerra, Riquelme, and Skewes 2019).
3. Management and Exploitation Area for Benthic Resources.
4. Aquaculture Appropriate Areas.
5. Marine Protected Area.
6. In percentage terms, declared IMAs correspond to 42% of the total coastal allocated zone. In contrast, aquaculture areas have 19% and MEARBs 33%.
7. “As the leaders of the association of indigenous communities of the Walaywe territory, and applicants for the Mañihueico-Huinay Indigenous Marine Area, we believe that this agreement with the leaders and communities of the other groups recognized as users of the coastal zone, represents a possibility to unify our point of view about our territory and how we can live together, respecting our processes. We declare that all inhabitants of the Walaywe territory who make use of the coastal zone will be recognized as users in the IMA Mañihue Huinay Management Plan. Thus, we close the agreement process thinking about the common good of the inhabitants of the Hualaihué territory” Letter of the indigenous communities of Hualaihué to the Undersecretary of Fisheries, August 14th, 2017.

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