ENVIRONMENTAL GOVERNANCE AND GLOBALIZATION: THE FARMED SALMON INDUSTRY IN CHILE

by

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Table of Contents

List of Figures

Abstract

Environmental Governance is a challenge for countries whose economic growth is underpinned by natural resources. On one hand, the state has to keep political legitimacy reacting to internal demands from a diverse civil society in the context of a democratic regime. On the other, the state has to tackle demands from global capitalism to be in the global market. This dissertation sheds light on how developing countries can build and exert environmental governance. In this dissertation, environmental governance is the process of making decisions regarding public goods or services and providing them integrating actors from outside the state.

The case study is the farmed salmon industry in Chile. It is a strategic case because aquaculture is a globalized activity that is presenting ambivalent consequences. It is an opportunity for countries like Chile to develop technology and knowledge in a sector that has a higher level of added value although it is based on natural resources. At the same time, it is an industry that demands coordination between the state and the companies to ensure the social and environmental sustainability of the industry and many workers and communities related to this activity. The farmed salmon industry in Chile has been known as a competitive sector, being the second exporter of farmed salmon in the world. Unfortunately, this rapid growth since the 2000s has had costs. Fish illnesses and pollution of the ecosystem have been present during all this time. A crucial moment was in 2007 when a virus provoked a dramatic breakdown, killing tons of fish and provoking an economic and serious social crisis. This was a milestone in the history of this industry that led the state to implement a process of new regulation and promote a new style of production. This can be considered as a shift in the environmental governance of the farmed salmon industry in Chile.

This dissertation examines and explains the mentioned shift and its consequences on the organization of the farmed salmon industry in Chile. Given that is only one case examined, the dependent variable has been explained considering diverse dimensions. To do so, three aspects of sustainability were defined to control differences regarding the environmental governance shift in the farmed salmon industry in Chile. The first is the use of pharmaceutical products, the second is the use of marine location through concessions, and the third aspect is the dependency of the farmed salmon industry on fishmeal. These three aspects were analyzed from an Integrated

Political Economy of the Environment perspective. This theoretical framework is based on perspectives of the Environmental Sociology and Sociology of Globalization. The perspective elaborated in this dissertation considers three actors or processes in permanent tension: the state, the civil society, and the globalization. I explain the environmental governance shift for each aspect of sustainability focused on the relationships between these actors.

The farmed salmon industry in Chile was a theoretically strategic case. It was carried out codification of trade journal articles, laws, and governmental reports. Codes were based on the three aspects of the dependent variable mentioned above and four aspects of environmental governance. Quantitative data elaborated by organizations and other pieces of research were integrated into the qualitative analysis.

Regarding the environmental governance of pharmaceutical products, it was possible to understand that changes were associated with more information from the companies to the government agencies but without a complete transparency. The regulation was not more explicit about the restriction of pharmaceutical products beyond those chemicals internationally banned. The pressure in this regard came from buyers such as supermarket chains, what is the starting point of international regulation though certification schema. Also, International NGOs exert an indirect pressure toward the salmon industry in Chile, demanding better information from American environmental organizations. With respect to the use of marine locations, this dissertation found that the state keeps its prerogative of marine property administration as a mechanism of governance. Based on this principle, the state carried out important transformations that in general aimed to rescue the industry and give a new opportunity allowing its expansion toward southern Chile seeking cleaner waters. Another important measure was the rescue of the industry through subsidies and the possibility to use concessions as collateral for bank loans. Finally, the implementation of biosecurity zones which are known as “Salmon Neighborhoods.” These zones allow a better coordination of biosecurity procedures and a faster reaction facing contagious illnesses. Regarding the use of fish feed and dependency on fishmeal, this was not a matter of legislation or agreements at the time of the studied environmental governance shift. It was only a concern of international organizations from which Chile was totally disconnected. As a general conclusion, the new environmental governance of the salmon industry in Chile can be defined as an unstable balance instead of a trilemma. The main aim of

this vulnerable balance of governance is to regulate an industry based on the idea of self-regulation and an endless growth and capital accumulation, dramatically conditioned by dynamics of global capitalism.

Chapter 1: Introduction

This chapter depicts the main changes in the Chilean economy to be inserted into the global market. These changes have been carried out in the last forty years with a significant role of foreign direct investment implementing an export-led strategy of industrial development. As part of this strategy, the farmed salmon industry emerged as a second-generation export sector having more added value than traditional exports based on natural resources. Although the salmon industry in Chile has had an increasing economic success, it has meant also having undesirable consequences on the environment throughout time. The main puzzle of this dissertation is presented: what happened to the salmon industry and its environmental governance after a dramatic phytosanitary breakdown in 2007? Finally, a general description of the following chapters of the dissertation is given.

Chilean Economic Integration into The Global Market

Economic growth always has been a challenge for developing countries. It has been even more difficult since the 1980s. A significant phenomenon occurred when developing countries had to face their inability to repay international loans that supported their economic national projects three decades before. Export-led strategies were recommended to accomplish the plan of macroeconomic stability dictated by the International Monetary Fund (IMF) and the World Bank. The aim was to open their economies to international capital flow and intensify their export-led economies, which historically have been based on the exploitation of natural resources.

Exporting primary or raw material is still the main sustenance of Latin American economies in the current era of global trade. This condition has been boosted by the increasing demand for raw natural resources from emergent economies like China and India in the 2000s (Gallagher and Porzecanski 2011). Svampa (2015) has called this new type of economic globalized project the "commodity consensus," which assumes "the irrevocable or irresistible character of the current extractivist dynamic, resulting from growing global demand for raw materials" (p. 67). Economists who focus on developing countries have discussed what has been called the "resources curse thesis" (Auty 2007; Ploeg 2011; Sachs and Warner 1997). This thesis states that countries rich in natural resources struggle to grow economically despite their comparative

advantage. This dependency on exports is not just a characteristic of neoliberal projects undertaken by right-wing (conservative) technocrats and national elites. Leftist (post-neoliberal, progressive) governments in the 2000s also carried out their economic programs intensively based on the exploitation of natural resources (Bull and Aguilar-Stoen 2015; Svampa 2015).

Therefore, export-oriented growth strategies boosted the exploitation of natural resources, which had serious environmental consequences (Liverman and Vilas 2006; OECD-ECLAC 2005). Such is the case of pollution produced by the mining sector (Altomonte and Sánchez 2016) or the depletion of natural resources like in the fishery sector (FAO 2016).

The insertion of developing countries into the global market and their position in the global division of labor shape their institution type and strength. Therefore, their structural position influences the way nations tackle their environmental problems. Scholarly work has been carried out on the tensions that economies based on natural resources have to face regarding democracy (Haber and Meraldo 2012) and the environment and social welfare (Sinnott, Nash, and de la Torre 2010).

A historical revision of the relationship between national economic projects in Chile and its position in global capitalism can be done. According to Schwartzman (1985), Maurice Zeitlin demonstrated how developmental projects in Chile have been historically conditioned by its position in the international market since the 19th century. Foreign investment to extract nitrates and copper marked the Chilean international market until the 1930s. Then, there was an attempt of inward economic development, which aimed to create Chilean industries based on strategic sectors such as machinery, durable assets, and petrochemical products. This strategy known as "Import Substitution Industrialization" (ISI), collapsed in the 1970s. Once the dictatorship of Augusto Pinochet was imposed (1973-1989), neoliberal measures that shaped a particular industrial strategy were implemented.

Chile was the first country in the world that implemented a radical package of free market reforms (Fourcade-Gourinchas and Babb 2002). Regarding international trade, novel capital-intensive commodities such as fruit, fish, and cellulose were crucial (Ffrench-Davis 2004; Peres 2002). Since the 1990s, democratic Chilean governments have carried on neoliberal measures

but with more emphasis on the legitimacy of the economic model. Toward this aim, the Chilean state reinforced its important role in the extraction and exportation of copper in Chile through The Corporation of Cooper (CODELCO). Also, the Chilean state is defined as a liberal economic model with selective social policies regarding labor rights and some intervention regarding capital control and the exchange rate. Under a neoliberal viewpoint, these "interventionist" policies make Chile a neoliberal model, but not in its purest form (Sheahan 2002).

Chile's economy has historically based on exporting natural resources with a low level of added value. The intensive use of natural resources still provokes a tension between economic growth and environmental care. This is more concerning given that from the 1990s the neoliberal model was furthered, which meant to gain a better entrance into the global market and create better conditions for foreign investment and the consolidation of export policies (Huber 2002).

Chile was a place for multinational corporations to consolidate their presence in Latin America (Fernandes and Paunov 2008). Regarding international trade, economic liberalization was crucial despite protectionist legislation on anti-dumping (1992) and safeguard measures (1999) that had been enacted (Saez 2005). The Chilean industrial strategy was to create an "industrial atmosphere". This means to be receptive to the needs of private investment (foreign or national) regarding suitable conditions for their aims such as training of hand labor, research, and public infrastructure (Peres 2002). The implementation of this condition is mediated by non-governmental organizations, which are part of local networks. Regarding productive sectors, there was an emphasis on those nontraditional products and social groups that were able to carry out public-private cooperation to open new niches in the global market.

Chile reached an important milestone when it joined the World Trade Organization (WTO) in 1995. This opened new niches for Chilean commodities on the global market. The United States and the European Union provided sufficient market access, which stimulated innovation in specific economic sectors. The so-called South-South cooperation, based on economic agreements among Latin American countries, was not a crucial objective for the international trade strategy of Chile (Harrison, Rutherford, and Tarr 2002). Although being part of WTO is a positive opportunity for countries in terms of transparency of trade policies, it is also challenging to adapt their domestic institutions to the international agreements (Baumann 2002). For

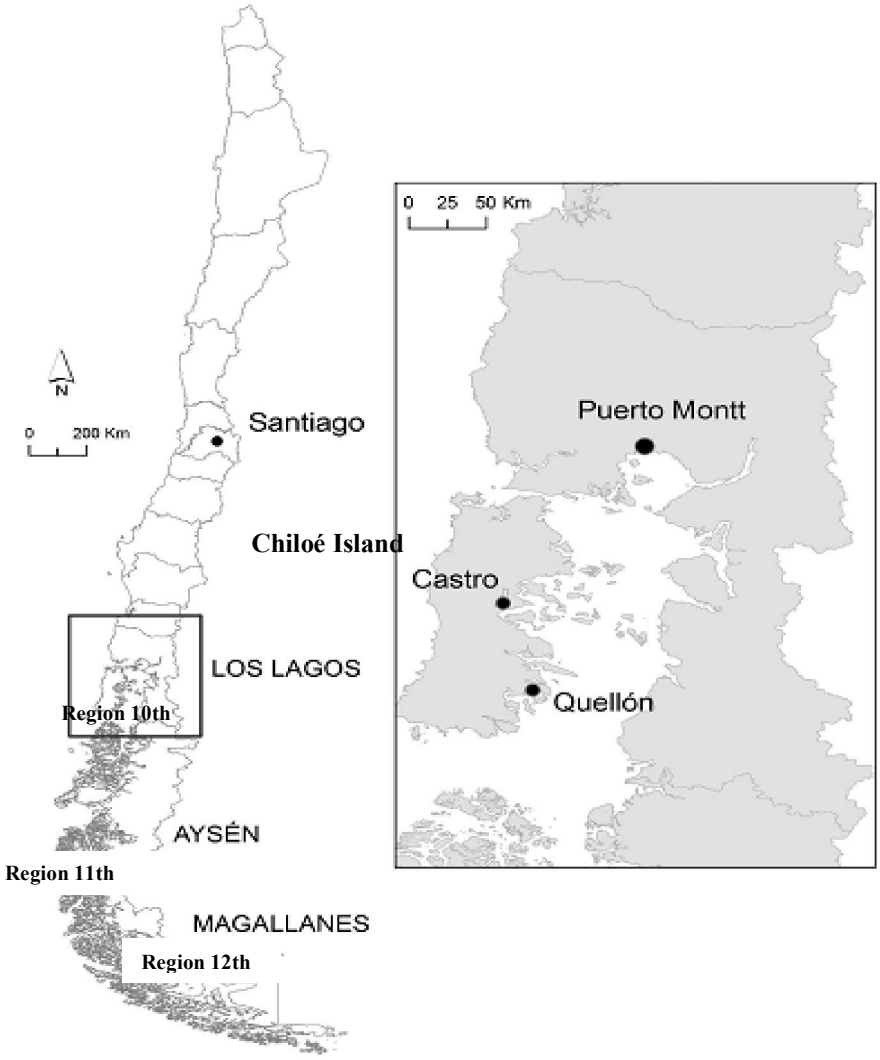
instance, the World Bank played a key role in the policy-making process of the 1992 National Environmental Framework Law. This legislation was an important step that facilitated the Chilean economy to stringent markets. Chile fulfilled the requirements of a global economy, especially for those economic sectors that carried out productive processes that added more value. Although these emerging economic sectors based their added-value processes on knowledge and technology, their position in the global market is very unsteady. They are vulnerable to international factors such as fluctuations in both demand or price, lack of foreign investment, or competition with more consolidated corporations.

Incorporating new economic activities into the global market and seeking their consolidation has meant a low quality of environmental stewardship. From the mid-1970s through the mid-1990s, the economic openness of the Chilean economy was possible due to avoidance of the internalization of environmental costs (Quiroga 2001). This period of low-intensity environmental stewardship benefited some sectors that would lead the economy to a new phase. It was necessary to make these sectors competitive in the global market by focusing on the rapid growth of production. This phenomenon has been theorized as the ascendant phase of the "Environmental Kuznets Curve".

Industrial Strategy and Farmed-Salmon in Chile

In Chile, a controversial economic sector regarding environmental care is aquaculture, specifically the farmed-salmon industry in southern regions (Figure 1). This activity has received praise from scholarly and business arenas. It has a global legitimacy as an economic alternative given the depletion of wild marine resources (Barton 2008; Skladany, Clausen, and Belton 2007). It is also seen as a more sophisticated and sustainable way of exploiting natural resources, having characteristics of manufacturing whose added value is based on knowledge and technology in its distinct phases of production.

Figure 1: Map of Chile Indicating Regions 10th, 11th and 12th and Chiloe Island (Region 10th)



Source: Bustos-Gallardo (2013)

The salmon industry in Chile was part of an "economic imperative" (Barton and Fløysand 2010). The demand in the United States and some countries in Europe for farmed salmon has soared since 2000. The pressure for covering market niches forced the salmon industry in Chile to become part of a production race with an elevated level of negative externalities affecting ecosystems that are shared with other economic activities. The way for this industry to be a lead exporter in the world was a generalized style of production in aquaculture (FAO 2016): intensive farming with high densities of fish (Barton 1997). The result was the saturation of the natural

ecosystems in the context of loose regulation and supervision regarding long-term issues of environmental sustainability (Barton 2008; Fløysand, Barton, and Roman 2010).

Since colonial times, Latin America has been vulnerable to the economic cycles based on the demand for primary commodities from developed countries (CEPAL 2016). The salmon industry has been no exception in this regard. Its success has not been immune to the ups and downs of international markets, which interact with the mentioned problems related to its negative externalities on the environment.

The vulnerability of the sector to external and internal factors plays an important part in the history of Chile's farmed salmon industry. National environmental advocacy and stricter requirements from large destination markets have increased the discussion about the environmental sustainability of this sector. The concern is not only focused on negative externalities in local communities, but also regarding possible advantages that this sector may have based on bad practices such as low costs from labor exploitation or overuse of chemicals and pharmaceutical products to control parasites and illnesses. The salmon industry in Chile has tried to face all of these requirements to gain and maintain international market niches with relative success. As mentioned above, there is a tension between economic growth and environmental care in the context of global capitalism. The trajectory of the salmon industry in Chile and its diverse phases make this industry a compelling case study to delve into that tension.

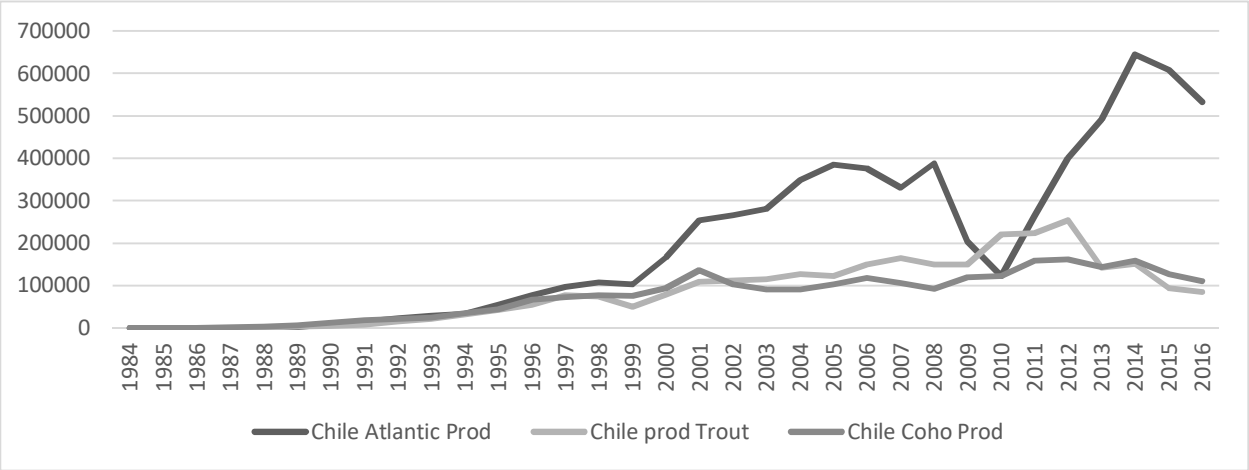
Chile is the second exporter of farmed salmon in the world after Norway. These two countries represent 70% of the world's farmed salmon production. However, these two countries are very different. While Chile began its massive production of farmed salmon in the 1990s, Norway had started several decades before. Regarding their stage of economic development, Norway's GDP per capita is three times that of Chile. Norway has a tradition of an expanded state welfare, while Chile has had an orthodox neoliberal regime since the 1970s. Although these two countries have shared the market of farmed salmon for at least 20 years, Chile has implemented a particular way to catch up to Norway regarding salmon production in the world.

The salmon industry in Chile was created under the umbrella of the neoliberal economy in the 1980s, achieving a prominent place in the international market of farmed salmon (Barton 1997,

2008; Barton and Fløysand 2010; Bjørndal and Aarland 1999). By the 1990s, the industrial strategy of Chile had situated farmed salmon at the center of a new phase of exports. During this decade, Chilean exportation of farmed salmon soared. According to export data, Chile overpassed countries with a long tradition of salmon aquaculture, including Canada in 1990, Japan in 1991, and the U.K in 1992.

Figure 2 shows the rapid increment of salmon production in Chile, especially the Atlantic salmon. However, according to the figure 3 focused on Atlantic salmon, there is still an important gap between Norway and Chile. Without a doubt, the former is the top producer of this type of salmon in the world.

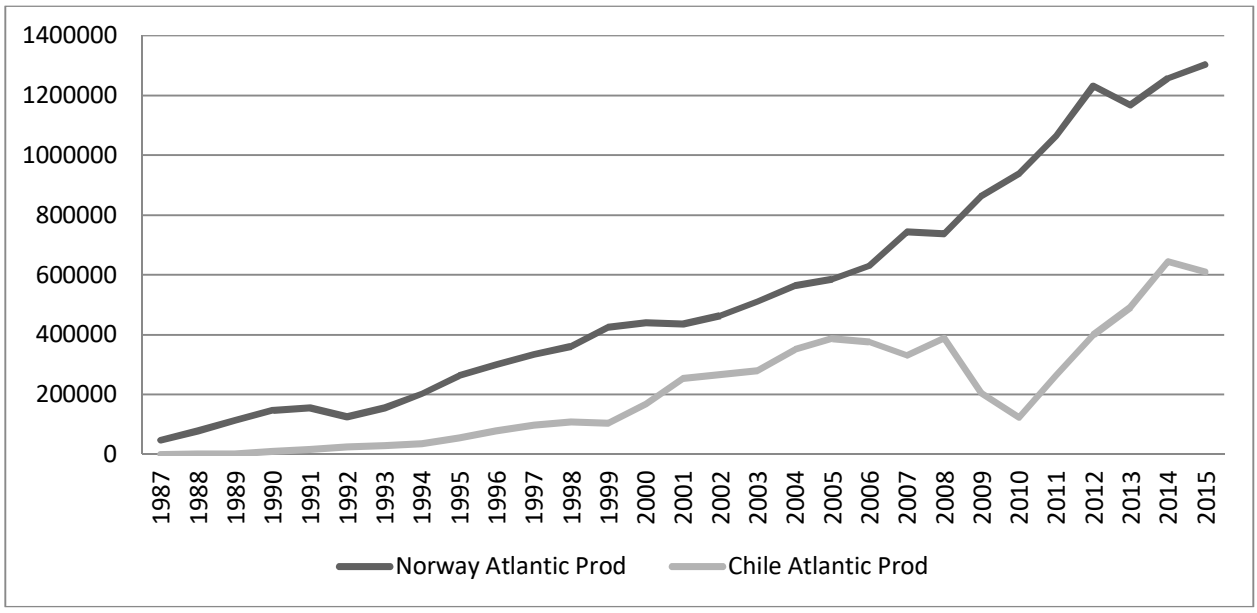
Figure 2: Chilean Production of Salmonids from 1984 to 2016 (Tons)



Source: FAO Data Base

The 2000s were the best years with respect to production. Thus, from an economic standpoint, the salmon industry in Chile is considered an example of diversification and innovation in the global commodity market among developing countries (Ffrench-Davis 2004) and the most efficient among salmon industries in the world (OECD 2009). The leadership of the farmed-salmon industry in Chile has been possible due to the intensive production of Atlantic salmon (Figure 3) which was considered the best option to enter the global market given the lower complexity of the cultivation of this type of salmonid.

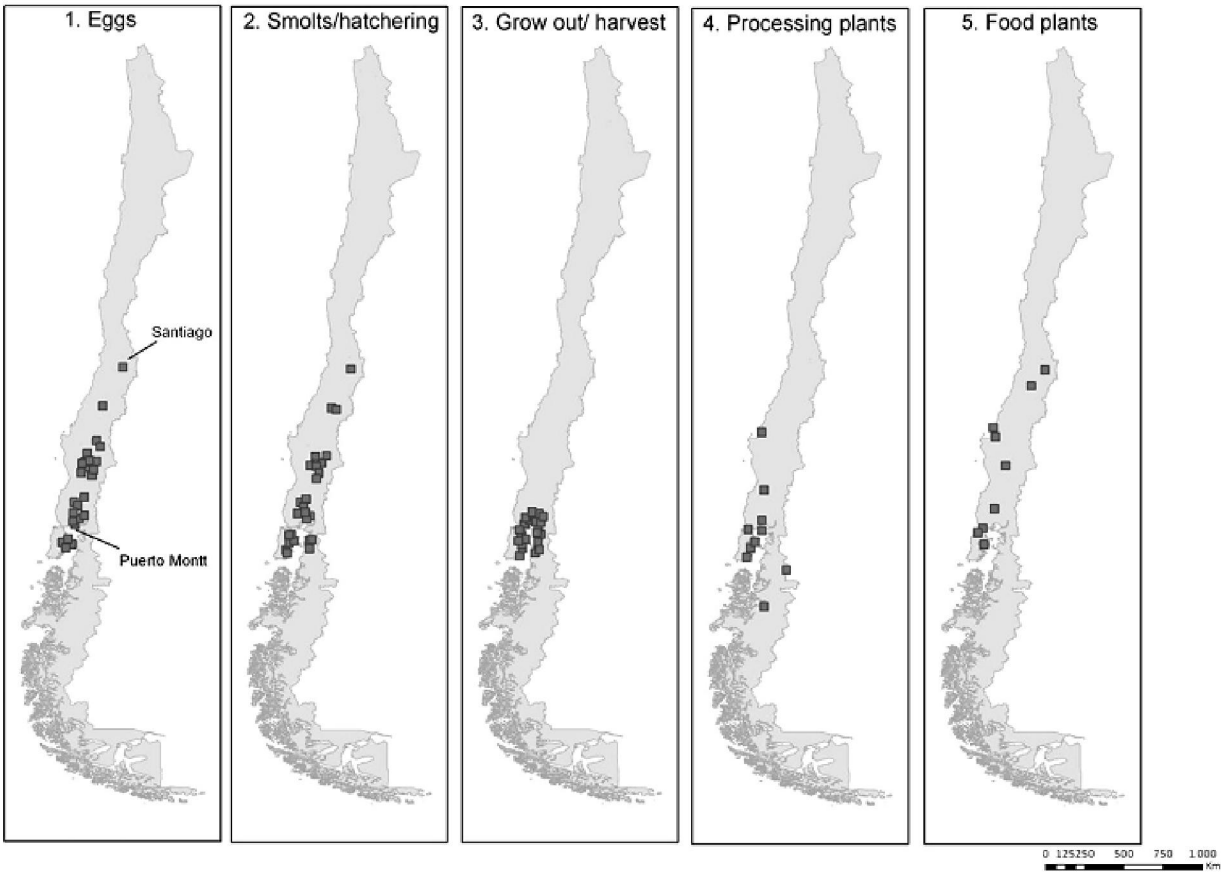
Figure 3: Chilean and Norwegian Production of Atlantic Salmon



Source: FAO Data Base

At the national level, it has been a dynamic sector with respect to applied technology and added value. The latter has had good consequences for the Chilean economy. On the one hand, the farmed salmon industry has generated a "national cluster" of production. This has led to an increasing vertical integration of the value chain within the country, generating thousands of diverse kinds of jobs according to the different parts of the process. On the other hand, the farmed salmon industry is characterized by high penetration of foreign capital, which is facilitated by liberal investment rules (Phyne 2010). At the subnational level, it has boosted local economies through the demand of direct and indirect labor, transforming the daily life of rural communities (Barrett, Caniggia, and Read 2002). In this regard, Although Regions 10th and 11th are the most important places of cultivation, other parts of the production process have been located in other regions, as Figure 4 presents.

Figure 4: Production Chain of Farmed Salmon in Chile Along the Country.

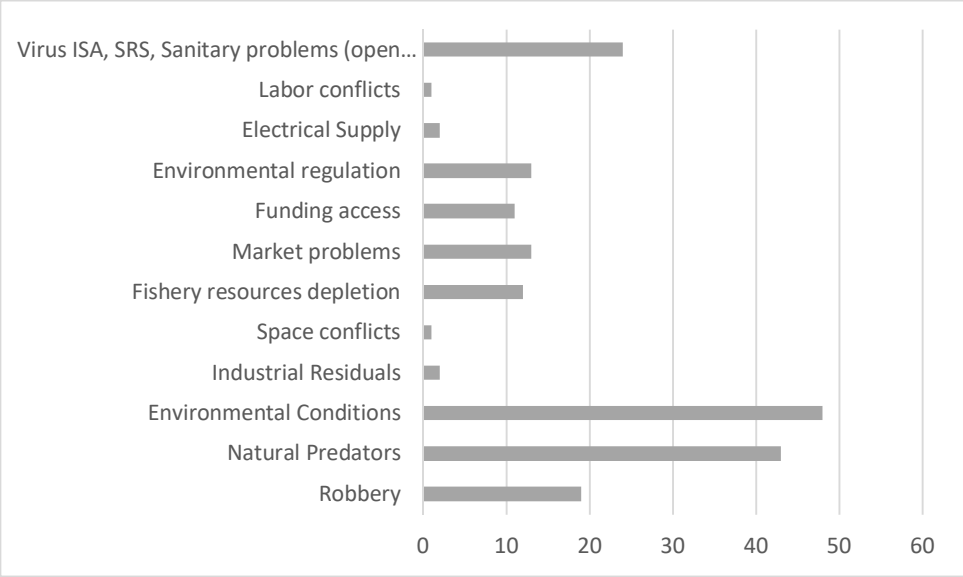


Source: Bustos-Gallardo (2013)

Despite the neoliberal economic and social regime in Chile, the state played a significant role in fostering the progress of the salmon industry. From the beginning of this activity as an industrial activity in Southern Chile, the public-private alliance was crucial. State agencies made it possible to tackle the complexity of farming salmon related to settlements, knowledge transfer, natural risks adaptation, and obviously the entrance into the international market of commodities. However, the role of the state is not always by action; it can be by inaction. Even though there was a regulation regarding aquaculture since this activity started as an export-led industry, this had been barely sufficient to face the soaring increase in salmon production. The race for production, persistent effort to keep up big buyers, and a lack of suitable regulation of the sector led the industry to collapse.

As Figure 5 presents, problems related to illnesses and environmental conditions were declared by salmon farmers as important in the Fishery and Aquaculture Census carried out in 2007. As expected, the history of the salmon industry in Chile was marked by a sanitary breakdown in 2007.

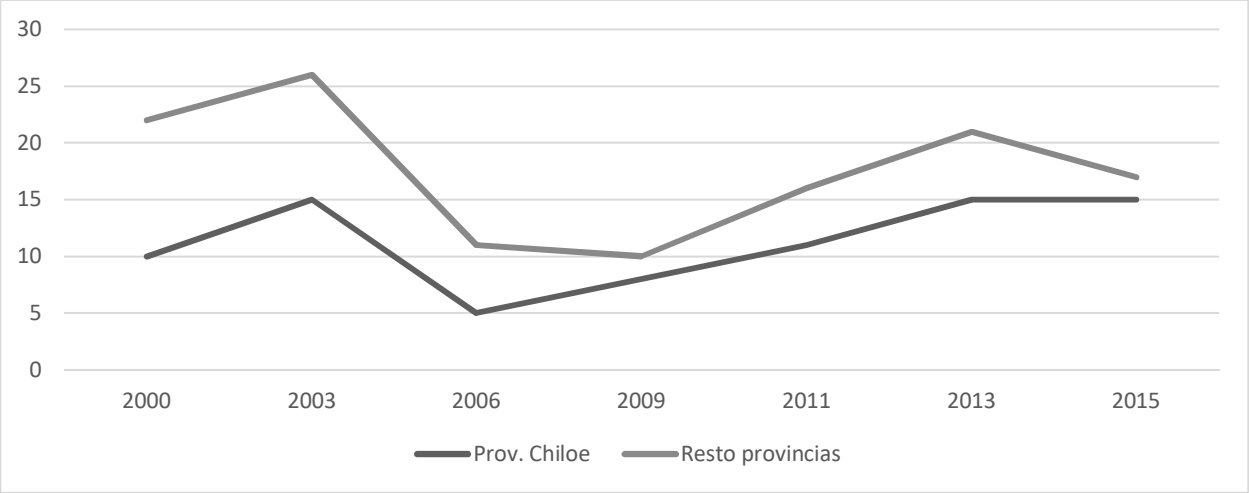
Figure 5: Problems Related to Farming Salmon According to Farmed Salmon Companies



Source: National Census of Fishery and Aquaculture 2007

The salmon industry dramatically declined its production (see Figure 3), between 2007 and 2010, causing an economic and social crisis in southern Chile. The latter can be noted in Figure 6 which shows how the increase in the percentage of poor households coincided with the ISA crisis years. Urgent measures from the government were implemented to contain the social crisis. On one hand, economic growth of the sector was halted provoking the loss of thousands of jobs. On the other, the weak environmental stewardship during previous decades entailed a legitimacy crisis of the sector in the face of national communities and international consumers. A new tension between economic growth and environmental care developed.

Figure 6: Percentage of Poor Households in Chiloé Island and the Rest of Provinces in Region 11th



Source: National Socioeconomic Characterization Survey (CASEN)

Being the second producer of salmon in the world under a deficient regulation of the activity has come with criticism. The industry has been questioned by national and international organizations denouncing negative social and environmental externalities (Barton and Fløysand 2010; Vallejos, Oyarzun, and Garrido 2014) in addition to provoking several cultural changes in rural communities (Daughters 2009; Phyne 2010; Pitchon 2015).

Chilean legislation and associated public agencies that have regulated the salmon industry in Chile have been at the center of this criticism. Moreover, some scholars have made the claim that inserting Chilean farmed salmon into the globalized market under a neoliberal regime has generated significant problems with institutional governance (Barton and Fløysand 2010; Bustos-Gallardo 2013; Tecklin 2015). This governance has been based on a long-term legal vacuum and the promotion of aquaculture as a self-regulated industry.

General Background of Chilean Aquaculture Regulation

In the 1980s, the salmon industry was still experimental, but the timing was favorable. The intensive extractive model had led to a crisis in the wild fishery in the 1980s (Figueroa et al. 1997) making aquaculture a significant alternative. Salmon farming was in a "foundational" phase under the umbrella of a public-private alliance called "Fundación Chile" (Montero 2004).

At that time, only generic legislation covered fishery and aquaculture and an emerging association of salmon producers defending the interests of the sector.

According to Fuentes (2014), aquaculture salmon farming was designated as a commercial activity in the 1990s. This happened when there was a legislation update and the Law of Fishery and Aquaculture (Ley 18,882) was enacted in the last year of General Pinochet's dictatorship. The discussion of the law was carried out by representatives of the military government. The commission was headed by Admiral Mario Duvauchelle. Participation was very restrictive. It was limited to experts and some representatives of interest groups. One of these organizations was a group of fishermen unions with a role of cooperation but a restricted influence on the decision process. In general, representatives of civil society had a specific amount of time to expose their observations and requirements without further discussion.

When the law was discussed in 1988, the government had given 324 aquaculture concessions and 2,267 were waiting for resolution. This data demonstrates a great interest in this activity and the pressure for regulating this economic activity. The law-making process is underpinned by the idea that aquaculture was a strategic export sector for the country, which was in an appropriate time given the increasing demand for farmed salmon from the United States and the European Union. Also, according to the international scientific community, aquaculture is a realistic way to compensate for the depletion of wild marine resources in the world.

Production of farmed salmon and trout was growing exponentially, and prices tripled in value (Montero 2004). Because of this economic phenomenon, a suitable legislation was demanded. Regulation regarding areas of concession appeared in 1991 in response to modifications of Chile's General Law of Fishery and Aquaculture. The new rules were related to basic sanitary measures and implementing environmental impact assessments. Important sustainability measures were contemplated, such as the maximum amount of production and the import of hydrobiological species. However, these measures were only loosely enforced. The main objective was promoting salmon farming through increasing the assignment of maritime concessions.

Salmon exports from Chile gained their highest level of production and export in the first decade of the 2000s. According to Fuentes (2014), at that time, the "National Policy of Aquaculture" and specific pieces of legislation were enacted. In 2001 the Sanitary regulation (known as Reglamento Sanitario or RESA) regulated crucial aspects of sustainability, such as control of imported species, disease control, sanitary zonification, and density of farms. In addition, also in 2001, regulation related to short-term environmental impacts (known as Reglamento Ambiental para la Acuicultura or RAMA) considers aspects such as the size of farms and distances between them, and contingency plans in cases of emergency, such as salmon escapes.

The period from 2007 to 2010 can be considered a transitional phase for the environmental governance of this industry. During this period the grave effects of the ISA crisis were evident. There was an abrupt decline in production and, also, a legitimacy crisis of the salmon industry as a productive sector that benefits local communities and the national economy. The Chilean government and salmon companies had to face this crisis by reacting to demands from different actors, such as workers, environmentalists, buyers and international consumers. A concerning issue was that the sanitary regulation (RESA) had not anticipated contingency plans to face such type of breakdown. The National Service of Fishery (SERNAPESCA) was the governmental entity that had the faculties to implement emergency measures with some level of improvisation. Some examples of these measures were a strict control of imported salmon eggs, mandatory elimination of ill and dead fish, and early harvest to avoid contagion. According to Fuentes (2014), these contingency measures would be claimed as a burden for the growth of the productive sector in another context. However, farming salmon companies did not resist as they had in the previous periods (1989-2007).

The central government intervened by coordinating those measures of contingency, shaping public opinion, and giving financial backing to companies. However, the role of the state was not promoting structural changes regarding the rules and agreements that would guide the salmon industry. According to Bustos-Gallardo (2013), the Chilean government demonstrated its inability to address long-term implications of this environmental crisis.

