

**SWANS, ECOLOGICAL STRUGGLES AND ONTOLOGICAL
FRACTURES: A Posthumanist Account of the *Río Cruces* Disaster in
Valdivia, Chile**

by

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Abstract

This is a dissertation on ontological struggles –that is, struggles between competing ways of performing the world. More precisely, I study the *ontological opening* resulting from such struggles once what I call dominant performances are exposed to revision and room is made for non-dominant ontologies, such as alternative human/nature entanglements.

I analyze the ontological opening provoked by a landmark event in Valdivia, Chile: the Río Cruces ecological disaster that since 2004 has affected a protected wetland and its colony of black-necked swans. The disaster, that followed the installation of a new pulp-mill by ARAUCO, one of the world’s largest pulpwood companies, sparked an unprecedented mobilization with long-lasting effects.

Staying close to the “doings” of the actors, my political ontological interpretation describes, first, how the disaster exposed ARAUCO’s environmental practices as constitutive of its way of performing the forest business and, doing so, also fractured Chile’s until then dominant business model. Second, I describe how the disaster revealed the workings of environmental procedures and the techno-scientific knowledges upon which they were based provoking the breakdown of Chile’s environmental edifice and its ensuing reform. Third, I follow the ontological struggle that the disaster unleashed around Valdivia’s identity once dominant performances tied to the city’s industrial past were confronted. I describe how historical entanglements between Valdivians and rivers became the substrate of a reconfigured identity closely connected to wetlands. Finally, I attend to the centrality that the actors attribute to the swans in explaining the disaster’s effects. Despite no meaningful bond with the swans existed before 2004 I conclude that the swan’s “suffering” was the most agentic force within the struggle. I take this finding as evidence of the non-dominant nature/human entanglements that surfaced once dominant realities were fractured.

In contrast to critiques that conceive of local mobilizations as failing to embody a fully transformative potential this conclusion demonstrates that single-issue ecological struggles may contribute to the world’s politicization. On the one side, by allowing non-dominant ontologies to manifest and travel more freely and, on the other, by expanding the borders of the political community to previously ignored actors, both human and nonhuman.

Preface

This dissertation is an original intellectual product of the author. The fieldwork reported from Chapters 3 to 9 was covered by UBC Ethics Certificate H12-02249, granted on September 7 of 2012 by the Behavioral Research Ethics Board to the research titled “Swans, Ecological Struggles and Ontological Openings: A Posthumanist Account of the Río Cruces Disaster in Valdivia, Chile.”

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Foreword by the Author

In the austral spring of 2004, the fate of a colony of black-necked swans turned into a nation-wide issue in Chile while marking the lives of many humans, including myself. The swan's material existence became obvious when the *Río Cruces* wetland –a protected wetland located upstream the city of Valdivia, 850 km south of Santiago– showed signs of contamination. The swans had gradually established there in great numbers after in 1960 a 9.6 earthquake on the Richter scale hit the zone. This event caused the subsidence of the lands surrounding the Río Cruces giving shape to a huge wetland. In 1981, the wetland was declared a Natural Sanctuary by Chile and a site of international importance for migratory birds by the Ramsar Convention. By mid 2000s “the sanctuary” was considered by some as home to the most important reproductive population of the species.

In December of 2003 about 7,000 resident swans were counted in the sanctuary. Two months later, in February 2004, a new pulp-mill owned by the Chilean mega-holding ARAUCO began to discharge its liquid wastes into the Río Cruces, 30 km upstream the wetland. By April 2004, two thousand hectares of the aquatic plant that was the swan's main food supply had collapsed. The bluish and transparent waters of the wetland turned into dense and brownish ones while the swans began to starve and their brains, hearts, and livers accumulated heavy metals. Dozens of swans were found dead and many fell over the city. No chicks or nests were found. A year after the pulp-mill started to discharge its wastes to the Río Cruces, less than 200 swans remained in the protected wetland.

Human communities were also affected. People living close to the industry reported respiratory problems, skin allergies, impacts in their vegetables and signs of acid rain.

Several economic activities related to the sanctuary disappeared along with the swans, such as a fluvial touristic route and associated projects promoted by indigenous associations.

In Valdivia, a citizen movement in defense of the swans and the *Río Cruces* wetland emerged, calling itself *Acción por los Cisnes* [Action for the Swans]. I was part of it from the outset. Moreover, I was literally captured by the fate of the swans and the wetland, and, especially by the citizens' overwhelming response to the disaster.

During four intense years, I dedicated my full-time professional, voluntary work to the movement's objective of stopping the disaster, recovering the wetland, and saving the swans. As a sociologist trained in biological conservation and environmental conflicts, my main tasks consisted in analyzing all sorts of reports, legal resources, and scientific studies, while preparing position documents and technical presentations for authorities, public agencies and international organizations, as well as newspaper articles, press releases, and educational talks for the broader public. I also became one of the movement's spokespersons, focusing on academic and international audiences, authorities, and the media. Finally, I directed and wrote the script of a documentary entitled *Ciudad de Papel* that tells the story of the Valdivian movement up to 2007, when the film was launched. In sum, I came to live the unpredictable, intense, tough, and economically impoverished –but no less exiting and rewarding– life of an environmental activist in Chile, far away from the safer professional grounds I had been familiar with for over 15 years.

The voluntary work of members like myself and a vast network of individual supporters sustained the movement. Our position papers circulated widely, fostering an extended

reconsideration of the country's environmental framework. Gradually, the Valdivian mobilization became a "case study" and a landmark in Chile's environmental trajectory.

Despite this apparent "success," and after five years of intense activism, the movement was deeply frustrated. Although a scientific report commissioned by the government established ARAUCO's responsibility in 2005, authorities granted the company an *ad-hoc* permit allowing it to continue discharging the same compounds identified by the said report as causally connected to the disaster. Meanwhile, the government enrolled the sanctuary in Ramsar's red list of endangered wetlands and committed a plan for its recovery. As the polluting discharges continued the plan no longer made sense and was abandoned. Despite the landmark crisis that the disaster had provoked, our purpose as a movement –to stop the disaster and recover the wetland– was far from being achieved.

Having dedicated half a decade of my life to this struggle without getting even close to our purpose, I felt exhausted and devastated. In particular, I felt betrayed by the workings of public agencies, with whom I had previously worked to conserve natural areas. Instead of preventing the disaster or stopping it on time, environmental agencies had not only been involved in its fabrication, but were more interested in not affecting ARAUCO's property rights than in protecting citizens or recovering the ecosystem. Unable to digest our failure and unprepared to see or value the broader consequences that our struggle was already provoking, I decided to take some distance in order to make sense of this experience.

Seeking new grounds from which to remake myself, I decided to pursue a doctorate in Human Geography at the University of British Columbia, Canada. There, I became fascinated by posthumanist perspectives and their understandings of the political. I was

especially attracted to the idea that humans are not the only actors of consequence and that the social is constituted and sustained by ties and relationalities that include all sorts of nonhumans. I came to understand that, through the bond that connected them to humans, Valdivian swans could be conceived as political actors in their own right. I could now analyze the disaster's long-lasting effects in connection to their full-blown agency.

The possibility of reflecting at a distance also allowed me to see that, despite our apparent failure, the Valdivian mobilization had provoked outstanding effects. Indeed, mediated by the agency of the citizens/swans association the Río Cruces disaster generated a dramatic breakdown of the country's environmental framework and its consecutive reform. Similarly, after exposing the until-then dominant business model incarnated by ARAUCO, the disaster also forced the company to modify some of its deep-rooted practices.

The posthumanist lens provided me with tools for addressing the most pressing of all the questions that had taken form within me: How was it that a strictly local, single-issue and relatively resourceless movement had become such a political whirlwind, totally messing up Chile's environmental frame, provoking changes in the practices of the country's major forest holding, and forcing powerful business associations to support a legal reform that they had opposed for years? I had so far conceived the Valdivian case as the "last straw" with regards to the country's environmental framework (Sepúlveda and Villarroel 2012). My hypothesis was that the institutional consequences of the Río Cruces disaster could only be understood when considered along with dozens of previous environmental conflicts and their accumulated effects. However, this hypothesis didn't explain why Chile's environmental frame collapsed precisely with this disaster and not before or after.

At the same time I was completely unsatisfied by explanations that pointed to things like the movement's "strategies" or "power" for explaining the visibility and outcomes of the Valdivian mobilization. I knew first hand how *Acción por los Cisnes* emerged, what it did and how it worked, and such strategic-like explanations did not fit with what I had witnessed. I believed that something key was missing from such accounts. Something that had been decisive, not only for the local response to the disaster, but also for its resonance beyond Valdivia. Something hard to pin-down or talk about without risking simplistic interpretations: the role of the swans.

Of course, the swans could not be easily ignored. They had been at the center of the movement's demands, discourses, and iconography. Valdivians shouted, in the first place, for the swans when taking to the streets and put them on almost every poster, flyer and picture that inundated the city for several years. Pushed by Valdivian demands but also by less evident forces –such as their suffering– the swans also turned into the key concern for authorities. Every measure taken in relation to the disaster was meant, in the first place, to reduce the threats to the wetland's population of swans. Swans and their suffering also captured the attention of the media. Thousands of articles and images of injured, agonizing, or dead swans inundated national newspapers and TV shows for four long years. The effect of these images was overwhelming. Through them, the swans displayed an unprecedented agency, able to inflect laws and mark globalized mega-holdings.

However, in general swans were conceived as "mere detonators" of the Valdivian mobilization. The corporeal experiences that had connected swans and humans were not seen as relevant in themselves. What I had witnessed, however, was that people's responses to the suffering of the swans had been crucial in their concrete responses to the disaster. I

also situate my encounters with black-necked swans as key in sustaining my involvement in the movement as well as my motivation for this academic work, through which I attempt to make sense of the disaster as a Valdivian citizen and a female human.

Posthumanist approaches allowed me to frame my hypothesis about the magnitude of the disaster's effects through new lens. I began to see that it was not just the environmental framework that had come under public scrutiny. More fundamentally, it was *the understanding of the wetland, the swans, and their relation to humans* that began to be deeply questioned once environmental procedures proved to be ineffective and, furthermore, appeared to be complicit with the disaster's fabrication. In brief, *the configuration of the world itself had become politicized.*

Indeed, the ontology or "the world performed" through the environmental procedures that had led to the approval of ARAUCO's pulp-mill in the mid 1990s had now lost support and began to be openly confronted along with its scientific foundations as the disaster unfolded. In particular, the place previously assigned to the Río Cruces wetland and its black-necked swans by the technocratic knowledges involved in the mill's environmental assessment was unexpectedly confronted. While such technocratic procedures had denied any relevant value or bond that meaningfully tied these "natural" entities with humans, safely putting them outside "the social," the Valdivian struggle had brought the swans and the Sanctuary into the center of the political community. Doing so, the struggle openly interrogated the world's dominant ontology, characterized precisely –amongst other traits– by an overt division between "the natural" and "the social." As I now see it, this ontological politicization –or confrontation with *how* the world and what exists in it is classified,

distributed and interrelated— was key to understanding the magnitude of the public questioning that the disaster provoked.

In sum, posthumanist approaches gave me the distinctions I needed to acknowledge that the Valdivian movement had made visible a bond that tied swans and humans together and that was non-reducible to language, but nevertheless “real” in its material effects. Such approaches also provided me the tools to address this story with the awareness that, without making room for such swan/citizen entanglement, there was no way of fully accounting what the Valdivian struggle has been really about and what sort of marks it has left.

In this dissertation, I explore and trace the long-lasting effects of the Río Cruces disaster. I seek to reveal how human/nonhuman associations and their political agencies may acquire the potential to erode the science-laden grounds that sustain environmental institutions and their ontological assumptions, provoking social, cultural and legal transformations. In doing so I wish to contribute to making visible the ontological politicization that this event enabled. In particular, I want to stress the idea that the Valdivian disaster generated an ontological fracture in the dominant modes of relating to nature and made room for the surfacing of alternative, non-dominant worlds like the ones expressed through the bond between swans and Valdivians. A type of bond that not only subverts the divide between humans and other sentient beings that is proper to Euro-modern categories of thought, but that brings forward an ontological multiplicity that we urgently need to acknowledge if we are to explore new ways of co-inhabiting with nonhuman others.

This ontological openness leads to the core of the political project I wish to mobilize in this work. Simply put, I want to make evident that *Valdivian swans are already members of our*

political community. That is, that their “doings” have the capacity to fracture the laws, productive practices, development programs, and territorial identities that give shape to the society in which we live. This apparently simple statement about what swans can do to “us,” humans entails huge consequences. Beginning with the one that interests me most: if swans are, in fact, already sociopolitical actors, it follows that the Euro-modern ontological matrix in which we inhabit –which dismisses the capacity of nonhumans to be full-blown agents– is in fact being reconfigured from within through events such as local ecological struggles. In short, the world’s ontological multiplicity is being revealed through confrontations between the still dominant Euro-modern ontology and hitherto alternative modes of entanglement between humans and nonhuman others. My political project insists on providing evidence of the political agency of the swans and the non-dominant ontologies that come with it hoping that such acknowledgement will contribute to bring about less oppressive human/nature relationalities. To this end, I give a special place to the testimonies of interviewees –including past and present political and environmental authorities as well as ARAUCO’s executives– who describe how they were moved by the fate of the Valdivian swans and forced to act in response. An experience that, as I show in the final chapters, sits at the core of philosophical debates around our relations with animals and expands dominant notions of “the political.”

Finally, I cannot end this preface without referring to key recent events. When I began the fieldwork for this thesis, in September 2012, the Valdivian movement had cooled down and the swans had returned to being entities pertaining to “the natural world.” Soon later, however, a new path breaking event relaunched their sociopolitical potency: on 27 July 2013, after eight years in a trial pursued by Chile’s State Defense Council, Valdivia’s First

Civil Court sentenced ARAUCO to repair the environmental damage caused to the wetland. The sentence was crushing for ARAUCO. It determined, not only that the company was directly responsible, but that the wetland had ecologically collapsed only three months after its pulp-mill started to function. This meant that the wastes discharged by the mill into the river had been exceptionally toxic and abundant. However, the ruling also affirmed that the wetland was undergoing a sustained recovery –although still partial– due to the improvements imposed by public agencies over the operation of ARAUCO’s pulp-mill.