The last phase identified by Fuentes (2014) has been called “Salmon 2.0” by the industry because it followed the sanitary crisis in 2007. In economic terms, the salmon industry had a

rapid recovery in production and exports, resuming its prominent place in the global market. With respect to environmental regulation, some important measures were carried out at the national level. In 2010, the Ministry of Environment, the Service of Environmental Assessment, and the Superintendency of the Environment were created. According to some scholars, the salmon industry in Chile has improved its environmental governance since 2009 (Asche and Bjørndal 2011). After overcoming the crisis, the industry could be promoted as a globalized industry addressing the global demand for higher stringency with respect to environmental care (FAO 2016). The challenge of the industry was different: gaining legal and political conditions for expanding further in southern Chile (Barton 2008; Tecklin 2015).

The Puzzle: Environmental Governance and Farmed Salmon in Chile

There is a consensus which claims that the salmon industry is a productive sector that learned from the crisis and was able to become a 2.0 version. I argue that this idea is not sufficient to understand the environmental governance shift of this industry. This "learning idea" does not account for political and economic factors in the context of a global economy that shapes national institutions and decision-making processes regarding economic sectors.

A new examination of what happened with the salmon industry and its environmental governance after the ISA crisis is fundamental. This phenomenon constitutes an appealing case of the tension that developing countries face: creating growing industries and following the rules of global markets and, at the same time, tackling demands for better environmental governance and environmental justice. It is worthwhile to consider specific issues such as why this industrial sector suffered from a grave breakdown despite international awareness and scientific knowledge? What type of environmental governance shift was carried out under global market demands? Why is this productive sector still vulnerable to factors that triggered the breakdown in 2007? Why, under stricter environmental regulation and governance strategies, this industry recovered its economic performance and social legitimacy to compete in the global market?

It is evident that to address to these questions a definition of environmental governance is indispensable. In general terms, governance is understood as the practices and principles that underpin the regulation and incentives system regarding an activity in a specific arena. It is assumed in the literature that governance is a phenomenon beyond the scope of the national

government, contemplating a wider spectrum of actors. In the environmental field, this research understands that governance is the ruling and control of the use of natural resources and eventual externalities of productive processes affecting ecological equilibrium and implicated communities. Given the range of these definitions, environmental governance ought to be considered in specific contexts, such as territory, productive activity, or sociopolitical moment. This research sheds light on the environmental governance shift regarding the farmed salmon industry in Chile examining the mentioned environmental governance shift regarding four aspects: administration, regulation, redistribution and, knowledge and technology. Additionally, it is a consensus, in public and private sectors, that any environmental governance should be analyzed in terms of a "governance for sustainability" (Barton and Fløysand 2010). In this regard, three aspects of sustainability have been taken into account: dependency on fishmeal, dependency on pharmaceuticals to control illnesses, and ownership system of maritime territory.

Dissertation Plan

Chapter 2 is focused on the theoretical discussion to obtain useful and suitable hypotheses. The first section of this chapter is a general description of environmental governance in Chile and some theoretical implication are presented. In this regard, adopting the concept of "environmental governance" has two implications for my research strategy.

First, although governance is a concept wider than government, I argue that the state still plays a crucial role regarding national industrial strategy. I consider that it is important to have a general theory of the state and its relationships with private economic interests in the arena of a global capitalist system. As Evans (1995) claims, national states emerge as the functional response to the problem of order. However, the state has been judged as an institution in terms of national economic transformation. According to theoretical frameworks within environmental sociology, the state can play diverse roles with respect to capitalist interests.

Second, environmental governance is related to economic globalization like other national institutional processes. There is enough empirical evidence to consider factors that might explain a shift in the environmental governance of the farmed-salmon industry in Chile. I argue that different attempts to explain these changes cannot only hinge on endogenous factors such as learning ability of the industry or adoption of a new type of consciousness. A globalized industry

such as farming salmon interacts with global market dynamics and international organizations' forces. Therefore, this research requires theories that contribute to suitable hypotheses for inquiring into international phenomena affecting national environmental governance.

The second section puts forward a detailed discussion of the different pieces of theory around my research questions. The main aim is to obtain a consolidated theoretical framework considering diverse contributions. Thus, this research builds upon an *"Integrated Political Economy of the Environment"* perspective. National factors and actors such as the government, state agencies, and companies face the tension between economic growth and environmental care. But this tension is increased when we considered international actors and dynamics as part of a globalized capitalism. Theoretical support from the sociology of globalization and international political economy yields hypotheses regarding global factors affecting national policies. In this regard, Dani Rodrik (Rodrik 2011) puts forward the idea of a trilemma with three components: national sovereignty, democratic legitimacy, and hyper-globalization. The latter shapes the ability of the state to select national industrial projects and affect policy-making processes in this regard.

Two big theoretical traditions preface the mentioned integrated theoretical perspective. The first is called *"Diffusion of Ecological Modernization"* perspective. This is constructed from principles of Ecological Modernization theory and Global Society theory. A general glance of this perspective lays out a global diffusion of modern technology, theories, and institutions. Public policies and legislation are imitated through a contagious process promoting good practices and modern values.

The second tradition is called *"Global Capitalism Pressure"* perspective. This is constructed from principles of Treadmill of Production theory and World-system theory. This perspective puts emphasis on the centrality of endless production as an inherent part of modern capitalism. In terms of globalization, the position of the countries according to the international division of production explains changes in their national institutions. Demands in the environmental field from advanced economies and international organizations' aims can affect policy-making processes in peripheral countries.

Chapter 3 is focused on the description of the dependent variable, which is the environmental governance shift about the farmed salmon industry in Chile. Given the milestone that meant the ISA crisis, this is the reference to define our comparison points. Time 1 is that period before this crisis and time 2 the time during and after this crisis (time 2).

In a more operational way, environmental governance as the dependent variable is described. On one hand, there are three critical aspects of environmental sustainability that are used as a reference to examine the environmental governance shift of the farmed salmon industry: use of pharmaceutical supplies, the property of marine space, and dependency on fishmeal.

Chapter 4 is focused on research strategies, methods and data sources. In general terms, preliminary results are the product of two sources. First, the analysis of the main law of Fishery and Aquaculture in Chile as well as every piece of law that modified it before and after the sanitary crisis that the salmon industry faced in 2007. Also, records of parliamentary discussions in commissions and general sessions were analyzed and integrated into the analysis of the law and specific regulations. Second, to capture facts regarding different issues related to my research and to comprehend the perspectives of different actors regarding these facts, I analyzed articles and pieces of the press releases. The Norwegian online trade journal called "Intrafish" was considered as the best source. This trade journal has an international scope and its main target are owners and managers within the farming-salmon sector. Also, it was the only trade journal with a reliable searching system that included many years. Finally, statistical data elaborated by organizations and firms are used to complement qualitative results.

Chapter five to chapter seven present the results from the data gathered using the sources mentioned above. Each chapter is focused on each of the three aspects of sustainability that provide a description and explanation of the environmental governance shift in the farming-salmon sector in Chile. Hypotheses will be assessed in light of the results.

Finally, chapter 8 presents a summary of the results and a general conclusion.

Chapter 2: Toward an Integrated Political Economy of the Environment Framework

This chapter builds upon the concept of environmental governance and its application to the Chilean case. After rephrasing the main research question using this conceptual development of governance, I present theoretical perspectives to address the research question. First, I have defined the "*Diffusion of Ecological Modernization"* perspective, wherein Ecological Modernization theory and World Society theory converge. Second, I defined the *"Global Capitalism Pressure"* perspective, wherein Treadmill of Production theory and World-systems theory also converge. I depict both perspectives in terms of three components: the state, civil society and market actors, and the global capitalist system. But also, I consider some pitfalls in each perspective. A third alternative perspective is built as the theoretical framework for this dissertation: An*"Integrated Political Economy Perspective of Environmental Governance"*. The question about the environmental governance shift of the salmon industry is framed by three components, namely: the state, global capitalism, and civil society. This consolidated theoretical perspective will support the specific questions and hypotheses described in the next chapter.

Defining Environmental Governance

In order to understand the idea of environmental governance, it is important to understand what the conceptual place of government is. A controversial issue regarding the concept of government is the claim that the state is weakening in the context of economic globalization and how this would affect democratic legitimacy regarding the governing of natural resources. Using the concept of governance, the concept of government is not displaced along with the centrality of the state. It is a matter of general knowledge that the concept of government contemplates both rules of law from the state and formal organizations related to the political power of the state.

There is an alternative position that reconsiders the role of the state in this era of globalization in its historical trend of rising and decline (Chase-Dunn and Hall 1997). Peter Evans (1997) reviews the role of the national states in the context of globalization and claims that the national states can still defend what international organizations cannot defend in the field of markets. The states still play an important role regarding the effects of economic growth (Morley 2001; Rodrik 2007, 2011), and this role can take on different characteristics. An example is when the IMF and

the World Bank exerted pressure on developing countries dictating economic measures to overcome the crisis in the 1980s. The responses to this international pressure, especially among countries in Latin America, were different (Huber 2002). Instead of dissolution or total "hollowing out" of the state (Jessop 1997), there is a transformation of its role. The state structure and its capacity of intervention depend on the phase of the capitalist economy (Rodrik 2011; Rueschemeyer and Evans 1985). According to Gamble (2014), there is still state sovereignty, but it is inserted into international markets and international labor divisions that transform its political role.

Governance is a concept that comprises a wider set of entities and phenomena besides the state (Larson and Soto 2008; Lemos and Agrawal 2006; Newell, Pattberg, and Schroeder 2012). This put both the government (state) and the management (corporations) as two poles with regards to the environment that limit the conceptual framework in which environmental governance is settled. From diverse definitions, it is possible to put forward some common characteristics of governance, which are relevant to this research.

First and foremost, the concept of governance connotes a process of decision-making which is carried out to define the content of public goods or services and the process of providing them while reconciling conflicting interests (Knill and Lehmkuhl 2002). Second, governance contemplates a spectrum of actors and practices that shape regulation, social control, and conflict management in a specific economic or social realm at different geographical levels (Bull and Aguilar-Stoen 2015; Cerny 2014; Folke et al. 2005; Jessop 1995). Third, there are mechanisms of legitimacy that cannot be avoided using the concept of governance rather than government. Governance implies the imposition of common or collective purposes, identities, and discourses in order to address specific outcomes affecting the environment (Bell and York 2010; Gamble 2014; Hay 2014; Payne and Phillips 2014).

Environmental Governance in Chile

Different phases of the environmental governance in Chile can be depicted. In the 1980s, under neoliberal economic policies and the fostering of the exporting sector, environmental consequences were passed over to ensure economic growth (O'Ryan and Ulloa 1996). A national constitution under dictatorship established a vague and limited environmental right compared to

other countries in Latin America (Tecklin, Bauer, and Prieto 2011). This period can be characterized as a "socioecological silence" in Chile (Barton and Floysand 2010).

At the beginning of the 1990s, environmental institutions were still very weak in Chile and there was almost no room for this issue in the political agenda. The pressure from civil society on the new democratic government for developing an environmental regime was related to international demands and pressure (Tecklin, Bauer and Prieto 2011). The World Bank and other transnational organizations such as the Bank of Interamerican Development and the European Union gave their support and therefore influenced in different ways the implementation of the new environmental regulatory system (Ruthenberg 2001). In the Chilean Congress, the discussion focused on the country's participation in the international market and attracting foreign investment. This was part of the rationale to promote an environmental law. For instance, the eventual incorporation into NAFTA and the later bilateral free trade agreement between Chile and the United States in 2003 were important arguments (Tecklin, Bauer and Prieto 2011).

The National Environmental Framework Law (Ley de Bases Generales del Medio Ambiente) was passed in 1994, but its regulations were enacted in 1997. In general, it included three areas, namely a) environmental impact assessments, b) norms for environmental quality and emissions, and c) decontamination plans when the normal levels of pollution have been surpassed. In spite of the fact that Chile's economic growth has been based on natural resources, the first attempts at improving environmental institutions in the 1990s were focused on urban pollution. This was a less politicized issue than copper mining, timber and fishery sectors (Ruthenberg 2001). Regulatory instruments in Chile did not intervene in productive processes and only dictated standards of emission and pollutants, which does not raise political or ideological controversy. There is no reference to the economic use of natural resources. These legal instruments only established the criteria for protected species and areas. New institutions were not able to solve several environmental conflicts until a reform was carried out several years later in 2009 (Tecklin, Bauer and Prieto 2011).

In general terms, this legal framework followed what the World Bank calls the "Coordinator Model," as an alternative model to the "Ministry Model," implemented at that time in several other countries in Latin America. The World Bank justified this model through three points,

namely “the strong sentiment” of the Chilean society was to avoid a large, centralized and bureaucratic agency that the ministry could be. Second, creating an inter-ministerial entity would mirror the transversal nature of the environmental management and, finally, there was a close relationship between government and business actors. The latter would foster the adoption of voluntary agreement programs and carry out private investment for improving production processes to be aligned with the governmental aims in environmental issues. In general, for the World Bank, the design and implementation of the new law framework in 1994 was a good case of the coordination model. The main challenges were, on one hand, a cultural change and the understanding of technical procedures of environmental management; on the other, a problem of enforcement. The latter was not a strong characteristic of the coordinator model.

Barton and Fløysand (2010) call this initial period of environmental legislation in Chile the “economic imperative” phase. In this regard, a powerful and cohesive business sector connected to trade organizations, think tanks and right-wing parties was crucial in the Chilean policymaking process. As has been documented, the elite’s control of policy-making processes has had an important role in the design and implementation of environmental regulations in Latin America (Bull 2015). The Chilean case was no different. Tecklin and colleagues (2011) state that in spite of the loose new regulatory institutional frame, there were complaints from the right-wing politicians because the law threatened constitutional principles of economic freedom and private property rights.

Some changes were carried out at the beginning of the 2000s. Some modification of the law yielded the use of market-based instruments as a complement of the command-and-control approach that the Chilean legislation had adopted with respect to environmental care (Montero, Miguel, and Katz 2002). At the end of this decade (2009), a Chilean “ministry model” was implemented regarding environmental affairs. The Ministry of the Environment was created along with the Environmental Assessment Service (EIAS) and the Superintendency of the Environment (SE). At that time, Chile was pursuing a membership in the OECD which was an important influence to carry out these measures[1] (Godoy-Faundez et al. 2012).

[1] Chile becomes a member of OECD in 2010.

From this conceptual and factual background, this dissertation aims to understand the environmental governance shift that the salmon industry had after the ISA breakdown. This general question involves other more specific inquiries about incorporating the role of the Chilean state and other national institutions as well as multiple factors related to global capitalism. The next section lays out crucial theoretical perspectives to address these questions.

The Diffusion of the Ecological Modernization Perspective

The mentioned ISA crisis of the salmon industry in Chile has been considered an inflection point of an environmental governance shift regarding the salmon industry in Chile. According to the industry representatives and government agencies, it was the moment that led this industrial sector to improve its relationship with the ecosystem. This idea has been widely accepted among local, national, and international actors. Considering environmental sociology literature, it is sensible considering the proposal of the "environmental Kuznets curve". Within this model, an ecological crisis might be an inflection point after a lengthy period of economic growth. After a threshold of economic growth in a particular economic sector, societies intensify their focus on policies regarding environmental care. However, this model it is not enough to understand the institutional dynamics behind environmental governance shift. A more general theoretical framework is needed.

There is a theoretical perspective that pays attention to environmental crises as a pivotal moment for change. This is known as Ecological Modernization theory (EMt). This perspective claims that there is a new type of modernity based on using human knowledge to improve and diffuse technology and create new kinds of social organization (Hannigan 2006). Specifically, EMt is "the social scientific interpretation of environmental reform processes and practices at multiple scales" (Mol 2010). An important aspect of the mentioned reform processes is ecological crises. These can be seen as "moments of transition" (Blowers 1997) toward technological and institutional modernization of industrial societies. In other words, it is a moderator of an ongoing long-term process of modernization. The role of ecological crises is a booster of novel types of environmental governance striving to legitimize ecological concern and technological improvements in the productive processes (Spaargaren and Mol 1992).

Sustainable Capitalism as New Economic Rationality

EMt acknowledges the tension between economic growth and environmental care (e.g. ecosystem depletion and pollution). However, economic growth and industrialization are essential for human well-being. There is not an inherent contradiction between economic success and the environment insofar as it is possible to advance toward the second type of capitalist modernity.

Given an interdependent relationship between economic and ecological systems, negative externalities in the sustenance base are unavoidable. However, an ecological crisis is the expression of old-fashioned industrialism and moderates an ongoing process of ecological modernization. Externalities due to the capitalist mode of production can be solved by furthering a new type of modernization and industrialization. As Buttel claims (2000b:61), from the EMt perspective "capitalism is sufficiently flexible institutionally to permit movement in the direction of sustainable capitalism."

A new type of modernization means embracing an ecological rationality. This rationality should be incorporated in public and private sectors and structurally part of institutions (Mol 2010). Political and economic institutions should be related to both technological improvements of production and consumption based on environmental consciousness (Jorgenson and Clark 2012; Mol and Spaargaren 2000; Spaargaren and Mol 1992). This type of modernization has been linked to “reflexive modernization” coined by the German sociologist Ulrich Beck, who challenges radical environmentalism claiming that solutions are within the limits of industrialization and science (Buttel 2000).

The Embedded Autonomous State in the Environmental Field

According to EMt, the role of the state is to induce environmental reforms and boost “capitalist eco-efficiency” and rationalization. This means, for example, creating preventive policies instead of reactive ones. Following Chaffin and colleagues (2016), it is the shift from an “adaptive environmental governance” to a “transformative environmental governance.” The former is reactive and builds resilience and adaptive management of socio-ecological systems. The latter, in contrast, is proactive and seeks an environmental regime shift. EMt has promoted new ways of

regulation and policies to create a modern relationship between the state and capital. This does not mean a “captured state” (Domhoff 1990) by private interest groups. At certain levels of modernization, there is autonomy of environmental issues as decision-making arenas (Mol 2010).

According to Mol (2010), EMt needs a theoretical basis regarding types of state structures, policy networks, and policy cultures. In this regard, Peter Evans's concepts of embedded state and state-society synergy are similar. Evans (1995) criticizes a supposed total autonomy of the state with respect to market actors and claims the state is embedded in civil society and able to construct markets and promote growth. An equilibrium between the Weberian idea of "corporate coherence of the state” and connectedness with interest groups in society is crucial to carry out industrial policies. Mol explains that Evans would add that fostering "urban sustainability" or "livability" is another important goal for the state (Mol 2000).

A crucial contribution of Peter Evans (1995) regarding “Embedded autonomy” of the state are the ideal types of roles that the state can exert to ensure its legitimacy on growth and industrial capacity. They are as follows:

1. Custodian State: Regulator mainly based on controlling undesirable behaviors, but not stimulation. Mainly policing.
2. Producer State: As states regulate, they also produce services. This type of state goes further. The state competes with private producers. There are two assumptions: Local capital cannot develop innovation ability and foreign capital does not care about local development.
3. Midwife State: The state stimulates entrepreneurial initiatives and leads them into a new economic sector. There are diverse ways of midwifery:

    - Being less of a custodian
    - Reducing uncertainty and risks for investors
    - Import tariffs
    - Foreign Investment restrictions as protection of national entrepreneurs
    - Providing productive subsidies

- Public promotion of new economic sectors (seeking legitimacy)
- Engaging foreign investment with local entrepreneurial projects when the latter cannot carry out challenging investment projects.

4. Husbandry State: Once entrepreneurial initiatives enter a new economic sector, the state nurtures this sector, promoting its evolution. It helps firms when they have to take over expansion or face new challenges. For instance, it supports this sector with research infrastructure and the acquisition of technology.

In short, the state accomplishes a significant role creating good conditions to attract initiatives and accelerate the diffusion of mechanisms of ecological modernity. This demands a state connected with private actors avoiding being captured by corporatist interests.

Civil Society and Market Actors Outside the State

According to Lemos and Aagrawal (2006), a new type of modern governance is beyond a "command and control" fashion associated with the state. Thus, it is possible to find ways of co-governance which are a signal of the state-market embeddedness and, at some level, civil society- market actors' embeddedness. Regarding the former, market actors and corporations are part of the civil society. EMt promotes a so-called "soft governance", which means market-led instruments of control and initiatives of self-regulation are carried out by industrial sectors. EMt focuses its attention on corporations and regulatory changes at the company level as a first place of innovation in this matter. But also, there is the following scale of corporatist interests to standardize regulation initiatives from the private sector (Rudel, Roberts, and Carmin 2011). Carrigan and Coglianese (2011) state, based on Braithwaite (2002), that new governance research suggests that these new governance instruments advance public policy goals while reducing the costs and informational demands on government.

Private globalized organizations are a special case of the rise of new actors promoting diverse kinds of regulations. Jordan, Wurzel, and Zito (2003, 2013) have called these regulations "New Environmental Policy Instruments (NEPIs)". Examples of those instruments are conduct codes and certifications from private agencies. For instance, private certification means that different processes and products in specific productive sectors are endorsed before national and

international buyers and stakeholders in general. These types of regulations can be an alternative or complementary way of governance with respect to state regulations. Other authors have a more radical posture and claim that NEPIs can be a form of governance without government (Rhodes 1996; Rosenau and Czempiel 1992).

With respect to the alliance between market-actors and civil society, EMt promotes the concept of multifactor governance (Newell et al. 2012), which considers a wider spectrum of actors from civil society having politicians as interlocutors. EMt puts its emphasis on a new type of agency (individuals and organizations) related to market and civil society in general. Private entrepreneurs and their innovations are the main actors in the process of modernization. In order to achieve this aim, entrepreneurs as market-actors are expected to foster innovation and the development of technology because it is mainly a matter of the market (Blowers 1997). Despite the fact that the state is an important influence on creating the conditions to facilitate these autonomous processes of innovation, it might be highly questionable that the state alters processes of production and consumption. For instance, it is not a task of the state to take over a process of de-modernization promoting small-scale production and consumption, as more critical theories of capitalism claim. This would move away from market actors and damage trusty relationships.

Globalization as a Diffusion Process of Ecological Modernization

EMt is considered as a "transformationalist" perspective of globalization. This standpoint does not condemn global capitalism insofar as global processes can be considered an opportunity to diffuse environmental consciousness through values, practices, and new institutions (Weidner 2002). It is an "emergent tendency of ecological modernization, now on a global level" (Sonnenfeld and Mol 2002:1322). The diffusion of a particular type of actors, institutions, and practices in the field of environmental care needs a particular theorization which is still diffuse in EMt. Following Frank and colleagues (2000), this perspective has several common points with the well-known "World Society Theory" (WSot) or "World Polity" (Meyer 2010), a prominent perspective on the globalization of institutions, culture, and practices.

In general, the concept of "World Society" means global integration or global convergence based on agreed upon values and institutions. The concept of globalization as global convergence is

used to explain different processes of diffusion and adoption such as global integration, organizational forms or legal reforms (Schwartzman 2006). The latter means, in short, the diffusion of western principles, norms, knowledge, and practices. For instance, in the economic realm, WSot has dominated the idea of common institutional configurations and economic policies across the world since the 1990s.

According to WSot, changes regarding values, norms, and laws in a society are carried out following "world models" (Meyer, Boli, et al. 1997 a). These models are designed by academic and non-governmental organizations; and technocratic cadres in the governments. This process of diffusion leads societies to converge (global isomorphism) on modern institutions and a cosmopolitan ethic underpinning a transnational civil society (Martinelli 2005). This isomorphism is possible in a context of global heterogeneity given the diffusion of cosmopolitan templates to understand the world in an agreed upon way.

Another significant characteristic of WSot is that the process of diffusion takes place following a logic of path dependency. For instance, John Meyer (Bergesen 1980:72) stated that "peripheral states have followed the patterns of development of the core states, following modern values based on the idea of the nation-state and its expansion."

WSot claims that there is an expected upgrade process of ecological modernization. According to Ehrhardt-Martinez, Crenshaw, and Jenkins (2002), this process is carried out through the aforementioned diffusion of templates regarding innovation on both a material dimension (technology) and an ideological dimension (institutions). Time of the adaptation and reception of these templates varies. It depends on the level of structural problems that less developed countries might face regarding the interaction between their economic development and the environment.

States and global economic interests are not the main explanatory factors of environmental governance changes. The origin is a global environmental regime promoting environmental concern at the global level. An environmental governance shift is based on a multi-actor spectrum which goes beyond national boundaries. According to Meyer and colleagues (1997), this world environmental regime is "a partially integrated collection of world-level organizations,

understandings, and assumptions that specify the relationship of human society to nature." World Society Theory gives an important role to formal associations and organizations. The latter has been seen as a different source of social order with respect to the state, market, and community (Streeck and Schmitter 1985).

Environmental global governance is diffused by international Non-Governmental Organizations (INGOs) which are able to exert their social capital at national and local levels to carry out a process of diffusion. The mechanism can be described as follows:

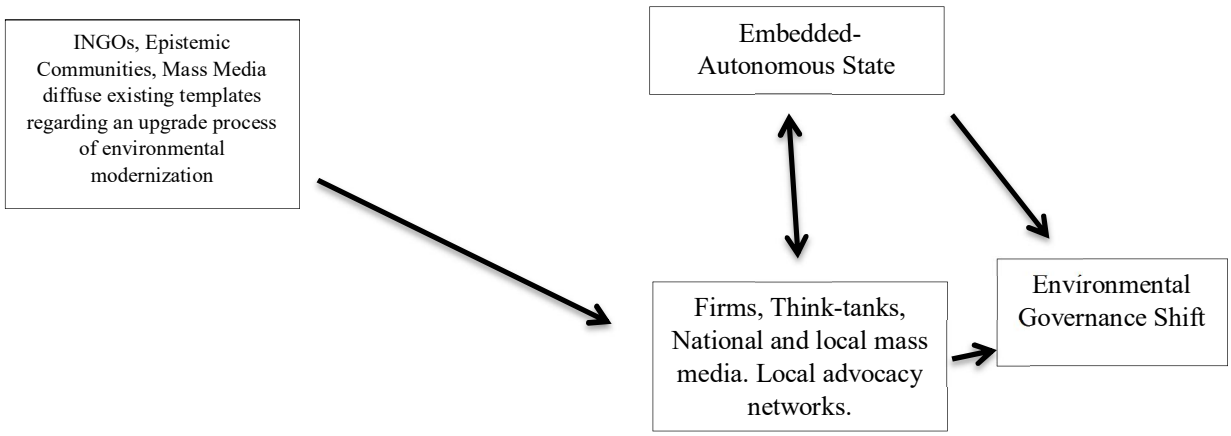
> Acting as the primary carriers of world culture, and as agents of many categories of individuals and peoples, INGOs translate the diffuse global identity and authority of world citizenship into specific rights, claims, and prescriptions for state behavior (Boli and Thomas 1999:188).

According to Boli and Thomas (1999), transnational bodies (INGOs) exert a special type of authority which is not rational/legal like states' authority. They do not have economic power like transnational corporations. However, they shape frames that orient states and policymakers. Moreover, these INGOs "serve functions that have historically been the task of governments, most notably that of regulating the negative externalities of economic activity" (Mayer and Gereffi 2010:1). The impact of the global environmental regime on national regulation in this field is mediated by INGOs. An example is put forward by Boli and Thomas (1999) examining the standardization of commodities, productive processes, and standards of quality. According to them, any state-centric theory fails to explain the phenomenon of standardization, which is a transcendent level of social organization beyond firms, states or countries. The authors claim that "technical rationality dominates over power" (Boli and Thomas 1999: 191). An example of this process of diffusion and the role of INGOs in the environmental field is the promotion of the international private certification of commodities. The increase in regulatory agencies is explained by a process of contagious diffusion mainly as a process across sectors (finance, utilities, and social) rather than a national one.

Apart from INGOs, there are two complementary types of organization. The first is part of a rationalistic and "scientized" culture at the global level. Within this culture are epistemic

communities, which carry out a process of theorization. Cultural categories are informed by abstract categories and scientific evidence, generating complex and rich models of diffusion (Strang and Meyer 1993). However, according to Dobbin and colleagues (2007), it is not a completely rational and thought out process of adoption. Lawmakers follow good foreign practices, experts' opinion or ideas that make sense according to the context. The second type of organization is the set of cultural and social movements at the local level which can be seen as "advocacy networks" (Keck and Sikkink 1998) or "subpolitics" (Beck 1999). International organizations cannot succeed without local organizations in obtaining legitimacy of new ideas at this level. This perspective takes the idea of multi-scale governance or, in other words, "below and above the state a better world" (Sinclair 2012:63).

Figure 7: Diffusion of Ecological Modernization Perspective and Environmental Governance



According to Figure 7, international creators of good practices, values, and theories with respect to environmental care can spread ideas according to modern principles. The destination can be directly the state or firms. Given that there is a state connected with civil society by exerting its role of midwife, these modern ideas are shared. The state, specifically the parliament will pass legislation according to this modernization process. But also, there is a direct connection between firms and environmental governance. This indicates initiatives of self-regulation and private certification.

Shortcomings of the Diffusion of an Ecological Modernization Perspective

This perspective has its origin in countries like the Netherlands and Germany. Therefore, it is important to cast doubt on its applicability in other contexts. It is important to note that this dissertation's study case is an economic sector in a developing country. Although Chile is the country with the highest per capita GDP in Latin America, its position is still mediocre among their partner countries in the OECD. Its economic growth is still depending on an intensive trade of natural resources and its CO2 footprint is increasing. It is evident that Chile is not in a descendent cycle of the "Environmental Kuznets Curve". This should not be very surprising. This theoretical model emerged from societies with advanced capitalism (Buttel 2000a), which makes it difficult to transfer it to peripheral countries. According to York and Rosa (2003:275), there has to be "an important distinction between societies' reactions to a social problem and the effect of those reactions on the problem itself". Therefore, the general context of the salmon industry in Chile regarding dematerialization of its economy is not favorable to assume a general tendency of adopting a new environmental rationality.

Another debatable aspect is the role of ecological crises in this perspective. Crises are seen as opportunities for introducing and diffusing a new environmental rationality. This has been a very sensible idea among salmon industry owners and advocate politicians in Chile. Optimistic management perspectives promote this idea to create a climate of "industries that learn" as part of a legitimacy recovery. In order to demonstrate this learning process, the industry has accepted with relative acquiescence changes in regulation. Also, it has implemented innovative technologies within a paradigm of "green capitalism". This promotion has worked, and it is difficult to confront this omnipresent rationale. However, it is sensible to understand that "many changes in institutional form that appear as a reaction to environmental problems may be symptoms of those problems rather than solutions to them" (York, Rosa, and Dietz 2010:82). A process of modernization in the environmental field can be also evaluated in terms of its progress toward a general dematerialization of the economy (York 2004; York et al. 2010). Therefore, measures within the EMt framework such as new corporative governance, regulation based on inventiveness, self-regulation based on external schemes, etc. can be indicators of the presence of a new way to tackle externalities of business on the environment. However, EMt logic has a contradiction that might hinder this process or even cause an opposite undesirable effect. It is

known that EMt considers profitability as a powerful incentive for improving environmental care measures. However, profits through environmental improvements can be used to expand the production, even in a different sector of the economy doing the opposite with respect to what was gained. Likewise, other measures such as private regulation based on eco-labels improve not only the environmental performance of corporations, but also the demand for more production which produces other types of externalities (Rudel et al. 2011). In short, the kernel rationale of EMt is the strong connection between modernization and economic growth. Other perspectives build upon this connection and deploy theoretical and empirical work demonstrating that EMt's premise is wrong.

In the political arena, EMt has a particular approach to the state. Given that the concept of governance comprises actors and practices besides the state, there is a logical connection between governance and the idea of obsolescence of the state. The state as an institution is– according to some scholars— obsolete considering the context of neoliberal national regimes and economic globalization. As Knill and Lehmkuhl (2002) claim, "the successful constitution of transnational markets coincides with the inability of governments to address social and political problems that are emerging from economic integration, both at the national and the international level" (p. 42). Consequently, it is possible to identify the claim that neoliberal globalization has produced the weakening of national developmental projects and the end of the "development state" (Berger 2000; Centeno and Cohen 2012; Harvey 2005). A worthwhile example is how regime theory scholars (Krasner 1999; Levy and Prakash 2003) give a leading role to the ideological character of an international regime of governance dominated by multinational corporations. In fact, the concept of governance has been associated with neoliberal ideology underpinning economic measures (i.e. privatization of public goods) imposed on developing countries from lending and donor agencies (Batterbury and Fernando 2006; Goldman 1996; Payne and Phillips 2014). From this "statelessness" perspective, governance would be a way of producing social order apart from the state or the implementation of governing mechanisms without the authority and sanctions of government (Rosenau and Czempiel 1993 in Jordan et al. 2003).

Regarding the role of civil society from this perspective, there are some points that cast doubt. EMt considers that the main actors are INGOs and transnational organization as part of a global

environmental governance. It also considers the role of civil society and social movements as part of a global diffusion of ecological rationality but within market-led initiatives. However, there is evidence that new types of private regulations have created other types of problems trying to be a modern way of governance. This type of private regulation was conceived in the first world mainly to endorse environmental and social sustainability of different productive units of the global commodity chains. Developed countries are increasingly facing negative externalities produced by their big corporations in various parts of the world. Thus, this kind of regulation is considered a humanitarian response to the undesired consequences of globalized capitalism and, through this effort, decreasing the public complaints of conscientious consumers of the first world and international NGOs (Bartley 2007; Cafaggi, Renda, and Schmidt 2013; Prado and Woodside 2014). Trusting consumers in the first world represent a new type of dependency, which is unstable and beyond the agency of local communities who suffer from negative externalities in their livelihoods and ecosystems. At the same time, they can be considered a mid-term strategy for legitimacy abroad, being ineffective at the local and national level.

From modernization theories and their later theoretical renewals (like EMt), globalization offers new ways to boost social development. Under this logic, some societies are backward regarding the process of modernization given that this is a path-dependent process. However, it is necessary to understand other phenomena such as power relations or historical structures of domination influencing countries' development. Industrialized countries have achieved their level of development and neglected the achievement of development of industrialized countries through the exploitation of peripheral countries (Shannon 1989). According to some scholars focused on capitalist development across the world "the distinctions between market-based economies of the United States and England and the societally and state-coordinated economies of Germany and Japan, are characterized as coherent, resilient alternative forms of capitalism, not as detours off a common trajectory" (Berger 2000: 4).

The idea of convergence that this path-dependency perspective claims has enough evidence. It is possible to identify an "Interconnected global order" or a "global convergence" in some terms. However, this fact does not support the idea of a unique global society based on common consensus and norms (Martinelli 2005; Schwartzman 2006). This global integration, according to

opposers of the world society approach, shares few core values and it has taken a polyarchic form of global governance (Martinelli 2005) and many of the shared values, organizations or institutional forms are adopted by consent rather than consensus (Schwartzman 2006). Also, whatever the forces are behind the adoption of economic policies as part of a process of global convergence, this adoption still depends on local institutional conditions of the state-societies (Fligstein 2001; Fourcade-Gourinchas and Babb 2002).

Global Capitalism Pressure Perspective

The Brundtland Commission Report released in 1987 strived to argue that "sustainable development" was the way out before the global ecological crisis. This means that it was possible to coordinate economic growth and environmental care based on scientific knowledge and the use of technology. Evidently, this standpoint fits well with the principles of the Ecological Modernization theory regarding making capitalism and the care of the environment a possible dyad. However, empirical research has demonstrated that improvements in technology have not produced a detachment between economic growth and environmental externalities. According to York, Rosa and Dietz (2010:84), the so-called "Jevons paradox" can depict this incompatibility despite technological advances. This paradox claims that the "efficient use of natural resources often increases in tandem with total resource consumption and pollution emissions". In the next section, I present a unified theoretical perspective upon this paradox and different authors' work that puts forward an inherent contradiction between the capitalist logic of production and environmental sustainability.