As in the early stages of the struggle, I became engaged in the events that led to the ruling. First, my fellow citizens and I met with the Valdivian judge to demand a clear and definitive sentence. Secondly, we met with the president of the State Defense Council to demand the dismissal of a monetary agreement between ARAUCO and this entity, which by the end of 2012 was almost approved. Finally, this time acting by myself, I held a series of conversations with ARAUCO’s main executives to persuade them to abstain from their right to appeal in the case of a condemnatory sentence.

My contacts with ARAUCO’s executives occurred as part of my research, when I interviewed them as actors in the struggle. These conversations –as well as those I held with former national authorities that I had confronted for years– provoked in me a transformative effect. I not only acquired a more nuanced understanding of the struggle. I also came to believe that the changes undergone by the company in response to the disaster were deep enough to open the possibility of a collaborative design focused on the wetland’s recovery. Certain that ARAUCO would be condemned, I explored along the company’s executives the terms on which the company should accept its responsibility after the ruling.

As these conversations were occurring, I became a privileged witness of the debates that the possibility of a condemnatory ruling sparked within ARAUCO's directives and board. In a sense, these internal debates incarnated the same confrontation between different ways of performing the forest business in Chile that the Valdivian struggle had sparked nationally. I confirmed the strength gained by previously non-dominant worlds –such as those mobilized around Valdivian swans– when one of ARAUCO's managers called me to report the board's final decision: the company would abstain from appealing to the ruling, accepting its responsibility in the destruction of the wetland. Never before had a condemned party renounced its right to appeal in all the history of the trials pursued by the State Defense Council since its foundation in 1895.

Outstanding events continued to happen as the company, the State Defense Council and Acción por los Cisnes agreed on creating a Scientific and Social Council for collectively designing the reparatory measures ordered by the local court. Inspired in the hybrid forums proposed by Michel Callon, Pierre Lascoumes, and Yannick Barthe (2009), I collaborated in giving shape to a council that brought together public services, representatives of the local university, ARAUCO's executives and members of the movement. That is, experts, public servants and citizens, all working together as part of the same deciding board. After 10 months, on September of 2014, the council finished its job and the measures –with a total cost of US\$ M 15– were ready to be implemented.

Of particular salience were two of the measures agreed by this hybrid council. First, the community program ordered by the court was designed through a participatory process involving the communities living in the wetland's surroundings. These communities –now grouped in an association called *Comunidad Humedal* [Wetland Community]– defined a

common vision along with a series of investments for the enhancement of the sanctuary's environmental, social and economic values, such as the reestablishment of the fluvial routes suspended after the disaster. A second measure consisting of a research center on wetlands was designed as an entity to be governed –not by scientists and experts alone, as expected by the university's officials– but by a board including representatives of three chambers, one social, another economic, and the third scientific, to be democratically elected.

Of course, all these events and measures have not been exempt from contradictions and deficiencies. For example, the local court's ruling has severe limitations regarding the protection of the wetland. Assuming that the ecosystem was already undergoing a natural recovery, the judge did not include measures for its restoration. On the other hand, there have been different visions within the Valdivian movement about how to relate to ARAUCO in the new scenario. Many citizens are still reluctant to any collaboration with the company and even with authorities within the context of the ruling's implementation. Finally, based on the monitoring conducted since 2013, in January of 2016 the Oversight Environmental Agency [*Superintendencia del Medio Ambiente*, SMA] announced charges against ARAUCO for eleven unfulfillments in the operation of the Valdivia pulp-mill (SMA January 8, 2016; January 11, 2016). According to the SMA such unfulfillments include the unreported discharge of untreated wastes into the Río Cruces, which would qualify as the most severe type of offense within the country's current environmental framework enacted, precisely, as a consequence of the Valdivian disaster. The SMA has also suggested that such untreated wastes would be the cause of a massive death of fish occurred in the Río Cruces during the summer of 2014, downstream of the mill's discharges. ARAUCO, in turn, has appealed through counter-evidence. The company has

argued that, despite some partial unfulfillments, the overall environmental performance of the Valdivia mill during the past three years has not surpassed the parameters and conditions authorized by the corresponding environmental permit, let alone included the discharge of untreated wastes into the Río Cruces. Therefore, ARAUCO has affirmed, the industry has no direct connection with the massive death of fish in the river, as the SMA has suggested (Lignum February 23, 2016).

Despite these tensions, Valdivians have gradually left behind the previous stage of generalized confrontation and for the first time in all these years have been able to focus on the design and implementation of measures for protecting the wetland. There are many challenges ahead and no guarantee of success. In particular, there is no certainty that the wetland will some day recover the ecological health it had in 2003, before ARAUCO's mill began to function. However, attending to what each of the actors have learned and, especially, to the unquestionable existence of a bond between the sanctuary, its swans, citizens and communities, in Valdivia we are inhabiting a different world. A world where it is now part of the "normal state of affairs" to consider wetlands and their nonhuman inhabitants as co-fellows in the daily making of this city.

Chapter 1: Introduction: Why this Research?

“... there are simply more agencies in the pluriverse” (Bruno Latour 2005:116).

Jacques Rancière (2001:32) suggests we are facing “the end of politics.” For Rancière (2001) and others concerned about this post-political moment, politics and the potential for social transformation have been evacuated or even foreclosed from the world we inhabit (Rancière 1999, 2000, 2001; Žižek 2000, 2002, 2011; Marchant 2007). By this, he means that key political questions about *what world we want to live in* have been replaced by an indisputable consensus built upon the “ultimate neutral” and “supposedly depoliticized grounds” of science, expert knowledge and technology (Marchant 2007). According to these post-political authors, what we are witnessing, then, is an “age of a ‘technological non-political politics’” where expert, technocratic modes of governing have colonized our collective lives, suppressing the legitimate dissensus and litigiousness that is constitutive of “the political” (Marchant 2007:45). The outcome, we are told, is “the dismissal of politics,” that is, the annulment of those “properly political” events that express a “polemical configuration of the common world” (Rancière 2003:6).

Nowhere is this post-political consensus described as more suffocating than in relation to the current ecological crisis (Swyngedouw 2009, 2010). On one side are environmental justice movements that urge reparations for environmental wrongs and on the other are ecological modernization approaches that propose technological-managerial paths towards ecologically sustainable progress. Yet, both ultimately agree: the present ecological crisis is an apocalyptic danger that demands “a more sustainable, and just, socio-ecological practice, one that operates fully within the contours of the existing social order” (Swyngedouw 2009:605). In this post-political world, we read, the central question of *what natures we*

want to relate with, preserve, or intervene in has been eradicated “from debates over what to do with natures” (Swyngedouw 2009:611). In its place, endless discussions over models, standards, best-practices and accountancies have been put to work. Such a managerial approach, Erik Swyngedouw (2009) argues, has ended up converting socio-ecological disputes into fragmented, piecemeal problems, disconnected from their broader causes and consequences, while each ecological demand is ultimately reduced to an individual discontent that merits a proper solution. Through such single-issue struggles –these post-political views sustain– nature has been evacuated of its political dimension, emptied of any radical divergence. In sum, under the post-political order environmental politics has been reduced to the “policing of environmental change” (Swyngedouw 2009:602).

Through the lenses of this post-political understanding, most contemporary ecological struggles fall under what critical authors describe as micro-politics (Marchant 2007). That is, as “dispersed resistances and alternative practices” (Swyngedouw 2009:615) that, despite being sometimes elevated to the level of “the political,” are “not truly political” because of their restricted, “multiple and fragmentary constituencies” (Marchant 2007:47). From this perspective, then, local environmental activism is seen as unendingly destabilizing the power structure without being able to undermine it effectively (Žižek 2000). Furthermore, even radical forms of environmentalism are seen as, finally, supporting the prevalent order they attempt to subvert for their “‘transgressions’ are already taken into account, even engendered” by the dominant order (Žižek 2000:264). In brief, for radical post-political approaches the present has become a radically reactionary world, *immune to local struggles* and foreclosed to “the articulation of divergent, conflicting and alternative trajectories of future” (Swyngedouw 2009:610).

This pessimistic understanding of the possibilities for social transformation sharply contrasts with other theoretical approaches describing the present world as *becoming increasingly politicized* and open to contestation and change through the multiplication of what Mario Blaser (2010) has called “ontological struggles.” That is, of *struggles involving the constitution and transformation of reality itself*. This refreshing analytical view and its corresponding political agenda –which I take as my own– build from posthumanist theories and philosophies that are contributing to a much broader theoretical inflection that is gaining terrain within social sciences, which Arturo Escobar (2007) has labeled the ontological turn. The effort displayed by these theories and philosophies during the past four decades –initiated by Bruno Latour in the late 1970s and followed by Michel Callon, John Law, Annemarie Mol, Donna Haraway, Sarah Whatmore, Mario Blaser, Juanita Sundberg, and many others– can be synthesized as a primarily ontological pursuit focused on exposing and tracing the performative nature of reality and the multiplicity of the world.

For the purpose of this work I propose to read the key contributions of these posthumanist approaches –which I will methodologically expand in Chapter 2– as the *unpacking, material tracing, and unsettling of what I call the prevailing ontological consensus*. That is, the dominant contemporary understanding about what reality is, how it is produced and sustained and, accordingly, how it may be eventually transformed. Accordingly, the central argument I elaborate is that the ontological endeavor pursued by posthumanist theorists constitutes a crucial contribution to the challenge of re-politicizing the world and discovering new sites where its transformation is effectively occurring, albeit in terms quite diverse from those announced by the radical reading of post-political critiques.

As I attempt to show in this work, local protests such as ecological ones may begin to be seen, not as politically foreclosed –like Swyngedouw (2009, 2010) and Žižek (2000, 2002, 2011) have argued– but as fully charged with a political potency as long as we begin to consider the unsettling that they are able to provoke in dominant ontological configurations of the world. In order to do so it is critical that we begin to interpret key political notions ontologically. As I further propose in the concluding chapter, Jacques Rancière’s influential concepts of “the political” and of “political community” –which post-political authors such as Erik Swyngedouw (2009, 2010) and Slavoj Žižek (2000, 2002, 2011) take as the basis of their approach– can be read in thoroughly ontological terms through a dialogue with political ontological perspectives developed by posthumanist authors.

The unpacking of the ontological consensus by posthumanist perspectives has been so far accomplished –as I will further explain in Chapter 2–, on the one hand, by making visible how the procedures and practices involved in the production of scientific facts are materially involved in performing the very reality they describe. As a result, “the real” may no longer be understood as a pre-given and exterior domain, waiting to be discovered. Rather, reality begins to be seen as the material –and in many ways unexpected– effect of interventions and practices, including those of science in particular (Latour and Woolgar 1979/1986; Latour 1992, 2001; Law 2004, 2008; Callon 2006, 2009).

On the other hand, posthumanist approaches have made room for what Annemarie Mol (1999, 2002) calls the ontological multiplicity of the world. That is, the acknowledgement that, since reality is the accumulated effect of the practices of situated actors, there is always more than one way of performing the world. Consistently, the world can be seen as a manifold of potential materializations that become more or less “real” depending on the

density, stability and endurance of those “doings” involved in its sustained performance. Furthermore, Michel Callon (2009) suggests, from this perspective the world may begin to be seen as the result of a continuous and unending struggle between worlds that are constantly competing “in order to prevail.” Reality, thus, becomes politicized.

The ontological politicization of the world is reinforced by the notion of *performation* proposed by Michel Callon (2006), which is key to my posthumanist interpretation and that I further discuss in the methodological chapter. The notion of performation builds on the concept of performativity, which conveys how entities, identities or social orders are the effect of sustained practices –including speech acts–.¹ Performation is distinct for its emphasis on the existence of competing realities that are constantly struggling in order to come into being. In so doing this notion makes visible the ontological multiplicity of the world and, as a consequence, the inherently politicized nature of “the” real understood as a singular and dominant version of the world.

I build on Callon’s concept of performation to interpret dominant descriptions of the world –such as those that result from the technocratic knowledges involved in environmental decision-making– as unstable configurations under which, in each time and place, multiple non-dominant worlds are struggling to surface and expand their “(corpo)reality”. Moreover, I see such underlying and non-dominant worlds as capable of transforming dominant realities once these are ontologically fractured by disruptive events –such as an ecological disaster– that allow them to temporarily surface and circulate more freely.

¹ I explain these concepts with more detail on pages 60-69.

Building on these posthumanist and performative approaches, the central point I wish to make is that the present ontological consensus –which I see as the constitutive underside of the post-political consensus– is in fact being unsettled through ontological struggles such as those described by Blaser and Callon, regardless of our ability to witness them. Such struggles are not only multiplying but, in doing so, they allow alternative worlds to unfold while transforming dominant realities and leaving behind the marks of such performances.

The analytical exercise I develop –described in detail in Chapter 2– consists, precisely, in the study of an emblematic ontological struggle by accounting for the fractures that a disruptive event provoked in dominant worlds, describing the non-dominant worlds that surfaced through the resulting *ontological opening*, and tracing the marks that such underlying worlds left in the until then dominant performance of things such as laws, institutions, practices and identities. From my posthumanist view such marks are the evidence of the political potency that non-dominant ontologies entail.

The ontological struggle studied here unfolded around the Río Cruces ecological disaster, which began in 2004 near the city of Valdivia, Chile when a new pulpwood factory, owned by the country's major forest holding, started to pollute a protected wetland and severely affect its resident colony of black-necked swans. The disaster sparked an unprecedentedly massive mobilization in Valdivia (39°48'30"S, 160,000 inhabitants), while provoking a sociopolitical and scientific controversy with vast and long-lasting consequences. These include the historical breakdown of Chile's environmental framework, substantive changes in the environmental practices of private corporations, the worst crisis ever experienced by one of the world's largest pulpwood companies, and the reframing of Valdivia's identity.