Capitalism as a Treadmill of Production

Allan Schnaiberg (1980) examines this contradictory relationship between capitalism and the environment. He uses the concept of the treadmill as a metaphor of the logic of capitalism regarding its endless propensity to produce. Thus, the "Treadmill Theory of Production" (TOPt) portrays a dialectical relationship between economic growth and environmental impacts affecting environmental governance. The ecological synthesis, a product of this dialectical relation, is defined as collective attempts to slow the treadmill, creating institutions that foster ecological sustainability (Schnaiberg 1980). Therefore, it is expected that technological innovations and

new types of institutions will be tailored by a treadmill logic, displacing every other social and environmental aim (Gould, Pellow, and Schnaiberg 2004; Oliver 2005).

Whereas EMt considers ecological crises as a window for new rationality with respect to environmental sustainability, the Treadmill of Production theory (TOPt) posits a different standpoint. This claims that an industrial sector can decrease production or implement technological improvements in its production process. However, apart from forced measures as a product of economic loss, these measures look for social legitimacy and expansion of capital. Therefore, it means legal and social reforms without a significant contribution to the sustainability of the environment. Regulation and state policies will carry out reforms but without affecting capital's interests. In short, if there is a higher concern for sustainability as the "Environmental Kuznets Curve" model states, this is only a product of a needed adjustment to boost an endless vicious circle.

Corporations must expand their operations and profits in a permanent context of competition. More accumulated capital means more technology and more intensive use of natural resources. Technology and scientific knowledge are used for endless economic expansion instead of a solution for environmental problems such as depletion of natural resources and pollution. Therefore, our societies are not moving toward a state of sustainability given the inherent contradictions of capitalism (Gould et al. 2004). In this regard, James O'Connor (1991) puts forward the idea of "the second contradiction of capitalism". This means that given the tendency of capitalism to look for lowering costs of capitals to restore profits, capitalism externalizes other costs onto conditions of production such as the natural environment. Thus, there is an increment of costs of other capitals, lowering profits.

A Captured State

Following Buttel (2010), there is an important assumption in the Treadmill Theory: the state has a dual role supporting economic growth and maintaining political legitimacy. Regarding the former, the state must promote private capital accumulation to ensure economic growth, job creation, and tax revenues. Regarding the latter, the treadmill logic for the state has to gain support from different interest groups such as investors, workers, and politicians on behalf of social progress, especially in times of crisis of legitimacy (Bell and York 2010; Rudel et al.

2011; Wallerstein 1999). One way to achieve this double mission is implementing regulations and sanctions. However, the institutional framework to do that has to be adapted to the treadmill logic. This logic is an enhancement of the monopoly-capital, which means 1) capture of regulatory agencies by the monopoly-capital sectors they purport to regulate, and /or 2) elimination of competitive capital by the high costs of conforming to regulation (Schnaiberg 1980).

According to John Foster (2005), the idea of the state in Schimberg is based on the historical analysis carried out by Kolko (1965) regarding the relationship between railroad investors and state regulations. It means that corporations were able to capture the American regulatory system. This is to highlight that the neo-Marxist perspective has claimed the state as a captured institution by corporate interests before TPt.

Civil Society and Interest Groups

According to Rudel et al. (2011), the "Productivist perspectives" such as TPt and other similar perspectives such as the "Growth machine theory" (Logan and Molotch 1987) had a special focus during the beginning of their development as theoretical perspectives. They were focused on the inherent consequences of industrialism without attention to contestation from civil society.

According to Eric Wright (2004), TPt is rightly focusing on production, instead of consumption, as the first cause of environmental deterioration. Market and private property lead to externalizing costs of production temporally, socially and spatially as mediators of production and the environment or ecological systems. Thus, according to Wright, TPt is a critique of the idea that put technology as a way out. But it is also critical with environmentalist movements focused on consciousness and consumption. What really matters, at last, is the structure of production and social movements mainly led by workers and people exerting their status as citizens (Buttel 2004; Gould et al. 2004). However, there is a strong criticism toward International Non-Governmental Organizations insofar as they are corporatist arrangements, which exclude disadvantaged and unorganized peoples (Rudel et al. 2011).

Therefore, a common criticism was that theories such as TPt do not acknowledge the importance of civil society in political and cultural changes in favor of the environment. However, it is

possible to fill this void by incorporating the concept of double movement coined by Karl Polanyi, which is a more structural perspective regarding the importance of civil society.

Polanyi (1957) claims that the supposed self-regulating market needs regulation and subsidies to from the state ensure profits. It needs the state intervention to protect labor as production means and natural resources. This demand is coming from capital and workers. The latter will create protests in which two different interests can be nested: job and environmental protection. As mentioned, O'Connor (1991) states that industrial expansion undermines the natural resource base that sustains capitalism (second contradiction), which generate demands from civil society for protection. In this regard, empirical evidence has demonstrated that social protests can be encouraged by blackmail jobs (Kazis and Grossman 1991) or by a green-blue coalition (Mayer 2009).

There are other critical approaches focused on the effects of global capitalism on the environment from the cultural realm. From this approach, there are ideological aspects related to capitalist contradictions. In a post-Fordist era, the capitalist system needs legitimacy beyond jobs. For instance, according to Bell and York (2010), a common strategy carried out by extractives companies is taking symbolic elements from localities and turning them into parts of an economic identity to gain legitimacy and their projects make possible.

Global Capitalism as a World-system

There is a strong criticism of the evolutionist bias of authors claiming that modernization is a path-dependency phenomenon. The principles of evolutionism and functionalism were contested by Marxist and neo-Marxist theorists. However, it is worthwhile to understand that in some sense evolutionism and the teleological character of the development theories was transversal. Evolutionism was present in Marxist analysis of national development. For instance, Laclau (1971 cited by Bergesen 1980) integrated the concepts of "precapitalist" Latin America and "the feudal regime of haciendas". There is not a unique path wherein some countries are more advanced. According to World-system theory (WSt), there is an evolution of a global economy which in the current phase, is a global capitalist system which has been known as "globalization". Within this system, countries occupied different hierarchical locations given their political interaction.

Chase-Dunn and colleagues (2000) state that economic globalization is the integration of the organization of production, distribution, and consumption of commodities in the world economy. But this integration needs to be politically controlled by institutions that follow the interests of the nations that are at the center of the modern world-system. The World-system perspective puts asymmetry between nations as a crucial and problematic part of environmental issues. The structure of the world economy and the position of nations on it have to be considered in order to understand the dynamics that affect the biosphere (Bergesen and Parisi 1999). The differences between central and peripheral countries not only remain, they have also increased. The latter has led Wallerstein (1999) to claim that "the environmental dilemmas we face today are directly the result of the fact that we live in a capitalist world-economy" (p. 8).

In order to solve the aforementioned dilemmas, the global economy needs institutions. The design and diffusion of new institutions necessarily depend on the interests of countries at the center that dominate the global economy. In contrast to Modernization Theory, from a world-system perspective, there is not a natural diffusion of institutions as part of a path-dependency process. According to Schwartzman (2006) countries at the periphery have to join international trade rules to take advantage of globalized capitalism by consent. It is possible to establish a continuum which goes from the diffusion process as a voluntary reception of cultural practices and norms to the imposition of practices by coercion (Goertz and Diehl 1992 cited by Schwartzman 2006). This coercion comes from the power of the global market, which imposes demanding institutional reforms within national economies.

It is possible to establish three mechanisms whereby World-system Theory explains an environmental governance shift in the case of the salmon industry in Chile. First, is the role of foreign direct investment (FDI) and its effect on national sovereignty. Especially since the 1990s, national economic growth meant being part of global markets (Robinson 2002) and openness toward FDI (Sumner 2008). Under these circumstances, developing countries must compete in order to attract FDI. This means, among other measures, implementing policies that lower barriers for foreign corporations. This means redesigning national regulations in order to avoid regulatory burdens that restrict the competitiveness of domestic industries (Gould et al. 2004; Haslam 2010; Knill and Lehmkuhl 2002). The conditions imposed by FDI challenge national institutions to face the consequences of external shocks and also maintain internal legitimacy

(Rodrik 2000, 2011). In short, FDI affects national sovereignty with respect to both the wealth created within the nation and internal political hegemony. In the field of environmental governance, the effect of FDI in host countries has been studied. Investors from the United States, for instance, have sought better conditions to invest abroad, especially in developing countries. Investing abroad has been mentioned as an issue of "ecological justice" (Holifield, Porter, and Walker 2009; Schroeder et al. 2008), externalizing environmental problems (Gould et al. 2004). On the other hand, FDI can be a way to foster good practices and advanced technology, as part of its spillover effect (Herzer, Klasen, and Nowak-Lehmann 2006).

The second mechanism is the legal construction of markets advocated by trans-national or globalized organizations (Halliday and Osinsky 2006). These organizations have a high level of legitimacy in the world such as the World Bank (WB), International Monetary Fund (IMF) or the World Trade Organization (WTO). These organizations are part of a wider network of private agencies promoting models of making economic decisions with a presence in almost all the countries of the world. In this process of promotion, there is a high influence of nation-states at the center of the world-system. Sinclair (2001:441) identifies these organizations as "makers of global policy" who exercise authority in two ways:

1. Constrain thinking to a specific range of acceptable possibilities and even exercise a veto over options regarding financial markets.
2. Construct markets by setting the standard or benchmark for the market players. There are no investments or loans with uncertainty. Private ranking agencies occupy this place.

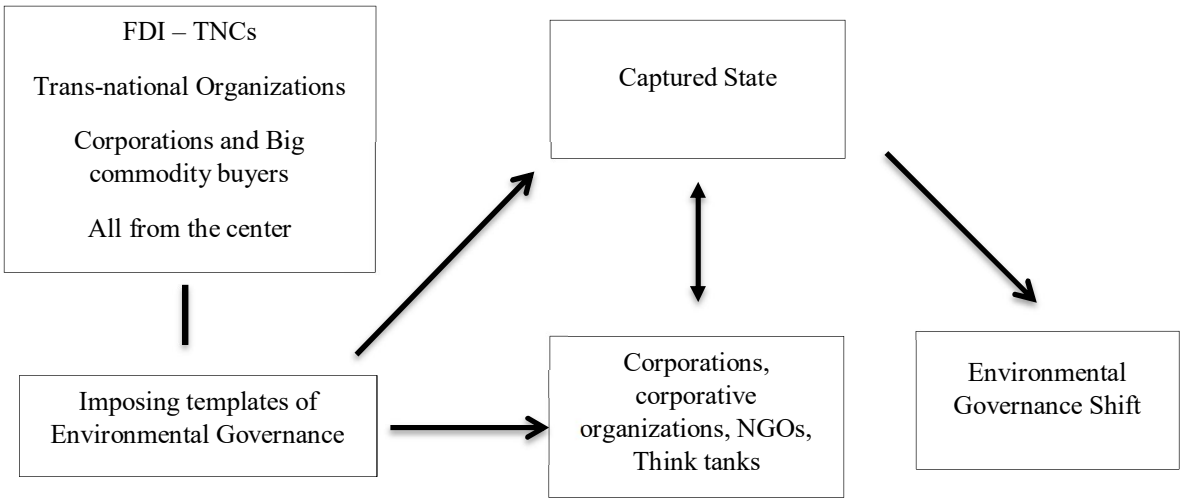
The third mechanism is the force that influences environmental national policies from the global market and its actors in a more direct way than the previous mechanism. Markets at the international and national levels need regulations. Regulation agencies get embedded among state, business, and international organizations.

International markets demand and shape regulation using two paths. On one hand, global-market actors use what scholars have called "state-centered regulations" (Jordana 2011). This type of regulation boomed in the 1990s. The powerful measures of deregulation in the 1980s were not the definitive strategy to create good conditions for attracting foreign investment and articulating

the global commodity chain. New kinds of institutions and regulations, giving certainty to investors and showing seriousness before bilateral agreements were necessary (Jordana, Levi-Faur, and Marin 2011). The latter idea coincides with the "competition hypothesis" of social policy diffusion (Dobbin et al. 2007) which claims that national economies adopt specific policies given the pressure from their direct competitors. However, there is a particular conception of the state in its role of environmental governance. From a World-system perspective, nation-states count but they have a constrained sovereignty in a hyper-globalized context (Rodrik 2011). Therefore, the state is important regarding the position of national economies in global capitalism. The role is not the same "developmental state" which surfaced in developing countries before the 1970s. It is a state that mediates between private capital and state agencies (Evans 1995).

On the other hand, there is what Levi-Faur (2011) calls "society-centered regulation." This is a more direct method used by global-market actors. There is a 'buyer-driven' value chain when big buyers of commodities at the center are active actors developing and imposing standards, rules, and procedures for producers.

Figure 8: Global Capitalism Pressure Perspective Explaining Environmental Government Shift



As Figure 8 presents the imposition of environmental governance's templates reaches producers who form coalitions among themselves and the state's agencies. From the principles of World-system Theory, there is diffusion through the consent of environmental governance templates among private entities related to the salmon industry. This diffusion comes from trans-national

organizations and corporations. The governance shift is then a consequence of the needs of the industrial sector to compete in the global market, influencing the government in order to create tailored environmental governance. The state is open to incorporate the demands of the industry in order to keep sovereignty and legitimacy. But also, the state might allow corporative mechanisms of self-regulation coming from the private realm.

Relevant Shortcomings Regarding the Global Capitalism Pressure Perspective

Without a doubt, this perspective presents a critical approach to global capitalism and its influence on national environmental governance. According to some authors, "the treadmill of production stands out as one of the first attempts in sociology to develop a political economy of environmental crises" (Foster and York 2004:294). From this viewpoint, EMt and its associated phenomena can be only a reaction in the face of crises. It is not a theoretical perspective observing the consequences of the economy as a whole, which is the only way to understand changes.

Regarding this last point, this approach is criticized. According to York (2004), TPt is not testable in a specific productive sector, since the trend of capitalism with respect to the environment cover different and interconnected sectors. The general effects of modernization on environmental sustainability is only noted when observing whole economies. In this regard, TPt is not useful for understanding changes in a specific industrial sector like farmed-salmon.

Another weak point of this perspective is its focus on production. It is important to note that production has its own dynamics in a capitalist system. Although it seems contradictory, it contemplated the lowering of production at some phases of capitalism. That is the case of the farmed-salmon industry in Chile. When prices declined dramatically given global market variables, owners were concerned about overproduction. It is suitable the criticism of John Foster (2005) toward the concept of endlessness production. According to this author, “the core issue where capitalism is concerned is accumulation” (p. 14). Therefore, it should be a “treadmill of accumulation” instead of a “treadmill of production.”

Regarding the perspective on the state, TPt claims that the state and governmental agencies are part of a coalition with the corporatist sector. This is problematic when we understand that there

are dynamics within the state that can be attributed to a particular interest of state officials. This is a Weberian idea of the modern state and his theory of a stratification system based on diverse sources such as bureaucratic power. Bureaucrats can have their own interests as state officials, which might be aligned with environmental care or not. The state can control the diverse interest groups within the civil society. This means that there is an "autonomous state" or at least a "potentially autonomous state" (Evans, Rueschemeyer, and Skocpol 1985). However, this idea of the state can be extreme, and it is necessary to look for more intermediate approaches to understand environmental governance in the context of the Chilean neoliberal political regime. The trajectory of the regulation of the salmon industry in Chile not only has guaranteed property rights, it also has implemented restrictions, which have been both contested and accepted by corporations. A captured state theory cannot explain this event without a more integrated perspective.

The role of civil society from this perspective is controversial. Schnaiberg developed his concept of the treadmill based on a neo-Marxist perspective of structural forces and contradictions of capitalism. In this regard, TPt takes into consideration agency but within a structuralist epistemological tradition. Not only capitalists and the state embrace endless economic growth and its legitimacy. Also, civil society does it in the role of worker or consumer. Therefore, environmental concern is not a matter of consciousness which led Schneiberg and colleagues to criticize mainstream green social movements (Buttel 2004). Different types of social movements such as "cosmetologists" or "meliorists" were only part of the "superstructure" but their action does not aim at the real causes of environmental degradation. According to TPt, these types of environmental social movements have failed to attempt to decrease environmental degradation.

It has been mentioned that there might be different paths toward environmental sustainability, even with similar economic development strategies. In this regard, there is a similar case with the relationship between actors pushing for environmental reforms and political institutional arrangement. There is evidence to demonstrate that corporations are willing to accept more stringent environmental regulations. Although this is still a vague statement regarding the reason to accept restrictions. It is necessary to explore theoretical explanations from other perspectives beyond TPt in order to understand this type of situation.

Fairbrother (2016) considers that TPt neglects a wider spectrum of solutions and cites Ostrom (2003) who states that "what the research in social dilemmas demonstrates is a world of possibilities rather than one of necessity." A valuable example is that the opposition between the interests of workers focused on "keeping jobs" and the interests of environmentalists focused on "environmental care". As mentioned, this opposition has been stressed by the "Blackmail job" approach. According to TPt, this would be part of an ideological victory of capitalism separating material well-being from environmental well-being. However, there have been documented cases where these contradictory forces have been allies (blue-green coalitions) under specific social and political conditions (Mayer 2009).

Regarding globalization, this perspective has a strong theoretical tradition and much empirical evidence. Within this context, the WSt has highlighted the role of global capitalism and its different ways of pressuring for the liberalization of national economies. This has contributed to, for instance, the increasingly free circulation of foreign direct investment (FDI) and low level of tariffs. The implementation of these measures is in exchange for foreign investment and financial loans. As expected, the pressure wielded by these organizations (e.g. IMF, WTO) and the dynamics of the global market have affected environmental stewardship at the national level.

However, according to Fairbrother (2016), there is evidence about major differences across countries with similar levels of development regarding the environmental impact of their economic output. Although it is not enough to challenge the premise regarding center-periphery of WSt, it is important to consider diverse mechanisms that mediate between the position of a country in the modern world-system and their environmental governance.

Another critical aspect is that the role of globalization in environmental governance at the national levels might influence opportunities that foster more sustainable economic practices. Globalized ideas have influenced firms, corporations and industrial sectors promoting new types of market-led regulations promoted by international environmental NGOs that have a more market-friendly approach. Their legitimacy is mainly supported by new types of social movements based on conscious consumerism trying to change the way that corporations behave in developing countries regarding environmental care. The national government and legislators are constrained through international pacts promoted by transnational organizations focused on

global environmental governance. According to Weidner (2002), the diffusion of environmental policies exerts an effect of demonstration that allows advocates of sustainability to expose rationale against ignorant economic interests and promote environmental innovations.

An Integrated Political Economy Perspective of Environmental Governance

Two comprehensive theoretical perspectives regarding the relationship between political and social institutions and the stewardship of the environment have been exposed. Although these approaches offer useful insights for this dissertation, they have particular limitations. To address these, a consolidated theoretical background is built upon the main contributions of these perspectives to shed light on the questions of this dissertation.

The main aim is to understand the type of environmental governance shift carried out to regulate the salmon industry in Chile. From this main question, others appear related to the role of the ISA crisis and the role of the state agencies. Also, the effects of the global market and its institutions on the mentioned environmental governance shift. Once actors and process involved in these questions are identified, an integrated political economy perspective can be defined.

Following Rudel and colleagues (2011), it is possible to define an Integrated Political Economy of the Environment Perspective. A perspective like this should take theoretical elements from Sociology, Political Science, Geography, and Economics. The authors propose the following general definition:

> "For sociologists, the political economy of the environment refers to how people control and, periodically, struggle for control over the institutions and organizations that produce and regulate the flows of materials that sustain people (corporations and the state)… Scholarly work on the political economy of the environment also includes efforts of nongovernmental actors—corporations and environmental social movement organizations—to shape environmental policies and behavior" (p. 222)

Although this phenomenon is important in environmental sociology (Bridge 2007), an integrated perspective is not solely focused on flows of materials as the previous citation states. It is

necessary to create a wider consideration. One consideration is the environmental governance of common pool resources (Ostrom 1999) and externalities (Fairbrother 2016).

A political economy of the environment incorporates a basic definition of political economy considering the interaction between economy and institutions. This includes the state and other actors as part of a process of control over economic decisions embracing the use of natural resources and eventual negative externalities on the environment. But also, the incorporation of other actors is due to a general trend of liberalization and privatization that put the state as one more actor, giving the role of "natural resource manager" to private organizations and promoting self-regulation schemes. On the other side, NGOs at the local and international level carry out alliances with communities in order to revert this process of the privatization of natural resources and the closure of decision-making processes (Baud, Castro, and Hogenboom 2011).

A political economy of the environment embraces ideas such as actors and institutions, policy-making processes and the effects of economic activities on the environment. This makes the concept of Environmental Governance to be within a more general perspective, which is presented in the following section.

Environmental Governance

In general, the concept of governance became a research tradition trying to install a new idea of institutions given the transformation and contradictions that the nation states have to face in the context of the first and second generation of the so-called "Washington Consensus" (Fukuyama 2016; Rodrik 2007). According to Batterbury and Fernando (2006), it has been necessary to understand at least two processes regarding institutions. The first is a geographical process of decentralization. The second is a political process of the concession of power to market and civil society. Both processes have constrained the historical political power of the state. But also, there is a third transformation, which is a shift from a political to a technical coordination of the markets from the state. Consequently, the problem of development is seen as a way to solve technical problems rather than a long-term political project, providing resources and institutions (Payne and Phillips 2014). Despite these changes in the role and scope of the state sovereignty, a "political economy of governance" is possible in order to understand the intersection between

state and capital (Batterbury and Fernando 2006) and also the intersection between public and private realms of governance (Knill and Lehmkuhl 2002).

The distinction between public and private arenas is highlighted by the "the regulatory approach" (Jordana 2005; Levi-Faur 2011), which sees governance as a matter of regulation. Regulations emerge as a way of governance in the current phase of global capitalism. This would explain why "capitalism could remain stable over the long run despite its generic, structurally inscribed crisis tendencies" (Jessop 1995:317). The relationship between governance and regulation is put forward by Jessop (1995), who states that "governance can be considered as the abstract concept and regulation as its concretization in the economic domain" (p. 320).

National states are still crucial for the formation and consolidation of markets through regulations despite the peripheral role that they could have in global capitalism. Thus, we have regulations coming from a "regulatory state" (Jordana 2011; Majone 1994). Also, there are "society-centered regulations," which come from private organizations in order to complement or even replace regulations from the state. Society-centered regulations have made the distinction between public vs. private confusing (Bridge and Perreault 2009; Cerny 2014; Levi-Faur 2011; Stoker 1998). However, these two fields of governance can still be an analytical guide for understanding different forms of governance. Considering the "governance capacity" of actors in each field (public and private), we can obtain ideal-types of governance (Knill and Lehmkuhl 2002), as the next figure shows:

Figure 9: Four Ideal Types of Constellation of Private and Public Governance

Four Ideal Types of Constellations of Private and Public Governance

		Governance Capacity of Public Actors	
		Low	High
Governance Capacity of Private Actors	Low	Interfering Regulation	Interventionist Regulation
	High	Private Self-Regulation	Regulated Self-Regulation

Source: Knill and Lehmkuhl 2002

Figure 9 depicts four types of regulations. The first is “Interventionist Regulation,” wherein the hierarchical power of the state dominates. As the authors state, "The overall responsibility for the provision of public goods lies with the state, as does the power to decide the content of public goods and the institutional form for providing them" (Knill and Lehmkuhl 2002: 50). The second is “Regulated Self-Regulation,” indicating an asymmetrical relationship with respect to providing services and their regulation. There are "cooperative patterns of interaction between private and public actors." However, the authors highlight the fact that "the overall responsibility for providing public goods still lies with the state" (Knill and Lehmkuhl 2002: 50), and the state leads mechanisms of governance based on incentives and supporting private interests. The third type is “Private Self-Regulation,” wherein "the provision of public goods basically depends on the governance capacity of private actors, while governance contributions of public actors are contingent upon the activities of private actors" (Knill and Lehmkuhl 2002: 51). The state can promote self-regulation or mediate it in cases of conflict, but direct control is only exerted in extreme cases such as control-like tendencies that interfere with free competition. Finally, there is “Interfering Regulation,” which indicates a lack of coordination between private and public actors and a vague type of governance. The authors state that in this type of governance, “governmental intervention can no longer compensate for the low potential for private governance contributions” (Knill and Lehmkuhl 2002: 52). There is a direct intervention, but it is ineffective given the deficient quality of relationships between public and private actors.

Environmental Governance from a Political Economy Perspective

Environmental Governance has been reviewed in general from a perspective of “Environmental Management” (Kirschke and Newig 2017). A political economy perspective places governance within a larger context and introduces new concepts such as state, markets, and civil society. From this perspective, it is worthwhile to consider the debate around those aspects. From my perspective, a fundamental starting point is the controversy around the so-called “natural commons”.

The idea of the “dilemma of the commons” coined by the human ecologist Garret Hardin (1968, 1998) is a theoretical precedent of environmental governance. Hardin’s idea about the overuse of natural resources and its unavoidable destiny given the pace of population growth marked the

starting point of institutions as an important issue in environmental sociology. The common belief in the endlessness of natural resources and free access to them would lead humanity to disaster. In spite of the fact that the only solution is to significantly decrease population growth, it is possible to manage resources through a collective agreement with coercion, such as taxes, private property, and breeding limitations (Hardin 1968). From Hardin's standpoint, the idea from the economist and philosopher Adam Smith which states that seeking individual interest leads to the common wellbeing does not work with respect to the limited character of natural resources and, obviously, in the context of scarcity. In this regard, Hardin's dilemma (1998) claims that "the more the population exceeds the carrying capacity of the environment, the more freedom must be given up" (p. 683). The institutional frame to address this dilemma is centered on governability, wherein the state is the sovereign institution that guarantees private property. However, a wider conceptualization of institutional arrangements and the spread of democratic values regarding decisions concerning the management of natural resources led scholars to look for alternative solutions to Hardin's dilemma.

Institutions and Environmental Governance

According to Elinor Ostrom (1999), Hardin's dilemma is a matter of limited resources and increasing demand that needs to be addressed in a different way. The idea of governance (instead of governability or government) is found in the economic theory of common-pool resources. They are defined as follows:

> A common-pool resource, such as a lake or ocean, an irrigation system, a fishing ground, a forest, or the atmosphere, is a natural or man-made resource from which it is difficult to exclude or limit users once the resource is provided, and one person's consumption of resource units makes those units unavailable to others. (Ostrom 1999: 497-498)

Ostrom lays out an institutional arrangement to solve Hardin's dilemma. Solutions would not be restricted to Hardin's way out which includes proposing private property, population control, and limiting freedom. Dietz, Ostrom, and Stern (2003) developed a wider concept of control based on agreements and cooperation. From their perspective, it is imperative to establish the

importance of institutions in the field of environmental stewardship and natural resources management, especially regarding common-pool resources.

Considering natural resources, as Ostrom puts forward, environmental governance can be defined as a process for coping with the control of common-pool resources. It means "making tough decisions under uncertainty, complexity, and substantial biophysical constraints as well as conflicting human values and interests" (Dietz, Ostrom and Stern 2003: 1907). To Bull and Aguilar-Støen (2015), based on Bulkeley (2005), it is also the “allocation, control and coordination of natural resources with different actors apart from the state” (p. 5). Likewise, to Bridge and Perrault (2009) environmental governance is "to describe and analyze a qualitative shift in the manner, organizations, institutional arrangements and spatial scales by which formal and informal decisions are made regarding uses of nature." (p. 475). It is clear that environmental governance is a concept with a different emphasis, but the common factor is broadening the spectrum of actors who might be diverse and even have contradictory interests.

As the previous definitions depict, environmental governance entails a political perspective of the environmental field, wherein power and contradictory interests are a matter of concern (Bryant 1992, 1997; Manring 2007). For instance, some evidence shows how new forms of environmental governance have favored market actors (Sanchez 2002; Tecklin et al. 2011). Another example is the way that multinational corporations have influenced national regimes of environmental governance (Levy and Prakash 2003). The latter leads us to take into consideration the mentioned spatial scales as the following definition does:

> [Environmental governance is defined as] formal and informal practices of use and management of renewable and non-renewable natural resources and its transboundary implications. This implies a focus on how these practices are perceived, contested and reshaped in the context of rapid and complex social, political, economic and environmental changes at local, national, and global levels. (Baud et al. 2011:80)

In other words, environmental governance is the set of regulations and practices facilitated by diverse actors, with diverse interests on diverse scales. This definition can be applied to different

situations or phenomena related to the use of natural resources and the externalities of human activities affecting the biophysical system.

It possible to claim that state institutions' control has changed in terms of their scope and interaction with other areas such as market, capital, and social movements. The concept of governance and specifically environmental governance acknowledge these phenomena and they can be analyzed from a political economy perspective. However, an important aspect is necessary to examine further. The influence of economic globalization reaches most social and political phenomena in the arena of the environment. In the following section, the effects of globalization on the state and civil society are briefly discussed to finally propose a general schema of the political economy of environmental governance.

International Political Economy and Institutions

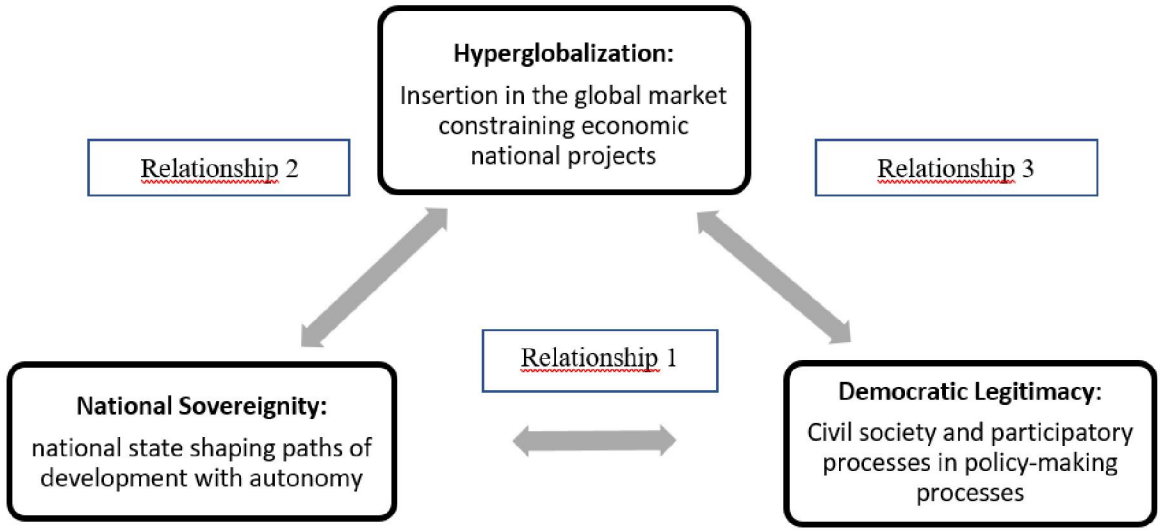
Globalized capitalism has aimed to deregulate national economies and reduce the state in order to establish a unique global market reducing national barriers as much as possible (Kobrin 2005; Rodrik 2011). Under the pressure of trans-national organizations such as the IMF or the World Bank over political and economic national institutions, neoliberal measures have sought the insertion of developing nations into the global market, abandoning old paradigms of inward development (Firebaugh 2003; Joseph 2003; Wallerstein 2000; Walton and Ragin 1990). Examples of changes regarding institutional arrangements can be depicted, namely a hybrid role of the state regarding economic development (Sheahan 2002); a dominance of the market in regard to social development (Filgueira and Filgueira 2002); weakening of labor unions producing a distortion of the labor market (Silva 2009), and a loose legal framework for the exploitation of the environment (Phyne 2010). In short, the main issue became how sustainable this economic growth could be, taking into account that economic globalization had affected the sovereignty of nation-states (Oliver 2005; Redclift and Sage 1998).

However, sociological theory and empirical research have demonstrated that state institutions cannot be neglected (Evans 1995). There is a historical scholarly tradition arguing that markets are embedded in institutional arrangement (Fligstein 2001; Granovetter 1985; Kolko 1965; Polanyi 1957). Thus, it is important to consider the fact that developing countries have adapted state institutions in order to enter into global capitalism, considering their historical and

structural disadvantaged position (Demir 2016). Thus, how this general process of institutional adaptation can be identified in the environmental field? Does this align with the case of the Chilean state and the salmon industry in this country?

Global economic insertion and institutional changes can be analyzed using a general framework. It is a matter-of-fact that national economic growth means being part of an integrated global market at the current phase of global capitalism (Robinson 2002). Rodrik (2000) wonders how far international economic integration will go, considering that markets, in the abstract, are related to jurisdictional scope, especially to national sovereignty. According to Rodrik (2000), "International Economic Integration" is a pertinent concept in order to understand the consequences of the international market and foreign direct investment (FDI) on national sovereignty. It is necessary to consider the tension between national legal systems and international market trends. For the author, there is a trilemma (see Figure 10) which presents three decision paths. Regarding one of these paths, "If we want highly participatory political regimes, we have to choose between the nation-state and international economic integration" (p. 180). Connecting with sociopolitical consequences, Rodrik states, "Once the rules of the game are set by the requirements of the global economy, the ability of mobilized popular groups to access and influence national economic policy-making has to be restricted" (p.183).

Figure 10*: Dani Rodrik's Trilemma (2011)*



The arrows in Figure 10 represent the aforementioned three decisions paths. According to the presented reality of developing countries and their efforts to be part of the global market, they are supposed to face serious problems of democratic legitimacy. This is the consequence of constraining their national sovereignty and their degree of freedom in order to follow their own projects of national development. However, following Rodrik's diagram, globalization offers alternative sources of legitimacy that might be an alternative way to compensate for the lack of sovereignty and problems of legitimacy at the national level.

Another possibility is that withdrawing democratic legitimacy in favor of economic global insertion does not necessarily mean a crisis of legitimacy or at least it does not mean a permanent one. The trilemma might be addressed, creating an "unstable balance" instead of an actual trilemma. In the middle of this "unstable balance," the question about constructing environmental governance in the context of global capitalism can be settled. I have adapted this trilemma to make it more suitable for this research.

Adaptation of Rodrik's Trilemma Schema

The general scope of Rodrik's trilemma is to make understandable the national politics in the context of the current phase of globalized capitalism. Therefore, this analytical tool has been adapted to address the research question of this research.

Relationship 1: The State and Civil Society

The implementation of neoliberal economic measures changed the type of state in Chile under the authoritarian regime (1973-1989). During an orthodox neoliberalism and a later pragmatic neoliberalism (Silva 1996), the Chilean state was the means to ensure governability and certainty for large capital based on extraction and export of natural resources. The polarization of society was not only political, it was also economic. Inequality and the appearance of "super riches" created conditions for unregulated lobbying, property and market concentration, and powerful organizations of historical landowners and new entrepreneurs inserted into the global economy (Solimano 2012). However, an institutional democratic regime has been creating higher levels of accountability and demands from the civil society. Institutions regarding electoral processes, party system and control of the military have allowed some stability and a restricted but

consistent democratic regime. Within this context, the relationship between the state and the Chilean market actors has several nuances. The economic elite is not completely homogeneous in terms of their political project, but there is a clear consensus regarding the centrality of the free market and economic growth with a small state bureaucracy. The latter gives a clear right-conservative profile to this economic elite. Historically, the state has been an attractive means to carry out the elite's economic and social project (Zeitlin 1988).

Since General Pinochet's dictatorship, organizations from civil society have been highly mediatized by political parties, which are part of two big coalitions. This has meant a low level of participation in social movements, associations, and electoral events. Political parties and their leaders keep their places in the parliament for a long time and, as an important indicator, congressmen move easily between state agencies and important positions, such as CEOs in the private sector. Even though the relationship between political parties and social class is highly diffused, it can be identified that right-wing parties strive to hinder progressive measures regarding social rights and labor unions. As a result, there is a weak welfare state, but it has a key role in creating good conditions for domestic and foreign investment. The farmed salmon industry is an iconic case.

Given the previous context, theorization about the relationship between state and civil society in the context of a neoliberal regime is needed. In this regard, according to some authors, the world is facing the so-called "regulatory capitalism" (Levi-Faur 2005). It is assumed that one of the main characteristics of capitalism in its neoliberal phase is promoting liberalization and deregulation of the market. Nonetheless, at the practical level, it promotes or is accompanied by regulation. Regulation agencies get embedded among state, business, and international organizations. Given the wide commodity chain, national economies need regulation in order to establish or reinforce markets (Levi-faur and Jordana 2005). At the international level, economic globalization introduced a new architecture of the international system of regulation and new non-governmental actors. In short, regulation has a twofold function: it enables markets and, at the same time, moderates their function.

Just as regulation regarding the farmed-salmon industry is important, the regulatory process matters. I examine the relationship between the state and civil society and how the policy-

making process was carried out within this relationship. Two steps are necessary: First, clarifying what civil society means. Second, asking who participates in the policy-making processes. Both issues are relevant topics in political sociology.

Civil society comprehends both the community and market actors, although these two realms can be identified with different logics of actions and interests. However, when we review their relationship with the state, market actors used to be more organized and a have a higher level of influence with respect to the community. Market actors maximizing their decisions lack legitimacy with respect to the public interests which, in general, is a legitimacy attributed to communities and the state.

According to Streeck and Schmitter (1985), modernity has generated a fourth type of organization to overcome the mentioned lack of legitimacy of market actors. It is an organizational concertation which is called an Association. It is a residual with respect to the state, community, and market. However, associations satisfied a particular systemic need, as do the other three. Associations defend specific interests with clear rules and institutionalized procedures. They reduce the complexity and uncertainty of the environment and in general are focused on prosaic interests.

The concept of Association is sensible if we think that the influence of private interest in the policy-making process is not always an indicator of a captured state and a misunderstanding of governance. Following Streeck and Schmitter (1985), Associations' influence is not the same laissez-faire that neoliberalism proposes. It is the "public use of private organized interests" (p. 128). Association can be part of a private-public governance that provides a solution to problems related to the legitimacy of the state. It can exert governance with a subsidiary role of the state. Associations might carry out initiatives of self-regulation giving governance and making markets compatible with politics. Besides, it helps the community to go beyond a voluntary basis.

Associations are private entities which cannot be identified with market actors given that they do not move in a dichotomy between capital and labor, but they aim to obtain profit. Regarding the state, Associations have private interests and do not have control over coercion or sovereignty on

the population. Finally, regarding the community, associations are not based on spontaneous solidarity and they are based on explicit and rational agreements.

Therefore, in this dissertation civil society is not only whatever is not part of the state. There are different actors with diverse levels of power interacting with the state. However, market actors and associations are critical in this research. They will be called the "Ruling Civil Society." Thus, the relationship between this part of the civil society and the state can define the type of state in a society.

The type of state can fall between two theoretical extremes. On one hand, it is the "captured state," which has been put forward by neo-Marxist authors. On the other hand, is the idea of an "autonomous state" that is based on a particular and different logic with respect to economic relationships or other spaces of sociability.

The autonomous state approach deserves a further description before reviewing alternative perspectives. According to this approach, the state is assumed to be independent and have particular interests. State agencies and their officials have their own institutional interests. In this regard, there is evidence that the state and officials need mechanisms of stability and governability to maintain social legitimacy. Facing this necessity, interest groups from the "Ruling Civil Society" find opportunities to influence state policies. Thus, the autonomy of the state is quite questionable.

Peter Evans (1985), following Polanyi's idea and other historical economists, claims that an "embedded autonomy" of the state regarding its relationship with civil society is needed to propel industrial strategies. A similar approach is presented by Campbell and Lindberg (1990), who claim that the state has a relative importance depending on the type of governance regime regarding a specific economic sector. Thus, the state as an actor might use diverse types of governance mechanisms and one of them is its capacity to establish property rights. In Campbell's and Lindberg's words, "the state shapes the organization of the economy by manipulating and enforcing property rights" (1990: 635).

According to Domhoff (1990), both neo-Marxist and autonomous state approaches are based on only one type of power matrix. The former is the economic networks wherein the owners of the

means of production will use the state according to their interests. The latter is based exclusively on political networks, based on bureaucratic power and political coalitions. Other perspectives acknowledge more actors and ways to influence the state role, such as the pluralist perspective which sees multiple centers of power as a product of electoral means. But, according to Domhoff, this is a naïve perspective when it claims that the state reflects in a suitable way different interest groups in society and sees politics following a market logic.

Domhoff (1990) put forward an alternative approach to understand the relationship between the state and civil society. This approach argues that the state is influenced by interest groups, but according to 4 types of power organizational networks: ideological, economic, military, and political. It is called the IEMP model. This model contemplates these four networks of organizations whose power belongs to those sources of power. Therefore, the division can be diffuse because one type of power can turn into another and the level of influence over the state can change throughout time. This is a kind of "pluralist theory" of a captured state with a perspective of asymmetrical power relationships. It is near to the neo-Marxist perspective, but without a monolithically economic perspective of social processes. An example from Fisher (2004) cited by Rudel and colleagues (2011) is the comparative research inquiring about policy-making processes and corporative influence regarding environmental legislation. According to this research, the three cases: Japan, the Netherlands, and the United States, presented different institutions exerting different levels of influence. Thus, in the first case, state officials were prominent. In the second case were environmental NGOs and in the latter were large corporations.

Relationship 2: Hyperglobalization and the State

The first measures toward trade openness and the insertion of Chile into the global market were carried out in the mid-1970s under the military government (Ffrench-Davis 2004). This outward economic development was consolidated under the following democratic regime in the 1990s (OECD 2005). This consolidation has been based on the idea that comparative advantages are only associated with natural resources (Evans 1995). Under these circumstances, this insertion should involve sacrificing either the national sovereignty or democratic legitimacy regarding social policies (Rodrik 2011). Emissaries of globalization (Schwartzman 2006) such as the

World Trade Organization (WTO) or the International Monetary Fund (IMF) have used pressure to make countries adopt liberal economic measures. The insertion into the global market has been a priority for these international organizations regardless of the effects on the real economy and national industrial strategies. Therefore, I examine the environmental governance regime considering this context and using an international political economy perspective.

An international political economy perspective is based on the idea that the position of the countries in the modern global capitalist system explains the way that political and social processes occur. Some examples of political processes are used to properly expose this perspective. According to Schwartzman (1998), global structural changes such as a global hegemony shift or global economic cycles affected domestic politics that bring back democratic regimes to developing countries in the 1980s and 1990s. Leslie Gates (2009) presents another case wherein it is demonstrated how a global economic crisis and changes regarding direct foreign investment have leveraged the power of neoliberal business over the Mexican state since 1970.

This research builds upon the mentioned international political economy perspective. Specifically, several principles of World-system theory are followed. However, there are also some theoretical aspects of alternatives schools. They contribute to understanding the effects of globalization on the state. The first aspect is a phenomenon called "global isomorphism" coined by World Society theory scholars. In general, global isomorphism is the process of convergence with respect to material and immaterial aspects of society. This convergence is possible given the diffusion of templates to understand the world in an agreed upon way. That is the case of the diffusion of social policies in different countries across the world. According to scholarly work (Weyland 2005), there is an effect of demonstration that led some nation to adopt specific types of social policies. Although the explanation at the first place of this diffusion is a matter of discussion, the diffusion of social policies and regulatory strategies as "culturally contagious" are still mechanisms to be considered. This is specifically important to understand how some private schemes of regulation such as norms of conduct or private certification have reached some productive sectors in developing countries.

The second aspect is known in the international political economy as “Global Commodity Chain theory” (GCC). GCC has been developed by Gereffi and Korzeniewicz (1994) as a critical perspective of the “comparative advantages” idea of the classical economy. GCC claims a divergent process of development among countries based on an international division of labor. This geographical division is also a configuration of a reproductive chain of surplus appropriation at an aggregated level. GCC highlights networks of firms that have built a transnational production system. The main assumption is that global corporations are agents of national development in the new global economy. One way has been fostering environmental governance which enables a global market.

Specifically, in this research, those elements related to the pressure that global market exerts on national institutions are taken into account. It has been applied to the relationship between global capitalism and national labor unions (Gates 2009). Even though this research examines a different phenomenon, the basic principle can be applied.

GCC and its market pressure perspective claim that when nations prioritize insertion in the global market, several institutional elements must change accordingly to market pressure. This pressure is applied directly during economic cycles or through the power of buyers (i.e. monopsony). But also, this pressure can be applied indirectly through the conditions that international organization such as the World Trade Organization (WTO) or the International Monetary Fund (IMF) impose.

Regarding the direct way of market pressure, the role of “big buyers” is central in the case of the farmed salmon industry. From the GCC perspective, there is a 'buyer-driven' value chain when big buyers of commodities are active actors developing and imposing standards, rules, and procedures for producers. Large retailers and food distributors such as Wal-Mart, Tesco, Costco, and Sysco exert their power in setting industry product and process standards (Tveterås and Kvaløy 2004). A process of environmental governance might be shaped by these forces to wield control over the commodity chain from the center. The imposition of new standards and the implementation of international private regulations from big buyers have been investigated as an issue itself (Auld 2014; Bartley 2003; Bartley et al. 2015; Cashore, Graeme, and Newson 2004). Bartley (2003) assumes the idea that the market is embedded in and depends upon institutional

arrangements. Therefore, the global market is affecting these arrangements, especially those from states, and creating new ways of governance.

In short, the GCC perspective considers the need of the global commodity chain to create a subsidiary state that supports specific regulations. There is the pressure from big buyers and their market-led strategies of certification as important aspects to understand new ways of environmental governance. For Levi-Four (2011) the global chain of production in the current phase of capitalism needs a suitable institutional architecture to work. This is a "society-centered regulation" that emerged and depends on interest groups in society. In the Latin American context "market participants" have significantly influenced national governments' agendas (Campello 2015; Heredia and Schneider 2003).

Relationship 3: Hyperglobalization and Civil Society

The salmon industry and the Chilean government have struggled permanently to obtain democratic or social legitimacy given its environmental and negative social consequences mentioned before. It seems that this aim has been quite successful. After several sanitation crises, the salmon industry in Chile is still the second largest exporter of the world supported by new sources of regulation and legitimacy before the international buyers and consumers.

According to Rodrik (2011) new global governance mechanisms have complemented or even substituted state regulations without challenging national sovereignty. An example of these types of global initiatives is how international organizations (NGOs, business association, etc.) play the role of steward over the environment. These organizations can help economic sectors and national governments keep and recover legitimacy if these institutions foster environmental sustainability. Private organizations diffuse diverse kinds of regulations, such as conduct codes or certifications. This means, for instance, that different processes and products in specific product sectors are endorsed before national and international buyers and stakeholders in general. Well-known cases of international private certifications are the Forest Stewardship Council (FSC), Maritime Stewardship Council (MCS), or in the last ten years the Aquaculture Stewardship Council (ACS).

The diffusion of private certification as a mechanism of environmental stewardship has an important base in Ecological Modernization theory (EMt). This approach focuses on a new environmental rationality from the private sector represented by firms and NGOs. It is a rationality attached to technological and organizational innovations regarding ecological problems in advanced industrial nations. Thus, EMt can explain part of the increasing tendency to adopt certifications as private regulation.

However, it is relevant to keep a political economy perspective to understand the processes behind these new types of governance created in the context of liberalized international markets. Bartley (2003), from an "institutional embeddedness" perspective, claims that globalization is affecting institutional state arrangements, creating new ways of governance like international private certification. Private regulations as institutional arrangement emerged in developed countries from social movements and international institutional context (Neoliberalism and free trade). Private regulation might be an alternative or complementary way of governance, but they exclude the central role that governmental and Inter-governmental regulatory structures could exert in another political and economic global context. International organizations (e.g. FAO, ILO) have expressed their concern regarding the effects of the spread of private regulations in fishery activities and in the aquaculture sector specifically, but they recognize their effectiveness as regulatory methods. Also, it has been proved that in the United States, the government exerted a significant role to foster private regulation in both apparel and forest sectors. Thus, private regulations and, specifically, private certifications are not only strategies for a good market position, but also a "political construction of market institutions" (Bartley 2003, 2007).

Private certification as a type of private regulation has been a research problem mainly in developed countries. It is important to know how these countries set new or reformed institutional frames to legitimate productive processes abroad or productive processes as part of a global chain value. However, theoretical arguments may suggest that this kind of regulation exerts a different role in less developed countries (like Chile) given that the global market has different "game rules" for them.

In short, new types of regulation (i.e. international certification, ecolabel, corporate protocols, etc.) can be the connection between modern capitalist globalization and market actors in the civil

society. The effect of this relationship on national environmental governance is an important query in this research.

Chapter 3: Description of the Dependent Variable

This chapter describes the dependent variable in detail. This is the environmental governance shift of the salmon industry in Chile following the big phytosanitary crisis in 2007. This variable is observed by selecting three aspects that dominate the discussion about the sustainability of the farmed salmon industry in various parts of the world: Use of pharmaceutical products; dependency on Fishmeal; and marine property. Finally, considering the "International Political Economy of the Environment" perspective described in chapter 2, hypotheses are presented for each aspect of sustainability. These hypotheses are tested following a specific research strategy, the theoretically strategic case study approach (Ragin 1992).

Dependent Variable Specification and Research Strategy

Although most of the changes regarding environmental governance of the salmon industry in Chile might be related to state regulation, they do not give a comprehensive diagnostic explanation. There are other relationships that matter. There are formal and informal ways to carry out relationships between national and international actors engaged in the salmon industry. The current institutional arrangement has integrated new regulatory references, actors, and interests beyond the state's scope (Barton 2010; Bustos 2013).

There is scholarly research to understand the critical aspects of the institutional regime of the farmed salmon industry in Chile (Barton and Fløysand 2010; Bustos-Gallardo 2013; Fløysand et al. 2010; Oseland, Haarstad, and Fløysand 2012). However, those studies describe and explain these institutional arrangements focusing on the factors that unfolded from the sanitary crisis that the industry has faced since 2007. They put the sanitary breakdown at the center of their examination. It is necessary to conduct an analysis that integrates other phenomena highlighted by an international political economy perspective. To address this gap, this research considers additional description and explanation of the salmon industry's government and its shift since 2008.

The dependent variable of this research is the environmental governance shift that was carried out regarding the farming-salmon industry in Chile. In this research, this shift is assumed to be based on several modifications of the General Law of Fisheries and Aquaculture in Chile. Also,

it is possible to assume diverse pathways regarding one or more aspects of sustainability that allowed the industry to thrive after a grave sanitary crisis in 2007.

To address the research question, it is necessary to define our dependent variable. As mentioned, this is the environmental governance shift of the salmon industry in Chile. This shift is defined in terms of three aspects of the environmental sustainability of the farming process, which were strategically defined to systematically account for specific changes regarding environmental governance. These three aspects of sustainability that applied to the salmon industry in Chile are:

1. Use of pharmaceutical supplies: Farmed salmon, like any other confined being, are vulnerable to different types of parasites, bacteria, and viruses. Despite that, the use of chemicals and antibiotics has been replaced by vaccines (Asche and Bjørndal 2011). This is still a matter of concern given the impact that some types of chemical substances had on the environment and on human beings.
2. Feeding dependency: Salmon is a carnivorous fish. The feeding of salmon depends on animal proteins coming from caught wild fish. While aquaculture is an opportunity to recover wild fish supply, it is at the same time an industrial sector demanding wild fishery. The latter has been called the "fish meal trap" (Asche and Bjørndal 2011; Naylor and Burke 2005). International organizations such as FAO and WWF have expressed their concern on this issue affecting the sustainability of both aquaculture and wild fisheries.
3. Maritime territory and property: A clear property system is crucial for the development of any private entrepreneurship. However, maritime locations have specific characteristics. They are ecological systems of permanent fluids wherein the actions committed have a high level of uncertainty. A common-pool resource cannot be protected with only the principles of private property and the free market in order to establish an equitable assignment of property rights (Tecklin 2015; VanderZwaag 2006).

Changes regarding the mentioned aspect of environmental sustainability can be found in different research reports and articles. Also, it is possible to obtain a general perspective by doing a general review of the Chilean legislation regarding aquaculture in the last ten years. However, in this research, I depict those changes following a theoretical framework that takes

national and international actors into consideration. Also, given the case, I identify areas in which there was not an actual shift.

Having determined the definition of the dependent variable, a clearer research strategy is now possible. My research strategy is to describe changes (t1 vs. t2) for each aspect of environmental sustainability of the salmon industry. The changes that are part of the environmental governance shift in the farmed salmon industry in Chile are explained by mechanisms nested within each of the following three relationships based on Rodrik's trilemma (Figure 11): the state and civil society, hyper-globalization and the state, and hyper-globalization and civil society. This set of relationships have been defined in the "International Political Economy of the Environment" approach in chapter 2.

The research strategy can be summarized in the next table:

Figure 11: Summary of the Dependent Variable and the Research Strategy

	Time 1 **Pre-2009**	**Time 2** **2009 - 2012**
	Relevant Aspect of Sustainability	
Relation 1: State & Civil Society		
Relation 2: Hyper-globalization & State		
Relation 3: Hyper-globalization & Civil Society		

Hypotheses According to the Integrated Political Economy Perspective

Hypotheses are supported by the theoretical framework constructed for this dissertation. There are three hypotheses that will be tested according to the collected data that are evidence or counterevidence for each of them.

Figure 12: Specific Hypotheses according to Each Relationship in the Integrated Political Economy Perspective

	Pharma	**Property**	**Fishmeal**
State & Hyper-globalization		h2: If civil society does not regulate the administration of marine territory, then hyper-globalization exerts pressure the state to implement regulation and/or public policies to encourage expansion of licenses to facilitate the supply of farmed salmon in the international market from Chile.	
Hyper-globalization & Civil Society	h1: If the state does not regulate in a stricter way the amount and quality of pharmaceutical products, then hyper-globalization exerts pressure over the industry as part of the "Ruling Civil Society" to build market-led governance		h4: If the state does not regulate the amount of fishmeal, then hyper-globalization exerts pressure over the "Ruling Civil Society" to use alternative fish feed.
State & Civil Society		h3: If the pressure of hyper-globalization is not relevant, then it is the state the main actor able to exert governance mechanisms over the ruling civil society assigning marine concessions and their different uses	

Chapter 4: Methods and Data Sources

This chapter describes the challenges that this dissertation faced regarding social scientific research given its particular characteristics. Then, both specific methods and data sources are described giving details and rationale about the specific procedures of analysis.

Methodological Considerations

This dissertation has two main limitations given its research method approach. First, it does not consider the diversity of companies with regards to the multiple criteria that might affect their contribution to a new environmental governance. Second, the period being studied might present different parameters in order to understand the quality of the measures, decisions or rationales of actors regarding a new environmental governance. These two limitations need a special research strategy that contemplates specific procedures for gathering and analyzing data.

Given the first limitation, it is only about one case. As mentioned in the previous chapter, the theoretically strategic case study is the farmed salmon industry in Chile. However, I use three points of comparison as nested cases to test the hypotheses: use of pharmaceutical products, marine property, and dependency on fishmeal. These three cases do not solve the problem of having a small number of cases from a statistical viewpoint, but it allows for a comparison of three specific relationships (state/civil society, state/hyper-globalization, and civil society/hyper-globalization) for each nested case. These three specific relationships can potentially theoretically explain the environmental governance shift in each case. According to my hypotheses, one relationship should prevail in terms of the explanatory variable, but not in terms of statistical significance. However, this comparative approach provides analytical leverage considering the context of the historical moment being analyzed.

I tackle the second limitation through two ways. First, the concept of sustainability is a normative concept and therefore, dynamic according to the parameters that international organizations and powerful nations define throughout time. In this research, I used three cases related to the concept of sustainability that the FAO had defined for aquaculture in 2005, before the period of study. Second, the universal character of these three nested cases was ensured using international sources of information. In this case, an international trade journal was used because

it has to cover a wide spectrum of companies and decision-makers regarding aquaculture as a globalized economic activity. This obligates the trade journal to treat and inform its readers about relevant issues while taking into consideration the situation of the industry in specific national contexts.

Methodological Strategy

The main methodological strategy in this work is a single case study: the farmed-salmon industry in Chile. A case study is defined as a strategy that relies on "multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis" (Yin 2009). With respect to the process of data collection, I looked for information drawing on document analysis focused on both qualitative and quantitative information. This analysis incorporated 1) pieces of legislation regarding fishery and aquaculture legislation and its reforms from 1989 to 2012 (Figures 13 and 14); b) relevant parliament discussions which are recorded in public minutes covering the same period; c) press releases from a specific aquaculture trade journal with international coverage from January 2007 to August 2009; d) reports from government agencies related to this industrial activity since 2005; and e) global reports and databases from international organizations to obtain historical statistics. The analytical approach is described as the coding of trade journals articles and archives.

Data Sources and Analysis Process

- Official documents with legislation regulating the aquaculture sector in Chile (see Figure 13 and 14)
- Formal documents and reports from International organizations (WTO, World Bank, FAO, ILO, etc.) that provide the main guides for the aquaculture sector and their approaches to regulation of the trade based on aquaculture commodities.
- Official written records of discussions of regulations in the parliament.
- Reports from the Chilean department of national statistics and the central bank of Chile.
- Firms' and firm unions' websites.
- Firms' annual reports: It is up to each firm to launch annual or bi-annual reports with regard to the performance of the firm in the market and other outreach purposes. Some of

these reports are called “sustainability reports” which are focused on environmental issues. Also, some firms have monthly digest reports for the community.

- Press articles: taken from a trade journal that specializes in the aquaculture sector around the world. The period for content analysis went from January 2007 to August 2009 (See Figure 13).

Figure 13: *Legislation before the ISA virus crisis (t1). (The most relevant are highlighted)*

Year of Enactment	**Number or Name of the Law/Decree/Official document**
Pre-1980	Legislation about fisheries is ruled since 1931.
1980s	Decree 175 that rules fishery activities
1989	18892 General Law of Fisheries and Aquaculture
1990	Decree 427 modifies decree 175
1991	Decree 19079 and Decree 19080 modified 18892
1992	Decree 430 merges 18892 and its modifier decrees
1993	DL 290 Regulations of Concessions
1994	Regulation of Aquaculture National Register DL 475 National Policy of use of coastline (and use of coastline commission)
1995	Regulation of first time imported hydrobiological species
1997	Law 19300 General Law of the Environment
2001	DL 319 Sanitary Regulation RESA DL 320 Environment Regulation RAMA
2003	DL 125 National Policy of Aquaculture
2005	DL 345 on hydrobiological plagues and "red tide" DL 153 Regulates Use of Coastline Region 11th
2006	Decree 20091 and Decree 20016 modified 18892
2007	Sanitary Regulation (enacted in 2001) officially came into effect.

Source: Author

Figure 14: Legislation after the ISA virus crisis (t2). (The most relevant are highlighted)

Year of Enactment	Number or Name of the Law/Decree/Official document
2008	Emergency decree 2638 to control ISA. Measures not contemplated by RESA. DL 236 (RREE) Treaty 169 on indigenous communities
2009	DL 416 modifies RESA Resolution 3612 modifies RAMA Resolution 1449
2010	Decree 20434 modified 18892 DL 349 modifies RESA DL 350 modifies RAMA
2011	National Commission of Aquaculture (Law) DL 239 modifies DL345 on red tide
2012	Decree 20583 and Decree 20597 modified 18892 DL 72 Replace regulation of species usually imported
2013	Ley 20657
2015	Decree 20825 modified 18892 Ley 20837 modifies 20657

Source: Author

It is worthwhile to note that the number of pieces of law (new or modifications) was higher in time 1. However, it is possible to state as Fuentes (2014) does, that legislation after the ISA virus crisis (time 2) were more relevant in terms of its content. Laws in time 2 dictated changes that in another context would be impossible given the opposition of the salmon farmers. However, some of those laws in time 1 and time 2 were not considered given that they were not relevant to the testing process of my hypotheses.

Analytic Approach

Different dynamics and mechanisms are described as a sequence of events insofar as they appeared in the trade journal. This allows ensuring the strength of the defined relationships as explanatory factors.

A content analysis was conducted in a digital format (text corpus from official documents and websites) were stored according to date, source, and main issue. Later, different topic codes were applied to the corpus. Regarding the content analysis of secondary quantitative data, I made a database with relevant variables for each firm or at an aggregated level according to available dates.

To present the results that emerged from the coding system, a narrative approach was chosen. This approach goes beyond story-telling. Theoretical aspects are incorporated through both the logic of the exposition of the results and the connection between facts or pieces of discourse.

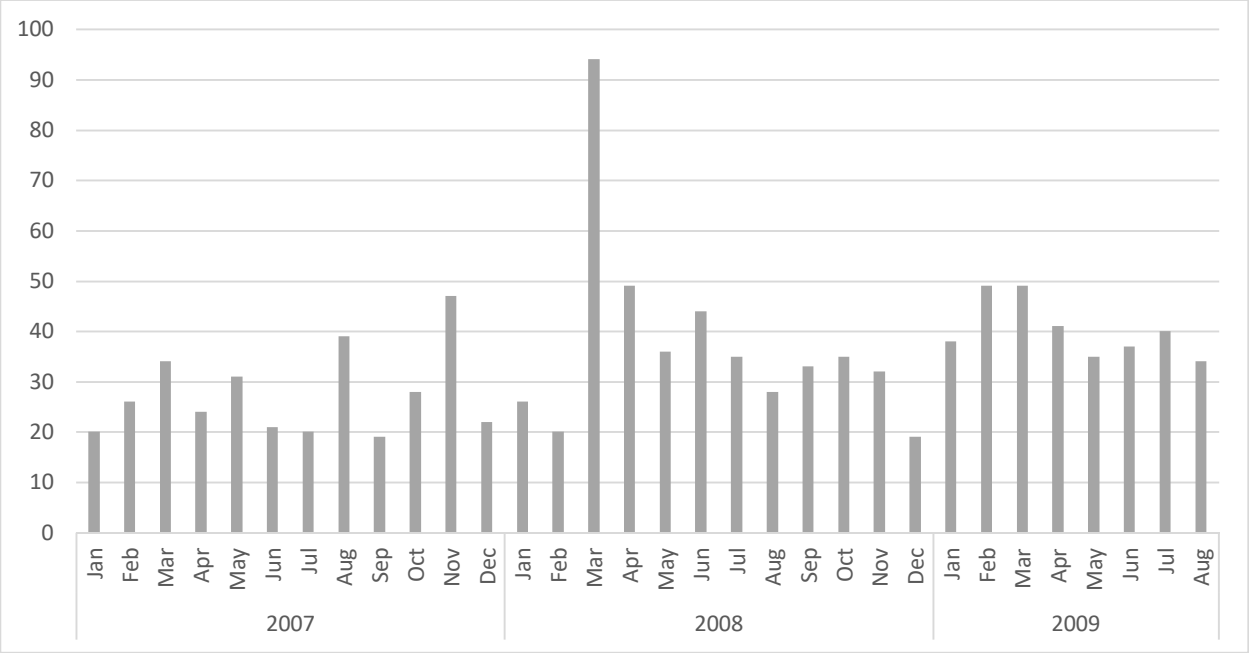
Gathering Information

I collected all the articles from January 2007 to August 2009. The trade journal Intrafish (electronic version) has a search function that goes back to 1995. I look for the word "Chile" and skimmed each article selecting those that accomplished the following criteria:

1. They had to be news, column or editorial piece implying practices and a related opinion or declaration (justification, rationale, criticism, etc.) of identifiable people.
2. They had to be articles focused on technology (machines, pharmaceutical products, added-value techniques) insofar as they related to the main problems that the industry in Chile was facing at that time.

In total, the first selection considered 1,105 articles. The distribution of the articles during this selected time period is the following:

Figure 15: Number of trade Journal Articles Codified by Month and Year



Source: Author

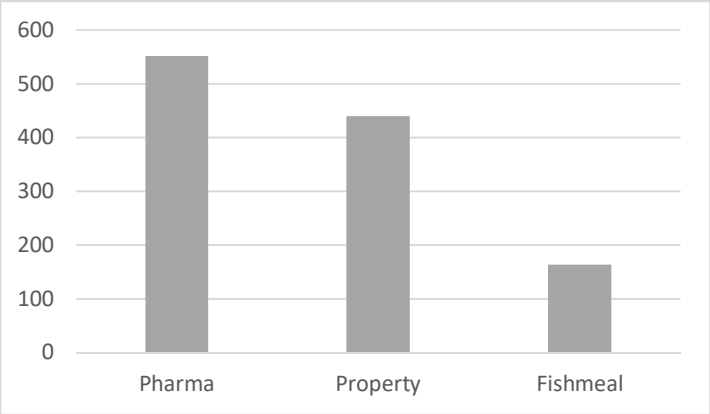
Codification Process

The first phase of codification treated both trade journal articles and law corpus as the same unit of analysis. The first code was according to time. Articles were divided into two groups: Time 1 (January 2007 to May 2007) and Time 2 (June 2008 to August 2009). Afterward, codification process was based on a list of codes from my three nested cases:

1. Use of pharmaceutical products and phytosanitary conditions: Analyzing laws and discussion of them in the parliament, this code was applied to all of the articles or the parts of articles in which there were explicit statements about the regulation in this topic. The main corpus was made up of those specific laws regarding environmental care (Reglamento Ambiental) and phytosanitary conditions (Reglamento Sanitario). Regarding the trade journal articles, this code was applied to statements about this aspect of the Chilean industry as well as the industry in other countries when the extracts were relevant for later comparison.

2. Marine Territory: This code was applied to statements about the regulation of the use of concessions as well as those topics in the trade journal articles related to territorial space in Chile where there was or where there could be salmon cultivation. This includes facts or opinion from experts of journalists.
3. Dependency on Fishmeal: This code was applied to statements and facts related to fish feed that generally contributed to understanding the use of fishmeal by the salmon industry in Chile and abroad.

Figure 16: Number of Excerpts from Trade Journal articles and Laws per Each Code (First Phase)



Source: Author

The second phase of codification comprehended 4 aspects of governance that are beyond the environmental field but can yield a baseline of analysis regarding the role of the state and its relationship with hyper-globalization and civil society. These codes were taken from Duit (2015). This author put forward the concept of "environmental state" in order to describe the role of government in the environmental field. Based on Duit's work, four aspects of environmental governance were defined in this study as follows:

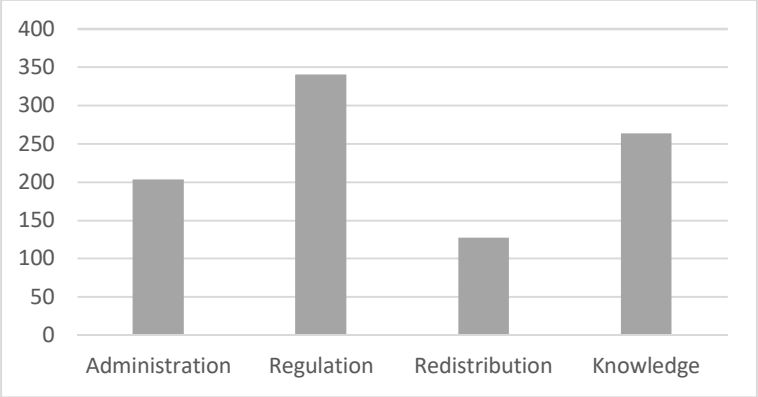
1. Administration: this code was applied to statements about the role of creating organizations on behalf of the state. It is what is known as the public administration apparatus. For example, this code was applied to facts or opinions wherein SERNAPESACA or a specific person from the government was implied. Also, if those agencies created or eliminated by the new environmental governance.

2. Regulation: this code was applied to the role of command and control as authority. It covers regulations that are created and enforced by state agencies. However, it was also applied to other types of regulations in the private sector. This is an important aspect of governance in which more actors (national and international) are able to participate.

3. Redistribution: this code is related to the use of public funding. It is the economic power that the state has. This aspect of environmental governance might be the use of environmental taxes and spending like subsidies. It can influence market prices and actor behaviors. However, public spending and investment are embedded in public-private associations that can also be considered in this dimension. Aspects related to concessions and the economic possibilities that these licenses open for the companies were considered by this code since it is theoretically an exclusive mechanism of governance from the state.

4. Knowledge: This code was applied to the capacity of confluency that organizations might have. Both the state and private entities can be at the center of knowledge and information networks. This includes pieces of law or news regarding scientific research, monitoring programs, and dissemination of information that was relevant.

Figure 17: Number of Excerpts per Each Code (Second Phase)



Source: Author

It was possible to make a link between the two groups of codes, obtaining a cross table with the number of excerpts for each cell:

Figure 18: Percentage of Excerpts that Represents Overlap of Codes from Aspects of Sustainability and Aspects of Governance (N=440)

	Administration	Regulation	Redistribution	Knowledge and Technology
Property	87	68	76	8
Pharma	13	27	24	75
Fishmeal	0	5	0	17
	100	100	100	100

Source: Author

This table allowed me to identify the prevalence of each topic linked to pieces of information from articles and laws. I could judge the quality of the information according to the state's functions and judge its direction or meaning. In this case, the analysis of frequency indicated that the state cannot be neglected as an actor exerting effects on governance. Functions of Administration, Regulation, and Redistribution were mostly associated with the governance of Marine Property. I put apart the overlap between the code knowledge and technology with the three nested cases. This is because this code can be assign also to private initiatives as it was defined above. It cannot be attributed exclusively as a state function.

This first cross-coding quantitative analysis allowed me to confirm that the state was relevant regarding the governance of Marine Property. After a qualitative analysis, I concluded that most of the excerpts indicated that the other two actors (globalization and civil Society) were much less relevant.

Regarding the hypotheses related to the Pharmaceutical Products Use and Use of Fishmeal, the role of the state is dubious. Therefore, it was necessary to implement a strategy of analysis to define the role of hyper-globalization and civil society explaining governance. Thus, there was a third phase of codification. This takes into consideration the other two relationships taken from the mentioned Rodrik's trilemma. This codification was not carried out with software assistance. Once each mentioned code was saturated with all the evidence (excerpts), they were sorted according to each relationship insofar as they were mentioned. Considering theoretical principles

of my “Integrated Political Economy of the Environment” perspective, I looked for relevant findings that allowed me to test my specific hypothesis explaining the governance shift carried out for two nested cases (Use of Pharmaceutical products and Use of Fishmeal). Specifically, I carried out a frequency analysis of pieces of information for each Rodrik’s relationship:

State & Hyper-globalization relationship: if most of the excerpts from journal articles and law indicated that actors from globalization were mentioned as a reference for the policy-making process and laws, then this could support those hypotheses where the influence of globalization is relevant.

Civil Society and Hyper-globalization relationship: if most of the excerpts from journal articles and law indicated that actors from globalization were mentioned as a reference for mechanisms of governance emerging from the civil society, then this could support those hypotheses where the influence of globalization is relevant.

Civil Society and State: if most of the excerpts from journal articles and law indicated that actors from the civil society were mentioned as a reference for the policy-making and laws, then this could support those hypotheses where the civil society is relevant.

Thus, it was possible to define which of the three relationships explains, in terms of quantitative and qualitative criteria, the shift of environmental governance regarding a specific nested case. Also, given the interpretative analysis, it was possible to define the main mechanism associated with the main causal relationship upon the interpretation of the meaning. It is worthwhile to say that based on theoretical ideas and empirical support from other research, some mechanisms were highlighted even for those relationships which were not strong enough to support hypotheses. The main aim was to contribute with a baseline for future research (see Figure 28 at the conclusion).