Given the saliency of the Valdivian disaster it has become commonplace to consider it a turning point in Chile's environmental history (Larraín 2006; Pizarro 2007; Tironi 2011; Delamaza 2012). So far, however, the Río Cruces case has only been partially analyzed and there is disagreement regarding the reach and nature of its effects. Most accounts have focused on describing the changes that occurred in the ecosystem (UACH 2005b; WWF 2005; Ramírez et al. 2006; Lopetegui et al. 2007; Lagos et al. 2008; Palma et al. 2008); the consequences for Chile's business sector (Delamaza 2012; Halpern 2007); and the effects over the country's environmental institutions (Larraín 2006; Pizarro 2007; Tironi 2011). With the exception of works that explain the controversy's most salient consequence—the 2009 environmental reform—as originated in the commercial pressure coming from Chile's international partners (Tecklin, Bauer and Prieto 2011), most accounts attribute the sociopolitical crisis and the institutional changes that followed the disaster to the “power” of the Valdivian movement (Rivera 2010, 2011; La Tercera 2005; Pizarro 2007; Tironi 2011). Consistently, this movement has been described as the first expression of a new wave of politically unsettling mobilizations that have multiplied in the country since the mid 2000s, including the student's massive protests of 2006 and 2011 (Delamaza 2012; El Mercurio August 12, 2013). Nonetheless, such accounts fail to satisfactorily explain the type, sources and workings of the said “power” displayed by the Valdivian mobilization.

As an insider of the Valdivian movement, I contend that the long-lasting effects associated with the Río Cruces disaster cannot be accounted for by the movement alone. Indeed, the movement's actual character, resources, and scope were highly contingent, proper to a local struggle led by a small group of technically well prepared but mostly politically inexperienced citizens. Moreover, the Valdivian movement constituted a single-issue

mobilization whose primary purpose was the defense of the swans and the recovery of the polluted wetland, with no broader political program than to expose the environmental proceedings involved in the approval of the industry deemed responsible for the disaster. Thus, the forces involved in generating the Valdivian struggle's lasting effects, which –as the coming chapters show– went far beyond the wetland, the swans and the polluting industry, not only remain unexplained but continue to raise fundamental questions.

How could a local, single-issue and resourceless actor be responsible for causing such far-reaching effects, including the breakdown of Chile's environmental edifice, the revision of the country's commercially strategic pulpwood industry, and a reconfigured territorial identity of Valdivians? After a decade, this outstanding controversy and its transformative potential still lack substantive consideration.

My explanation points to what I will call the ontological struggle provoked by the Río Cruces disaster and the resulting *ontological opening*. I propose this term from my own reading of posthumanist theories, which I further describe in Chapter 2. In brief, I understand an *ontological opening* as the state of suspended and fractured reality resulting from events that drastically interrupt the “normal state of affairs.” In so doing, such events slow down thought while making visible the agencies, workings, and investments involved in such a state, eventually exposing these to public revision and confrontation.

Here I show that the *ontological opening* generated by the Río Cruces disaster resulted from the revelation of the disaster's institutional fabrication. That is, from the accumulated evidence –articulated and circulated through the ‘doings’ of the Valdivian citizens/swans association– showing *how* environmental knowledges and procedures charged with

assessing the ecosystem and preventing its damage had instead caused its destruction.

Through such technocratic knowledges and procedures, experts and decision-makers had claimed to know what a swan or a river are, how they were or not entangled to humans, and how they should be protected. Now, exposed in their overt failure, they became subject of public revision revealing along the systemic failures of Chile's environmental frame and its connections with the pulpwood-oriented "forest model" that was until then dominant in Chile and also with the notion of development that had settled in Valdivia and had been decisive in the approval of ARAUCO's mill in the 1990s. Thus, it were not "just" environmental knowledges and procedures, business models and local notions of development what the Río Cruces disaster unsettled. It were the dominant worlds of which such entities, practices and identities were part what became fractured, exposed in their workings and subject to revision and change.

Massive disruptions of reality provoked by events such as an ecological disaster have received close attention from posthumanist disciplines. Latour (2005) has referred to such events as "matters of concern" while Michel Callon, Pierre Lascoumes, and Yannick Barthe (2009) call them "overflows," and Sarah Whatmore (2009) "ontological disturbances." Overflows and controversies express existing concerns about the consequences of precarious and sometimes contradictory knowledges that is "hardwired into the working practices of industry and government" (Whatmore 2009:588). Ultimately, all these related notions point to those moments "in which the things on which we rely as unexamined parts of the material fabric of our everyday lives become molten and make their agential force felt" (Whatmore 2009:587-588). In these situations, Whatmore (2009:588) adds, what we "think we know" or, more commonly, what "'experts' claim to know" becomes "subject of

intense public interrogation” and turn into “generative events in their potential to foster the disordering conditions in which reasoning is forced to ‘slow down,’ creating opportunities to arouse ‘a different awareness of the problems and situations that mobilize us’.”

Although posthumanist approaches have developed and applied a vast set of tools for making visible the performative nature of the world, when it comes to the study of these generative events the focus has been placed on what these traditions call “knowledge controversies” rather than in their performative consequences. That is, in the disturbances that affect the stability of scientific descriptions within the context of increasing uncertainty and heated debates involving sensitive topics such as environment or health. Accordingly, the main target of these analyses is how to evidence the sources of such uncertainty while democratizing techno-scientific decision-making through diluting the division between experts and non-experts (Callon et al. 2009; Whatmore 2009; Tironi 2011).

In contrast, the posthumanist account that I offer here is focused on the “ontological controversy” that the Río Cruces ecological disaster unleashed and on how it unsettled, not only the scientific descriptions about the world, but also the world as such. That is, the dominant ways in which things such as the Río Cruces wetland, the black-necked swans, Chile’s “forestry model” and Valdivia’s identity had been materially performed thus far with the key involvement of technocratic knowledges, environmental laws, and development programs. In other words, I follow the ontological controversies provoked by this local ecological struggle in order to understand its political ontological consequences, including its capacity to fracture dominant configurations of the world and reveal the performative investments needed to make “certain” realities prevail.

By presenting the *Río Cruces* disaster as an ontological struggle I also make room for the surfacing of non-dominant realities. That is, alternative modes of existing and relating. In particular, these non-dominant ontologies involve human/nonhuman entanglements that differ from those that are dominant in our contemporary Western societies such as, for example, different modes of performing “natural” entities like the black-necked swans or the Río Cruces wetland in terms of what they are, what they can do, and how they relate (or not) to humans. I conceive of these non-dominant ontologies as expressions of the multiple co-existing worlds that underlie dominant realities and that are constantly competing to prevail. Although they may have remained hidden, marginalized or simply unable to manifest themselves, once dominant realities are fractured –such as it happened with the Río Cruces disaster– these alternative worlds can surface and circulate more freely.

As I show in this work, the non-dominant ontologies mobilized through the Valdivian disaster were not only able to modify the previous trajectory of dominant performances. They are also crucial for accounting for the unsettling potential of the disaster. The most evident demonstration being the capacities that the Valdivian swans showed for “moving” humans to respond to their suffering. A response that presupposed the existence of ties with humans that no available performance of the world had thus far considered.

By describing the ontological struggle unleashed by the Valdivian disaster and tracing its sociopolitical effects, I wish to show that, as said, the present conjuncture is not as foreclosed politically as radical post-political authors have suggested. Instead, I argue, it is charged with potentially transformative events that may include the local, situated struggles that critical authors consider as politically irrelevant (Marchant 2007). Before going deeper in how local ecological struggles may turn into ontological confrontations able to unsettle

the prevalent order, I wish to provide some conceptual elements related to the reigning ontological consensus and its connection to modern science.

The current ontological consensus corresponds to what many authors have called the Euro-modern ontology (Dussel 2000; Quijano 2000; Mignolo 2007). Philippe Dèscola (2005) describes this specific worldview as “ontological naturalism,” which he situates as one of the four main ontological formations identified across human history. What characterizes Euro-modern naturalism is the total separation between “nature” and “culture,” the stark domination of “nature” by “culture,” and the exclusion of “God” –or spiritual entities and forces– from the forces that take part in the constitution of reality (Latour 2005; Blaser 2009; Dèscola 2005; Escobar 2007). Also, the Euro-modern ontology is distinguished for treating difference in hierarchical terms and conceiving time linearly (Blaser 2009).

There is, however, an additional and crucial element constitutive of the Euro-modern ontology that has produced vast sociopolitical effects while assuring its supremacy over other ways of conceiving reality: the Euro-modern ontology assumes the existence of a *singular ontological matrix* (Blaser 2009; Escobar 2012). Since the ontology assumed as “real” is the Euro-modern one, it follows that “nature” is a single, thoroughly biophysical and pre-discursive domain, ontologically independent from and anterior to “culture.” Therefore, “nature” is not just presumed to be exterior, material, and pre-discursive, but “one and always the same.” That is, a unitary, essential, and immutable domain. It follows, on one hand, that “the real” may not be intrinsically affected by what actors “do,” for it is exterior, anterior and essentially immutable to society; and, on the other hand, that there is “one” and “only one” truthful description of what “the” natural and unitary world “really is.”

The privilege of having the capacity to provide such a truthful description of “*the*” world corresponds, amongst all the types of knowledges that have ever existed, to a specific and local form: modern science. As one of its major products, modern science shares its ontological foundations with Euro-modernity. Modern science not only presupposes a divide between “nature” and “culture” but its effectiveness is fully dependent on the existence of such divide. The scientific pretension of objective knowledge is founded, precisely, in the idea of “*a*” natural world that is detached from the “doings” of humans. As Arturo Escobar (2012) explains, through the claim of a supra-rationality or universal reason that only Euro-modernity possesses, scientific knowledge places itself as the only one that may speak “on behalf of nature.” Any other knowledge, particularly if it admits nature/culture cross-links is considered non-verisimilar and, thus, marked as inferior.

For arriving at truthful descriptions about “*the*” world, modern science developed a mode of knowing guaranteed to be objective, controlled, and replicable. Consistently, the scientific observer was enacted as a reliable and detached witness, able to narrate with analytical distance the experiments that gave birth to modern science in the late 1700s (Haraway 1991, 1997; Latour 2001). The neat divide between nature and culture was reproduced through the body/mind binary, symptomatically marked by the exclusion of the feminine body from the scientific scene. Indeed, women were explicitly excluded from the stage where the scientific observer was historically constituted: “the experimental way of life built the exclusion of actual women as well as cultural practices and symbols deemed feminine, into what could count as ‘the truth in science’” (Haraway 1997:28). Moreover, Haraway adds, gender became more and more invisible, as the body was kept hidden so it would not pollute science: “the kind of visibility –of the body– that women retained glides

into being perceived as ‘subjective,’ that is, reporting only on the self, biased, opaque, not objective” (Haraway 1997: 32). Since then, the success of modern science has required a continued effort to assure that the separation of body/mind and nature/culture is sustained. These efforts include contemporary practices that Callon et al. (2009) call the seclusion of science from society, in the face of threats derived from controversies and overflows.

Albeit being a particular, historically situated mode of understanding how the world exists and is organized, the Euro-modern “distinction between the world (Nature) and its representation (Culture),” and the accompanying notion of ontological singularity have been and continue to be “affirmed as universal” (Blaser 2009:889). Accordingly, the Euro-modern ontology, defined as superior, has been globally imposed over other ways of being and relating through historical processes of colonialism and cultural erasure critically described by modernity/coloniality theorists (Dussel 2000; Quijano 2000).

The centrality of science and technology in contemporary social orderings and modes of governing has reinforced the Euro-modern ontology, as post-political approaches have emphasized. In particular, Swyngedouw (2009) has shown that the techno-managerial approach to the global ecological crisis has resulted in an ontological stabilization of “Nature.” That is, in the production of two mirroring and equally managerial “natures” that occupy the space of contemporary political imagination. On the one side are the apocalyptic natures that anticipate a global catastrophe and demand urgent action through the return to a more benign and harmonious nature. On the other side are the manufactured techno-natures that promise efficient responses to environmental challenges through the invention of machines, artificial life or cyborg-like organisms. Although these two natures may lead to differentiated material worlds, both are predicated upon the view of a single, exterior

“Nature” that may be scientifically known, predicted, and managed (Swyngedouw 2009). In brief, in the post-political era, the entangled, hybridized, and always changing “natures” that populate our planet have been converted into a single, universal, and managerial “Nature” subject to expert knowledge and technical design (Swyngedouw 2009).

Despite its substantive sociopolitical effects, the specifically Euro-modern notion of *ontological singularity* has not been contested by critical approaches (Sundberg 2014). This silence sharply contrasts with the massive effort invested by these same approaches in unsettling the modernist nature/culture divide. On the contrary, the idea of a singular, exterior, perdurable and strictly biophysical nature, proper to Euro-modernity, is deeply rooted across disciplines and philosophical stances. Not only realist and critical-realist traditions, closest to the natural sciences, subscribe to the idea of a singular ontological matrix. Constructivist approaches that have claimed to make room for non-dominant knowledges also take such assumptions for granted. Even some posthumanist authors remain situated within the Eurocentered ontology while contributing to silence both the local character of knowledge and the existence of indigenous epistemes (Sundberg 2014).

For instance, representatives of the constructivist perspective known as “socio-natures,” of great influence within Human Geography, have affirmed that even though the existence of *a nature* that is independent from knowledge or extra-discursive is an undecidable issue, the world is finally “one and the same” (Castree 2001). By this they point to a biophysical domain that, albeit undefined, is assumed to constitute the ultimate layer of reality. That is, a realm where no discursive inscriptions are found but “just matter” exists. In this sense, such a domain is also immutable as long as it is governed exclusively by “the laws of nature.” Although recently Arturo Escobar (2007) has subscribed to what he labelled the

ontological turn, calling for ontological humility (Escobar 2012), in “After Nature” (1999:2, emphasis added), one of his most influential pieces, he also backed the notion of ontological singularity when arguing that his non-essentialist approach had nothing to do with “denying the existence of *a* reality” that is “biophysical, pre-discursive and pre-social.”

Despite all the efforts invested by the realist/constructivist debate in trying to differentiate the autonomous existence of a pre-social nature from its social construction, the fact is that our (human) understandings of nature pertain in themselves to “the social.” Paradoxically, then, any agreement regarding the “true” character of reality can only be epistemological. Furthermore, notions of nature as a domain of “intrinsic value, truth or authenticity” (Soper 1996:22) have entailed huge sociopolitical consequences, beginning with the erasure of certain humans and their ties to places that have been represented as “pristine” or “wild” (Kosek 2006). Therefore, when it comes to the ontological many questions will have to persist. Moreover, I agree with Escobar (2007) in that, regarding the definition, distribution and internal relations of what exists –that is, regarding ontology– the best we can do is to cultivate our own ontological humility.