Finally, after this phase of codification and the sorting of qualitative and quantitative evidence, a narrative presentation of results following a temporal logic is constructed. This demonstrates how facts and opinions were deployed, interacting with both the legal framework and its discussion by the parliament, and the theoretical aspects of the framework of this dissertation. This allowed, in a systematic way, to support theoretically and empirically the narrative of results avoiding rhetorical and speculative statements.

Chapter 5: Environmental Governance of Sanitary Conditions of Production and Use of Pharmaceutical Supplies

This chapter examines the governance shift regarding the use of pharmaceutical supplies in the salmon industry in Chile. This means addressing several questions such as what are the international forces and actors influencing this shift beyond the tendencies and discoveries of the applied sciences. Also, how is this international influence settled in the national parliamentary discussion within the context of a significant sanitary breakdown? What are the references for a new deal about the use of pharmaceutical products within an economic policy framework? Are there international methods of environmental governance for market actors as an alternative to excluding the state? The use of pharmaceutical products, as part of the environmental governance of the salmon industry, is studied using alternative theoretical ideas with respect to the diffusion of technical knowledge and the autonomy of both the state and market actors as the main agents of a governance shift.

The Costs of a Successful Industry in Chile

The breeding of fish (as with commercial chicken or beef) requires chemicals and pharmaceutical products (medication, antibiotics, etc.) to control diseases. However, the adequate use of pharmaceutical products and chemicals to keep good sanitary conditions depends on different variables. One of them is the pace of production and environmental conditions. As mentioned, the salmon industry in Chile had a rapid and impressive growth which was internationally praised. However, there are antecedents indicating that this striking growth was a risky path towards collapse.

In 2007, Kontali, a Norwegian center for the analysis of the aquaculture sector in the world, warned of the dangerous amount of waste that the salmon industry was producing in Chile, given its growth pace. Although Marine Harvest CEO Atle Eide accused analysts of communicating a "misleading picture of the reality" (Intrafish 01/07), it is possible to find several other warnings made at that time about the “Chilean way” of salmon farming. A specialized journalist stated, "when Chile’s aquaculture industry was expanding 50 percent a year, the country was widely criticized by Norwegian producers for such an unsustainable growth rate" (Intrafish 11/2007).

That unsustainable situation was depicted as several phytosanitary problems of the industry. Illnesses were out of control and this was a discussed issue among international producers and scientists related to the global salmon industry. There were viruses attacking fish such as Salmon Pancreas Disease and the Infectious Salmon Anemia (ISA) as well as bacterial problems such as Salmonid Rickettsial Septicaemia (SRS).

There was an agreed upon explanation about the sanitary problems in Chile. The impressive increment of production of farmed salmon in Chile was being carried out in an inappropriate space. The territorial dimension used to develop the salmon industry was considered to be a critical issue. A Norwegian NGO's biologist stated, "If you take all these fish farms (in Norway) and squeeze them together in an area one-fifth the size of all these Norwegian areas, well then you have the Chilean situation" (Intrafish 05/2008). The overcrowding of farms which, at the same time, had a high density of fish were the structural condition explaining the proliferation of illnesses.

Besides the sanitary problems, there were other factors that made the industry's situation even worse. In 2008, the Pew Environmental Group "Pure Salmon" requested a report from the Food and Drug Administration (FDA) using the Freedom of Information Act. The report listed the main problems of the Chilean salmon industry found in 2007. This information was gathered when a commission from the FDA, an American government agency, visited several centers of cultivation and salmon processing plants in Chile. This information was published by specialized press and it can be summarized as follows (Intrafish 04/2008):

1. A lack of treatment of waste processing plants.
2. A lack of understanding of biosecurity measures.
3. A lack of sharing of knowledge about diseases, outbreaks, and what to do to combat them among individual companies and vaccine manufacturers.
4. A lack of trained staff and technology to sequence the ISA virus genome A.
5. The resistance of salmon to the pharmaceutical product Slice used to fight sea lice.

These problems detected by the American governmental agency were confirmed by what national NGOs had claimed, yet they were not a matter of public information. In specialized

press, sea lice were the most concerning issues given that the causes and consequences associated with this illness appropriately depict the situation of the farmed salmon in Chile.

Bacteria, Viruses, and Parasites: The Use of Chemicals and Antibiotics

Sea lice became a difficult problem to solve. Sea louse is a parasite that adheres to fish, weakening its immune system. It is a phenomenon in wild fish, but fish farms are a favorable environment for sea lice to proliferate given the high-stress levels of fish and the fact that these parasites do not have natural predators when fish are kept in a cage. An expert from Marine Harvest stated that in summer 2006-2007 sea lice became an epidemic illness, which led the industry to intensify the use of hydrogen peroxide and deltamethrin (Alphamax) (Intrafish 06/2008). Likewise, Adolfo Alvial, who was the director of the Technological Institute of Salmon (INTESAL) in 2007, stated that sea lice infestations had increased 30% in 2007 (Intrafish 05/2007).

The sea lice problem worsened when this parasite turned resistant to treatments via pharmaceutical products. One example is a product called emamectin benzoate, whose commercial name was SLICE. According to the mentioned INTESAL's executive, there were some factors explaining why treatments against sea-lice did not work: increasing water salinity and temperatures above historical levels, SLICE had been used indiscriminately (no treatment plans), and operators were using generic versions (alternative drugs or "cheap Chinese copy formulas") (Intrafish 05/2007). Therefore, pharmaceutical companies were continuously launching new formulas. For instance, given that there was a resistance to emamectin benzoate, laboratories developed two new products to fight sea lice in 2007 (Intrafish 06/2007).

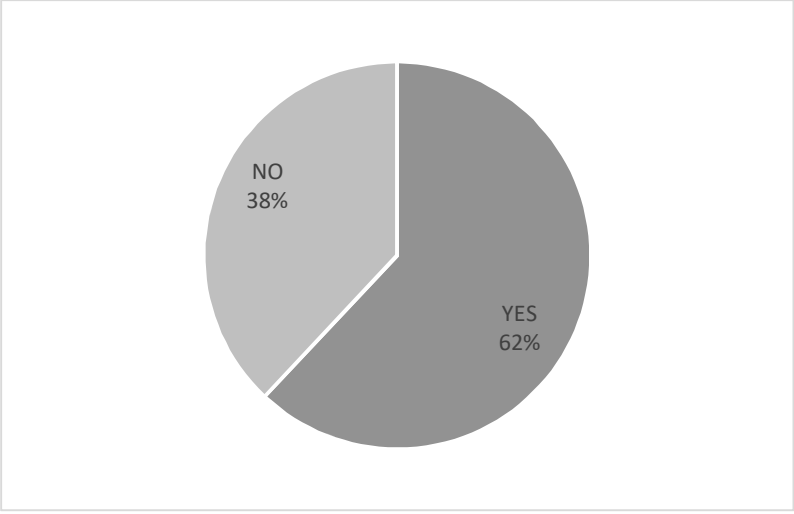
Another factor is related to the reaction of the sanitary authority prior to the sea-lice infestation. SERNAPESCA declared sea lice as a high-risk disease, a declaration that opens more possibilities of control, just in July 2007. That happened because the authorities realized that the ISA virus interacts with the sea lice problem because these parasites are a pathway for the disease to spread the virus easily in the context of high-density farming (Intrafish 08/2007). This density problem had been acknowledged before by the industry. In this regard, Eide, Marine Harvest CEO, stated that the salmon industry in Chile needed more regulation because it was a liberalistic regime. A critical issue was a space producing salmon in high-density conditions and,

therefore, creating favorable conditions for illnesses. In this regard, a specialized journalist claimed "the industry has chosen to huddle together in a relatively limited geographic area... in the future, it is imperative the industry extends its horizons by exploiting larger areas in order to create new growth" (Intrafish 03/2007)

Sea-lice and other disease problems hindered the accumulation of economic margins in spite of the fact that industry growth had been successful until 2005. In 2007, the Mainstream company had reduced production volume by 21% because of sea lice mortality according to its CEO Geir Isaksen. Likewise, Marine Harvest declared that its production costs increased because of illnesses (Intrafish 05/2007). Apart from the increasing amount of fish mortality, costs increased because of the permanent need for pharmaceutical products to control viruses, bacteria, and parasites. Otherwise, the salmon industry would lose its international market position. The consequence of striving to be successful in the global market of salmon was to be discredited. The salmon industry in Chile was strongly criticized because of its overuse of chemicals and other pharmaceutical products.

In 2007, 62% of the companies acknowledged that they had bought pharmaceutical products (Figure 15).

Figure 19: Number of Farmed Salmon Companies that Purchased Pharmaceutical Products During 2007



Source: National Census of Fishery and Aquaculture, Chile 2007.

Regarding the use of antibiotics, Chilean authorities acknowledged that they do not have an accurate idea of how much antibiotics are used by the salmon industry in Chile in 2007. Moreover, before 2009, collecting information regarding the use of antibiotics by the industry was not mandatory. However, there were independent measures carried out by NGOs and scholarly actors. According to Terje Vassdal, a professor at the Norwegian College of Fisheries, Chilean salmon producers were using as much as 600 tons of antibiotics a year. In 1987-1988, Norway used around 50 tons of antibiotics to produce in approximately 50,000 tons of salmon and trout. However, according to the professor, it was impossible to get a firm number, as there were no official statistics (Intrafish 11/2007). In 2003, 134,163 kilograms of antibiotics were used to produce 280,481 tons of salmon in Chile, 478 grams per kilograms of fish. Norway used 1.5 grams of antibiotics per kilogram of fish. (Intrafish 03/2008). In 2008, a report required by the INGO Oceana stated that Chilean salmon industry uses 600 times more antibiotics than Norway. In 2007 was the highest point with 385,635 kilograms. (Intrafish 04/2008).

A new report from Marine Harvest stated that this company uses 5,000 times more antibiotics in its operations in Chile than in Norway. That was confirmed by Marine Harvest Communications Director Jorgen Christiansen. (Intrafish 07/2009)

In 2007, a representative of Pharmaq, an international company with a branch in Chile made a challenging statement. According to him, there would be solutions for sicknesses in Chilean farmed salmon and, in a few years, the industry would be achieving the same sanitary standards as Norway. However, demands for sustainability were hasty considering that the farmed salmon industry in Chile was still young and therefore could not behave the same way immediately. What Chile was doing was part of the same path that Norway had followed. For instance, Norwegian salmon industry used a lot of antibiotics until they developed vaccines. Now they use almost 0 antibiotics (Intrafish 04/2007). Likewise, a CEO from the Chilean trade organization called SalmonChile defended the industry regarding the use of antibiotics claiming that this is part of an industry phase because the industry in Norway used twice the amount of antibiotics that Chile uses now during its first years before using vaccines. (Intrafish 07/2009).

This comparison and path-dependency thesis was based on the prestige of the Norwegian salmon industry regarding the use of antibiotics at a time when this issue was of great concern in Chile.

However, it is worthwhile to note a controversy in this regard. Although the industry in Norway has demonstrated a significant decrease in antibiotics, this practice is not necessarily because of an effort from companies. For instance, given that Norwegian state was the principal shareholder of the company Cermaq, the WWF sent a letter to the Norwegian Ministry of Trade claiming information about how much antibiotics this company used in Chile. Marine harvest, another Norwegian capital, had been given this information before, which demonstrated that it used more antibiotics in Chile than in Norway. (Intrafish 07/2009).

But the use of antibiotics was not only a matter of quantity. In 2007, the international NGO Ecoceanos demanded to suspend specific types of antibiotics which had been questioned by international health organizations. They were Quinolones which contains Oxoline and Flumequine, and Fluoroquinolones which contains Sarafloxacin and Enrofloxacin. According to the NGO, the use of Quinolones and Fluoroquinolones by the salmon industry in Chile had increased from 5 tons to 18 tons from 1988 to 2005 (Intrafish 06/2007). However, their complaints were dismissed by the sanitary authority.

In general, the use of antibiotics and other pharmaceutical products were a usual topic in mass media focused on aquaculture. News about salmon companies in Chile violating the sanitary rules of some buyers was a permanent threat to the prestige of the salmon industry in Chile. There are some events the salmon industry and the Chilean government had to face regarding the misuse of pharmaceutical products. For example, the company Tesco found Crystal Violet contamination (antibacterial, antifungal agent) in some samples of raw salmon. SalmonChile denied it at that moment. Afterward, it was proved, but no company names were disclosed. UK veterinary medicines directorate stated, "We think that this revelation could affect their legitimate economic interests and the probability that these companies provide voluntary information in the future" (Intrafish 02/2007). Another case was when the Food Protection Agency in Canada rejected a shipment of Chilean salmon because they detected Emamectin and Ivermectin which are used to fight parasites. The National Service of Fishery and Aquaculture (SERNAPESCA) defended the accused firm and said Emamectin Benzoate was not dangerous and for that reason, it was allowed in Chile. According to the Chilean government agency, Canada was asking for a lower dose than is generally accepted (Intrafish 02/2007). Some months

later, FDA USA found the banned chemical in the fish feed which was used as a raw supply for pets' food (Melamine) (Intrafish 05/2007).

Many of these illness problems could be avoided using vaccines. The pharmaceutical industry for animals has developed them for aquaculture. However, according to the specialized press, Chile had not applied good vaccines treatments. This had been very different in Norwegian salmon industry which put them into use around 1990. (Intrafish 01/2007). The experience in that country has been successful in this regard using multivalent vaccines with six different antigens. (Intrafish 06/2008).

However, there was some resistance to use vaccines by part of the salmon industry in Chile. Government officials stated in 2008 that a report from the government had advised the industry to invest in vaccines. (Intrafish 06/2008). The reasons are not clear, but it is possible to reject the idea that there was no availability of suitable vaccines. According to a press release, vaccine manufacturers had been working for many years for the specific South American problems and they were available (Intrafish 05/2007). For instance, Pharmaq presented two new vaccines in Chile in 2006 against IPN, Vibrio, Furunculosis and Salmonid Rickettsial Septicaemia (SRS) (Intrafish 04/2007). Likewise, Novartis laboratory received approval from Chilean authorities to begin marketing its Birnagen Forte 2 vaccine to treat SRS as well (Intrafish 10/2007).

The Regulation of Pharmaceutical Products

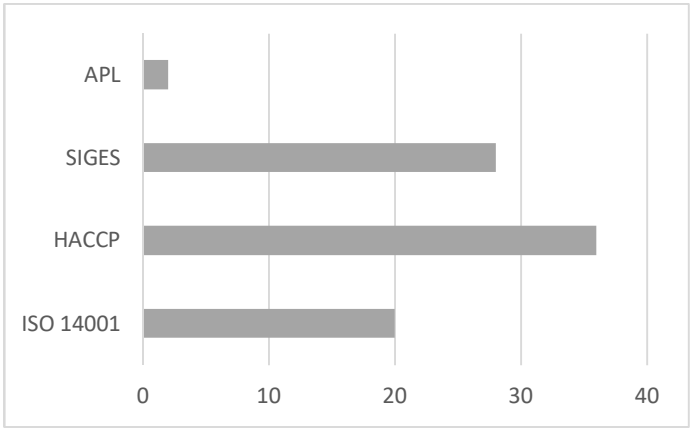
Before reforms due to the ISA crisis, the Chilean government tried to solve the problem of overusing pharmaceutical products in two ways. First, exerting official defense of the industry after international incidents that compromise the sanitary and food security of the salmon industry in Chile. Second, regulating the conditions that favor illness infection. The latter way is commented on further by reviewing the Chilean legislation in this regard before the ISA crisis.

Legislation regarding the use of pharmaceutical products and specifically antibiotics already existed before the ISA crisis. It is possible to find regulation in this regard in the early 1990s. The general aim was the protection, control, and eradication of high-risk illnesses that might threaten aquaculture. Reviewing the discussion of the General Law of Fisheries and Aquaculture in 1989, sanitary regulation was discussed and considered as part of the law because experts

warned that illnesses such as bacterial kidney disease (BKD) could put salmon farming in risk. The measures of security were applied to the chain of production before and after cultivation, considering procedures in laboratories. These measures were announced in the law but there were no specific procedures or ways of reinforcement.

While a specific regulation for concessions (obtaining, use, trade, etc.) was enacted in 1993 (Reglamaneto de Concesiones), regulation for both sanitary management (Reglamento Sanitario para la Acuicultura) and environmental care (Reglamento Ambiental para la Acuicultura) were enacted several years later, in 2001. These pieces of legislation regulated specific aspects in order to decrease the use of chemicals indirectly. For example, limiting loading capacity to avoid favorable conditions for fish's illnesses and the need for pharmaceutical products. Also, it was mandated to submit information regarding the projection of the annual production of salmon to gain a concession. However, these measures did not rule cultivation in marine zones and only regulated cultivation of fry and smolts in lakes and rivers. Regarding marine zones, where farms are for fattening up fish, the main aspects to be regulated were the distance between cultivation areas in marine zones (1.5 nautical miles) and standard distances with respect to the shore and the layer. Another alternative was private regulation, but this type of private regulation was not developed enough in Chile in 2007 for the aquaculture sector. As Figure 16 depicts, 27% of the companies had acquired an environmental certification (SIGES) designed by the own industry in Chile (SalmonChile) for their members. Another environmental certification is ISO 14001, which is quite general regarding environmental care. Only a 20% of the companies had been acquired this certification. Most companies had HACCP certification, but this is not related to environmental issues (the same for APL certification). In general, there was not strict and direct regulation (public or private) of pharmaceutical products until modifications were carried out in 2009.

Figure 20: Certifications Received During 2007 According to Companies



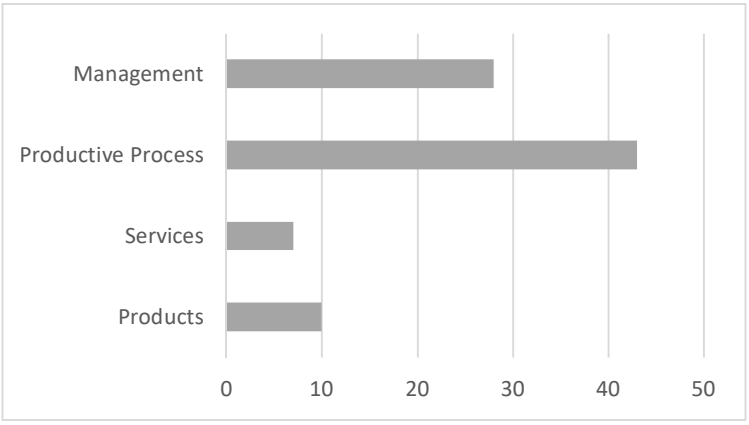
Source: National Census of Fishery and Aquaculture, Chile 2007.

This is the general phytosanitary context of the salmon industry in Chile and its regulation that came before the crisis provoked by the appearance of the ISA virus in 2007.

The Collapse: ISA Virus and its Consequences

In 2007, there were not good sustainability indicators for the salmon industry in Chile. Several entities such as environmental NGOs, scholarly experts, and Chilean politicians denounced negative externalities and claimed that the salmon industry in Chile lacked regulation. Even a Norwegian bank (AGN Sundall Collier) expressed its concern about the Chilean industry's elevated level of fish mortality increasing production costs (Intrafish 01/2007). The initiatives related to innovation had been in general made to improve the production process and those related to environmental care were not mentioned (Figure 17).

Figure 21: Percentage of Companies According to the Types of Innovation Initiatives that they Carried Out During 2007.



Source: National Census of Fishery and Aquaculture, Chile 2007.

In August 2007, this situation started to become much worse. The corporation Marine Harvest communicated to authorities that the ISA virus was present in some of their centers. However, according to the same company, they did not inform the government authority on time because they thought it was another breakdown of SRS (Intrafish 08/2007). Some weeks later other companies such as the Chilean-based Aguas Claras and Mainstream, a branch of Cermaq had tested positive for ISA. (Intrafish 09/2007). At the end of 2007, Marine Harvest had 60 percent of its plants – 42 of 68 plants – in the infected areas according to a report from a stock market broker consultant organization (Intrafish 12/2007). In 2007 the ISA virus triggered a huge economic and social crisis in two regions of southern Chile (X and XI). However, in 2008 a farm was confirmed to have ISA present in Region 12. (Intrafish 10/2008). Afterward, SERNAPESCA stated that 11,066 tons of fish had been killed by ISA from July 2007 to July 2008. (Intrafish 08/2008). Regarding the consequences, a Chilean senator stated that "the disease has cost the industry 77 million of dollars in one year, and 1,000 people fired. (Intrafish 03/2008).

A Forewarned Crisis

Part of the salmon industry in Chile tried to frame the ISA breakdown as a low-profile problem. A common idea in the mass media was that it was something frequent in all salmon industries in the world. This idea had historical support. A report in Science Daily cited by Intrafish states that ISA was first recorded in Norway in 1984. During the last 25 years, more than 460 outbreaks of

ISA had been recorded in that country, all of them in farmed salmon. Another example is Scotland which had a significant ISA breakdown in 1998. However, it is important to note that there are different ISA virus stains which have distinctive characteristics regarding symptoms and riskiness (Intrafish 03/2009). If the ISA virus was assumed to be part of the salmon industry everywhere it exists, any breakdown should not be the end of the industry. The Marine Harvest's CEO argued that farms, where the ISA virus had been detected, were not a threat when there was enough distance between centers and suitable density within each center (Intrafish 08/2007).

The problem was that requirements such as the distance between centers and density of farms had been neglected for several years in the Chilean industry. According to experts, the ISA virus represented a big deal given the level of density of farming-salmon in Chile during this time. Close to half of all farming was carried out only near the Chiloe Island's coast. (Intrafish 08/2007). An expert journalist stated: "Chile's salmon industry has grown by leaps and bounds over the past two decades, but with the growth has come claims of environmental degradation, poor wages, and unsafe working conditions." (Intrafish 12/2007). Thus, it was an opportunity for experts to claim that this collapse was predictable. An expert journalist from INTRAFISH stated that the biological challenges of farming salmon in Chile have been common knowledge for a long time, but it is surprising these problems had such a negative impact on the bottom lines of companies operating there (Intrafish 08/2007). The INGO Pure Salmon had defended for many years inland farming, arguing that the ISA crisis was proof of the environmental danger caused by open-net pen framing (Intrafish 08/2007).

A Canadian professor stated that blaming others is not useful because there were several factors that were more concerning:

> I have, since my first visit to Chile in 1997, consistently warned my Chilean friends that the system of farming they were operating with multi-company farming of areas, multiyear class stocking, with fish multi-origins, placed in sea seethes where no following of the whole area was possible and where control of sea lice and other husbandry stresses was minimal, delivered in boats and lorries with little or no prior disinfection, would inevitably lead to a major health

> problem for the industry. The ISA problem which now exists in Chile is I believe just that. (Intrafish 08/2008)

In the middle of the crisis in Chile, it was known that a former executive of the trade association "Salmon of the Americas" (SOTA) had presented a lawsuit against this organization alleging that he was fired because he denounced bad practices of the Salmon industry in Chile in 2006. One of those practices was the use of FDA-banned antibiotics. (Intrafish 10/2008)

The unstable situation of the farming salmon industry in Chile had been denounced in venues that are exclusively for companies' executives. A Norwegian veterinary wrote in 2009: "In 1997, when I was the plenary speaker at the Chilean salmon farmers' annual conference, I amused Chilean farmers and their Norwegian advisers by saying that 'If Chile continues to farm the way it does at present, with no proper attention to biosecurity, I am afraid your industry will be unsustainable. It will collapse within 10 years." (Intrafish 01/2009).

However, spokesmen from the salmon industry tried to locate sanitary problems of the industry and, specifically, the ISA outbreak in a major context. The context was 15 years of growth of the sector, creating jobs with some unavoidable environmental costs. These costs are part of the phase of any new industry trying to achieve a position in the global market. In 2009, The INTESAL's director stated: "the reason for the wretched situation is due to a lack of knowledge in the industry about limitations of the natural environment. Both the industry and authorities were equally ignorant about how the environment would react to farming methods and operation in Chile" (Intrafish 06/2009).

SalmonChile CEO stated: "The accelerated growth of salmon farming this last decade, which has provided so many benefits to the region, has most likely prevented us from realizing in time the changes we need, but I am convinced that we now already know what we have got to change" (Intrafish 11/2008)

This ignorance was acknowledged by Chilean politicians. Some months before the ISA crisis, the Chilean parliament had submitted a report from a special commission investigating the case of the salmon industry in Chile. For twenty years different organizations had complained about the detrimental consequences of the salmon industry in local communities. After some months of

investigating, the Fisheries Commission of Chile's Chamber of Deputies could not prove contamination of the seabed due to the sedimentation and buildup of fish feces and feed residues. The main conclusion was that further scientific evaluation was necessary. Nor was there proof of consequences of salmon escapees. Regarding antibiotics, the commission said it was regulated and treatments had to be prescribed by a veterinary and not used in a preventive way. The rest of complaints in this regard would not be based on scientific knowledge, they were only speculation. (Intrafish 03/2007).

A Crisis Got Deployed

In the second half of 2007, the virus ISA was spreading, and the government and salmon producers had to implement improvised and strict measures. These measures were put in place within six months to prevent further disease outbreaks. The regulations would force salmon farmers to lower cage density, as well as make farming facilities more spread out.

In the beginning, not all the measures were welcomed by the industry. Marine Harvest's technical director claimed that the communication with Chilean government agencies was not very good. However, they were trying to achieve a convivial climate for cooperation. (Intrafish 08/2007). The government handled the situation by avoiding a shock strategy toward the salmon industry. Jorge Chocair, Chile's deputy minister for fisheries stated, "The point is to make the industry more sustainable – not to break the backs of companies' finances" (Intrafish 11/2007). One example of this flexibility is when Chilean authorities enacted the policy of slaughtering fish in single cages, rather than everywhere on farms where the ISA disease had been detected (Intrafish 11/2007). While in Scotland, in 1998, the first measure against ISA was killing all fish regardless of if they were presenting ISA symptoms or not (Intrafish 06/2009).

Beyond the flexibility of the measures, there was a twofold aim. On one hand, it was necessary to face an uncertain crisis regarding its magnitude and consequences. On the other, it was necessary to protect the image of the industry. While several sanitary measures were taken, both the government and the industry worked to avoid the impression of catastrophe.

Cermaq CEO stated that there might be an overreaction of the industry facing the last events related to the ISA virus. However, the company had to appoint a Chilean managing director

focused on the Americas, which meant mainly Chile. (Intrafish 08/2007). There was no room for pessimism to improve the image of the industry. For instance, a Marine Harvest CEO recognized that there was a positive consequence of the ISA crisis in Chile. They could help improve the global market balance of salmon and lead to further restructuring in the sector. (Intrafish 08/2007). Some months later the same CEO stated "The Chilean industry is cooperating much more than we have ever seen before. They have gone a long way to solving the sea lice problem, or at least reduce it, and now ISA is next to come, and I am certain they will manage that, as well." (Intrafish 11/2007). Likewise, the CEO of the Chilean-based company AquaChile said that some reactions regarding the ISA crisis were exaggerated. According to the CEO "Outbreaks are mainly concentrated in one company and geographical area. This is a virus that has been latent in Chile for over 10 years and the extraordinary outbreaks in the last few months are minimal considering the total biomass the industry handles. The most important factor is that the industry as a whole and the sanitary authority have reacted timely with new measures and regulations for its effective control." (Intrafish 11/2007)

Regarding the government, the Ministry of Economy gave special recognition to some companies, in the middle of the ISA crisis, for successfully complying with the Clean Production Agreement (Intrafish 01/2008). Also, the Undersecretary of Fisheries and Aquaculture stated that the ISA crisis was "a great opportunity to develop research, vaccines and international cooperation to study its effects" (Intrafish 06/2008). In terms of efficiency, the Ministry of Economy stated that the government was investigating the outbreak traceability in order to know the origin of the ISA. Also, they were going ahead regarding other illnesses such as a pancreatic disease which is still not present in Chile (Intrafish 06/2008).

At the time of the ISA virus crisis, the Chilean government kept its historical strategy of commercial openness. Under this logic, new treaties would be a good signal for the international market. Thus, Chile and Russia signed an agreement to cooperate on improving sanitary rules governing Chile's fisheries and aquaculture. (Intrafish 06/2008). But this had some background. In 2008, Russia initiated an inspection of several companies that export farmed fish to Russia. There were 21 rounds of inspections in other countries in collaboration with local authorities. More than 400 businesses and vessels were inspected. Like in Norway, only a few Chilean companies received the approval of Russia. (Intrafish 05/2009)

But not only the companies and government were part of this campaign to improve the image of the salmon industry's situation. The organization Salmon of The Americas (SOTA) stated that only 0.1% of Chilean production has been affected by ISA virus. It also highlights that ISA is not dangerous for humans and praises the early discovery of this illness and the collaboration between the industry and the government so that most fish were saved from the cages (Intrafish 08/2007).

The ISA crisis and following incidents could not be disguised for a long time. Unfortunately, events indicating bad sanitary management kept unfolding and drawing the attention of consumers and buyers abroad. In 2008 a consumer union in the USA urged the FDA to test Chilean salmon further after authorities in German found banned chemicals in Chilean salmon. The substances were crystal violet, anti-fungicide, and abamectin. The CEO of SalmonChile argued that the only way of contamination was imported food made of feathers from Brazil or Argentina. (Intrafish 10/2008).

The ISA Crisis Became an International Concern

The ISA crisis and other associated sanitary issues were very bad signals for the international market. There was a profound concern regarding how these sanitary problems could affect the commercial relationship with the USA, which was the main destination of salmon exportation. For instance, the concerns of exporters regarding the United States can be seen when an expert journalist stated, "the USA is not a country known for taking prisoners when it suspects contamination of food products or even a potential risk" (Intrafish 04/2008).

Another specialized journalist stated "Fish diseases are still causing major losses for fish farmers all over the world. Lately, international attention has been directed at the infectious salmon anemia (ISA) outbreaks in Chile, largely because these outbreaks influence the market's impression of what salmon shares on the stock exchange are worth." That was confirmed some months later when the stock prices of salmon companies producing in Chile nosedived on both the Santiago and Oslo stock exchanges since the summer (Intrafish 10/2007).

The ISA crisis could not be disguised not only because it was grave in terms of its causes and consequences. Another factor was the pressure from the international press. Articles about the

situation in Chile regarding farmed salmon and the ISA virus breakdown led journalists and experts to comment on this situation and previous events related to a sanitary problem in the Chilean farmed salmon industry. This type of article was not innocuous.

An article in the New York Times (Figure 18) about bad practices in the salmon industry in Chile such as fish density in cages and overuse of antibiotics contributed to the stock value of some companies falling in the Santiago stock market. Also, Safeway, a supermarket chain, reduced volumes of Chilean salmon prompted by this article. However, two months later, the New York Times had to submit a correction because they cited someone who said to be the director of a port at Chiloe, but he was a security guard as a source.

Figure 22: Article Published in The New York Time

Virus Kills Chile's Salmon and Indicts Its Fishing Methods
Barrionuevo, Alexei
New York Times (1923-Current file); Mar 27, 2008;
ProQuest Historical Newspapers: The New York Times (1851-2010)
pg. A6

A fisherman and his catch at Puerto Montt, Chile, where infectious salmon anemia is killing millions of fish destined for export to Japan, Europe and America.

Virus Kills Chile's Salmon and Indicts Its Fishing Methods

By ALEXEI BARRIONUEVO
PUERTO MONTT, Chile —

tourists and other marine life.
"All these problems are related to an underlying lack of sanitary

be true," Mr. Hjeltnes said. "But as long as everybody has been making lots of money and it has

Source: New York Times March 27th, 2008

Some weeks later, SOTA defended the salmon industry from the article in the New York Times stating that it was based on false information. (Intrafish 04/2008). Likewise, a CEO of a trader

company declared against Safeway "It is good for them, they use it for publicity… we say 'no' to Chilean salmon, we are the best, come and buy your food in Safeway. That is bullshit… they do not realize the damage for plant and farm workers whose livelihoods and feeding their families depend on Safeway taking this salmon" (Intrafish 04/2008).

On April 4th, the Ambassador of Chile in the United States Mariano Hernandez sent a letter to the New York Times' director defending the salmon industry in Chile and the article published by that newspaper in March was unnecessarily alarming consumers in the United States, the main destination of farmed salmon from Chile. This part of its letter is important because endorses the salmon industry in Chile regarding its phytosanitary conditions:

> "Moreover, all relevant food industries in the world face different challenges related to safety, sanitary controls and so on. The fact remains that Chile shows a remarkable record in prevention and management of food safety in this field."

Some months later, the New York Times published another article about the ISA crisis in Chile and other problems related to other sanitary issues one more time. The article stated that the salmon industry in Chile was moving further south, taking the virus to clean marine locations. Also, there were still exports of banned chemicals (Intrafish 09/2008). As expected, SOTA defended the Chilean salmon industry and claimed: "The article makes statements that mislead readers to believe that the salmon farming industry is not in compliance with the guidelines set by The Food and Drug Administration… Our association must point out that our members work side by side with the FDA as well as their own governmental agencies with complete transparency" (Intrafish 02/2009). However, a Chilean NGO called Terram confirmed the New York Times' article and stated: "This reaffirms the indiscriminate use of emamectin benzoate and antibiotics in the salmon industry, which different organizations reported some time ago, and shows the inefficiency of Chile's regulations and control." (Intrafish 03/2009)

Some months later, The Huffington Post released an article calling for more attention from American authorities on the salmon industry in Chile. This article denounced the strategy to face the ISA breakdown by moving further south. It also cites the report launched by the Pew Foundation regarding the historical problems of this industry according to the FDA such as the

overuse of antibiotics and other pharmaceutical products which are banned in the USA (Intrafish 07/2009). Likewise, The New York Times also highlighted the report from the FDA regarding the problems found in the Chilean salmon industry. But also, this article reported that the Chilean government was using incentives to reform the industry. In this regard, the Chilean government had provided $120 million in loan guarantees to help producers meet the new regulations (Intrafish 07/2009).

The ISA crisis was deployed in both biological and social terms. Finalized in 2007, Marine Harvest had closed several Chiloe-area farms and moved operations south toward the less-crowded, disease-free waters of Region 11. (Intrafish 11/2007). The year finished with a press release that was a nuisance for the industry and the Chilean government. An article in the Washington Post appeared about the ISA crisis and denounced contamination of the salmon industry in Chile. The deadline said: “Chile’s Flourishing Farms Prompt Fears For ecosystem; Methods of Salmon Industry Threaten the Very Purity It Vaunts, Critics Say” (Intrafish 12/2007).

Saving the Industry: The Policy-Making Process of a New Regulation

The Chilean government launched a plan to tackle the ISA outbreak some days after that the Marine Harvest was assumed to have infected farms. Given the uncertainty about how grave the ISA outbreak was, experts recommended isolating farms and slaughtering fish as rapid as the companies could work. Moreover, SERNAPESCA ordered to immediately slaughter fish in those centers that detected ISA. (Intrafish 08/2007). Another measure was that companies must inform the government about dead fish each week and the transportation of fish in good boats was banned. (Intrafish 08/2007). Several other specific measures were implemented insofar as the ISA virus was appearing in different farming locations according to their risk level.

Acting to tackle the crisis, some more structural problems were a matter of criticism against the government. One of them was why there was not a contingency plan made in advance by the government according to the General Law (Intrafish 08/2007). Also, it was evident that there was a lack of resources to reinforce regulation and measures regarding critical issues. In this regard, the government increased the budget for SERNAPESCA by 600 million dollars (Intrafish 06/2008).

Beyond the emergency measures and criticisms, the state backed the industry through diverse ways to overcome the ISA crisis. One of them was that the government agency of development CORFO guaranteed up to 60% of the loans granted to the salmon sector, with a guarantee limit of up to US$8 million. In addition, the Chilean president decided to present incentives to those who set up farms according to the new aquaculture regulation to promote joint management. (Intrafish 01/2009)

Other actors joined the campaign to overcome the crisis. Chilean scholars, NGOs, and representatives of the salmon farming sector in southern regions 10 and 11 discussed aquaculture load capacity at a workshop. This meeting was organized by the Centre for Oceanographic Research of the Eastern South Pacific (COPAS) of the University of Concepcion and the Centre for Research of Patagonian Ecosystems (CIEP) (Intrafish 02/2009).

The Industry Playing in Two Fields of Policy Design: Public and Private Realms

Regarding the organized salmon industry, mainly represented by SalmonChile, there was a close relationship between this entity and the government regarding short-term measures. However, it is possible to note that the industry also worked autonomously in other aspects. Although there was not a bad relationship with the government, there were several instances when there was an industry plan and, in some cases, they exerted their own measures. For instance, Multiexport CEO declared a rescue planed design by the company. It is interesting that they stated that one of the measures was to support a bill going through the Chilean parliament (Intrafish 04/2009).

Other initiatives were implemented and highlighted by the industry giving a signal of recovery and better image. For example, Marine Harvest stated that they will carry out vaccination against SRS to reduce antibiotics use. (Intrafish 08/2008). Mainstream along with a fish oil company implemented a system to reduce waste which is not mandatory by regulation. (Intrafish 12/2008). SalmonChile stated the Chilean salmon industry was working to reduce the use of antibiotics (Intrafish 03/2009). Moreover, some companies published that they were vaccinating salmon against ISA. For instance, the company Multiexport announced that the company was using a vaccine to combat ISA which was made in Canada. After some weeks, Multiexports stock price increased (Intrafish 05/2009).

Apart from the particular initiatives mentioned above, there was a more important process that highlights the important role of the salmon industry in the governance shift regarding sanitary aspects. The industry was able to use different ways of organization to design, promote, and finally submit their idea of a new regulation regarding the sanitary aspect of the sector.

Salmon farmers reacted rapidly and took advantage of an ongoing coordination process led by a well-known INGO. The World Wildlife Fund (WWF) had scheduled the "Salmon Dialogues" with SalmonChile producers, retailers, and environmental groups several years before the ISA crisis. The aim was to agree on minimum requirements for quality standards in aquaculture to create a reference of good practices for a future international certification system (Intrafish 12/2007). These meetings were the base for another initiative formed by the government to implement emergency measures against the ISA crisis and a participative process of new regulation of the salmon industry in Chile. Although this initiative was classified as participative and contemplated different actors, it was undeniable that the organized salmon producers were the main actor given their power based on different types of capital.

In 2008, president Bachelet appointed a former official of the Chilean Minister of Fisheries and Aquaculture Felipe Sandoval, to lead the so-called "salmon roundtable", which would gather different actors to submit a diagnostic of the crisis and a proposal to improve the sustainability of the salmon industry in Chile.

The "Salmon Roundtable" and the Role of the Salmon Industry

The "Salmon Roundtable" was a public and private mechanism of cooperation in order to solve the ISA crisis and design suitable regulation for the future of the salmon industry in Chile. In this case, according to the declaration of president Bachelet, ministers, government officers and company CEOs, this commission had to define clearer and stricter measures to avoid dangerous events for the industry and their workers.

This commitment was a challenge for the industry. The salmon industry had practiced the idea of self-regulation especially in issues related to environment care and biosecurity. However, after the ISA crisis and the diverse sources of pressure, the organization of farmers had to admit that this idea of self-regulation had not given satisfactory results. There was a consensus among

salmon farmers that the salmon industry in Chile needed to be regulated by the state and recover from the ISA crisis. Their main rationale was economic. A Marine Harvest CEO said that the Chilean salmon industry "needs stricter regulations to invest new capital in Chile and return to the global stage." (Intrafish 04/2009).

Although the radical idea of self-regulation regarding environmental care was not well considered in the industry anymore, there was still an idea of autonomy. This autonomy was exerted through a private coordination among incumbents. This autonomy idea claimed that new regulation should be designed for those who knew the business and put at risk their capital in a nascent and novel industry for Chile. The salmon industry, according to the farmers, deserved support from the state through regulation and incentives but also, the ability to contribute to the policy-making process.

It will be notorious after some details of its functioning, that the “salmon roundtable” was a formal way for companies to lay out their proposals and interests. In other words, it was the connection between private interests and the parliament. Some of these interests are described below.

Solving the Origin of the ISA crisis

A controversial issue that was figured out was how the ISA virus had arrived in the Chilean farms. The discussion between the origin of ISA was even in the international mass media, where it highlighted the complexity of this research because there are several variants of ISA strains around the world. However, a pharmaceutical company, looking for a vaccine for the ISA breakdown in Chile, discovered that only one strain of the ISA virus accounted for 70% of the presence of the disease in Chile. (Intrafish 08/2008). Upon this discovery, the main clue was the importation of salmon eggs, which was mainly carried out from Norway. In this regard, Aqua Gen, a Norwegian company of genetic material, denies that the ISA came from Norway through the eggs. They stated that ISA was in Chile for several years before and most of the centers with ISA can be traced back to local Chilean egg producers (Intrafish 06/2008). However, according to a research led by Dr. Fred Kibenge at the University of Prince Edward Island in Canada, the ISA breakdown in Chile can be traced back to Norway (Kibenge et al. 2009).

Research on the origin of the ISA virus only confirms the hypothesis held by the salmon industry in Chile. In 2008, a CEO of a salmon company had stated "before everything was based on trust, but now with this regulation, we will know that the ova come from disease-free farms and parents"(Intrafish 06/2008). Moreover, a different CEO of Marine Harvest assumed that an important measure is to stop importing genetic material like ova to prevent new types of disease. In this regard, he stated, "foreign companies, which have different production standpoints in various countries around the world and that are temporary investors in Chile, can see this issue (stopping imported ova) in a different light, but hopefully the government accepts our proposal" (Intrafish 11/2008).

In 2009, SalmonChile agreed that an urgent measure was better management of genetic material as the supply of the industry. A spokesman for SalmonChile stated:

“The sanitary measures are based on a safety and immunity pyramid, with eggs at the apex and supported by greater care, control, and prophylaxis. This will be reflected by very strict regulations on purchases from abroad and domestic production… the measures on assuring the quality of the genetic material by means of certification that eggs are virus-free. To control this, each of the broodstocks will be verified to make sure they are virus-free" (Intrafish 01/2009).

A Better Organization of Marine Territory as a Measure of Environmental Care

A CEO of the salmon company Cermaq stated that the solution for the ISA virus crisis in the current areas would have to come from inside the industry (Intrafish 10/2007). Thus, three crucial proposals were put forward by representatives of the salmon industry. The first idea was about distances between farms to avoid the spread of contagious illnesses. This idea about distances was already contemplated in the General Law of Fisheries and Aquaculture since the 1990s. However, there was not a regulation about distances between centers of cultivation (sets of farms), which will be important for future regulation.

The second idea was about moving centers and expanding the production of salmon had also been around before the ISA crisis, and it gained more relevance after the ISA crisis. There is a connection between this idea and the first one, as the Canadian CEO of Cooke Aquaculture put forward. He warned that Chile should learn from the crisis and implement geographic separation

of centers. That would imply to move centers toward extreme southern Chile (Region 11th) (Intrafish 11/2007). In this regard, the six most important salmon companies in Chile -- Salmones Mainstream, Salmones Multiexport, AquaChile, Camanchaca, Los Fiordos and Marine Harvest – in a meeting in July 2007, declared that to address fish-health issues impacting the region's salmon farms it was necessary to coordinate and expand. They acknowledged they had "very crowded production areas with no coordination between the different producers sharing such areas. The map is the main problem" (Intrafish 07/2007). Furthermore, a Marine Harvest spokesman stated that ISA could force a move to Chile's Region 12 (Intrafish 12/2007), which is the region with a unique ecosystem and pristine waters off the Chilean coast. In reaction to this idea of expansion, Pure Salmon argued that moving centers toward clean locations was not the solution. According to this INGO "Those problems include overproduction, lack of regulation, lack of separation between government and industry, lack of transparency/information and precedence of economic interests over environmental and social concerns"(Intrafish 11/2007).

The third idea aimed to solve the problem of coordination. According to experts, Chile had to resolve the problem of multi-ownership of sites because they have different sanitary and biosecurity policies. (Intrafish 01/2009). However, this process of coordination was not subject to ownership as a mandatory measure. The measure was to put centers of cultivation, either of the same company or not, in the same area. This would allow coordination regarding different processes of cultivation making it easier to avoid and tackle any phytosanitary problems. As a specialized columnist stated, "Candor and cooperation among fish producers could play a much more vital role than all the world's vaccines in battling fish diseases" (Intrafish 09/2007). In this regard, Marine Harvest implemented a new production model in Region 10, rotating farms, reducing the load, and allowing one zone with good performance from the production standpoint to recover. A spokesman for this company stated "This model includes management by areas and not farm-by-farm. The idea is that farms sharing a fiord, a bay or an area that are affected by a tidal current share information, coordinate strategies, revenues, and treatment… Marine Harvest is inviting companies that share zones with it to form working teams…This is a set of measures, which as a whole, constitutes a new production model for Chile, which we are willing to drive and lead at Marine Harvest" (Intrafish 12/2007).

Other Market Actors in the Scene

Another reaction to the ISA crisis was the appearance of market actors concerned about the situation and influencing it in diverse ways. One of them was insurance companies, which in 2009 held the 11th International Aquaculture Insurance and Risk Management conference. According to a journalist covering this event, insurance companies in the field of aquaculture look for information in a different way than the academy does to be risk assessors. For instance, for insurance companies, at the top of the problems were weather problems and alga blooms. (Intrafish 03/2009). Furthermore, insurance companies had an opinion regarding the ISA crisis, helping to improve the image of the industry. Thus, an insurance company CEO states that the ISA crisis is not a big deal as other media had reported. "Now, we hardly make any payouts on ISA losses -- there are some mitigation and cleanup costs, but no big payments". For them, it is more probable for loses because of pancreatic disease (PD) or sea lice. (Intrafish 03/2009)

Other market actors were consultants and pharmaceutical companies. In the first case, the case of a former expert from INTESAL, who founded a consultant organization to provide information to producers and investors about the quality of the farming environment and practices in general. According to this expert, this type of consultancy was necessary because there was a lack of quality scientific information that led to the ISA crisis and other sanitary problems. (Intrafish 08/2009). Regarding the second case, pharmaceutical companies found enough incentives to look and promote new products. However, it is necessary to do further analysis of this issue.

Pharmaceutical companies invest insofar as there is a market for products. In Chile, according to this industry, there were no incentives for pharmaceutical products because some companies preferred copies of the product. For instance, in Chile, some companies were withdrawing SLICE, which is the original product, and used copies to combat sea lice. The European Union is looking for information about licenses and doses regarding pharmaceutical products in Chile. (Intrafish 05/2009).

Despite the problem of pharmaceutical products copies, there were incentives after the crisis for developing new pharmaceutical products. It is possible to highlight seven cases:

1. The company Centrovet laboratories presented a vaccine against ISA in Chile, ready to produce 60 million doses in 2009. The company acknowledges that it had support from SERNAPESCA and CORFO (Intrafish 02/2009).
2. The Norwegian company Inmunocorp Animal Health developed ProVale which was an environmentally friendly immuno-stimulant that aimed to replace antibiotics. The company stated that there were no vaccines for most bacterial diseases and they have a high cost of development. (Intrafish 03/2008).
3. Skretting, which is a big company of feed, entered into a contract with another company to produce a product with marine zooplankton to combat sea lice. (Intrafish 06/2008).
4. The center for research of the Chilean salmon industry (INTESAL) together with fish feed maker EWOS launched a project to develop an oral vaccine for the salmon rickettsial syndrome (SRS) (Intrafish 01/2009).
5. Centrovet laboratories presented a new oral vaccine to fight SRS (Intrafish 03/2009).
6. The Norwegian Toxicologist Baard Johannessen discovered a more efficient way to combat salmon lice combining two different pharmaceutical products with a specific sequence, and dose (Intrafish 08/2009).
7. The company "Farmacologia en Acuicultura Veterinaria" launched a new polyvalent vaccine against ISA in Chile and other illnesses such as Infectious Pancreatic Necrosis (IPN), Salmon Rickettsial Syndrome (SRS), and Vibrio. (Intrafish 08/2009).

The pharmaceutical industry was an important actor in the mass media regarding the eventual consequences of the ISA crisis in Chile and the importance of new regulation for the future of the industry. For instance, Europharma claimed that according to a survey made by this company, the amount of smolt put in the sea cages would depend on whether a vaccine for infectious salmon anemia (ISA) was made available in Chile. If not, the total release could be considerably lower. Moreover, according to this pharmaceutical company, several salmon companies have already decided not to set out any fish at all in 2009 (Intrafish 03/2009).

Submitting a Draft of the Law

When SalmonChile met in a council in Puerto Varas, Chile, they agreed unanimously on new measures of sanitary prevention. One of them is the "Salmon Neighborhood" system to

implement sanitary measures in a coordinated way. As it was acknowledged, this idea was elaborated and defended before politicians because of the effort of the G6 (Marine Harvest, AquaChile, Multiexport Foods, Los Fiordos, Camanchaca, and Mainstream Chile). In this meeting, the government agency SERNAPESCA supported the agreement (Intrafish 11/2008).

It is evident that the salmon industry was crucial in the design of the new regulation, carrying out important modifications. The ideas from the salmon industry elaborated in the "salmon roundtable," are connected within a general strategy that was the base for the new regulation: moving further toward southern Chile to implement a new model of cultivation (implemented before in other countries) based on sets of centers that belong to the same or a few companies. This strategy demanded more marine space because those sets of centers would be separated by a significant distance. These are the implications of the "Salmon Neighborhoods".

The mentioned agreement from the industry and somehow from the roundtable was the base for the first proposal of reforms for the Fishery and Aquaculture Law. This allowed Felipe Sandoval, who was the leader of the "Salmon roundtable", to state that there were agreements reached by the "Salmon Roundtable". The main agreement was the system of "salmon neighborhoods" that needed to be in a new sanitary regulation. Sandoval stated: "It is important to have coordination, and although salmon companies have said self-regulation does not work, I think it will in the neighborhoods because that system has sanctions, an increase in penalties, and when a neighbor is committing an offense, others will be able to report this, and that neighbor will be penalized. So, I believe we will create incentives through this law"(Intrafish 04/2009). This led Intrafish to state that "the bill to modify the General Fisheries and Aquaculture Law, which dates back to the early 1990s, was designed by the salmon roundtable, chaired by Felipe Sandoval. It was presented by the government [to the Chilean parliament] with an urgent status"(Intrafish 05/2009).

Strategies of Pressure and Lobby

After that, this strategy was presented and became a bill, there was a second step from the salmon industry. It was necessary to create pressure for passing this bill in the parliament. This pressure came indirectly from banks. Companies needed loans or bargains on their debts with banks, meaning they needed to use marine concessions as a mortgage. However, this right was

part of the new law. Thus, SalmonChile stated that the government had been so slow to present the procedures to allow the industry to proceed with its neighborhood plan, that it needed legislative changes to allow for the transferring of licenses. SalmonChile CEO states: "We are concerned because without neighborhoods there is no solution... there is no banks financing. There is no agreement with the banks or anything" (Intrafish 03/2009).

The neighborhood system was enacted. SERNAPESCA had to start coordinated work with the industry for the relocation of farms. A market analyst stated that "it will cost to initiate new activity. You will not get payback immediately. You have to think long-term and cautious, gradual growth... possibly the biggest challenge will be to achieve biologically responsible operation in cooperation with your neighbors" (Intrafish 07/2009).

Use of Pharmaceutical Supplies: Changes After the ISA Crisis

As mentioned, urgent measures were taken to handle the out of control crisis. Measures such as halting production in some farming centers and the relocation of other active cultivation centers. Some locations were declared as “infected zones” and some years later the criterion of classification was broadened to contemplate other categories such as “zones of vigilance”, which are near the infected ones. Also, the concept of “sanitary emergency” was introduced, which allowed government agencies to close centers of cultivation, killing suspicious fish despite the fact that they are not for human consumption, restriction of the amount of fish per farm, reinforcement of sanitary procedures for transport, use of tools, and handling of supplies related to the salmon farming.

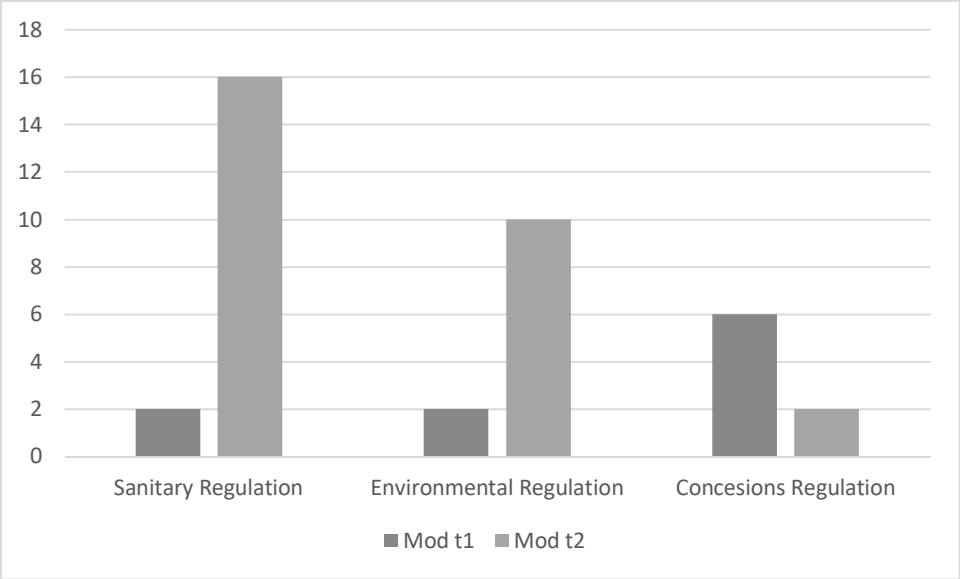
Once the ISA crisis was controlled but still facing consequences, government agencies obtained more enforcement power. In 2011, legal reforms gave more authority to the National Service of Fishery and Aquaculture (SERNAPESCA) to inspect sanitary aspects related to fish mortality, disinfection, use of antibiotics and other pharmaceutical products in the centers of cultivation, etc. These measures increased the public budget to contract more inspectors and certifiers to carry out diverse types of supervision related to the mentioned sanitary measures.

In 2011 and 2013 regulation was updated and other long-term measures were implemented. A critical issue was the density of cultivation farms in marine zones. In this regard, in 2013

regulation addressed this issue. Density is determined by the Undersecretariat of Fishery and Aquaculture (SUBPESCA) for a set of centers of cultivation (salmon neighborhoods) but not for individual cultivation-specific centers. The gauging of density depends on the history of production and fish mortality of the centers. Therefore, there is no assigned density when the centers of the neighborhood had not operated in the past. Information about density per neighborhood and centers of cultivation should be public information and made available by the SUBPESCA.

The main modifications gave more specifications regarding both procedures of general sanitary programs (preventive function along the productive process) and specific sanitary programs (reactive function based on surveillance, control, and eradication). These programs are established regarding specific illnesses that the SUBPESCA defines. These programs must follow the general sanitary regulation. As Figure 19 presents, most of the modifications were focused on sanitary and environmental issues. However, it is only a descriptive approach that does not contemplate the relevancy of those modifications.

Figure 23: Number and Topics of Modifications Made in t1 and t2



Source: Own Elaboration from Data Base of Ministry of Justice, Chile.

Regarding the use of pharmaceutical supplies, government agencies have to make some information public about the number of antibiotics used by the salmon industry but, as mentioned in the regulation above, this information does not relate data to companies.

The law contemplates reports from external audits and a mandatory certification by an external certifier of the sanitary situation to clarify any suspicion of illness. The regulation states that the main step that these entities have to follow is to carry out the process of sanitary certification. It is important to note that this type of certification is not like private market-led certification, which gives a special label of endorsement.

Within the mentioned sanitary programs, there are some aspects explicitly regard the use of pharmaceutical supplies such as:

1. Antimicrobials cannot be used as a preventive practice.
2. Pharmaceutical supplies have to be authorized through a laboratory approval and supervised by a veterinary.
3. Every center has to have a manual of pharmaceutical treatments according to the general sanitary program.
4. Every treatment has to be recorded and that information has to be submitted monthly to the National Service of Fishery and Aquaculture.
5. Fishmeal with pharmaceutical products has to have a special treatment with respect to normal fishmeal.

In this new period after the ISA crisis, there was not a substantial modification regarding regulation of prophylaxis processes, which implies the use of vaccines. Regulation in this regard only states that if a center decides to use vaccines, these have to be in the register of National Agriculture Service. Only instructions for the correct application can be found in the programs of vaccines that the National Service of Fishery and Aquaculture provides.

Other pieces of regulation were mentioned but they were eliminated in posterior legislation. That is the case of a measure discussed in 2011 about the characteristics of the infrastructure of cultivation centers regarding sanitary security. This piece of law was eliminated later in 2016 as well as other pieces of regulation that demanded more information about sanitary records.

The most important and structural change after the ISA crisis was regarding the territorial order of concessions and the use of space in relation to environmental sustainability. As mentioned, groups of centers of cultivation were arranged in 2013, which were called “Barrios Salmoneros” (Salmon Neighborhoods). This is a set of concessions within geographic limits and declared as a suitable area for aquaculture. The criteria to define these salmon neighborhoods were environmental conditions, sanitary history (fish mortality) and productivity history of those centers. Other criteria are related to each center such as the quality of infrastructure, the percentage of expected survival and the weight of fish. In short, the set of concessions are supposed to share similar characteristics (geography, marine currents, climate, etc.) for more efficient sanitary management.

Neighborhoods must carry out coordinated actions to keep a good sanitary standing. That is the case of a sanitary planned recess, which is a period that a center of cultivation cannot cultivate fish and must leave that location empty. This “period of rest” follows the “productive period”. These periods in coordination with other centers (neighbors) must be known in advance through the specific sanitary programs.

Also, this measure fostered initiatives of self-regulation. This means, for example, that concession owners who belong to the same neighborhood can make voluntary agreements related to production and sanitary conditions under the authority of the SERNAPESCA. These voluntary agreements aim to make the production of farmed salmon more efficient and sustainable. Some examples of agreed measures taken by neighborhoods are: cultivating a unique type of salmon to coincide in the recess time, coordinating measures to control events of algae bloom, and coordinating the management of illnesses and process of vaccination. Also, they could coordinate the amount of fish to be cultivated which could be a lesser density regarding what the regulation dictates for those centers, but this was eliminated in 2016.

Each neighborhood must communicate the agreements to SERNAPESCA. Also, each one must have a coordinator, who is the bridge between concession owners and governmental agencies.

Conclusion

In this section, I will do a summary of the governance shift regarding sanitary conditions and the use of pharmaceutical products. Then I will show some current information about the performance of the main companies in this regard.

In 2008, a SalmonChile CEO stated that it was necessary to lower the production and gain more space. (Intrafish 11/2008). In 2009, a Cermaq CEO acknowledges that they have learned from the ISA crisis. The industry in Chile was very liberal and too aggressive which was not a good strategy. (Intrafish 03/2009). These two declarations summarize very well the problems of the salmon industry detected by scholarly research and environmental NGOs. However, the new governance of the salmon industry was pretty different at the end.

The Chilean state and the political class had agreed on a neoliberal pact. This means a position of the Chilean economy in the global market characterized by openness and diversification of its export-led industry. Chile had signed a free market treaty with the United States in 2003. This country was the main destination of Farmed Chilean Salmon. Also, the US was home to one of the fiercest non-profit organization called The Pew Charitable Trusts whose program "Pure Salmon" denounced all the faults that the salmon industry in Chile had committed while exporting to the US. After that, they demanded more transparency and adherence to the FDA with respect to salmon from Chile. Therefore, the design implemented to enforce regulations would entail reducing the production and exports to the US market; and many others were eager to occupy the Chilean place. In the face of this international pressure, there is no a key role to international environmental organizations as a reference for congressmen and the president to elaborate a new environmental governance for the salmon industry in Chile. Throughout all of the parliament discussion and press releases, organizations such as FAO or WHO were completely absent.

The state, specifically the parliament, was the place to discuss proposals already agreed upon among salmon owners, government officers, and the INGO WWF. It was a globalized salmon industry with a national headquarter (SalmonChile) and international partner (SOTA) that kept a direct relationship with the government. The idea of "Salmon Neighborhoods" and expansion further south was its principle emergency measures. However, they were adopted as a general

strategy afterward. A revision of press release before the ISA crisis was carried out to state that the industry was looking for solutions about marine space already at that time. The salmon farmers became part of the "Ruling Civil Society", being the main actors (not only as experts but also as citizens) in the policy-making process to ensure the path of growth that they were pursuing since the 2000s. This process was moderated by the WWF which has a more suitable strategy for combining economic growth and environmental change in the context of globalized capitalism.

Regarding the relationship between the global phenomena and the civil society, it is possible to confirm my hypothesis (h1) in this regard. The salmon industry companies and associations as part of the national civil society received pressure from supermarket chains, INGOs, and even international government agencies regarding their practices related to both the reaction before the ISA virus and the plans of the industry. However, this hypothesis left another actor out. International mass media created an impressive pressure on the salmon industry in Chile. The international press and their articles were present in Chilean media. It was possible to note how the government had to demand a public retraction from the New York Time with respect to some facts that this newspaper had not presented or presented misleading information.

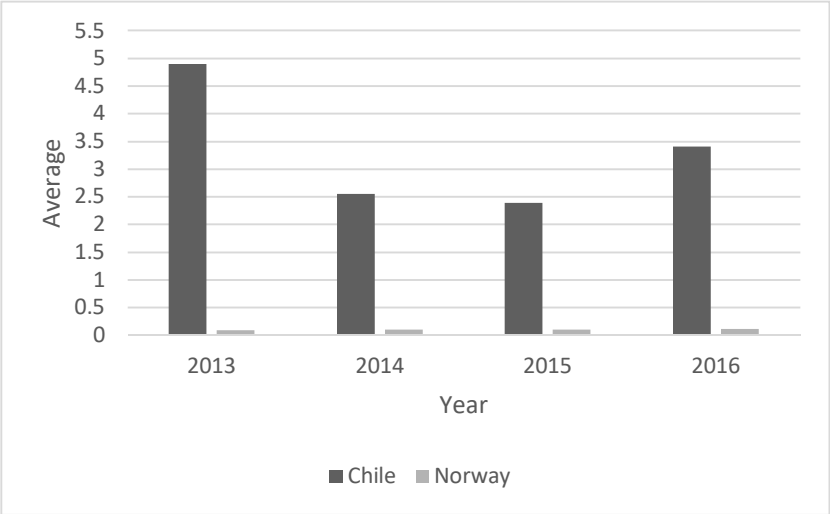
It was possible to note that the phenomenon of international certification as an alternative or private governance was appearing as well-seen tools to coordinate goals and improve legitimacy before the international market and specifically before supermarket chains. However, the international certification in the context of aquaculture begins its peak moment after 2010; which put this phenomenon beyond the scope of this dissertation.

After presenting the conclusions and the level of consistency of my hypothesis, I am presenting some data for future research in the environmental governance of the sanitary conditions and the use of pharmaceutical products in the salmon industry in Chile.

In 2014, several exceptions were added regarding the distance between centers of cultivation within a neighborhood, which made regulation in this regard more flexible. These last reforms do not fit with the challenges that the industry currently faces. For instance, the control of plagues is still a pending issue. In comparison with the first exporter of salmonids, the Chilean salmon

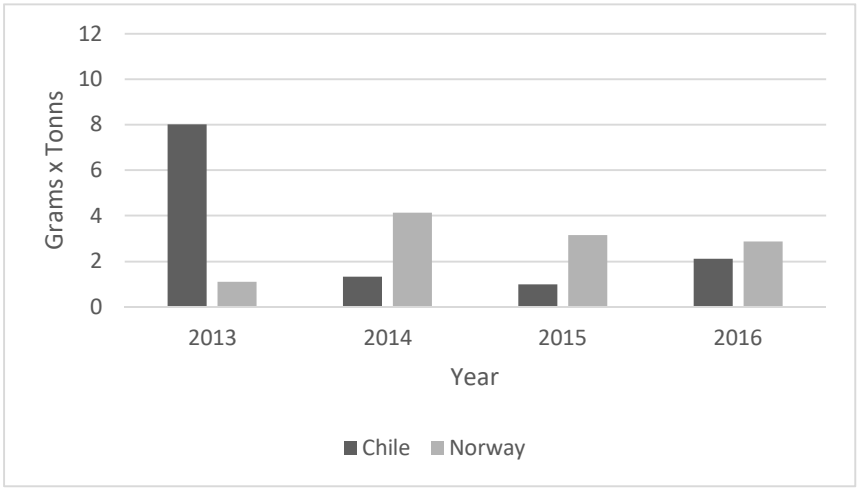
industry has not been able to overcome its dependency on pharmaceutical products. The next graphics show data from the Global Salmon Initiative. This is a transnational organization led by the main farmed salmon corporations. They submit an annual report of sustainability considering some indicators.

Table 20: Indicators Regarding Different Aspects of the Sanitary Conditions of the Farmed Salmon Industry in Chile. Comparison Between Chile and Norway. Average of Adult Female Sealice Per Month.



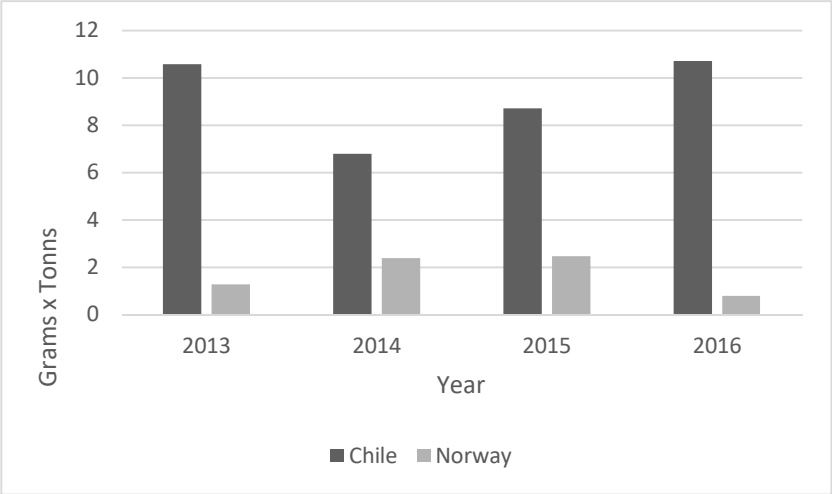
Source: Sustainability Reports from Global Salmon Initiative

Table 21: Indicators Regarding Different Aspects of the Sanitary Conditions of the Farmed Salmon Industry in Chile. Comparison Between Chile and Norway. Anti-Sealice In-Feed (Active Pharmaceutical Ingredients)



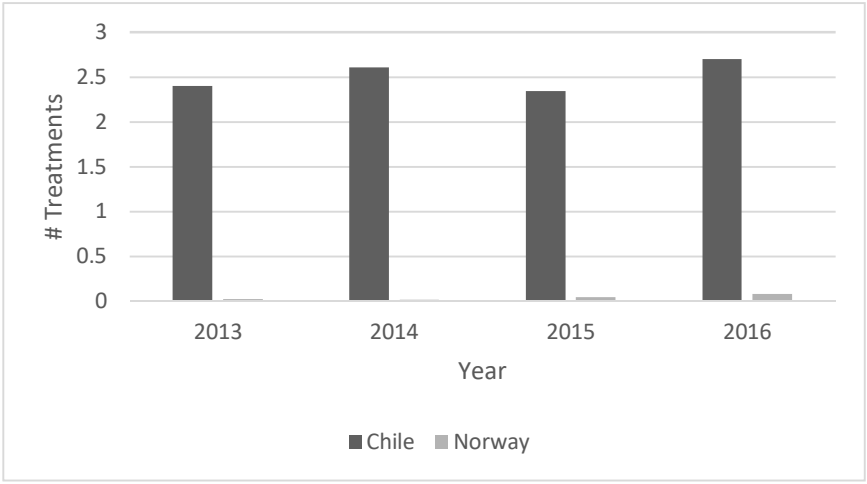
Source: Sustainability Reports from Global Salmon Initiative

Table 22: Indicators Regarding Different Aspects of the Sanitary Conditions of the Farmed Salmon Industry in Chile. Comparison Between Chile and Norway. Anti-Sealice In-Bath (Active Pharmaceutical Ingredients)



Source: Sustainability Reports from Global Salmon Initiative

Table 23: Indicators Regarding Different Aspects of the Sanitary Conditions of the Farmed Salmon Industry in Chile. Comparison Between Chile and Norway. Number of Antibiotics Treatments Over Entire Production Cycle.



Source: Sustainability Reports from Global Salmon Initiative

It is necessary to understand why the salmon industry presents similar indicators with respect 10 years ago regarding chemicals and use of antibiotics to combat illnesses and parasites after an assumed Environmental Governance shift.

Finally, results from this chapter are summarized in the following table using the relationships stated by the theoretical framework.

Figure 24: Summary of Facts Depicting the Environmental Governance Shift regarding Sanitary Conditions of Production and Use of Pharmaceutical Supplies from t1 to t2, according to Each Relationship of the Theoretical Framework.

	Time 1 Pre-2009	Time 2 2009 - 2012
	Environmental Governance of Sanitary Conditions of Production and Use of Pharmaceutical Supplies	
Relation 1: State & Civil Society	<u>Regarding "Ruling Civil Society"</u> 1. State back the salmon industry by omission 2. Loose regulation about the use of antibiotics by the salmon industry 3. Inaction of the state regarding pharmaceutical overuse. Companies implement their own sanitary goals 4. Government agencies reinforce norms insofar as do not affects growth and prestige of the industry 5. The state only recommended the use of vaccines in the salmon industry 6. The six bigger companies of the salmon industry implement its own organization (G6) to implement measures against ISA breakdown 7. The "roundtable" as a formal mechanism of participation and informal legislation commission in the policy-making process <u>Regarding communities and civil organizations</u> 8. Lack of public information about the use of antibiotics by the salmon industry 9. State communicate the idea of a young and immature salmon industry 10. Government agents trying to avoid general alarm about ISA breakdown until the situation was out of control 11. Research center of the industry communicate results and procedures before or instead government agencies	<u>Regarding "Ruling Civil Society"</u> 1. State back the industry through subsidies, new concessions in other regions, and allow using licenses as collateral for bank loans 2. Government agencies can supervise the suitable use of antibiotics 3. The goals regarding the use of chemicals are agreed by a private organization of companies internationally 4. Government agencies reinforce norms and publicize it 5. It is up the industry to use vaccines. If so, they have to be registered 6. The bigger companies agree on other measures such as exchange centers of cultivation. Thus, a company can manage a whole "salmon neighborhood" and facilitate mandatory coordination of sanitary measures 7. There are no roundtables as a venue of communication between the state and the salmon industry. However, CEOs occupy job places in the government and otherwise. <u>Regarding communities and civil organizations</u> 8. Use of antibiotics can be public but not per company 9. State communicate the idea of an industry that learned 10. The government implements an observatory of breakdowns publishing periodical reports 11. State funds research centers apart from the industry's and which submit public reports

Relation 2: Hyper-globalization & State	1. Other nation-states agencies supervising conditions of the industry (i.e. USA, Russia) 2. International corporations having different sanitary norms according to the country 3. International corporations criticize the government for bad regulation for overcrowding farms 4. INGOs denouncing that some chemicals used by the salmon industry were banned in other countries but not in Chile 5. Government officer defending the industry confronting international accusations by INGOs or international press	1. Other nation-states agencies still supervise conditions of the industry, including China. 2. International corporations still show different sanitary norms according to the country 3. International corporations satisfied with more space but not enough. 4. INGOs still denouncing put emphasis on antibiotics 5. Government implements a subtler way of promotion taking CEOs in official committees to visiting other countries
Relation 3: Hyper-globalization & Civil Society	1. International experts warning about the risk of illnesses in international conferences and mass media 2. INGOs supporting labor protests 3. International press denouncing problems of the salmon industry in Chile 4. International farmers organization (SOTA) defending the industry abroad 5. International pharmaceutical companies looking for new products for the industry 6. Market-pressure to overpass Norway and occupy new commercial niches 7. SalmonChile defending the industry confronting sanitary incidents abroad 8. INGO WWF organizes workshops with companies and experts to agree on standard practices for a future certification scheme 9. Importation of salmon eggs is a controversial issue in a globalized industry in the national mass media	1. International experts acknowledge the 'new environmental governance" of the salmon industry in Chile 2. INGOs are divided between those denouncing environmental consequences through protest and other though fostering and awarding better practices of the industry 3. International press denouncing the consequences of the salmon industry as a global problem instead focused on Chile 4. SOTA has been more concerned about the restrictions in the USA for salmon farmers and social movement against farmed salmon in Canada 5. International pharmaceutical companies adapting their products to the resistance of salmon to them. Also introducing new types of vaccines but still no used by all the companies in Chile 6. Market-pressure and the goal to overpass Norway still an incentive for the Chilean industry 7. SalmonChile facing protest from other regions where the industry wants to expand and creating marketing commissions to promote farmed salmon from Chile abroad. 8. WWF promoting private certification (ASC) 9. Most eggs are produced in Chile under the new regulation

Chapter 6: Environmental Governance of Marine Property

Changes regarding the governance of marine property are analyzed in this chapter. Specifically, what explains the way that this new environmental governance implemented is related to the system of marine concessions. It is important to know if guidelines from environmental international organizations regarding the pristine ecosystem of southern Chile were considered in the policymaking process or how valuable new marine locations were to improve the legitimacy of the industry before international market actors. Also, what was the role of the state with both the market actors and local communities regarding this process of location assignment? What type of embeddedness between state officials, salmon industry CEOs, and labor and environmental actors counted for the process of a new governance. In this regard, one of the most important conditions for national and international investment is property certainty. This chapter describes how a new environmental governance tackles the problem of legitimacy of the industry without diminishing certainty for investors.