The work of Karen Barad serves well to illustrate the sort of ontological humbleness that Escobar calls for. In her 2003 paper on a “posthumanist performativity” Barad explores how matter comes into being. Elaborating on Niels Bohr’s quantum physics, she proposes to give up the distinction between epistemology and ontology for it reverberates “a metaphysics that assumes an inherent difference between human and nonhuman, subject and object, mind and body, matter and discourse” (Barad 2003:829). Barad, thus, develops what she describes as an “agential realism” whose basic premise is that there is no “primary epistemological unit” of “independent objects with inherent boundaries and properties”

(Barad 2003:815). The primary unit of existence, she states, corresponds to “phenomena” that are materially indeterminate. As such, reality takes shape through knowledge practices that are “cut” from such ontologically primitive or indeterminate state. Barad insists that entities, human and nonhuman, that are involved in producing these “intra-agential ontological cuts” –from concepts to laboratory machines– are inseparable from the realities that, as effect, take shape. In sum, for Barad there is no such thing as an autonomous and pre-discursive matter. Instead, there is a constant flow of agencies that take part in producing the specific intra-actions through which matter itself –that is, the reality and the world– comes into being. Barad’s primitive phenomena –close to Callon’s (2006) primal “plasma”– reinforces the notion of fluid reality whose performance is constantly inflected by all sorts of agencies taking part in the constitution of objects, identities, and relations.

At this point, I must clarify that to acknowledge the fluid and indeterminate character of the basic state of what exists has nothing to do with abandoning the pursuit of scientific knowledge. On the contrary, scientific accounts of “the real” continue to have a fundamental place in providing effective descriptions, explanations and predictions about the world. To be consistent with the idea of ontological indeterminacy descriptions of the world need to overcome a limited notion of “truthfulness” that assumes that a pre-given reality is waiting “out there” to be discovered.

In replacement of the notion of “truthfulness” Callon (2006) proposes that of “verisimilitude.” That is, the capacity that a scientific statement has to describe and predict the world, not because there is a reality that precedes it, but because it is so entangled with the world that it describes and names –through interventions such as metrics, instruments, theories and politics of knowledge– that it can actually “make such reality happen.” In

other words, what the notion of “verisimilitude” expresses is the material correspondence between scientific descriptions and the reality they represent.

By reviewing this debate, my goal is to be aware that the notion of *a* nature that is always “one and the same,” exterior, and autonomous, exists only within the contours of the Euro-modern matrix of ontological singularity in which we, Euro-moderns, currently live (Sundberg 2014). Thus, the modern way of understanding what nature is and how we humans are (or not) related to it, is only one mode amongst many others. A local mode –as Callon (2002) would insist– that emerged in seventeenth century Europe, as Michel Foucault (1994) has so brilliantly described when narrating the birth of Natural History.² To accept this situatedness with ontological humbleness implies accepting also that it may be that such Euro-modern mode of conceiving nature has left out or, even more, has erased certain aspects, properties, or relationalities, not because they lacked ‘verisimilarity’ –in the sense proposed by Callon– but because they were not measurable in the sense demanded by the modern scientific method and its operations of representation. Therefore, rather than continue confronting realist and constructivist arguments about the existence of a pre-social

² In the sixteenth century, Foucault (1994) describes, before modern science appeared, History was still a unitary domain. Then, “to write the history of a plant or an animal was as much a matter of describing its elements or organs as of describing the resemblances that could be found in it, the virtues that it was thought to possess, the legends and stories with which it had been involved” (Foucault 1994:129). In brief, he explains, “the history of that living being was that being itself, with the whole semantic network that connected it to the world (...) the great tripartition, apparently so simple and so immediate, into *Observation, Document, and Fable*, did not exist” (Foucault 1994:129, emphasis in the original). “And this was not because science was hesitating between a rational vocation and the vast weight of naïve tradition, but for the much more precise and much more constraining reason that *signs were then part of things themselves*, whereas in the seventeenth century they became modes of representation” (Foucault 1994:129, emphasis added). Thus, when the first books of Natural History were published, *something was missing*, says Foucault: “The whole of animal semantics had disappeared (...). The words that had been interwoven in the very being of the beast have been unravelled and removed: and the living being, in its anatomy, its forms, its habits, its birth and death appears as though stripped naked” (Foucault 1994:129-30). And, he concludes: “Natural history finds its locus in the gap that is now opened up between things and words –a silent gap, pure of all verbal sedimentation, and yet articulated according to the elements of representation, those same elements that can now without let or hindrance be named” (Foucault 1994:30).

ontological domain, perpetuating in this way a debate that is totally framed within the Euro-modern matrix, we should begin to attend to the multitude of alternative ontologies –such as, for example, those where rivers and swans are already members of the political community– that are emerging in front of us and, more importantly, that are taking part in the making of the world. In brief, I call for acknowledging the existence of alternative ontologies in the here and now.

This is, of course, no simple task. As Blaser (2009) has argued, the most important political consequence of the Euro-modern worldview and its notion of ontological singularity has been a reductionist understanding of non-modern ontologies by treating them as mere “cultural perspectives” on *the* world. *A* world that is, of course, the *one* that corresponds to the Euro-modern naturalistic ontology. As a result, whatever is proper to non-modern worlds and knowledges in terms of how “they distribute what exists and conceive their constitutive relations” (Blaser 2009:886) is positioned as primitive modes of being and relating, inherently unable to produce accurate representations of “*the*” reality.

According to Blaser, this reduction of ontological difference to a matter of cultural perspectivalism must be the target of rigorous analysis. Particularly because modernity has been granted a normative status (Blaser 2009). Thus, he adds, in recognizing modernity as a specific (and local) ontology and making room for non-modern ontologies it is crucial to acknowledge them in their own terms rather than in hierarchical relation to Euro-modernity. One way to do so is by paying serious attention to the ontological struggles that Blaser has described, which will proliferate as a result of increased capitalist incursions in indigenous territories. Blaser (2010:2) argues that the focus on ontological struggles –that is, struggles over the constitution, distribution, and relationality of what exists– is the most fruitful

perspective to address the present global conjuncture not only because it reveals that “alternatives to modernity exist,” but also because such conflicts “force modernity to reshape itself in order to deal with radical difference.” In other words, if difference is to be taken seriously we must accept that it can no longer be reduced to a question of different “perspectives” but, ultimately, a question about the world’s ontological “multiplicity.”

Indeed, as Blaser has shown, the accumulated effect of ontological struggles has been an increased visibility and circulation of non-modern, indigenous forms of being and relating through national and international networks as they defend their own practices and knowledges. The result is that indigenous worlds have become –to use Blaser’s term– more “(corpo)real.” That is, their “ontological density” has increased, as expressed in the thickening of their ties with governments, laws, policies, international agreements, private companies, and so forth. Indeed, as Blaser (2010) describes in detail for the case of the Yshiro in Paraguay, indigenous worlds and knowledges have expanded their presence and political empowerment across Latin America during the past decades confirming what modernity/coloniality theories have for long argued: non-modern ontologies are not just pieces of anthropological archives but fully alive and distinctive worlds that differ from Euro-modern ones.

The challenge of dealing with ontological struggles implies, then, to accept the co-existence of multiple worlds. Only then we will be able to “recognize that there are other worlds –not cultures– that are different from the modern one” (Blaser 2009:890). This is a complex task because, as Blaser (2009) explains, what is at stake in ontological struggles is precisely the differing “things” that are at stake. For, ontological confrontations do not simply expose diverse modes of interpreting “*a*” singular world. They reveal thoroughly different worlds

altogether. In particular, indigenous ontologies reveal nature/culture entanglements that simply have no translation into modern scientific categories. Therefore, acknowledging their existence is, at the same time, threatening the very singularity of the Euro-modern ontological matrix. For, as Blaser (2009) describes, Luna is not a whale for the Mowachat nation but a Tsux'lit, an entity with precise properties and powers that has no equivalence in modern categories. And Evo Morales is not performing rituals to symbolize the ethnic character of his politics. He is following a precise protocol in order to actively summon nonhuman forces that will take part in his government. There is no way of acknowledging these nature/culture relationalities from within the Euro-modern ontology. To dismiss their pertinence to alternative, non Euro-modern worlds is to reject their existence.

Blaser's approach strongly resonates with Escobar's (2012) description of the non-dominant worlds that are proliferating in Latin America and elsewhere through the activation of a "politics of relationality." That is, a politics that presupposes the existence of relations between humans and nonhuman entities –such as mountains, oceans, rivers or swans– through which the latter are considered to be "members" of territorial communities where collective life-projects unfold. Although many of these nonhuman entities do not have a scientifically demonstrable existence, Escobar (2012) states they are nonetheless "real," as evidenced when they in fact "act" as part of the political community. Blaser (2014), for example, highlights the case of *Pacha Mama*, an Andean entity –mistakenly translated as Mother Nature– that has proven to be so alive and strongly tied to the peoples of Ecuador and Bolivia that it has been granted political rights.³

³ The Constitution of Ecuador (2008), in its Article 71, grants *Pacha Mama* the right to be integrally respected in its existence and the maintenance and regeneration of its life cycles, structure, functions and evolutive

In contrast, however, as Sundberg (2014) has argued, Eurocentered epistemologies consider that recognizing *pachamama* as a political actor in its own right risks returning to a primitive and superstitious state. In brief, to a pre-modern knowledge. Even though most posthumanist descriptions make room for “things” and “entities” that are co-producers of social life, they reify Euromodern categories when failing to recognize the capacity of nonmodern ontologies to produce knowledge able to theorize the involvement of nonhumans (Sundberg 2014). In sum, for Latour, Blaser, Sundberg, Callon, Escobar and many others, seen through posthumanist lens the current ecological crisis is helping reveal human/nonhuman ties, entanglements and relationalities that are increasingly enacted from the borders or fractures of dominant worlds. These crosslinks between “culture” and “nature” that are re-emerging with particular force through confrontations such as ecological ones are pressuring for new spaces of theorization.

Returning to my research, the key argument I put forward is that the increased ontological politicization of the world described by Blaser and others is not only occurring through confrontations between modern and non-modern –that is, indigenous– worlds. I argue that such ontological politicization also is taking shape through the tensions provoked in the dominant ontological consensus, its techno-scientific foundations and sociopolitical arrangements, by non-dominant albeit still intra-modern ways of being and relating –in particular, of relating to nature– that are expressive of the world’s multiplicity. As Escobar (2012:11, translated by the author) puts it, “there are other forms of modernity, dissident, marginal, or alternative, within the West (...) while new modernities are arising from within the fractures of that dominant modernity.”

processes.

I see these intra-modern, non-dominant ontologies as the embodiment of the ontological multiplicity that Annemarie Mol (1999, 2002) describes as foundational to her political ontological project. Let us take a closer look at Mol's "ontological multiplicity" in order to better explain how intra-modern multiplicity may be observed and traced.

Through the study of medical practices, Mol demonstrates that the bodily conditions taking shape in laboratories, hospitals, and clinical procedures are not pre-given and exterior domains. Depending on the practices involved, Mol finds, specific illnesses materially differ between one medical site and another. For instance, studying the practices involved in the diagnosis of anaemia, Mol observed three different ways of measuring this condition that resulted in also three distinctive medical "objects." That is, in different entities with their own history and also in their material properties and modes of acting. Mol (1999:85) warns, however, that these differing objects do not constitute completely "alternative" realities, for "the various anaemias that are performed in medicine have many relations between them. They are not simply opposed to, or outside, one another." In fact, while they may "clash at some points, elsewhere the various performances of an object may collaborate and even depend on one another" (Mol 1999:83). Thus, Mol (1999:75) states, "reality does not precede the mundane practices in which we interact with it. But is rather shaped within these practices." If reality is "done," Mol (1999:75) concludes, it follows that "it is also multiple."

The consequences of Mol's multiplicity are vast. The first and most evident is the rupture with the Euro-modern idea of a singular or unitary ontological domain governed by underlying, structural laws that are exterior and anterior to society. At stake, thus, is the very existence of such pre-discursive, essential and autonomous nature with its fixed laws.

A second consequence is that difference can no longer be reduced to a matter of cultural or epistemological pluralism or “perspectivalism” –as Mol calls it– as constructivist accounts have done so far. As Mol (1999:76) explains, perspectivalism relies on the metaphor of “construction,” allowing difference to multiply in “the eyes of the beholders” but without touching the singularity of the real. To be acknowledged, difference needs to involve the world’s multiplicity by replacing the metaphor of “construction” by those of “intervention and performance” (Mol 1999:77). Only then we may begin to deal with “a reality that is *done* and *enacted* rather than observed” (Mol 1999:77, emphasis in the original).

Thirdly, if reality is “done” it follows that “it is also political” (Mol 2002:7). That is, “its character is both open and contested” (Mol 1999:75). The recognition of the world’s ontological multiplicity implies accepting the permanent, always open possibility of competing configurations: “reality is never so solid that it is singular. There are always alternatives” (Mol 2002:164). Once this *ontological openness* –as I will call it– is accepted, we can no longer evade what Donald Mackenzie (2006:1444) calls “the most important question: What sort of world do we want to see performed?” Or, as John Law (2008:637) reframes this same question: “how to interfere in and diffract realities in particular locations to generate more respectful and less dominatory alternatives”? It is not, however, just a matter of choosing. Rather, as Mol (2002) explains, the point becomes accepting that the world we live in is not one, that there are lots of ways of living, and that each one comes with a different ontology and a different grading of the good.

What I propose, then, is that through revealing the existence of non-dominant, albeit intra-modern human/nature relationalities local ecological struggles may unleash a transformative potential that is not reduced to their capacity to confront power structures or

mobilize programs of social change, as post-political approaches have argued. Such potential lies, rather, in the tensions that these ecological struggles can provoke on dominant ways of performing things such as wetlands, rivers, forest economies, or local identities. These mutations derived from ontological struggles centrally include the constitution of the political community itself by expanding to nonhumans the definition of who counts as a political actor able to inflect the trajectory of prevalent orderings

As the coming chapters show, perhaps the most salient of the ontological fractures registered by this research has to do, precisely, with the political agency displayed by the Valdivian swans and, in particular, by the unquestioned centrality that their suffering had in the transformative power reached by the Río Cruces disaster. The outstanding capacity of these birds to “move” an impressive array of actors to “do” things in response to their suffering contrasts with their incapacity to make full sense of such experience. Such unspeakability is revealing of the unthinkable character that this deep human/nonhuman entanglement has from within our Euro-modern constitution while reaffirming its pertinence to non-dominant worlds. Indeed, as Jacques Derrida (1995, 2002) and others (Desmond 1978, 2003) have shown, being “moved” by the suffering of a nonhuman animal constitutes a deeply unsettling event for it challenges the foundations of our Euro-modern frames of thought. Despite this uneasiness, the responses provoked by the suffering of the swans is the major confirmation that I found in this research of the potency that non-dominant, alternative ontologies –to which the encounters with swans pertain– actually have in the performance of the world in which we are currently living. If we are truly to overcome the apparent foreclosure of the political by making room for the unsettling effects of non-dominant ontologies, it is urgent that we refine our analytical tools in order to

develop a broadened understanding of how the world is being transformed by actors that are not always human. It is based on their capacity to provoke these types of ontological expansions that I propose to conceive of local struggles such as the Valdivian one as having the capacity to mobilize non-dominant human/nature entanglements that are already producing meaningful sociopolitical reconfigurations.