Marine Concessions as Property in the Chilean Legislation

Regulation about concessions has been the central issue of the aquaculture regulation in Chile between 1989 and 2012. It is possible to note that before the ISA crisis, the discussion about the regulation of the concession acquisition process and the use of marine spaces was mainly focused on fostering salmon farming.

In 1989, the law-making process and its discussion were based on the idea that the salmon farming industry had to be a strategic export sector. In this regard, according to the discussant in the military commission, small producers were not functional, and they would be excluded from the leasing system of concessions. It was feasible that medium and large industries would be inserted into the international market. Under this assumption, many fishermen were forced out of the aquaculture business.

From the beginning of the General Law of Fishery and Aquaculture, marine concessions were defined as a “permanent” right for an undefined time if the owner accomplishes some conditions. Apart from this permanent right, there were others regarding concessions for other types of property. One of the main aspects regarding the property of marine spaces for aquaculture is its

process of commodification. It was established at the end of the 1980s that concessions could be tradeable, inherited and transferable. After some years they could be rented.

Time limitation regarding concessions was an issue related to investment. The rationale to support the unlimited concession was the endless interest for attracting investment avoiding the uncertainty related to the expiration of the concession or permission to access it. It had to be a concession system under principles of property rights that guarantee certainty and compensation in case of expropriation. Also, the assumption was that producers need certainty regarding the property because they have enough risks to face (natural disasters, market prices variation, etc.). However, the law established reasons to end the authorization of the concession in those cases where the use of a concession is different from aquaculture or reiterative practices are damaging the environment in very extreme cases.

Despite all of these privileges or conveniences, there was some rationale to restrict the assignment of concessions. In the 1990s, there already were signs of speculation practiced by people who acquired concessions rights to wait for a higher plus-value. At the beginning of the 1990s, there were some concessions that were not efficiently exploited given that there were not enough incentives to invest and produce. Instead, some concession owners were expecting a larger demand to obtain better prices selling or renting concessions. Therefore, producers were concerned about how many people could enter the business.

A concern of legislators was how possible was a closure regarding access to concessions. One of the alternatives was offering the concession to the best bidder. However, the auction would be a controversial issue with respect to the principle of national security because of the endlessness of concessions. Also, auction systems had not been common in the Chilean administrative legislation. In the face of that dilemma, it appeared as though the process of applying to concessions was asking for more sophisticated information. A technical project should give a guarantee of investment and added value.

Given that concessions imply the use of a common natural asset, there is a license which must be paid annually. It is based on indicators of national accounts and the length of the concession. Annually patents increase the price, except for concessions used to cultivate algae and small

organizations of fishermen. This issue was not a big deal in discussions for low amounts for big companies, because it ensures certainty of property to an investor. This type of certainty is not only about the space and the projected production. It is also about the fish as property. Indeed, it is prohibited to capture cultivated species (except by the farming company) in zones specified by SUBPESCA, despite these fish escaped.

Behind the increasing demand for concessions, there is a more general territorial aspect. This is the assignment of Suitable Areas for Aquaculture (SAA). Within these areas, concessions can be assigned. Although SAA cannot be declared when they affect national parks, national monuments, and protected areas, they provoked much resistance from other incumbents such as fishermen, mussel farmers, tourism businessmen, environmentalists, etc.

ISA Crisis and Its Consequences on Marine Property

The ISA crisis and the history of phytosanitary incidents revealed several structural problems in the farmed salmon industry in Chile. One of them was the lack of a sensible balance between the astonishing growth of the industry and the marine space in which the production was carried out. Demanding more marine spaces and concessions was a phenomenon before the ISA crisis. However, when the crisis occurred, this issue was a recurrent topic in mass media.

During the 1990s and 2000s, the expansion of the salmon industry in Chile was very rapid compared with the history of salmon industries in other countries. However, most of the centers of cultivation were around the internal coast between the Chiloe Island and part of the mainland of the Region 10th. This region had enough infrastructure to develop the nascent salmon industry. However, the pace of growth surpassed the limits of the ecosystem, provoking several sanitary and pollution problems in local communities. The limit of growth in the salmon industry has been an issue in other countries and there are examples where growth is not the central aim of the industry. Ona case is the Scottish Salmon producers' organization. They regretted the national government's lack of willingness to back their project of expansion given the tough competition with Norway and Chile. Until 2007 it had been an introverted strategy of production, whose aim was not insertion into the international market. Moreover, the Scottish salmon industry asked for more flexible regulations to be competitive (Intrafish 04/2007).

The Chilean case has been very different. The limit of growth of the industry was not clearly determined by Legislation nor the Chilean National Policy of Aquaculture in 2003. Moreover, the national policy states as the main objective:

> To promote the economic growth of the Chilean aquaculture to the maximum possible level throughout time, within a perspective of environmental sustainability and equity of access to the activity (p. 17).[2]

Given the goal of the state regarding the salmon industry, marine space has permanently been a critical and controversial issue. There was pressure from different actors to expand the activity. In February 2007, Marine Harvest CEO declared that a big problem in Chile was space. It was necessary to expand the industry geographically (Intrafish 02/2007). Before the ISA crisis, there were companies that expressed the need for more space to carry out new production projects. However, according to some companies, it was not only a matter of productive expansion per se. If centers are so close, the likelihood of illnesses contagious is higher (Intrafish 05/2007). Therefore, more space meant more distance between centers, even though a specific distance was already determined in a specific piece of legislation (Reglamento Ambiental para la Acuicultura). This regulation states that there had to be a specific distance (1.5 nautical miles) between centers of cultivation. However, this was not enough. According to a Marine Harvest CEO, a stricter regulation of distances between centers was necessary (Intrafish 08/2007).

But the expansion was already happening. SUBPESCA stated that the demand for concessions in region 11th started in 2005. For instance, the company El Golfo had 23 sites in region 11th since 2006 and transported salmon in wellboats to Quellon (Region 10th) (Intrafish 03/2008). Companies such as AquaChile, Yadran, and Multiexport were already producing salmon in Region XI, despite the fact they had to pay higher costs of transportation. However, that cost still pays off because it lowers the risk of illnesses by being able to have a lower density of fish (Intrafish 05/2007). According to SUBPESCA, in 2008 the demand was more intense for this

[2] Original citation: "Promover el máximo nivel posible de crecimiento económico de la acuicultura chilena en el tiempo, en un marco de sustentabilidad ambiental y equidad en el acceso a la actividad".

region. There were 1,262 permit applications for region 11th (plus 568 already issued) (Intrafish 03/2008). This region was mentioned as "the place to start again" (Intrafish 03/2008).

When the ISAvirus crisis affected regions 10th and 11th, the demand for sites increased further. The demand was also for locations in the southernmost region of the world, which is Region 12 in Chile. The CEO of Cooke Aquaculture stated that the only way to overtake ISA is “relocating 30 [percent] to 40 percent of the Chilean production to other regions like Region 11 or Region 12"(Intrafish 09/2007). According to SUBPESCA, the demand for concessions for region 12th were 1,028 (plus 65 already issued) (Intrafish 03/2008). Cases already with issues are represented by the companies Pesca Chile and Nova Austral, both with centers in region 11 and 12 (Intrafish 06/2008).

In 2008, the SalmonChile CEO stated that with the new measures the industry would be able to get back on its feet in 2014. Also new farms in the two southernmost regions 11th and 12th would facilitate this goal (Intrafish 08/2009). It is interesting that despite the fact that the National Policy declares “equity of access”, there was a phenomenon that could be called “economic closure” regarding the access to new southern locations. SalmonChile was an active actor in favor of the movement toward regions 11th and 12th but not for newcomers. (Intrafish 11/2008).

As mentioned, the ISA crisis accelerated the migration of centers of farms further south. For instance, after closing several Chiloe-area farms in Region X, Marine Harvest and Cermaq moved their operations south toward the less-crowded, disease-free waters of Region 11th (Intrafish 11/2007). One month later, a CEO of Marine Harvest declared that they were thinking about Region 12 because the crisis seemed to be big. Despite the fact that this company did not have licenses in region 12th, it would start buying licenses in the area but avoiding additional investments (Intrafish 12/2007).

Finally, in October 2007, the president of SalmonChile gave a speech in an important public event and said to the government authorities that to overcome the ISA crisis the expansion of the industry was crucial, among other measures:

> "To achieve all this, we are going to need some help to populate and equip Region 11th, which will be the hub and base for the doubling of our industry... From the regulatory standpoint, this involves the zoning of the coastline, unified sanitary management, speeding up the authorization of vaccines, homologation of national and international certification."
> (Intrafish 10/2007)

The interests of the industry were clear regarding the way to solve the ISA crisis. Its influence on the policy-making process was permanent and explicit. The modifications of the law were an important adjustment of the industry to stay in the first positions of the farmed salmon international market.

Marine Property: Changes After the ISA Crisis

During the period after the ISA crisis, there was a "property closure" that included regulatory modifications to prevent new owners from entering the market. In doing this, there were significant changes regarding the property of concessions as follows:

1. Concessions were not given for an indefinite time anymore. They have to be given in 25-year increments, but they could be easily renewable.
2. The rent of concessions is not contemplated by the new legal reforms.
3. The requirements to obtain a concession are stricter. There are 12 requirements related to the technical aspects to evaluate concessions. Some of them are related to how suitable the areas are regarding other activities or the "territorial regulator plan".
4. An "in situ" revision of the required area is carried out by authorities as a complement of written reports provided by applicants.

In 2010, the prohibition of going further toward southern Chile and building new farms was crucial for the first pieces of regulation after the ISA crisis. This provoked many complaints from salmon owners because a measure like that was a hindrance to the industry recovery. The latter meant more space for new locations in healthy marine water, abandoning previous cultivation centers, which had been declared infected. However, a transitory article dictated that this prohibition would be set aside in 2014. The industry would be able to expand their cultivation

centers toward southern Chile (11th Aysen region and 12th Magallanes region) after submitting an environmental impact declaration and other stricter requirements. Also, a similar article stated that the time that centers were paralyzed because of mandatory measures against ISA virus (between 2007 and 2010) does not count as a reason to remove the right over the concession.

The expansion of the industry was necessary with respect to economic profitability but also, to turn it into a more sustainable industry. In terms of international interests, it was a response to an increasing demand from healthy fish from consumers in countries that are the destination of salmon exportation.

However, there are other issues related to this expansion. It has provoked resistance from communities, NGOs, and fishermen as well as other economic activities in southern Chile. Thus, the process of expansion needed legitimacy through a new regulation. In this regard, the organization of marine locations was the way to implement this expansion, yet it was not the way to obtain legitimacy from other actors.

In this new phase of legislation after the ISA crisis, mechanisms of participation in the decision process are considered. In this regard, the Council of Coast Use was created as a mechanism of participation to decide how the coastal territory of a region should be used. Other incumbents such as fishermen and local municipalities are part of this commission which is in communication with government agencies. Therefore, new concessions or relocation of them must be compatible with this territorial planning. For instance, when SUBPESCA proposed SAA, the Regional Council of Coast Use has to produce its judge to approve these areas. If the latter does not happen, it is understood that those proposed suitable areas are approved. After the last years, its efficacy is evaluated as poor, given the low level of coordination and agreement of local actors.

In general, the role of the state was crucial for the recovery of the salmon industry after the ISA crisis. There were three important mechanisms where the state was engaged:

Marine Concessions

Marine concessions had been tradeable in the original law of fisheries. However, there were several changes after the ISA crisis that decreased some advantages for farmers in exchange for others. Concessions were not perpetual anymore. They could be held for 25 years and be renewed for 10 more years.

While in Norway there is a limit of concessions that a company can have (Intrafish 09/2008), in Chile this restriction does not exist. Marine concessions kept the attribute of being tradable as a passive capital of a company, therefore they can be concentrated as capital. A company can buy another company or a part of it with the concessions that the acquired company had. Therefore, there is an incentive for horizontal integration and eventually an oligopoly in the industry and of marine concessions. For instance, when the company Leroy seafood had economic problems because of the ISA crisis, a spokesman from the company declared that one possibility for the company was selling 22 licenses and leaving Chile. (Intrafish 02/2008). The editor of a trade journal stated a sensible idea: "Fish farming real estate and clean water are global commodities that will soon be in short supply"(Intrafish 09/2008).

One of the most relevant changes was that concessions or licenses could be used as collateral for financial transactions. This economic right put the concessions into the logic of private financial capital, which was a controversial issue.

State, Companies, and Banks

The state supported the industry regarding their debts with national and international banks. It was a guarantee to pay most of the industry's debt and the industry had to invest in research and technology improvement.

After the ISA crisis, several companies had serious economic problems. As a Cermaq CEO stated, the big problem apart from space was access to capital. (Intrafish 02/2009). Some companies had to restructure their debts with banks. The government gave guarantees through CORFO for the industry's bank loans. The condition was to change the time of concessions from unlimited to 30 years. However, there was a complaint from some salmon farmers because the state was not honoring "the right of ownership and freedom" (Intrafish 07/2009)

But the modifications of the law also allowed companies to use aquaculture permits (concessions) as collateral to obtain loans from banks for three years. During this period the rights over concessions cannot be removed. (Intrafish 04/2009). Banks needed the certainty of the future of the industry and concessions were important to rescue the industry.

This was a key factor to pressure the parliament and the government to enact modifications of the General Law of Fisheries and aquaculture. A SalmonChile CEO stated that despite the fact that the system of the neighborhood was fine, it was late to solve the problem of obtaining new capital. "without neighborhoods, there is no bank financing. There is no agreement with banks or anything" (Intrafish 04/2009).

Late or not, these modifications would consider convenient measures for the industry. The regulation after the ISA virus crisis included more concessions in the southern region (11th and 12th), concessions as collateral, updated legislation about sanitary conditions (salmon neighborhoods and distances), and new regulation regarding pharmaceutical products. Otherwise, companies would not be able to renegotiate their loans with the banks.

This phenomenon integrated banks as incumbents of the field of the salmon industry. They were actors communicating their concern about this activity. For instance, the press highlighted that banks expected an improvement in production and prices, given new sanitary measures and expansion to region 11th and 12th. (Intrafish 04/2008)

Salmon Neighborhoods

The state was a facilitator of the relocation of cultivation centers or “salmon neighborhoods”. It was not only a sanitary measure, it was also an opportunity for moving forward and using spaces with healthy water. The system of zones of centers of cultivations was designed as a new type of sanitary management. This set of centers of cultivation must operate and carry out sanitary processes in a coordinated way. Also, these zones have to be out of function for two years to recover the quality of marine zones and avoid saturation of water.

This model of management contemplated more distance among farms. But also, more distance between centers of cultivation. The salmon neighborhoods are separated by marine corridors. All

these measures aimed to avoid the spread of contagious viruses and transmission of parasites and bacteria.

Given that neighborhoods needed coordinated actions for each phase of production and defined periods of emptiness at the same time, the relationship between companies with different centers of cultivation within the same neighborhoods might be difficult. This was an incentive for horizontal integration. SERNAPESCA defined 58 "salmon neighborhoods" with the help of SalmonChile. 24 in Region 10th and 34 in Region 11th. This was possible, as mentioned before because modifications of the law allowed owners to transfer permits among them. That means changing, selling or leasing their permits (Intrafish 01/2009).

Consequences of Regulation Changes

After several modifications to the General Law of Fishery and Aquaculture and specific regulation regarding the environment and sanitary procedures, it is possible to identify three general consequences:

Vertical-horizontal Integration

The relationship between the commercial features of concessions and salmon neighborhoods allowed for the expansion of the industry and the horizontal integration of it. For instance, a Marine Harvest CEO stated that this is a new model of production: companies sharing close cultivation areas to act coordinately (Intrafish 12/2007). It can be inferred that neighborhoods under the same owner would facilitate coordinated procedures in cases of sanitary emergency and in general environmentally sustainable practices.

Acquisition of firms by another is a transaction of licenses or concessions too. There were several examples of this process of horizontal integration and concentration of marine licenses:

1. Norway-based Leroy seafood group acquires shares from Veststar Holding which had 25 licenses under approval (Intrafish 02/2007).
2. Cermaq declared to see an advantage to buy part of the salmon company Unimarc because it is a firm with good positions of their concessions with respect to their own

concessions (Chiloe Island), and it would be easier to coordinate illness control by having all concessions (Intrafish 12/2007)

3. The 6 biggest companies operating in Chile were discussing a way to boost horizontal integration or exchange of concessions and centers in order to have one company operating the same way in a bigger area and facilitating sanitary control(Intrafish 12/2007)

Financialization of the Salmon Industry

Another important aspect regarding the consequences of the ISA crisis is the financialization of the salmon industry. This phenomenon has been present since 2007 when the salmon company Invertec was the first company producing salmon in the stock market. (Intrafish 01/2007). The industry had intensified its search for new capital to finance its recovery or new projects. Companies were not only trading in Santiago stock market, also in the Oslo stock market in Norway.

The image of the industry was damaged given the ISA crisis and other problems revealed by this incident. There was a weak image of the salmon industry as a business, which an investor would not trust. This boosted the importance of national facts regarding the environmental sustainability of the industry. It intensifies the pressure of the companies on the government for giving good signals to the international market. One of these signals was a rapid new environmental governance regime, which the salmon industry used to support its idea of Salmon 2.0.

Resistance

The new measures that would allow a more sustainable salmon industry, more marine space toward southern Chile, backing the industry through subsidies, and contemplating the concessions as mortgages in the law so the industry can obtain loans, were measures that made NGOs, fishermen unions and fired workers very upset. For instance,

1. 16 fishermen unions ask a moratorium regarding the expansion of the salmon industry into region 11 (Intrafish 03/2008).

2. Fishermen unions and NGOs threaten with an international boycott if the expansion of regions 11 and 12 was not stopped (Intrafish 04/2008).
3. Workers union argued that the modification of the General Law of Fishery and the neighborhood system was allowing permute concessions and they can be used as a collateral for loans in a privatization of the coastline. (Intrafish 05/2009)

Also, communities in southern Chile (Region 11th and 12th) were divided between those that wanted more jobs near them and those that saw their livelihoods threatened. Other initiatives were part of a campaign for social justice to rescue the salmon industry by the state. For instance, some legislators of the left-wing in Chile, proposed a bill to impose a 5% of taxes on salmon profit given that the patent they pay was "ridiculous" (Intrafish 04/2007). However, this was totally outside of the free market philosophy of the Chilean economy and of the contracts or treaties of foreign investment.

Conclusion

Given that the perpetual condition of concessions meant a scandal among other actors such as fishermen and national NGOs, the new legislation limited the concession to 25 years with the chance to renew for other 10 years. In spite of some complaints from the association SalmonChile, finally, this point was passed. However, the salmon industry had another crucial issue expected to be regulated even before the ISA crisis. This was the expansion of southern Chile. This was allowed through a modification of the fishery law under the condition of approved studies of environmental impact. This appears as the main criteria for giving a new order of marine concessions and the governance of this issue entailed several conflicts with fishermen and NGOs that advocate for local communities. The role of INGOs was mainly indirect regarding this issue. They supported local communities and NGOs to draw attention from national and international communities. However, the campaigns and resources were focused mainly on the so-called "salmon-dependency" of communities through the jobs and indirect economic activities of the "Los Lagos" Region and its Chiloe Island. The international influence was not through guidelines from international organizations in order to create a new governance of marine territory. It was mainly driven by the pressure of interest groups like

fishermen, indigenous communities and what I have called the "Ruling Civil Society" through formal lobbying and direct dialogue with government authorities.

It is possible to note that before the discussion and enactment of the reforms of the law regarding marine concessions, salmon farmers in Chile and international experts took the relocation and expansion of farms centers further south for granted. There was a settled idea presenting the "Los Lagos" Region was somehow a "sacrificed zone" after several years of rapid growth that ended with the massive infection of the ISA virus. More pristine waters in "Aysen Region" and Patagonia were the way out for the industry insofar as it was able and willing to implement a new strategy of production based on sustainability principles. The expansion of the industry toward better locations is an important aspect for international market actors as an indicator of the salmon industry's recovery.

Along the policy-making process there was not a presence of international organizations such as the World Bank or the World Trade Organization. These organizations did influence the policy-making process of the General Law of Environment at the beginning of the 1990s. However, they were not present in this environmental governance shift according to the reviewed data sources. Nor other organizations such as INGOs or trade organizations. This does not allow me to confirm my hypothesis (h2) that hyper-globalization exerts pressure on the policy-making process of marine territory administration.

The Chilean state went to the rescue of the salmon industry using the prerogative of administration of property rights. The goal was keeping the salmon industry's position in the international market. As one can see, the principle of survival that underpins the free market theory did not apply in this case. The state injected a significant amount of money to support unemployed workers. But also, to help the companies to adapt their infrastructure to the new regulation. This allowed companies to resume production and contract workers insofar as the market was stable. This took three years, but some allowed the industry and the government to gain legitimacy. The state facilitates or mediates the tensions between actors of the civil society: the "Ruling Civil Society" and the local community and workers.

But the state not only mediates this legitimacy tension between the industry and the workers. It was necessary to mediate between other actors which were the banks. An important rescue

operation from the state was the legislative reform that gave companies the possibility to use marine concession as warranty or mortgage to obtain loans from banks. Banks and insurance companies enter the farmed salmon business. This produces an interesting phenomenon (beyond the scope of this research) that turns banks into new actors concerned about the environmental and economic sustainability of the industry. This results in a new type of embeddedness between productive capital, financial capital, and the state. This confirms my hypothesis (h3) that the state the main actor able to exert governance mechanisms over the "Ruling Civil Society" assigning marine concessions and their different uses.

Finally, the results from this chapter are summarized in the next table using the three relationships defined in the theoretical framework.

Figure 25: Summary of Facts Depicting the Environmental Governance Shift regarding Marine Property from t1 to t2, according to Each Relationship of the Theoretical Framework.

	Time 1 Pre-2009	Time 2 2009 - 2012
	Environmental Governance of Marine Property	
Relation 1: State & Civil Society	<u>Regarding "Ruling Civil Society"</u> 1. Regulation of concessions focused on fostering salmon industry giving certainty for investors and national security issues 2. Concessions as permanent right, perpetual unless the owner commit irregularities 3. Empty farms as an indicator of possible use of concessions for economic speculation 4. Not explicit restrictions for concessions, only based on the complexity of applications 5. All fish cultivated in farms is private property and fishery of them is robbery, even if they escaped. 6. Regulation of big locations assigned as suitable areas for aquaculture in which concessions can be given. 7. No limitation of density per farm, only for centers of cultivation (set of farms) 8. Regulation about the distance between centers of cultivation 9. Concessions were available for regions 10th, 11th, and 12th. The main restriction was the availability of infrastructure	<u>Regarding "Ruling Civil Society"</u> 1. Regulation of concessions focused on fostering the industry taking care sanitary aspects 2. Concessions are not perpetual anymore 3. It is mandatory to leave farms empty for two years as a "rest period" to avoid saturation of the ecosystem 4. Concession applications must submit an assessment of environmental impact besides other technical reports 5. Only companies and supermarket have authorized salmon for internal demand. It is still banned to fish salmon 6. Suitable areas are conflicted by new regulation about protected ecosystems areas 7. There are explicit algorithms to calculate allowed density per farms 8. Regulation of space between cultivation centers and between farms within them. Also, "salmon neighborhood" system is mandatory.

	10. Concessions or licenses can be rented, inherited, and sold. <u>Regarding communities and civil organizations</u> 1. Individuals have the right to submit an objection to any concession requirement	9. Restrictions for concessions in region 11th and 12th for the limited time given the spread of ISA virus 10. Concessions cannot be rented anymore. However, they can be inherited and sold. Also, they can be used as collateral to obtain bank loans <u>Regarding communities and civil organizations</u> 1. There are territorial plans that contemplate participation of different actors of the community. Concessions cannot be given for special zones assigned by the community.
Relation 2: Hyper-globalization & State	6. No restrictions for foreign investors. Only more paperwork. 7. Assignment of marine location is an exclusive prerogative of the Chilean state 8. Pressure from experts and international salmon farming organizations for more space	6. No restrictions for foreign investors. Only more paperwork. However, concessions as collateral for loans from international banks 7. Assignment of marine location is an exclusive prerogative of the Chilean state 8. Pressure from experts and international salmon farming organizations for more space in southmost Region 12th
Relation 3: Hyper-globalization & Civil Society	10. INGOs supporting national NGOs and community organizations rejecting centers of cultivation near their coast 11. The law of fishery and aquaculture is compatible with international treaties about environmental care	10. Private certification systems incorporating standard good practices of the relationship between the industry and the community 11. The law of fishery and aquaculture clashing with treaties about indigenous rights defending those tribes with ancestral cultural and economic connection with the sea

Chapter 7: Environmental Governance of Fishmeal

This chapter sheds light on the governance of fishmeal which has generally been considered an issue depending only on market variables. However, there are important aspects regarding global ecological tendencies that have put it at the center of the debate about aquaculture and especially about farmed salmon. The dependency of the salmon industry on fishmeal protein is crucial. However, it can be supposed that after the ISA virus crisis that hit the salmon industry in Chile, new issues emerged as part of an environmental governance shift. In this regard, did the relationship between wild fisheries and salmon feed appear in the construction of a new environmental governance? Fishmeal companies have an increasing interest in replacing raw material from wild fish with vegetal protein. However, did the industry and the state consider recent technologies in this regard as part of a new environmental governance? Are new types of international regulation and buyers influencing decisions of salmon producers about fishmeal? This chapter observed this aspect of environmental governance considering the perspective of the salmon industry and the voice of the fishmeal corporations at the time of the ISA crisis in Chile.

The Importance of Fishmeal

There are two big essential functions of fishmeal in aquaculture, especially for the salmon industry.

First, fishmeal is used for pharmaceutical treatments. Feed has been the main way to introduce medication for fish to control illnesses and sanitary crises. Salmofood, a Chilean-owned fish feed company states: “We have worked especially to make our feed containing additives available as fast as possible at the farms to timely address any contingency situation requiring dosage flexibility and quick dispatch"(Intrafish 08/2007). This type of fish feed is called “functional fish feed” because it contains other elements related to health fish (Intrafish 06/2008). In 2008, the Chilean government through the agency CORFO subsidized the 15% of the costs of the Norwegian company Ewos. In that way, the company would be able to investigate nutrition issues to control illnesses in the Chilean salmon industry. (Intrafish 06/2008)

Second and foremost, given that salmon is a carnivorous fish, most necessary proteins come from fishmeal. the fish feed for salmon is an important source of protein. The increment of aquaculture in the last decades has been an important phenomenon considering that wild fishery has decreased dramatically. However, there is a paradoxical relationship. While the salmon aquaculture represents a solution for the depletion of wild fish (part of the solution), it also represents an increasing demand for protein from wild fish (part of the problem). At the time of the ISA virus crisis in Chile, Aquaculture consumed 56% of the world's fishmeal production and 87% of the fish oil. (Intrafish 10/2008). This phenomenon put forward an important issue with respect to the sustainability of the salmon industry. This is the level of dependency of the salmon industry on fishmeal. Fish feed accounts for as much as two-thirds of aquaculture producers' costs (Intrafish 05/2007). Thus, it is an important indicator of the economic sustainability of the industry. But also, this issue is not only relevant in terms of economics. It has been an important aspect of environmental sustainability and should be considered as part of an updated environmental governance.

Fishmeal and the Salmon Industry in Chile

One of the advantages of the farmed salmon industry in Chile has been the availability of fishmeal at a low price. Chile and Peru are two important producers of fishmeal and fish oil in the world. In 2007, Peruvian and Chilean production of fishmeal accounted for two-thirds of the world's production (Intrafish 05/2007). Peru was the world's largest fishmeal producer accounting for 41 percent of world exports in 2006 (Intrafish 11/2007). While the Norwegian salmon industry had to import fishmeal from Denmark, Iceland, Peru, Chile, Germany, Uruguay, Faroe Islands, France, and Holland (Intrafish 03/2009).

In the middle of the ISA virus crisis, fishing companies from Chile and Peru, particularly those in the fishmeal sector, were obtaining strong margins while the rest of the industry was struggling to make a profit. This was because of a high demand from China (Intrafish 09/2007)[3]. However, the undesirable effects came later. The ISA virus affected feed companies because

[3] This demonstrate that given the level of openness of the Chilean economy, this country imports and exports the same products. In this case, it is raw material for fish feed. Chile exports to Asia (75%), most of it to China. (Intrafish 02/2009)

salmon producers could not pay for deliveries (Intrafish 10/2008). Akva, a feed company in Chile, laid off 40 workers (Intrafish 10/2008).

Despite that there is not a great relationship between the production and trade of fishmeal and the effects of the ISA virus crisis in Chile, it is an important part of the sustainability of this industry. The availability of fishmeal and the protein necessary for the salmon industry is a problematic aspect in Chile as it is in the rest of the aquaculture industries in the world.

At the time of the ISA crisis, the Fisheries Commission of Chile's Chamber of Deputies released a report stating that there have been initiatives to replace fishmeal with a vegetable meal and oils. This produced an increase in the production of cereals and oleaginous crops in regions VII, VIII and IX. (Intrafish 03/2007). This is a key step regarding the sustainability of the industry, however, the effort for reducing raw fish material in the fish feed was not a matter of regulation.

Fishmeal and Sustainability of the Salmon Industry

The rapid production of salmon has a connection with the consumption of fishmeal based on the wild fishery. Salmon industry has been called "reverse protein factory" given that a higher amount of wild fish is necessary to produce a specific amount of salmon meat (Intrafish 07/2009). However, this statement can be controversial if the salmon production is compared to other industries such as poultry or pork, which have a worse protein rate conversion. Considering this comparison, salmon farming is converting protein into meat more efficiently, which is a processed source of protein for human consumption.

The problem of the so-called “Fishmeal-trap” has been part of several analyses of the advantages and disadvantages of the aquaculture. In an extended article in 2003, The Economist magazine highlighted that one of the sustainability problems for the aquaculture is the fishmeal dependency (Intrafish 02/2009).

The business of fishmeal is a global economic activity. There are powerful interests in maintaining the profit coming from the wild fishery and other marine raw material. According to environmental NGOs, the business of fishmeal is not concerned enough about the “fishmeal trap.” Fishmeal producers are looking for vegetable substitutions to make fishmeal due to market

variables like prices and stock. (Intrafish 08/2007). This makes sense given how some market phenomena related to fishmeal. That is the case when it was noted that a global run on fish oil, omega-3-enriched products for human consumption, was increasing in price. (Intrafish 09/2007). Consequently, it is necessary to delve into some market changes that led the fishmeal industry to implement alternatives that can favor the environmental sustainability of the aquaculture and the wild fishery.

At the time of the ISA virus crisis in Chile, there had been a 5-year trend of decline in the production of fishmeal. The main reason was the low catching situation. Costs of fishmeal were increasing, affecting the Chilean production of salmon (Intrafish 03/2008). Since 2002, restriction had been applied and only the anchovy can be used in fishmeal. The use of sardines, mackerel, and horse mackerel is reserved for direct human consumption (Intrafish 11/2007). Besides, fishmeal and fish oil were also demanded by poultry and pig growers. (Intrafish 05/2008).

Fish oil consumption by humans was increasing and threatening the supply for aquaculture. (Intrafish 07/2008). The Fishmeal and Fish Oil Organization (IFFO)[4] stated that the supply of fishmeal and fish oil for farmed fish is not only determined by availability but also prices. Human consumption (food or health products) was increasing, which means higher prices. (Intrafish 04/2009). Fish food prices were increasing due to the valuation of healthy human products based on fatty acids from fish oil. Regarding raw material from agriculture, biofuel was increasing demand. (Intrafish 03/2008). Therefore, there is a matter of feed security for humans because aquaculture and human consumption compete for wild fish. (Intrafish 10/2008).

The depletion of wild fishery and fluctuation of prices had provoked some concern for this input of the salmon industry. A Cermaq CEO declared that there were fears of fish feed shortages. There was a challenge regarding research efforts to reduce the proportion of marine raw materials in the salmon feed (Intrafish 03/2007). Moreover, the company Los Fiordos decided to

[4] The International Fishmeal and Fish Oil Organization (IFFO) defends the interests of fishmeal corporations. Its members account for 50 percent to 60 percent of global fishmeal and oil production. They have been looking for other niches for fish raw material different from fishmeal. The IFFO has been urging members to push the health benefits of omega-3 contained in fishmeal and fish oil to direct customers and to final consumers. The goal is that investors will flock to embrace the sector, and everyone will seek knowledge about this spinoff industry from the increasingly force-to-be-reckoned-with seafood industry (Intrafish 10/2007).

integrate fishmeal processing into a vertical integration process in order to ensure its availability and biosecurity (Intrafish 03/2008).

Sustainability of Fishmeal: Beyond Market Reasons

Despite the fact that a low amount of marine raw material in feed makes the growth rate of fish low (Intrafish 05/2007), according to an expert journalist, the wild fish in the feed has been cut in half since 2003 (Intrafish 03/2009). As mentioned, the availability of raw fish material is decreasing and expensive.

However, it is not possible to state that market incentives are the only explanation for why fishmeal corporations are looking for alternatives to lower the dependency on fish protein. The phenomenon called "conscious consumption" has created real pressure for farming companies and fishmeal producers. For instance, the supermarket chain Whole Food had conditions regarding the amounts of fishmeal and fish oil in salmon feed. (Intrafish 02/2007). Another example is the Swedish supermarket chain Coop Sverige which threatened to stop sales of Norway's salmon following a Swedish documentary which denounces the amount of wild fish necessary to feed farmed salmon (Intrafish 03/2009).

There is a pressure for reducing wild fish as a source of protein for farmed fish. This pressure has been based on scientific evidence. One example is the report from the Swedish Institute for Food and Biotechnology. This study concluded that within salmon farming, the production of fishmeal makes up 80% of the CO2 footprint. In terms of alternative fishmeal based on raw vegetable material, the difference is minor, given that the economic feed conversion ratio of the vegetable feed was higher than the conventional feed. More work and processing are needed to obtain the same amount of salmon meat. (Intrafish 05/2009). Thus, soybean has been an important alternative source of protein for fishmeal. Even Monsanto was working to obtain more efficient soy for fishmeal. (Intrafish 10/2008). The fishmeal company Skretting stated that significant research and development investments in recent years have contributed to increasing salmon feed sales by 22 percent while decreasing the consumption of fishmeal at the same time. The latter has decreased by 14 percent and fish oil by 29 percent using soy meal, sunflower meal and corn gluten (Intrafish 03/2008).

Certification has been an important mechanism of protection and legitimacy of the fishmeal industry exerted by IFFO. They created their own certification scheme based on responsible fishing and feed safety. The creation of a new standard was supported by Tesco (UK retailer), leading aquaculture feed companies, and environmental NGOs (Intrafish 01/2009). However, certification from the biggest association of fishmeal corporations cast doubts for several NGOs and companies. Trying to look for a third-party certification with an impartial position, the Marine Stewardship Council started a certification system on fishmeal. It certifies that there are sustainable marine ingredients in the feeds (Intrafish 05/2007).

Conclusion

The General Law of Fishery and Aquaculture and its modifications, as well as the records of the discussions in the parliament, did not integrate fish feed as a critical issue of environmental governance. Fish feed is seen more as its practical function regarding medication or other aspects of fish cultivation. The concern is that, although fish feed is a way to medicate fish, it is also a source of pollution for the seabed. It is possible to confirm the hypothesis of this research regarding the relationship between the state and hyper-globalization. It was not possible to observe any relevant connection between the Chilean state and International organizations such as FAO or business organizations such as The Marine Ingredients Organization (IFFO) in the policy-making process. Only the National Policy of Aquaculture, launched in 2003, acknowledge the importance of a sustainable use of fish feed, lowering its dependency on fishmeal. The strategy put forward the goal of developing a better quality of fish feed from the perspective of ecological externalities. As the Environmental regulation (2001) states, it is necessary to avoid pollution with non-eaten fishmeal that stops in the seabed. The lack of regulation in this regard indicates a disconnection between national environmental governance and global governance regarding the so-called “fishmeal” trap.

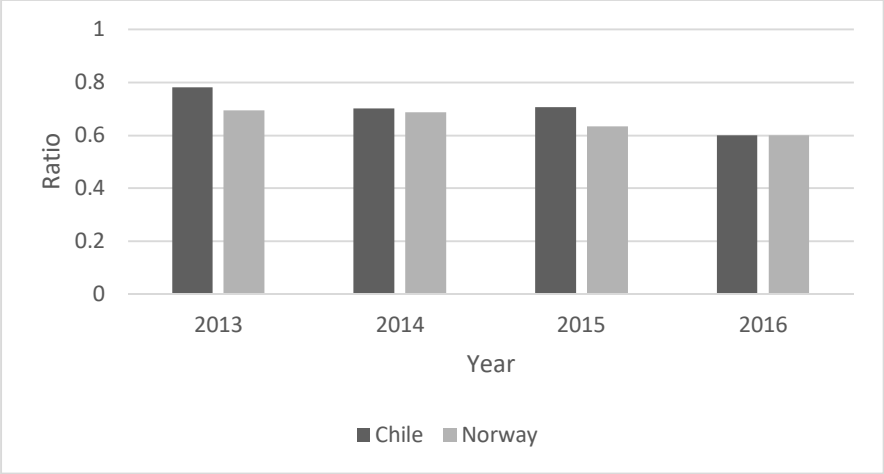
The national strategy concerning aquaculture in Chile has not been updated. It is not possible to know if there are any changes in concerns about the sustainability of fishmeal. However, phenomena of vertical integration which include fishmeal companies in farmed salmon production were justified from an economic point of view. Ensuring the availability of fishmeal

has been a crucial issue in terms of production for the international market and the use of pharmaceutical products through the fish feed. It is possible to confirm my hypothesis (h4) regarding the relationship between globalization and civil society. The former exerts its influence through the farmed salmon companies and associations. However, it is crucial to note that the main concern is to improve fish feed with respect to a more efficient feed process. Also, developing alternative fish feed that avoids fishmeal or raw fish material without neglecting the necessary protein for fish. It is not clear whether or not there is a concern about environmental governance about fishmeal. The concern is ambivalent between the efficiency of the feed process and the use of fish feed for medicating fish.

Finally, there is no state intervention related to the environmental consequences of fish feed based on fishmeal production and consumption apart from pollution. This is a matter of market dynamics for the state. However, it is possible to suppose that new regulations could be considering this issue. That is the case of international certifications of both fishmeals coming from sustainable fishery (i.e. Marine Stewardship Council) and the environmentally friendly consumption in the salmon industry (i.e. Aquaculture Stewardship Council).

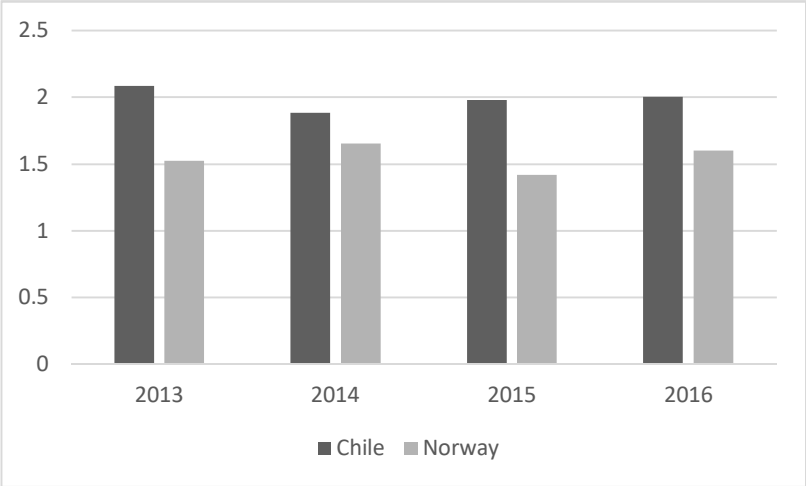
Dependency on Fishmeal is still a challenge for the farmed salmon industry in Chile. However, with respect to this issue, there is no an enormous difference with respect to Norway. This confirms the dependency on fish protein for fish feed is a global challenge.

Figure 26: Level of Dependency on Fishmeal. Comparison Between Salmon Industry in Chile and in Norway.*



Source: Sustainability Reports from Global Salmon Initiative. * The quantity of live fish from small pelagic fisheries required to produce the amount of fishmeal

Figure 27: Level of Dependency on Fish Oil. Comparison Between Salmon Industry in Chile and in Norway.*



Source: Sustainability Reports from Global Salmon Initiative. *The quantity of live fish from small pelagic fisheries required to produce the amount of fish oil

Finally, results from this chapter are summarized in the next table according to the three relationships defined by the theoretical framework.

Figure 28: Summary of Facts Depicting the Environmental Governance Shift regarding Dependency on Fishmeal from t1 to t2, according to Each Relationship of the Theoretical Framework.

	Time 1 Pre-2009	Time 2 2009 - 2012
	Environmental Governance of Fishmeal	
Relation 1: State & Civil Society	2. Wild fishery from Chile for exportation benefits salmon industry 3. Regulation only regarding "functional feeding"	2. Depletion of fisheries and measures in this regard affects the salmon industry 3. Public research centers looking for alternative fish feed based on vegetable protein
Relation 2: Hyper-globalization & State	9. Global market incentives Chilean industry based on the fish raw material for exportation	9. Private certification of wild fisheries (i.e. MSC), apart from other national measures, affects the salmon industry
Relation 3: Hyper-globalization & Civil Society	12. Initial concern about the unsustainability of the relationship between wild fishery and aquaculture	12. Supermarket chains demanding from salmon industry in Chile more fish feed based on alternative raw material 13. Increasing articles and documentaries about this issue

Chapter 8: Summary and Conclusion

We are living in a time of global climate change as a consequence of a long-term phenomenon of interaction between human society and the natural environment. Sociology has been able to explain this phenomenon using different approaches the examine the historical causes and mechanisms that led us to be in this concerning scenario. Sociological approaches have considered in a different way the role of institutions as units of analysis to explain different pathways regarding the consequences and solutions to face the challenges of environmental problems at different geographical scales.

Since the 2000s, international organizations have emphasized the importance of institutions and their mechanisms of governance. The state and the market have been at the extremes of a spectrum of possibilities to organize and make compatible diverse private and public interests in different realms. Whereas critical and radical perspectives in the field of social sciences and the environment lack sensible proposals, neo-functionalism is generating new analytical tools to solve current problems in the environmental field. Governance has been one of them, which has been quite easy to fit with the current phase of global capitalism: rapid and uncertain mobility of financial capital and atomized productive capital as a global commodity chain. Under this condition, the concept of governance reclaim the state as a legitimate institution of social cohesion and a custodian of private property but, it also integrates new actors from the market field. The market is understood as another institution that has colonized social spaces that used to be considered a matter of communal living or political affairs dwelling in the state.

Environmental governance is a broad concept that deserves more attention from sociology and its particular approach to institutions, which is less state-centered than in other disciplines like political science. There is enough research about the division that it highlights the importance of natural resources in national economies (i.e. dependency theory) and their political consequences. These consequences have been treated from the role of the national states confronting the foreign investment carried out by transnational corporations. However, we are facing an advanced process of commodification of natural resources. This phenomenon is not only part of the problem, they are also part of the solution. That is the case of environmental accounting or environmental valuation. These phenomena need more actors apart from the state

at the national and international levels. Environmental governance is a hybrid and pragmatic concept that has been used to avoid a state-centric approach (to govern) environmental issues. This concept allowed for integrating more actors under the normative premise of pluralism. However, the concept can be used to tackle not only the variety of social actors but also to understand empirically the complexity that results in different geographical scales and an approach that sees the environment as a set of natural resources in favor of the economic growth.

Summary

This dissertation embraced the concept of environmental governance and contributed to explaining how environmental governance in developing countries is carried out. I chose developing countries because they still struggle to grow economically based on natural resources and it is sensible to consider some particularity to exert environmental governance in that context. In doing this, a theoretical framework was proposed based on principles of the International Political Economy and approaches of Environmental Sociology. The combination of this empirical question and this theoretical background provided a novel work.

To respond to my research question, I decided to observe the mechanisms of governance in the farmed salmon industry in Chile. This has been a successful industry in a developing country that competes as an exporter of salmon in the global market with a very different society than Norway. Given its geographical location and political conditions, this industry was able to rise in the 1980s. Its growth was impressive and obtained legitimacy and support from the state and the civil society. However, all this powerful entrepreneurship was not strong enough regarding its environmental sustainability. In 2007 a huge phytosanitary breakdown cast doubt on the future of this industry and led the state to create a new regulatory system. Also, this incident put forward the need for a renewed way of production. Both legislative reforms and changes in the production style can be considered crucial parts of an environmental governance shift. This dissertation describes and explains this policy-making process as a transition between two moments of environmental governance of the salmon industry in Chile.

In chapter 1, I described the trajectory of the Chilean economy in the last 40 years which has been characterized by the implementation of a neoliberal economic and social regime. Like other developing countries, Chile has struggled to be part of global capitalism opening its frontier to

foreign capital and implementing an outward industrial strategy based on natural resources with a low level of added value. Within this context, the farmed salmon industry meant welcome economic activity in the 1980s, having an important state backing. In the 1980s Chile was part of the World Trade Organization, what was the consolidation of the neoliberal model.

The salmon industry's production in Chile grew dramatically since the 2000s. Being the second largest exporter after Norway, these two countries account for 70% of salmon production in the world. However, this growth was under flexible regulation and a without a clear strategy combining economic, social and environmental sustainability. Illnesses associated with bacteria, viruses, and parasites went out of control and the use of pharmaceutical products was increasingly necessary. Also, problems of pollution on the seabed and in marine water affected local communities. Unfortunately, legislative reforms were not enough to avoid a critical phytosanitary breakdown in 2007 that depressed the industry until 2010 and led different actors to attempt a new type of environmental governance.

Considering the mentioned crisis as an inflection point, this dissertation addressed how the Chilean government and the salmon industry in this country shaped an environmental governance shift process considering both national and international factors.

In chapter 2, I presented a review of the theoretical perspectives highlighting the aspects that are useful for the construction of my hypotheses. Perspectives from Environmental Sociology and the Sociology of Globalization were gathered to build what I have called an "Integrated Political Economy Perspective of the Environment." This consolidated perspective was built upon a political economy model proposed by the economist Dani Rodrik. There are three important relationships in the so-called "Rodrik's Trilemma." These relationships were presented in this dissertation to organize hypotheses, evidence, and the results. The three nodes of this trilemma are: the state and its struggle for national sovereignty and legitimacy, the civil society and its diverse actors with different and even asymmetric relationships of power among them and the so-called hyper-globalization, which is made up of the forces of global capitalism that affect both the national states and the actors that are part of the civil society. In this context, a straightforward definition of environmental governance was given, which fulfilled three aspects: a) a process of decision-making to define the content of public goods or services and the process

of providing them b) contemplates a spectrum of actors and practices that shape regulation, social control, and conflict management at different geographical levels and c) addresses specific outcomes affecting the environment.

Environmental governance in Chile has been a function of economic growth based on natural resources, although there has been important progress regarding regulating the assessment of the environmental impacts of productive activities.

Considering basic definitions and historical context regarding environmental governance in Chile, theoretical perspectives were developed. On one hand, from Environmental Sociology, the World Society theory and Ecological Modernization theory were considered. These theories have several aspects in common but the main one is that they consider societies and environmental problems from a path dependence perspective given its evolutionist roots. On the other hand, were the Treadmill of Production theory and the World-system theory. These two perspectives, as the previous one, have several common points. The central one is their criticism of the historical capitalist system in which environmental problems are consequences of its inherent contradictions. When analyzing these perspectives, it was necessary to create a consolidated approach that is open to the most suitable elements from each perspective. The International Economy Perspective of the Environment claims that a process of environmental governance and other connected phenomena can be analyzed in terms of the three problematic relationships between the state, the civil society, and the hyper-globalization process. In this dissertation, the set of three relations was not considered as a trilemma (the original idea of its author). Instead, it was an unstable balance that most developing countries face.

In chapter 3, the dependent variable is described and defined according to three specific aspects. The dependent variable of this dissertation is the environmental governance shift that affected the salmon industry in Chile. After an extensive review of scientific articles and reports from international organizations such as FAO, three aspects related to sustainability in aquaculture defined the dependent variable. The first aspect was the use of pharmaceutical products. This was a critical aspect given the elevated level of illnesses affecting the salmon industry. Two issues were important: first, the control of sea lice though chemicals and the use of antibiotics to combat bacteria. This topic was analyzed further in chapter 5. The second aspect was the use of

marine locations under concession or license. The use of marine space contributes to several problems of the salmon industry. Given that the aim of the industry was to produce at the maximum capacity of production means, this was not compatible with the ecosystem where the farms were settled. Therefore, there was a dispute for a common resource. This topic was analyzed further in chapter 6. The third aspect was the dependency of the industry on fishmeal. This is still an arduous task of research for the social sciences given the lack of suitable information and the fact that it is not an issue considered by the public agenda. It has been defined as a concerning issue by international organizations because there is a grave problem of sustainability behind the market problems associated with this commodity. Insofar as the aquaculture of carnivorous species increases, there is more pressure on the wild fishery as a source of raw fish material. This topic was analyzed further in chapter 7.

Regarding my research strategy, each of the aspects of sustainability associated with the salmon industry is analyzed from the theoretical framework defined in this dissertation. An interesting characteristic is that the third aspect (dependency on fishmeal) lacks adequate evidence considering the data sources used in this dissertation from 2007 to 2009.

In chapter 4, methods and data sources were described. This dissertation is based on a single case study which is theoretically strategic. As mentioned, the salmon industry in Chile is one of the top exporters in the world. The salmon industry in Chile competes with another industry in Norway, a developed country with a long tradition in aquaculture among other differences in the economic and social realms. It was relevant to examine the environmental governance that a country like Chile is able to exert given its position in global capitalism. However, I worked with three cases nested in the main case. These were the three aspects of sustainability, which among several other aspects were chosen based on theoretical criteria. Regarding the data sources, a trade journal was chosen to carry out content analysis, focusing on the discourse of actors engaged in the salmon industry at the national and international level, considering that they were aware of international readers. Also, in this trade journal, expert journalists are able to give details about the facts around the phenomenon I was investigating. About 1,200 articles were codified between January 2007 and August 2009. The results from this source provided interesting facts and statements around the relevant topics while law modifications and a new

regulatory system were discussed in the Chilean parliament. In this regard, both legislation pieces and minutes of verbatim discussions among congressmen were codified.

In chapter 5, I described the context before the ISA virus crisis that the salmon industry in Chile had to handle. The environmental conditions and the pollution of the sea-bed had been denounced several years earlier by INGOs and experts through the international press. Whereas the industry and national and international advocates proposed the rationale for being a new industry dealing with low levels of human capital, technology and difficult condition for competing in the global market. A spokesman for both national and international companies trusted the advance of technology to solve several problems with new types of chemicals and pharmaceutical products. The agreed-upon goal was to surpass Norway as the first exporter of Atlantic Salmon in the world. This would consolidate the position of the industry in the global market. Thus, the focus was on the rapid increment of production under the same restrictions of space and costs, instead of setting a goal based on environmental and economic sustainability. Some means were short-term strategies with an excessive cost that would be paid in the future. Five problems were detected:

1. Shortcut practices using Chinese copies of pharmaceutical products
2. Avoiding the use of vaccines given their excessive cost
3. Neglecting international experiences regarding sicknesses, specifically the ISA virus
4. Overuse of antibiotics, provoking the adaptation of fish and the obsolescence of specific types of antibiotics.
5. Jobs were the only source of legitimacy before local communities and governments

Regarding the role of the state, this was an ongoing process, even improvised. It was possible to note that the main objective of the legislation was to ensure an industry. This salmon industry was after artificial forests were implemented in the 1970s, the unique industrial sector co-created by the Chilean state. There were modifications in the 1990s with precarious participation by different actors. There was a permanent comparison between aquaculture and agriculture and that comparison led the policy-making process

Regulation regarding concession, environment and phytosanitary aspects can be described as following:

1. General measures regarding phytosanitary procedures. The most critical was the density of fish in each farm. However, there was no detailed regulation in this regard.
2. The weak ability of state agencies to reinforce regulation. Low budget for human labor and infrastructure.
3. Research mainly focused on finding suitable conditions for cultivation and improvement of the production process to make it more efficient. That comprehends fish sickness but insofar as they were present or represented a real risk.

When the ISA crisis appeared, weaknesses of the industry accounted. The spread of the illness was rapid and out of control. This crisis revealed that there were no plans for a crisis like that. Strict measures were taken by the government authorities to take care of the industry and try to calm workers and environmentalists. In the meantime, the industry, especially the 6 bigger companies at that time, was holding a meeting to design a new strategy. However, this strategy was twofold: overcoming the crisis and reducing its impact on margins and taking advantage of a window for a new deal with the state about the future of the industry.

In terms of sociological theory, there are some aspects to highlight. The first idea is related to the aquaculture as economic activity and its natural-structural characteristics. Negative externalities of mining, forestry or even production of meat are considered unavoidable collateral effects of economic growth. The hope that ecological modernization theorists promote regarding clean and cleaning technology makes sense in the face of these cases. In the case of aquaculture, the problem of negative externalities can be seen in an alternative way. The idea of self-regulation in aquaculture has been based not only on liberal economic principles. It is based on the idea that every negative consequence over the ecosystem can be a negative “boomerang” effect against the farming industry. In aquaculture economic sustainability and environmental sustainability are connected. Pollution provoked by chemical residuals, fish droppings, or wasted fish feed means the pollution of the environment wherein fish is cultivated. The rational principle is if farmers want to make this business profitable they will avoid a sick environment to cultivate their fish.

However, this principle was broken observing this study case. This connection between economic and environmental success did not guide the farmed salmon industry in Chile, at least until the ISA virus breakdown in 2007. The double movement that Karl Polanyi (1957) claimed several decades ago, was confirmed. The industry needed regulation to facilitate the industry's development or to implement welfare policies for workers, which is the help from a "Midwife State" in terms of Peter Evans. But also, state regulation was necessary to reinforce coordination and responsibility of the companies. This task could not be accomplished under the principle of self-regulation. This can be defined as a "regulated self-regulation" (Knill and Lehmkuhl 2002) wherein the industry is able to carry out two mechanisms of governance: it had autonomy for making a "draft of the law" before discussion at the parliament and implementing their own corporative agreements to regulate the industry aside from the law (private regulation).

The undesirable externalities can be part of the ascending part of the "Environmental Kuznets Curve," wherein the industry needs to focus on production instead environmental care. However, supported by international experiences this is not the only model to follow. Nor was the most efficient way of capital accumulation and social development because of the excessive costs that the ISA crisis meant for the industry and overall for workers. The influence of globalization worked well in terms of the astonishing production that the industry achieved thanks to new market niches and the comparative advantages of Chile regarding salmon farming. Nonetheless, the effects of globalization can be considered a negative factor that led to breaking the principle of self-regulation for the sake of a prominent place in the international market.

Second, the endlessness of economic growth (of production and capital accumulation) is taken for granted by most actors. In this regard, Chile is immersed in a well-established neoliberal regime. Structural conditions were the guidelines to insist on an endless growth despite a huge phytosanitary crisis revealing long-term weakness in terms of phytosanitary management. The position of the country in the international division of labor can be still depicted as peripheral. The vulnerability of the farmed salmon industry can be seen as a reflex of a national economy struggling for being inserted in the global market.

The institutional conditions can vary among countries to take advantage of economic globalization. In this case, the environmental governance regime regarding the use of pharmaceutical products and phytosanitary conditions can be explained by international factors

such as market pressure or a buyer-driven regulation. This confirms my hypothesis (h1) which claim that if the state does not regulate in a stricter way the amount and quality of pharmaceutical products, then hyper-globalization exerts pressure over the industry as part of the "Ruling Civil Society" to build market-led governance. From the perspective of Bartley (2003), these globalization mechanisms are able to affect institutional state arrangement in an indirect way, creating complementary or even alternative ways of governance that change the source of legitimacy. In the case of farmed salmon industry in Chile, this new source comprehends international association advocating this economic sector, INGOs, and a rising system of international certification.

Third, the results of this research do not state that there is a direct influence of international factors over the policy-making process. However, it is possible to note an active presence in participative venues of International Non-Governmental Organizations holding a close relationship with representatives of the salmon industry. It is possible to talk about embeddedness between global actors and the "Ruling Civil Society". Together, exerted lobby over decision makers in the state. The boundaries between the "Embedded Autonomy" coined by Peter Evans (1985) and the "Captured State" of William Domhoff (1990) is quite fuzzy in the case of the environmental governance shift.

Finally, some prospective aspects can be put forward although this dissertation did not cover a period after 2009. Upon the information shown at the end of chapter 5 (figures 21-23), there are other issues that might be investigated considering probable changes in the global market and its effect on national institutions. The results in terms of use of pharmaceutical products and its effectiveness to decrease sickness and parasites do not support a good performance of the new environmental governance. Salmon farmers in Chile still have as a goal to catch up Norway regarding production and exportation of Atlantic Salmon. Despite that after the crisis the industry gained momentum increasing production and exportations, the cultivation of salmon is still carried out in a narrow territory. This indicates that density of farms is still high. However, there are two central issues for future research: first, if the industry counts with the necessary legitimacy for expansion toward the further south or not, and second if the coordination that the neighborhood system assume is actually happening. In this regard, a detailed analysis by companies is necessary.

In chapter 6, I described the context of environmental governance regarding marine property. One important characteristic of the analysis was that the salmon industry has a particular issue associated with investment. Given that it is a high-risk economic activity, there had to be some conditions that give some level of certainty to investors. One of them is the property of marine locations. In the 1990s, given that there was a military dictatorship, an important dilemma was giving more certainty to entrepreneurs about marine property and at the same time avoiding risks to national security and territorial sovereignty. Once dilemma was solved, the military commission defined perpetual rights over concessions. This led to design procedures technically complex in order to create a system of distribution that put the most suitable entrepreneurs first. The investors could be either national or international, but with a promising project that was technically viable within a new phase of the export-led Chilean economy.

But concessions were not only perpetual, they also were tradeable. This aspect of the legislation has a long discussion. There was concern from some advisers about obtaining concessions just for economic speculation, without any productive aim. This led the military commission to impose periods in which a concession owner cannot leave a site without productive activity as well as other technical requirements to avoid the trade of concessions based on a speculative market.

After the ISA crisis, there were several emergency measures that implied the relocation of farm centers. However, these changes were within a major strategy of expansion that the industry was seeking long before the ISA virus breakdown. Although there was resistance from community organizations, changes in the governance of marine property were significant and favorable for the industry. The procedures to access new concessions were more sophisticated with more environmental and sanitary requirements. The new requirements imposed by the new regulation implicitly handled an increment in costs for the industry. This was with the direct help of the state either with loans or making concessions which were used as a mortgage to obtain loans from banks. The costs somehow became an investment producing a “property closure” toward those that wanted to enter the business and obtain more marine locations to carry out a supposed second phase of the salmon industry focused on sustainability.

With respect to the sociological implications, some aspects are worthwhile to note. First, environmental governance has been a concept used by both advocates of the grass-roots process of social development and by the "Ruling Civil Society" at the national and global level to support their embeddedness with the state and their influence on policy-making processes. Both positions have in common their disdain for the state as the central actor. However, in terms of property, the state is still the main actor exerting power and centrality in the processes of governance. The negotiation regarding an ending time for concessions and the control of the expansion of the industry was not a matter of direct international meddling. The state keeps some level of autonomy in the process, which does not mean that this prerogative can change according to the political force in government. It is not possible to hold the hypothesis (h2) claiming that if civil society does not regulate the administration of marine territory, then hyper-globalization pressures the state to implement regulation and/or public policies to encourage expansion of licenses to facilitate the supply of farmed salmon in the international market from Chile.

Second, it is important to note that the administration of property is an exclusive prerogative of the state. Evidence allows me to hold the hypothesis (h3) that claims that if the pressure of hyper-globalization is not relevant, then it is the state the main actor able to exert governance mechanisms over the "Ruling Civil Society" assigning marine concessions and their different uses. This is according to Knill and Lehmkuhl (2002) a type of Interventionist Regulation wherein the governance capacity of the public actors is high but the capacity of governance of private actors is low.

Supporting the mentioned hypothesis (h3) does not mean that the public interests prevailed in a pure style. The backing from the state as "Husbandry State" in Peter Evan's words (1985) was not only in terms of defending the industry in the international mass media or giving loans and subsidies. When the state and the new regulation mandated that concessions could be used by salmon farming companies as collateral to obtain bank loans, the state made a structural change in the environmental governance regime and opened the door for new actors in the field of the farmed salmon industry in Chile. This means that banks and insurance companies occupied a similar role as real estate in the process of urban planning. Sustainability of the industry not only matters in terms of environmental rationality (as ecological modernization advocates claim) but

also to prove economic viability. The concept of embeddedness has to be analyzed in terms of its double face: moderating market actors and making possible their dynamic interests. This ambivalent feature of embeddedness needs a theoretical counterpart, which is the concept of "captured state." This is the instrumental use of the state by different types of ruling classes and their associations, according to the historical phases of capitalism. It is necessary to delve into this possibility to clarify the concept of environmental governance.

Finally, it is worthwhile to wonder about the importance of the expansion and the dispute over territory in the process of building a new environmental governance. As mentioned, the reciprocal dependency between economic and environmental dependency was broken after two decades of the salmon industry's development. Expansion toward new marine locations was not only a solution for elevated levels of fish density; it is also an opportunity for a "fresh start". This is the corporative image that the new environmental governance allowed, which was called "Salmon 2.0". The expansion of the industry after the ISA virus breakdown was taken for granted for different national and international actors. This has a rational support given the increasing production of the salmon industry. However, the traumatic experience that provoked the ISA virus crisis implied a lack of legitimacy of the industry in local communities. The main region (Region X) where farmed salmon was produced in Chile is still a place plenty of sicknesses. Producing a free-antibiotic salmon in this region is impossible. The vulnerability of the industry in this region is higher than those in southern Chile.

In chapter 7, I presented a less investigated issue with respect to the use of pharmaceutical products and governance of marine property. This is the environmental governance of fish feed. Clearly, the so-called "fishmeal trap" is acknowledged by international organizations, experts, and companies as a matter of global governance. The commodity chain related to this product is evident. The raw material for fish feed is being sold from one country to others. The companies receiving this supply need fishmeal not only as the protein base that carnivorous fish like, but that salmon need. Although composition and quality of fishmeal depend on market variables like nature of raw material or prices, there are issues related to the sustainability of the aquaculture in general and, in particular, the salmon industry.

The availability of protein is an environmental and food security issue. Fish and animal farmers demand protein from fish. However, an alternative demand for oil or omega-3 products that use this raw material is increasing and elevating prices. The industries demanding raw materials that have animal protein are looking for alternatives. Soy and other vegetable protein can be a substitute, but they are still expensive and less efficient. At the same time, it means more pressure on agriculture. This leads farmers to cultivate only those products that the big industries of meat are demanding. That is the case of soy plant cultivation.

It is possible to confirm my hypothesis (h4) that claims that if the state does not regulate the amount of fish feed based on fishmeal, then the hyper-globalization exerts pressure over the "Ruling Civil Society" to use alternative fish feed. However, the evidence demonstrates that the rationale of this pressure can be based on economic variable instead of an environmental consciousness.

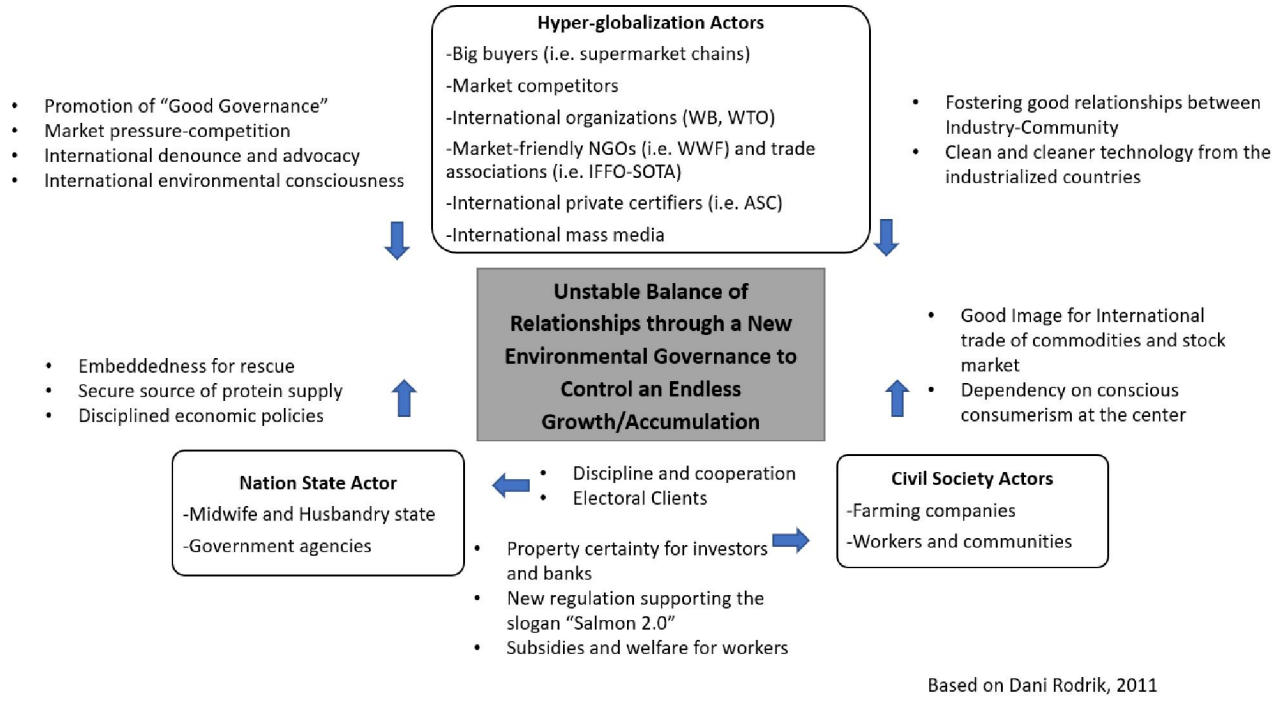
Beyond the goals of the pressure for adopting new practices regarding fish feed, it is important to consider that this was a global issue, at least during the period of study. National environmental governance in Chile regarding the salmon industry is not connected with the global concern about fish feed and its dependency on fishmeal. This global character is also demonstrated by the scope of the problem. Dependency on fishmeal is a common sustainability problem between Chile and Norway according to the information presented in chapter 7 (figures 25 and 26).

General Conclusion

In general, the shift of environmental governance solved the legitimacy crisis of the salmon industry before the international market actors. However, it is not a new type of deal for legitimacy at the national level. The tension that the state has to face is between two sources of legitimacy: on one hand, providing good conditions for the industry to keep its position in the global market, and on the other, reacting to national demands. The Chilean state and the environmental governance has allowed for a precarious and unstable balance between the Chilean national state and both legitimacy sources.

Resuming my research question, it is possible to establish a governance shift in the context of an "unstable balance" between the three components presented by the Rodrik's trilemma.

Figure 29: General Conclusion Based on Rodrik's Trilemma



According to Figure 29, the new Environmental Governance can be defined as an unstable balance instead of a trilemma. It is possible to maintain the political legitimacy of the state and social legitimacy of industry without renouncing to the demands of the hyper-globalization of the capitalist system. For that reason, the cost of this balance is the instability. This produces continuously systemic crises, which might have some emphasis in one of the relationships. To make this balance possible, there is an exchange of "governance mechanisms" (arrows). For instance, while the civil society keeps a good relationship between its fractions (farmers and community), there is a good image for the international community. Local communities trust the demands of "conscious consumers" in the countries at the center of global capitalism. These consumers are expected to pressure the farmed salmon industry in Chile to implement new practices endorsed by certification schema. Also, there is hope for what advanced technology means for keeping local ecosystems clean. Likewise, the state is able to ensure an industrial project that is a source of protein for the world market. The state is embedded (with low autonomy) as a "Midwife State" with the salmon industry at the beginning of this industry. During the period of study, the embeddedness is functional to solve eventual crises and implement rescue plans beyond the rules of the supposed "Darwinist" rules of the free market.

Considering this, it is closer to be a "Husbandry State." The hyper-globalization is permanently exerting pressure over the state to create conditions for the industry to compete. The most concrete example is the fixation with surpassing Norway as the first exporter of farmed salmon in the world.

A final and more concerning point is the relationship between the state and civil society conditioned by the hyper-globalization era. The national legitimacy is probably the most unstable. The consequences of the ISA virus crisis on the communities lasted almost three years. Collective memory has been cultivated in other regions by social movements that promote resistance to new locations for the salmon industry. National legitimacy is still a big challenge for the industry.

This mentioned resistance is weak in regions where the industry is already settled. Inhabitants have direct or indirect economic connections to the industry creating the so-called 'salmon-dependency" of these communities. As can be noted in Figure 29, workers are willing to be disciplined and vote for the politicians who defend the industry and their labor conditions. In exchange, they receive relatively high-quality jobs and subsidies during "bad times" for the industry. These benefits are realizable insofar as the state can give property certainty for the industry and banks. Also, the state supports the idea of a "Salmon 2.0" from Chile. The latter is because the salmon industry in Chile has been renewed and left a "sacrificed zone" (Region 10th) further south, where farms can be located in cleaner marine locations. This idea is supported by a new regulation and the exhibition of reinforcement procedures. Unfortunately, some current indicators that appeared at the end of chapter 5 cast doubt on the efficacy of the new environmental governance of the farmed salmon industry based on the questionable idea of endless growth.

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