In sum, then, through a political ontological interpretation that stays close to the “doings” of the actors, this study explores the *ontological opening* that the Río Cruces disaster provoked in previously dominant performances of the world –such as Chile’s forest model, environmental laws, the protected wetland and its colony of swans– that turned out to be fully implicated in the disaster’s fabrication. I demonstrate how such exposure not only provoked the transformation of such dominant performances, but also, in doing so, made room for the strengthening of alternative ontologies whose historical traces I also follow.

In Chapter 2 I present the methodology of my research. I describe how I define and trace the ontological fractures that the Valdivian disaster provoked as well as their effects. I also present the questions that guide my research and the sources I use to answer them. Finally, I introduce the core concepts upon which I build my key notion of *ontological opening*.

In Chapter 3, I recount the making of the globalized mega-holding that was ARAUCO by the early 2000s, connecting it to the unfolding of Chile’s forest sector and to the implementation of the country’s first-ever environmental frame in the early 1990s. I emphasize the investments and agencies that led to the until then dominant mode of performing the forest business in Chile, of which ARAUCO was considered the most successful representative. I also follow the traces left by alternative worlds that emerged in

resistance to the expansion of forest plantations and their pulpwood orientation, which were entangled to the defense of native forests.

In Chapter 4 I describe how the Río Cruces wetland and the black-necked swans came to be entities worthy of protection. To do so, I trace the human and nonhuman agencies that have taken part in the actual making of the wetland and the creation of the conditions that led to the establishment of its resident colony of swans. I pay especial attention to the knowledges that provide a broadened understanding of the agentic properties through which the swans and other species –like the *luchecillo*, the Valdivian swans’ main food– should be seen as key actors in converting the wetland into a protected sanctuary. I also follow the traces left by the swans along Valdivia’s history confirming that prior to 2004 there was no register of a meaningful bond with the city’s inhabitants.

In Chapter 5 I describe the events and “doings” that led to the approval of ARAUCO’s pulp-mill in the mid 1990s. In particular, I pay attention to the historical investments made by the company in order for its mill to be approved, while describing the workings and hesitations of the public agencies that were responsible for its assessment and for defining the conditions of its environmental permit. I also follow the traces of the ontological struggle that such decision unleashed locally, in Valdivia and in the fishing town of Mehuín, involving alternative modes of existence for entities such as oceans and rivers.

In Chapter 6 I describe how the Río Cruces disaster took shape while exposing in detail ARAUCO’s environmental practices as constitutive of its particular way of performing the forest business. I account how such exposure, as described by the actors, constituted a deep fracture, not only within ARAUCO, but also of in Chile’s until then dominant business

model. I also trace the long-lasting marks that such fracture provoked in the company, as accounted by its main executives and other sources.

In Chapter 7 I analyze the performative effects of certain scientific knowledges –which I call “commissioned knowledges”– that were determinant in the disaster’s fabrication. I describe how through their omissions, silences, and overt production of ignorance these commissioned knowledges performed the wetland as compatible with ARAUCO’s mill. In particular I recount how the ecological baselines prepared by commissioned scientists in the mid 1990s, key in the approval of ARAUCO’s pulp-mill, omitted one of the wetland’s main attributes –its estuarine hydrodynamics– that the disaster revealed was crucial in the accumulation of pollutants. I also analyze the performative effects of commissioned reports hired in the midst of the controversy and show how they contributed to enact the wetland and its species as both, unknown and disentangled from humans, further making them compatible with ARAUCO’s discharges.

In Chapter 8 I review how the events displayed through the disaster, and in particular the “doings” of the Valdivian citizens/swans association, led to the breakdown of the country’s environmental frame. In analyzing such massive fracture I describe how the workings of the country’s environmental procedures were exposed as fully implicated in the disaster’s fabrication by the non-dominant knowledges produced by citizens and expanded by the circulation of images of the swans and their suffering. I also trace how such non-dominant knowledges were decisive in provoking the breakdown and reform of Chile’s environmental edifice. I connect this fracture with the ontological struggle that the disaster sparked around Valdivia’s identity, describing the decisive role played by the existing entanglements between citizens and rivers, and how they enrolled wetlands and swans into

an expanded performance of the city's development. I also explore the long-lasting marks that such ontological reconfiguring has left in Valdivia.

In Chapter 9, building on the previous chapters, I focus on the political agency of black-necked swans. I provide evidence for the centrality of the swans in explaining the disaster's transformative potential even beyond the "doings" of the Valdivian movement. I describe the events through which the swan's political agency took form, including the circulation of images through TV screens and face-to-face encounters with agonizing birds. I show that the "suffering" of the swans became a key agentive force and take this finding as demonstrative of the existence of nondominant nature/human relationalities that were made available through the disaster.

Finally, in Chapter 10 I present the conclusions of this study. I propose a dialogue with political philosophies in order to reframe in ontological terms the political potency of local, situated struggles such as the Valdivian one. To do so, I develop an ontological interpretation of Jacques Rancière's aesthetic notion of the "properly political," arguing that the very coming into existence of new subjects that take part in the political community is the fundamental site of political inflection. Based on Simon Critchley's interpretation of Rancière I propose that the encounters between Valdivians and swans is the constitutive moment that turned the Río Cruces disaster into a "properly political" event.

Indeed, the most notable effect of the Valdivian disaster, I conclude, was to evidence the existence of non-dominant human/nature relationalities that are already taking part in the making of the world. As the Valdivian struggle shows, such alternative worlds have the capacity to unsettle dominant performances and their techno-scientific assurances by

revealing the hidden, forgotten –although fully alive– political agency of nonhumans. At the core of every one of the fractures that resulted from the Valdivian struggle I found the “doings” of swans and their associations with humans. It was through these human/nonhuman entanglements –the same that modernity has relentlessly weakened, erased or ignored– that the swans displayed a political agency capable of exposing a reconsideration of the practices involved in the disaster’s institutional fabrication.

In sum, the Río Cruces ontological struggle evidences that, in the here and now, inside this modernity that is supposedly immune to overcoming the greatest of all divides, humans are experiencing disturbing entanglements with nonhumans that have the capacity to spark from them responses that entail huge sociopolitical consequences. To acknowledge this is to make room for the political potential that lies within ecological struggles once we begin to pay attention to the ontological confrontations they may unveil. Through exploring the *ontological opening* the Valdivian disaster produced, its traces and long-lasting consequences, I expect to contribute to the understanding of how this local struggle may be deemed thoroughly political and materially involved in the gradual –although uncertain and contradictory– “(corpo)realization” of non-dominant, alternative realities that may mobilize less exclusionary and exploitative human/nature relationalities.

Chapter 2: Tracing and Describing the *Ontological Opening* Provoked by the Río Cruces Disaster: Methodological Strategy and Analytical Tools

“Any act, even of language, produces effects that might strike back”, Michel Callon (Barry and Slater 2002:18).

“Everything is uncertain. Everything is relational. And nothing is foundational” (John Law 2008:632).

2.1 Overview

In this work I address the study of the Río Cruces disaster as an ontological struggle and outline the resulting *ontological opening* derived from its production and contestation through following its effects and tracing their marks at different sites. The visibility and far-reaching consequences of the Valdivian disaster make this case a paradigmatic example of how a local, single-issue struggle is not only of sociopolitical relevance but can also unleash ontological confrontations with the capacity of bringing about non-dominant human/nonhuman entanglements. So doing, a local struggle like the Valdivian may take part in confronting dominant ways of relating to nature and their technocratic assurances, such as those characteristic of Chile’s neoliberal environmental frame.

In this chapter I present the approach, strategy and tools that constitute the methodology of my research. The approach refers to the posthumanist methodological stance I assume and, in particular, to its political ontological and performative perspectives. The strategy, in turn, points to how I address the description of the Valdivian ontological struggle and its effects. The latter includes the questions that guide my research, the sources I use to answer them, the signs to which I pay attention in detecting the ontological fractures and confrontations that I study, and the steps I follow in tracing their marks. Finally, the tools I deploy correspond to the analytical devices that I build upon to account for the Río Cruces disaster as an ontological struggle. I synthesize such tools in the notion of *ontological opening*.

As mentioned in the Introduction, I propose the notion of *ontological opening* as my own synthesis of what I consider the most outstanding contribution of posthumanist approaches. Based on works from the fields of Actor-Network Theory (ANT), Science and Technology Studies (STS), Political Ontology, and Economic Performativity, I articulate together two core concepts that are the dorsal thread of my analytical perspective: ontological multiplicity and ontological performance. While the notion of multiplicity compels us to overcome the idea of a singular reality in order to pay attention to the numerous natures, societies and identities that are constantly being enacted through the situated practices of actors, the notion of performance frames reality as an always unfolding event where multiple worlds –with all their richness and unexpected agencies– are continuously meeting, confronting and pushing to become more (corpo)real in order to prevail.

Methodologically, what characterizes posthumanist approaches is, according to John Law (2008), not only that they pay attention to materiality but that they “think through materials.” This is why, Law (2008:629) explains, its practitioners are so cautious about grand narratives and prefer to speak “austerely,” refraining from generalizations and allowing theories to be “worked through” empirical studies. Accordingly, ANT, STS and related fields may be seen as “little-narrative(s), thoroughly empirically-grounded, very material, small-scale relative of (say) Foucault’s larger-scale epistemic project” (Law 2008:632). Law’s description connects the apparently humble and narrow-focused case studies developed by these approaches with Michel Foucault’s broader project oriented to unsettling the modern episteme.⁴

⁴ Briefly put, Foucault’s project exposed the underlying “games of truth” of the “modern episteme”: that is, “the rules according to which what a subject can say about certain things depends on the question of true and

In my own interpretation of the posthumanist project I am interested in moving from the study of micro-processes involved in everyday, situated practices –that is the main focus of posthumanist studies– to the analysis of macro socio-historical processes such as the making of economic systems described by Callon (2006) or the encounters between indigenous worlds and coloniality addressed by Blaser (2009). Connecting in one narrative the analysis of actors’ concrete “doings” and the accounts of how “the social” has been historically performed makes possible the notion of the *ontological opening* of reality I herein explore. In this research, I connect the “doings” of the actors involved in a local ecological controversy –the Río Cruces disaster– with sociopolitical effects that traveled through time and space turning it into an ontologically generative event.

This chapter begins with a general description of my methodological approach followed by an overview of the research strategy. In the second half of the chapter I present the core concepts upon which I build the notion of *ontological opening* and its accompanying analytical tools, situating their origins and describing their evolution. Through this description I keep close to the studies from which these concepts and methodologies originated. In the concluding section, I present the questions that drive my research.

2.2 Methodological Approach

Understandings of what we call “the social” have dramatically changed in the past three decades. From poststructuralist accounts to flat ontologies, and from decentered agencies to embodied performances, the forces, actors and patterns that comprise what we conceive as a “society” have become increasingly unexpected and elusive. Despite these shifting

false” and how the rules that determine the “veridiction” of a certain discourse constitute “the historical a priori of a possible experience for a period of time, and area, and for given individuals” (Foucault 1984:942). Florence, Maurice (pseudonym). 1984. “Foucault”. Pp. 942-944, Vol. I, in *Dictionnaire des Philosophies*, by Denis Huisman (Comp.). Paris: PUF.

notions social research methods remain a relatively limited repertoire attached to what Law (2004) describes as conventional tools. These include the classic division between quantitative and qualitative approaches. While standard methods have proven to be effective in describing certain types of also standard social realities they are badly equipped to study the ephemeral movements, flows, and hesitant performativities through which “the social” is temporary assembled in always unique and local ways (Latour 2005).

According to Law (2004:5), the main barrier for a methodological refreshing of social research lies in the normativities that tell us “how we must see and what we must do when we investigate.” What prevail are notions of rigor that finally convey the importance of obtaining the technically most “robust possible account of reality” (Law 2004:9). This methodological rigor –an inheritance of positivism– demands science to be protected from the researcher’s subjectivity and is also linked to dominant understanding according to which “unless you attend to certain more or less determinate phenomena (class, gender or ethnicity would be examples), your work has no political relevance” (Law 2004:9).

Conventional methods also carry Euro-modern ontologies for which reality –“social” or “natural”– is “*a set of very specific, determinate, and more or less identifiable processes*” (Law 2004:5, emphasis in the original) waiting “out there” to be discovered.

If we are willing to accept the performative character of the world and its multiplicity we need to give up these normative orientations that demand straightforward descriptions. Not only because this would be the most appropriate form of generating accounts that make room for the messiness of “the social” (Law 2004). Also because through our painful efforts to make the social fit into coherent pictures we end up performing an “ordered” social reality that stands out despite our hesitations about what we have left out, or about

what we are not prepared to deal with or are not able to see. The point, then, is not just to recognize that describing the messiness of “the social” demands increasing methodological complexity but also accepting that social processes are “complex because they necessarily exceed our capacity of knowing them” (Law 2004:6). This methodological humbleness – relative to an ontological humbleness that accepts our limited understandings of “the real” – demands building accounts that make sense for the actors involved. That is, that translate “the social” –albeit partially– into narratives that reassemble society back again, to use Latour’s (2005) term. Such accounts need to consider all the human experiences that come along with the descriptions of the actors, including embodiment, emotions, and non dominant ontologies.

Such a challenge asks us to “rethink our ideas about clarity and rigor” accepting that knowing sometimes requires “techniques of deliberate imprecision” (Law 2004:3). This way of approaching the study of “the social” is “often slow and uncertain (...). A risky and troubling process” for it will “take time and effort to make realities and hold them steady for a moment against a background of flux and indeterminacy” (Law 2004:10). We need to slow down thought as Whatmore (2009) has put it, and move tentatively as Law (2004) recommends. For, this is “a slow method, or vulnerable method, or quiet method. Multiple method. Modest method. Uncertain method” (Law 2004:11).

2.3 Methodological Strategy

2.3.1 Ontological Fractures and their Effects

My exploration begins with what I call the *ontological fractures* provoked by the ecological collapse of the Río Cruces wetland. By these fractures I point to the breakdowns or deep unsettling that interrupted what Latour (2005) calls the “normal state of affairs.” That is, the

stark failures in social orderings that had so far functioned as stabilized assemblages of actors, knowledges, and practices. Through these unexpected interruptions the disaster helped to reveal, not only the workings involved in sustaining such stabilized orders, but also competing ontologies, exposed as constitutive of the world's performance.

The notion of ontological fracture is closely related to terms such as socio-technical overflow (Callon 2009), matter of concern (Latour 2005), or ontological disturbance (Whatmore 2009). All them point to events that disrupt prevailing "states of the world," as Callon et al. (2009) have called them. While for Callon et al. (2009) these overflows are opportunities to democratize democracy by bringing decisions into hybrid forums comprised of lay people and experts, for Latour (2005) these controversies expose uncertainties about *what* the world is made of, bringing about unexpected agencies that ultimately unsettle prevailing orderings including nature/society deep-rooted divides.

I prefer to use the term *fracture* to convey the idea of deep cracks or fissures that suddenly appear in already stabilized orderings or states of the world. The immediate sign of such fractures is a moment of "suspended reality" when, what until then seemed to function – a law, business model, an identity, or certain descriptions of "natural entities" –, does not work any more but rather appears as imposed, wrong, failed, or simply awkward.

What I want to study through these fractures is, first, how they open the black-boxes of "the social," turning visible the interventions, procedures and knowledges needed for such an order to function and be sustained. So doing, such fractures reveal the arbitrariness, imposed character or overt failures of dominant performances of the world. Secondly, I seek to show how, by provoking openings on dominant realities such fractures make room

for until then unacknowledged, hidden or marginalized ways of being and relating that this way become temporarily available and able to enter into the performance of the world.

Third, I want attend to the generative potency of these non-dominant realities by tracing the transformations they can foster in organizations, laws, and human/nature entanglements as a result of destabilizing heavily-invested social orders.

In order to identify and describe the ontological fractures occurred in dominant performances I start by accounting how such dominant realities –including Chile’s environmental frame, ARAUCO’s forest business, the protected wetland and its swans, as well as Valdivia’s identity– took shape and became stabilized. To do so, I follow the agencies, investments and knowledges involved in making such dominant entities exist also tracing how, in order to prevail, they had to confront ontological resistances along the way.

Once I have described the unfolding of dominant realities I account for the fractures that the disaster provoked on them based on the descriptions and testimonies provided by the actors as well as on the marks that such fractures left on objects, laws, practices, identities, and elsewhere, which I follow through secondary sources. These fractures include those occurred in dominant business models and the related environmental practices, the environmental proceedings and techno-scientific knowledges involved in the environmental assessment and approval of industries, and the industrial-laden identity and notion of development supported by local communities. What these fractures have in common is their explicit connection to the disaster as an ontologically generative event.

Once I identify the fractures, I pay close attention to the events that the actors describe as triggering these interruptions of dominant or stabilized social orderings. These triggering

events include, for example, mistaken descriptions about the ecosystem or its species, failed assumptions about the impacts of the pulp-mill's effluent, the political intervention of technical reports, the assessment of the country's environmental performance by international organizations, or unpredictable encounters with suffering swans. I explore the contents of these triggering events also tracing the role played in them by unexpected agencies and non-dominant human/nonhuman entanglements.

In terms of their effects, I pay special attention to how these fractures helped to, first, open the black-boxes of reality by revealing the fabricated character of the normal states of the world. Secondly, I focus on the performative power of the fractures identified, showing how they unleashed the questioning, confrontation and eventual transformation of until then prevailing realities. To show such performative power I trace the connection between the fractures and long-term changes occurred in laws, business practices and local identities that the actors themselves attribute to the disaster. I take such perdurable effects as evidence of the massiveness of the *ontological opening* provoked by the Valdivian struggle.

2.3.2 Traces and Agencies

I search for the ontological fractures and their effects based on the traces of breakdowns, failures, or unsettling found in the descriptions made by the actors as well as on similar marks left in objects such as newspapers, reports, images, and laws. I give special attention to the “doings” and agencies that actors consider to be involved, and to the practices, knowledges, associations, and identities they consider to be affected.

In the case of traces that involve nonhumans –such as the Valdivian black-necked swans– the task of identifying them through the accounts of the actors is trickier since, not only

they “appear associable with (...) social ties only momentarily” (Latour 2005:80) but they are also downplayed or even ignored given the difficulties involved in conceiving nonhumans as having any sociopolitical agency. It is “precisely because the social is not yet made,” Latour (2005:47) reminds us, that we should keep as our “most cherished treasure all the traces that manifest the hesitations actor themselves feel about the ‘drives’ that make them act.” Additional attention, therefore, is required to make the actors “talk” about their relation with the swans and with nonhumans more broadly. In particular, I attend to how humans were “moved” by the swans to “do” specific things. I make room, then, for all the uncertainties that refer to the role of nonhuman agents in accounts about the fractures provoked by the disaster. These uncertainties may indicate ontological controversies that involve the constitution of “the social” that actors are unable to express. Tracing nonhuman agencies has nothing to do with “some absurd ‘symmetry’ between humans and ‘nonhumans’” (Latour 2005:76). Rather, it means recognizing that “no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored, even though it might mean letting elements in which, for lack of a better term, we would call *non-humans*” (Latour 2005:72, emphasis in the original).

In order to make room for nonhuman actors, a redefined notion of agency is required. A first element in this redefinition has to do with intentionality. Posthumanism has taken from material semiotics the dissolution of the agency/structure dualism, disentangling agency from intentionality. Agency, then, acquires a completely different meaning. If linguistic semiotics is concerned with how words provide meaning to each other, the material semiotics applied by posthumanist approaches is concerned with how entities give each other “existence.” This is why there is a particular type of difference that actors can make

to each other: “they [can] make each other *be*” (Law and Mol 2008:58, emphasis in the original).⁵ This is why Callon (2006) has said that “existing is acting” and Law and Mol (2008:58) have affirmed that “[A]cting and being enacted go together.” To acknowledge such capacities is to recognize that actors are always ontologically inflected by other actors and, for the same reason, never “in control.” Indeed, other actors cannot only make a difference in an actor’s existing “but also influence[s] *what* exactly it may do” (Law and Mol 2008:70, emphasis in the original). That is, they can make a difference to its practices. This “making each other exist” or being enacted –rather than “making each other act”– is a sort of agency that fully pertains to the domain of the ontological. The key agential feature here is not intentionality or mastery but existence or enactment.

From a posthumanist understanding agency becomes something “ubiquitous, endlessly extended through webs of materialized relations” (Law and Mol:58). It is never fixed but shows up through the diverse channels available at each place and time. Acting, then, “may be told as a fluid event” (Law and Mol 2008:58) or “like a viscous fluid” (Law and Mol 2008:72) that moves around enrolling different actors in the way. This is why, to identify *who* is doing *what* remains a surprise, Latour says, and we might not be able to arrive at clear-cut accounts. What is clear is that actors always act in collaboration with other actors, since acting is always distributed in heterogeneous associations of entities that are bonded together: “[W]e are never alone in carrying out a course of action” (Latour 2005:46).

⁵ According to Latour (2005), however, we can still distinguish the individual entities that comprise a determined network through their particular doings. In general terms, “[A]ny thing that does modify a state of affairs by making a difference is an actor –or, if it has no figuration yet, and actant” (Latour 2005:71). Furthermore, Latour proposes that depending on the type of acting involved, individual actors can also be classified in intermediaries and mediators. Intermediaries are what transport meaning or force throughout the network, without provoking any particular transformation. Thus, they can be taken as black-boxes in themselves. Mediators, in turn, are what transform, translate, distort or modify the meaning or the force of the elements of the network, producing effects that may lead to multiple directions.

If, “[B]y definition action is dislocated” (Latour 2005:46), where can we localize agency? We can trace agency only after action has already occurred. Therefore, it is a matter of *post hoc* attribution (Callon 1986). Furthermore, most of the times there is no point in determining who has exactly done what. For, “[A]nything is, or might be, or might be said to be, an actor” (Law and Mol 2008:74). Rather, key questions turn to be about *how* the social is being made up, *how* different agencies hold it together, *how* it is exposed to fractures, and *how* existing assemblages mutate into new ones. In sum, *how* society is created and destroyed by an agency that moves through changing networks of actors.

In the case of humans, agency includes, of course, language acts. Indeed, language can be highly performative. This is not the same as saying that acts of speech can generate any effect they name. To say that a language act is performative is to acknowledge the way in which it is materially involved in making happen the effects that it names. Therefore, as Callon (2006) has explained, in order to produce any effect at all, the corresponding investments needed for such effects to occur must be already in place. Consistent with posthumanist traditions, I treat the different “doings” of actors –including the acts of language and the movements of nonhuman animals– symmetrically (Barnes 2002; Callon 1986).⁶ That is, I use similar terms to describe what humans and nonhumans “do” in an

⁶ The posthumanist notion of symmetry was first applied by Callon in his 1986 study “Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Briec Bay.” Callon defined symmetry as the “commitment to explain conflicting views in the same terms”, meaning not that humans and nonhuman are symmetric in their properties, but that concepts used to describe humans are also used to account for nonhumans. Doing so, disciplinary and ontological distinctions between “the natural” and “the social” disappear. In his 2008 article “On Sociology and STS” John Law explains that this notion of symmetry originates in early sociological studies of scientific knowledge that faced the dilemma of dealing with theories for which scholars lacked a way of discerning about their “validity.” The solution came from David Bloor’s (1976) *principle of symmetry*, a methodological pragmatism arguing that the validity of science was irrelevant since the object of study was knowledge production itself. True or false, it was knowledge –and not its validity– what had to be explained.

attempt to overcome the power asymmetries involved in dualisms such as human/nonhuman, natural/social, or agentive(active)/passive.

2.3.3 Sources and Descriptions

In identifying and describing the ontological fractures derived from the Río Cruces disaster as well as their effects, I follow Latour (2005) in staying close to the descriptions of the actors. This methodological stance, key to the posthumanist project –which I expand in section 2.4.3– has nothing to do with deploying an individualistic or atomistic methodological approach. Rather, to stay close to the accounts of the actors demands the use of ethnographic tools in the attempt of *returning to such same actors the power to determine which accounts of the world are more effective in describing what a society “is.”* Therefore, this approach demands abstaining from the temptation of replacing the actors’ descriptions by standard sociological explanations and their hidden or invisible forces: “[W]ill we have the courage not to substitute an unknown expression for a well known one?”, Latour (2005:48) asks. This is, Latour (2002) states, *the most morally, politically, and scientifically relevant question involved in the posthumanist understanding of society.* Methodologically, this key challenge does not point to naïvely accepting any description as pristine clear but, rather, to seriously and deeply engage in any controversial account without interpreting it before hand or interrupting its flow, no matter how counter-intuitive it may appear. Politically, this challenge implies letting the actors deploy the full range of controversies about “the social” including those about non-conventional agencies that may subvert the nature/social divide: “we are no longer sure of what ‘we’ means,” Latour (2005:6) says. In the face of these emerging human/nonhuman collectives we are

compelled to accept that some accounts of the world, so far deemed unreal, non verisimilar, or directly mistaken, need their capacity to describe it reinstated.

A first source for the descriptions of the actors are the interviews I conducted.⁷ Given the distance in time from the disaster, interviews were key in identifying and tracing this event's long-lasting effects. A second source consists on complementary accounts gathered from press releases, newspaper notes, rulings, scientific publications, official reports, TV images, pictures, and filmed material. Given the mediatic salience of the case, particularly between 2004 and 2007, the amount of these secondary sources is abundant.⁸ Secondary sources were of great help in complementing the accounts of the interviewees regarding the events they individually described. Also, secondary sources allowed me to build a broader composition of the historical performances I studied as well as of the networks of actors involved and their practices.

The great majority of the actors interviewed easily identified several ontological fractures or breakdowns that they considered to be directly connected to the disaster. Noteworthy are the extent and depth of the fractures identified by interviewees and the persistence of their effects, which greatly surpassed my preliminary assumptions about the generative power of this event. Most accounts concurred in attributing to the ecological collapse of the wetland a landmark character within the country's environmental trajectory, identifying marks left in institutions, practices, identities and the Chilean society, more broadly. Also and surprisingly many acknowledged deep marks in their personal lives.

⁷ I conducted 46 interviews, 44 of them to individuals and 2 to groups representing community actors. The individual interviews distribute as follows: 13 to past and present government officials, public servants and congressmen, 9 to scientists and academics directly involved in the controversy, 8 to Valdivian citizens and members of the Valdivian movement, 5 to representatives of business actors, 4 to environmental consultants, 3 to national environmental leaders and 2 to community actors.

⁸ Only press notes published in the first three years of the struggle sum more than 3,000 (Halpern 2007).

Indeed, I was impressed by how this event was considered by interviewees –especially by those who held positions of responsibility within the country’s past administrations– as a life-learning experience. For example, a former national authority figure with a vast political trajectory situated her involvement in the Río Cruces case as one of the two most outstanding events she had ever experienced. This emotional context favored profound conversations and further exploration of the controversy and its consequences. It also favored the willingness of actors to be interviewed, despite my previous and ongoing involvement in the Valdivian movement. In my research proposal I had anticipated that the most challenging interviews would be those with former authorities and business representatives, who could feel menaced by being interviewed by one of the spokespersons of the Valdivian movement. However, I found that, on the contrary, these actors not only made themselves available to talk with me about the disaster. But, perhaps precisely because of my involvement in the struggle, they were eager to share and discuss the lessons learned and explain how the disaster had marked their personal and professional lives. Therefore, my interviewees were highly self-reflective and self-critical about their roles in the disaster, and, just as importantly, open to acknowledging their hesitations and internal tensions regarding the courses of action in which they were involved. Furthermore, to my astonishment, many of my interviewees –well prepared people, in key political or economic positions– declared to have not known how to act and, even, to have later realized how mistaken they had been about fundamental things they were supposed to understand well, such as the limitations of science in the resolution of environmental controversies or the technical weaknesses of decentralized environmental entities.

With the help of my interviewees, then, the task of identifying and exploring the fractures provoked by the disaster turned out to be much easier and refreshing than I had expected. Furthermore, as the conversations with the actors evolved and I got to interview people who had held positions of high responsibility in the government, the company involved or the scientific teams in charge of developing key studies, I experienced a transformational process myself with respect to the struggle. I not only came to better understand what had led actors to act as they did during critical events, in some cases against their innermost inclinations. I also witnessed their uneasiness in the face of the suffering the disaster caused to the Valdivian swans. The evidence of these hesitations allowed me to reconfigure a broader and, at the same time, more nuanced picture of the investments and resistances involved in the disaster's fabrication.

Finally, I make the occasional use of autobiographical registers to complement or contextualize the descriptions provided by the actors or contained in secondary sources. However, I only use such autobiographical sources to enhance or expand what other actors have already accounted but not to counter pose their descriptions.

2.3.4 Tracing the Surfacing of Non-dominant Ontologies

Amongst the effects I attribute to the Río Cruces disaster is the occurrence of an *ontological opening*. That is, a prolonged state of suspended and fractured reality that, resulting from the overt exposure of how dominant realities have been made to exist and further sustained, allowed the surfacing and circulation of non-dominant worlds and, in particular, of non-dominant human/nonhuman entanglements. I define the latter as ways of acknowledging, experiencing, and describing natural entities –their identities, capacities, “doings” and, overall, their relations to humans– in a form that substantially differs from

those that are constitutive of dominant knowledges, such as the ones involved in environmental decision-making or scientific descriptions.

Non-dominant modes of existence of natural entities emerged in subtle ways. Although identifiable, they generally corresponded to temporary, unstable, hesitant, and even controversial events involving the forces that actors declared to have “moved” them to “do” certain things. Regarding non-dominant human/nonhuman relationalities I found most of their traces in the “doings” of the Valdivian movement, but also in the feelings or uneasiness that the disaster sparked in my interviewees.

In order to build an account of the surfacing of these non-dominant worlds I place my focus on three related aspects. First, I identify the ontological controversies involving the identity of nonhumans such as the Valdivian black-necked swans, the Río Cruces, and the protected wetland. I pay attention to descriptions of what they are, of their properties, and about how they are (or not) entangled to humans. Second, I attend to the modes of performing natural entities. I distinguish the ways in which technocratic knowledges performed the swans, the river or the wetland, from those performances displayed through the “doings” of the Valdivian movement. Finally, I pay attention to the capacities described for nonhumans through identifying what they are said to have “done” to institutions, identities, and politics.

One of the most challenging aspects of this research was to understand what was involved in the impressive agency attributed to the Valdivian swans by different actors. Indeed, the “doings” of the swans were considered by most actors as determinant in configuring the disaster as a landmark event. I work with the responses that the disaster sparked to explore the networks into which the Valdivian swans were recruited, paying especial attention to

the swan's political agency. That is, to their capacity of making others "do" things with relevant sociopolitical effects. To better understand the agency involved in the suffering of the swans I review posthumanist philosophies that reflect on the experience of animal suffering and its ethical and political power.

2.3.5 Narrating the *Ontological Opening*

A good posthumanist account, Latour says, is one that offers a rich description of *how* the social is assembled and reassembled together. This implies accepting that the opposition between description and explanation is artificial. Indeed, an over valuation of theory that comes from the natural sciences has led us to see descriptions as too particular, idiosyncratic, and localized. However, Latour (2005:137) affirms, "there is science only in the particular (...) A good text should trigger in a good reader this reaction: 'Please more details, I want more details' (...) if a description remains in need of an explanation, it means that it is a bad description (...) Much like 'safe sex', sticking to description protects against the transmission of explanations." A good posthumanist account is also one where all the actors can be treated as full-blown mediators. That is, as agents able to make a difference in the world. Methodologically this means that "all the actors do something" that "render[s] the movement of the social visible" (Latour 2005:128).

Following the posthumanist tradition, then, I gather descriptions and traces into a narrative that follows how "the social" was, first, put together, and how afterwards it was suspended, fractured, interrogated, transformed, opened, and multiplied, across time and space, as result of the Río Cruces disaster. In narrating the resulting *ontological opening* I emphasize two complementary movements. The first is a series of specific but interconnected ontological fractures referred to the breakdowns occurred in environmental laws, techno-

scientific knowledges, business practices, local identities and related notions of development. The result is a movement of what Callon (2006) calls disentanglement or, following Blaser (2009), I call de-(corpo)realization, which involves the unsettling and material weakening –or loosing of ontological density– of certain worlds and the practices and knowledges through which they were being performed. This ontological weakening is expressed in the lack of support, public questioning or extended consensus on the need of reforming or changing, things such as environmental institutions, forest businesses, or development projects.

The second movement consists of the materialization or (corpo)realization of surfacing worlds, through non dominant practices and knowledges involved in bringing them into existence. Callon (2006) might describe this movement as entanglement. These non-dominant ontologies do not appear magically into existence but are, rather, already part of an inherently multiple world where they had remained ignored or excluded. As they surface, entangle themselves into networks of actors and enter into their “doings,” these worlds increase their (corpo)reality and become more visible, albeit perhaps only in a temporary, contradictory, and incomplete manner. This second movement is evident, for example, in the political salience attained by the swans and, through it, in the enhancement of non-dominant notions of development related to a particular mode of performing Valdivia’s identity. In the same sense, the fractures that the Río Cruces disaster provoked in Chile’s environmental frame, and its resulting loss of (corpo)reality, gave way to a new institutional design materialized in the 2009 environmental reform. Finally, the massive disentanglement that affected the environmental practices of private companies that

prevailed in Chile until 2004 –expressed in open questionings and broad discredit– made space for new ones, more entangled to local development and environmental protection.

In sum, I want to account how the Río Cruces disaster turned into an ontological crossroads where the multiplicity of the world, that is, the competing ontologies that constantly struggle to (corpo)realize or become “real,” was made evident, inflecting dominant practices and knowledges while leaving behind long-lasting traces that persist until today.

2.4 Analytical Tools

In this section I present the genealogy of the notion of *ontological opening*, which I build from posthumanist studies. I see this field as an endeavor that evolved from a first focus on unpacking “the black-boxes of science” to deeper interrogations that have recently enabled the opening of “the black-boxes of reality.” So doing, posthumanism has made room for the world’s multiplicity and its ongoing processes of performance.

The first posthumanist accounts transformed the “reality” or “nature” described by science from something that was “out there,” waiting to be discovered, into the contingent result of interventions whose stabilization was not a matter of more or less “ontological authenticity” –the reflection of some underlying structure or cause– but the result of continuous efforts of materialization in which humans were not the only actors of consequence. Along the way, “the black-boxes of society” also became objects of ontological interrogation, making evident the investments needed for scientific theories, medical practices, economic projects, and all sorts of associations, hierarchies, and asymmetries to be produced and sustained in the performance of “social orders.” Gradually, these analyses also showed that from objects to worlds, reality was multiple. That is, that there was not only one way of

performing “the real.” The resulting performances depended on the practices involved, including the cancellation or disentanglement of non-dominant modes of being and relating.

As a whole, these approaches allow different accounts of macro-social processes, accounts that are not centered on invisible forces structuring society from backstage. Rather, society becomes a temporary effect of the practices of historically situated actors that are unable to take full control or mastery of the resulting course of events. This is precisely, Law (2008) argues, the leitmotif of the ontological turn. That is, to understand reality as a precarious achievement, refusing

“(…) to be overawed by seemingly large systems, and the seeming ontological unity of the world enacted by large systems. It is instead, to make the problem smaller, or better, to make it more specific. To deal with the materialities of specific practices. To discover difference. And then to intervene in ways that might make a difference to those differences” (Law 2008:637).

2.4.1 Opening the Black-boxes of Science

The question of how valid scientific facts are produced was the starting point for what Bruno Latour and Steve Woolgar accomplished in their controversial 1979 book (reprinted in 1986) *Laboratory Life: the Social Construction of Scientific Facts*.^{9, 10} In attempting an answer, Latour developed a two-year ethnography in a neurobiological laboratory where he adopted an agnostic stance, abandoning any reverence for the revelation of truths by skilled scientists. Instead, he observed “the way in which the daily activities of working scientists lead to the construction of facts” (Latour and Woolgar 1986:40).

⁹ This piece may be considered way ahead of its time in conceptualizing scientific practices. It was precisely for this reason that Latour and Woolgar’s study was so badly received by scientists –social and natural–, triggering what was known as the “science wars,” as Latour explains in *Re-assembling the Social* (2005). This impasse strongly affected how it was valued and, moreover, the acceptability of ANT within some strands of the social sciences that have persistently negated the political project mobilized by this tradition.

¹⁰ Note that the term “social” was omitted from the title in the second edition of 1986.

Latour and Woolgar's most notable finding was that the work of scientists does not differ from other activities. They learned that the production of scientific facts is thoroughly "social," lacking a distinctive mode of reasoning. Moreover, it appeared as "a disordered array of observations with which scientists struggle to produce order" (Latour and Woolgar 1986:36). However, they also observed that despite "actual scientific practice entails the confrontation and negotiation of utter confusion" (Latour and Woolgar 1986:36) scientists present their findings as neat rationalizations by erasing the traces of social construction.

Methodologically, Latour and Woolgar focused on the materiality of scientific practices. That is, in the physical entities with which scientists do their job, including instruments, objects, and beings (Law 2004). As a system of material production "the major product of the laboratory turns out to be *texts*" (Law 2004:19, emphasis in the original). All sorts of texts are produced in the laboratory and played off against others coming from outside. The purpose is "to produce statements that carry authority" about what reality is (Law 2004:27).

Latour and Woolgar found that in order to carry authority a statement must be what Law (2004) calls "unqualified." That is, it must "describe[s] the outside world without qualification" (Law 2004:27). This involves a double process that they called "stabilization" and "inversion": a fact becomes stabilized when all the messiness of fact production is bracketed off or deleted. Only then may a "fact" be presented as the result of a logical scientific reasoning that explains how reality "is."

However, through such operation, "reality" acquires life of its own: "it is as if the original statement had projected a virtual image of itself which exists outside the statement (...) an inversion takes place: the object becomes the reason why the statement was formulated in

the first place” (Latour and Woolgar 1986:177). Not only has the fact been crafted. “Reality” has been “secreted” from the practices displayed in the laboratory (Latour and Woolgar 1986:243). Once splitting and inversion occur it is quite difficult to resist the impression that a “true object” that represents “reality” such as “it is,” has been found and described by science. That is why “to marvel at the perfect match between the scientist’s statement and the external reality (...) is small wonder (...): they are the same thing” (Latour and Woolgar 1986:177). In other terms, “‘out-there-ness’ is the consequence of scientific work rather than its cause” (Latour and Woolgar 1986:182).

Once Latour and Woolgar revealed the fabrication of facts and the corresponding reality they secret, the path for a broader ontological interrogation of “the black-boxes of science” was charted. The question became: is it possible to unpack and trace the mechanisms through which “reality” is stabilized through scientific facts? Latour tried to answer this question in *Ciencia en Acción* [*Science in Action*] (1992) and *La Esperanza de Pandora* [*Pandora’s Hope*] (2001). Referring to “those ‘facts’ that are already stabilized,” Latour (1992:3, translation by the author) explains, “if we travel back in time, they open again showing the uncertainty, the actions, the decisions involved, the competence and controversies. Once at that point: in which of all the interpretations must we believe?”

The mystery of scientific facts, Latour (1992:153, translation by the author) concludes, is that if they are able to reach “a complete autonomy with respect to any sort of production, construction or fabrication, it is precisely because they have been artificially fabricated.” It is not only the realist/constructivist dualism what Latour has dissolved but the epistemological/ontological and human/nonhuman divides as well. As Latour (2005) himself synthetically put it: “true” facts may exist only because they “fit” with the

principles, patterns and properties of matter. In short, they are “facts” –meaning exact– precisely “because they are fabricated” (Latour 2005:90, emphasis in the original).

2.4.2 Tracing (and Flattening) the Materiality of “the Social”

One of ANT’s most disconcerting notions is its understanding of “the social.” In *Reassembling the Social* (2005), Latour explains this re-conceptualization. “The social,” he argues, is not a material of which things are made of but a “type of connection,” of ties, that bring together objects, entities, and processes that are not in themselves “social,” –in the sociological sense– into networks and associations. What we call “a society” is, therefore, “a stabilized state of affairs” or “what is *already* assembled together” (Latour 2005:1, emphasis in the original). “The social” becomes a “momentary association (...) between entities which are in no way recognizable as being social in the ordinary manner, *except* during the brief moment when they are reshuffled together” (Latour 2005:65, emphasis in the original). Once society is re-understood this way we may trace the associations and connections that comprise “the social.” That is, we may open “the black-boxes of society.”

Methodologically, there are several tools involved in opening the black boxes of “the social.”

A first task is to identify the heterogeneous elements tied together in the movements towards the constitution of a “collective”¹¹: “[W]hen we act, who else is acting? How many agents are also present?” (Latour 2005:43). To answer these questions we have only one choice: to follow the traces that the assembling of “the social” has left behind knowing that ties are temporary and unstable and that once they are stabilized they become invisible.

¹¹ The apparent distinction between the material and the social continues to obscure the agency of nonhumans. “This is why –Latour (2005:75) proposes– the word ‘collective’ will take the place of “society.” “Society” will be kept only for the assembly of already gathered entities” while *collective* “will designate the project of assembling new entities not yet gathered together.”

The best way to make such traces visible is rendering the social “as flat as possible” (Latour 2005:16). Methodologically, this involves replacing abstract, hierarchies, structures, and forces, with partial, situated accounts of *how* the social is gathered, sustained, and transformed. Only this way, we can “ensure that any new link is visible” (Latour 2005:16). As Escobar (2007) explains, “flat” ontologies are not the same as but opposed to horizontal ones, in that they discard the centering essentialism that infuses not only the up-down imaginary but also the radiating (out from here) spatiality of horizontality.

Flat ontologies become especially evident, Callon (2002:293) argues, in the relationships built between places and between agents that are far from each other. Flattening these relations or any other does not imply negating that there are hierarchies in the world, such as those implied in the existence of dominant and non-dominant ontologies. Rather, it means replacing explanations that attribute hierarchies to abstract notions of a multilevel society by very different descriptions that see social orderings as the effect of sustained investments that include movements and connections between objects and places. In brief, then, what posthumanist analyses try to do is to free us from a multilevel, inherently and pre-given hierarchical society: “You don’t need several layers, different layers,” Callon explains in an interview with Andrew Barry and Don Slater (2002:293). “You don’t need infrastructure and superstructure,” Callon adds (Barry and Slater 2002:293). “You only need places that are connected and the possibility of actors and information to circulate from one place to another” (Barry and Slater 2002:293).

In the case of knowledge, for example, such analysis implies accepting that all sorts of knowledge, even science, is local. And that when knowledge travel “[t]he result is not universality, but a movement ‘from one local knowledge to another’” (Barnes 2008:1440).

Regarding the accumulation of knowledge Barnes (2008:1442) reminds us that “[E]ven if distance is meaningless, place certainly is not.” In effect, places are sites where histories, actors, and practices inflect any traveling knowledge, no matter how tied it remains to its origin. This is why although we may “no longer have macro-structures”, as Callon asserts, this “doesn’t mean that there are only local localities” (Barry and Slater 2002:295). Rather, Callon concludes, what we have is a:

“(…) double logic of local framing and connection between localities. In these terms, some localities are able to control other localities. So what has to be explained is precisely the progressive construction of connections, and of localities that are able to control other localities” (Barry and Slater 2002:295).

Flat ontologies have been applied to the understanding of power. According to Latour (2005:64) “[P]ower, like society, is the final result of a process and not a reservoir, a stock or capital that will automatically provide an explanation.” Therefore, like any “[F]lagrant asymmetry of resources”, power has to be produced, composed, sustained and, thus, also explained (Latour 2005:64). From a posthumanist view, inequalities and differences in size that express seemingly solid hierarchies are always contingently performed, demanding great efforts in order to last. Such efforts necessarily involve nonhumans with the capacity to transport and sustain action. This is why, Law (2008) explains, “macro-social things” are not different in kind from “micro-social things”: they have simply been stabilized as larger through a process that he calls “deletion.” Methodologically, deletion is an action that can last longer and travel farther through objects that spread social orderings across space and time, such as texts. “What sociologists mean by the ‘power of society’ –Latour (2005:68) clarifies– is not society itself (...) but some sort of summary of all the entities already mobilized to render asymmetries longer lasting.” It is these objects and the networks of

which they are part what explain “the overarching power of society, the huge asymmetries, the crushing exercise of power” (Latour 2005:72). Thus, to open “the social” to ontological interrogation is to flatten it and dissolve its fixed hierarchies and invisible forces that social sciences use to explain how societies function:

“[W]hen sociologists (...) pronounce the words ‘society’, ‘power’, ‘structure’, and ‘context’, they often jump straight ahead to (...) mobilize gigantic forces, to detect dramatic patterns emerging out of confusing interactions (...) to reveal behind the scenes some dark powers pulling the strings. Not that they are wrong since it is perfectly true that older social relations have been packaged in such a way as to seem to provide a ready explanation for many puzzling subjects. But the time has come to have a much closer look to the aggregates thus assembled” (Latour 2005:22).

The flat ontological perspective is central to ANT’s political project. For, whenever “the social” is already assembled and asymmetries are already explained there is no space for re-assembling: “[I]f you have to fight against a force that is invisible, untraceable, ubiquitous, and total, you will be powerless and roundly defeated. To put in bluntly: if there is a society, then no politics is possible” (Latour 2005:250). This is why the posthumanist understandings “cut down to size” power, structures, globalization, and totalities putting them to “circulate inside tiny conduits” or pieces of reality in order to reveal “masses of hidden potentialities” so far invisible (Latour 2005:252). For, “[I]t’s only if forces are made of smaller ties, whose resistance can be tested one by one, that you might have a chance to modify a given state of affairs” (Latour 2005:250).

A “flat site,” Escobar (2007:109) adds, is “an emergent property of its interacting human and nonhumans inhabitants,” a manifold of potentialities. In effect, as Callon argues in Barry and Slater (2002), *resistances always occur in local sites that may become potential*

centers for the framing of alternatives. This is why, Callon (Barry and Slater 2002) adds, we need to pay special attention to the development of new strategies and the transformation of prevailing practices and modes of being and relating that occur in local places and are made by local actors. In Callon's (Barry and Slater 2002:302, emphasis added) own words: "the role of the social scientist is to *identify these actors, to try to appreciate, to evaluate their capacities (...) to reconfigure institutions and to produce results that can be transported to other places*. The way to transform the so-called macro-structures is to start with micro or local restructuring activities and to make connections."

In *Ciencia en Acción [Science in Action]* (1992), Latour applies a flat ontological approach to account for the accumulation of geographical knowledge and the emergence of Zoology and Botany in the late 1700s. Following Portuguese naturalists who sailed to the Pacific East with the mission of preparing reliable maps for the French court, Latour describes the production knowledge asymmetries between natives and cartographers. With each cycle of accumulation of geographical knowledge, built through objects such as ships and cartographical instruments, this asymmetry grew until a great dividing line was established.

Latour relates this accumulation of geographical knowledge with the emergence of natural disciplines based on the capacity of maps to "act at a distance." That is, to bring home facts, places and people through portable and stable forms. As he describes, the invention of maps allowed facts collected by the empire's naturalists to be stored, added, and combined: the history of science "is the history of the mobilization of everything that could be transported to accomplish the universal census" (Latour 1992:214, translation by the author). Once natural collections were accumulated in one site, zoologists or botanists could travel all over the world without moving from their museums: "The mysterious emergence of a

discipline is nothing more than (...) this general mobilization of the world that enables a few scientists (...) with the capacity to dominate all the plants of the Earth” (Latour 1992:214, translation by the author). These centers of knowledge accumulation coincide with places where natural disciplines emerged. Although they remained as local as any other, they had one major difference: “the relentless construction of a map” (Latour 1992:217, translation by the author). The resulting hierarchy of knowledge is the effect of its accumulation in one point. Once built, such dominance is reinforced by the circulation of such local knowledge as universal. The effect, Latour (1992:213, translation by the author) explains, was a Copernican revolution in the world’s hierarchy: “the cartographer dominates the world (...). The relation between scientists and the world has been inverted.”

2.4.3 Making Actors Speak: Posthumanism’s Political Project

Law (2008) sees the centrality that Latour gives to the actors’ accounts, so fundamental in the posthumanist political project, as an inheritance of feminist epistemologies, in particular of Sandra Harding’s standpoint theory and Donna Haraway’s (1991, 1997) situated-knowledges and modest witnessing. Haraway (1997) reviews how the modern scientist was enabled by a particular subjectivity emergent in the English 17th century. Through the practices by which pioneer scientists trusted one another as reliable to witness and report such experiments, a new subject emerged: a “modest” and independent witness who practiced a scientific narrative in passive voice, where the figure of the author disappeared and nature seemed to speak for itself. The final result, however, was not lack of modesty but the attempt to resemble the voice of God, or what Haraway (1991:189) calls “god’s trick”: “This is the gaze that mythically inscribes all the marked bodies, that makes the unmarked category claim the power to see and not be seen, to represent while escaping

representation. This gaze signifies the unmarked position of Man and White (...). That view of infinite vision is an illusion, a god-trick.” Haraway (1991:189) calls for the need to “find our way through all the visualizing tricks and powers of modern sciences.” The latter demands, Haraway (1991:188-9) adds:

“(...) insisting metaphorically on the particularity and embodiment of all vision (...) allows us to construct a usable, but not an innocent, doctrine of objectivity (...). I would like a doctrine of embodied objectivity that accommodates paradoxical and critical feminist science projects: feminist objectivity means quite simple situated knowledges.”

Such a position entails an alternative mode of witnessing that is “locatable, responsible and accountable” (Law 2008:634). This also means that we can no longer ignore that knowing is also always about performing. Hence, Haraway’s invitation implies “accepting the responsibilities that go with knowing (...). This, then, is a new kind of located and situated critical project, one that is profoundly political, but not foundational” (Law 2008:634).

A consequence of Haraway’s contributions for the political project of posthumanism is that any account of “the social” is performative, in the sense that the actors are assembled together by the author, creating and recreating “the social.” In this performative potential lies the possibility for alternative ontological accounts –that is, those that provide non-hegemonic descriptions– to circulate and increase their “ontological density.” This is how Blaser (2010), for example, explains the increasing (corpo)reality of indigenous non-modern worlds, which have become more and more visible and empowered as they entangle globally into networks, institutions, and discourses. A performative approach to “the social” presupposes the political potential involved in thickening the (corpo)reality of less privileged ontological universes through textbooks, accounts or dissertations.

Several consequences follow. One is that the question of “what the real world is really like” (Latour 2005:117) will never be closed but constantly reopened by the actors. Another is that ontological openness does not imply accepting the validity of multiple perspectives while believing deep inside that they are mistaken or unreal. Such cultural relativism is dependant –as explained in the Introduction– on the Euro-modern conception of a singular ontological matrix. If the ontological singularity of the world remains intact and there is no room for unconventional accounts of what the world is like, then there cannot be an *ontological opening* of “the social.” *Perhaps herein lies the strongest political implication of posthumanism: “the social” must be fully opened again, ontologically speaking, if we truly want to make room for all the worlds that co-exist and are pushing to become real.*

2.4.4 From the Materiality of “the Social” to Ontological Performativity

The *ontological opening* of the world has demanded the maturation of the terms and tools involved. The evolution of the notion of performativity is illustrative. The first posthumanist accounts to describe the production of scientific facts within laboratories referred to this process as one of “construction,” albeit with a meaning completely different from the one used by social constructivist perspectives. ANT’s concept of constructedness of scientific facts did not point to their lack of “veracity” –as suggested by constructivism– but to their stark materiality. That is, to the idea that, to become “truthful,” these statements required the intervention of material instruments and nonhuman agents involved in the “fabrication of facts.” However, the idea of construction implied the closure or stabilization of reality, as Latour and Woolgar (1979/1986) called it. Hence, construction came to denote a reality that once it was built up turned to be more or less solid. This was counter-

productive with the understanding of “the social” as the result of a continuous effort of fabrication. Here is where the notion of performativity entered the scene.

Theoretically, the performative approach is informed by two genealogies: J.L. Austin’s theory on performativity of language and Judith Butler’s theory on the performative understanding of gender.¹² Austin’s contribution has received great attention and is considered foundational of the performative tradition.¹³ However, as Law (2008:635) argues, performative perspectives have been also influenced by Foucault and Butler.¹⁴

In brief, Austin’s contribution was to acknowledge the power that speech acts have, not just in representing but in creating the world through “performative utterances,” which he distinguished from “constative (or descriptive) utterances” (Barnes 2008). Performative utterances don’t just refer to something that is already there. They declare new realities that emerge through the acts of speech. When Columbus said, “I declare this land to be Spanish,” his speech act marked a novel and consequential reality.

¹² In her 1993 book, *Bodies that Matter: on the Discursive Limits of Sex*, Butler (1993:9) proposes that bodies are not mere surfaces of gendered inscriptions but “a process of materialization that stabilizes over time to produce the effect of boundary, fixity, and surface we call matter.” In other terms, there is no “matter” where to ground claims on sexual difference that are prior to discourse. Rather, “matter” is always “fully sedimented with discourses on sex and sexuality” (Butler 1993:29). This materially sedimented gender is in turn constructed through discursive power: “there is no power that acts –Butler (1993:9) says– but only reiterated acting that is power in its persistence and instability.”

¹³ Erwin Goffman’s phenomenological perspective and his “dramaturgical approach” to sociology of everyday life has also been acknowledged as a precedent of performative perspectives (Barnes 2008:1434).

¹⁴ There is a direct connection between Butler’s work and the idea of language as performative when she affirms that (1993:30): “If the body signified as prior to signification is an effect of signification, then the mimetic or representational status of language, which claims that signs follow bodies as their necessary mirrors, is not mimetical at all. On the contrary, it is productive, constitutive (...) even performative.” Although Butler (1993:15) explains that the “materialization of norms requires those identificatory processes by which norms are assumed and appropriated”, she also makes room for fissures, tensions and contestation within such “constitutive constrains.” However, the possibility of agency, she says, may only appear “as a reiterative or rearticulatory practice, immanent to power, and not a relation of external opposition to power” (Butler 1993:15).

What the performative notion of language emphasizes is this capacity of “the very act itself which creates the reality that it describes” (Barnes 2002: 508). However, as Callon (2006) explains, the fundamental implication of the performativity of language does not lie in language itself. To say that language is performative does not mean that anything can be made to exist or act. *If a speech act is performative, it is only because the material conditions for it to produce the effects it names have been already set in place* (Callon 2006). Posthumanism applies this performative approach to scientific statements by showing how they are entangled with the realities they describe and, therefore, “indissoluble from all the devices that cause the entities they talk about to exist, actually to act” (Latour 1999, cit. in Callon 2006:19). These devices include instruments and interventions such as entanglements, disentanglements, and cancellations, which explain the performative power of any statement and their capacity to predict a given course of action still to come. As Callon (2006:12) explains, statements are performative, not because science is able to anticipate the trajectory of a world that is out there, but because of their power to perform the reality that they describe: “at the heart of science lies this two-way relationship between description and action.”

Applied to “the social,” the performative approach dissolves its ontological stability. In Latour’s terms (2005:37), while an ostensive world remains ontologically fixed no matter what may happen, a performative world “vanishes when it no longer is performed.” This is what Law (2008:634) means when he defines “the social” as “a temporarily established effect.” Moreover, the performative understanding of dilutes the realistic/constructivist dichotomy by acknowledging that, although it is not possible to make anything exist

(realism) “for any one entity there are thousands of ways of existing, of being detached from the surrounding plasma” (Callon 2006:19).

The concept of performativity has sparked debates within the posthumanist tradition. For example, Butler’s performative perspective has raised critiques from ANT scholars. In her influential work, *The Body Multiple: Ontology in Medical Practice* (2002), Annmarie Mol criticizes what she sees as Butler’s Goffmanian reasoning through which all (gendered) roles are reduced to performances with no backstage identities that precede them. Although Mol (2002:38) agrees with Butler in that gender is performed through everyday practices that redefine what is involved in any identity, she claims that Butler dilutes the involvement of bodies in such performances through what she calls a culturalist excess: “what about the entities of the natural world, the objects? The investigation of gender identity in terms of performance begins by diminishing the importance of a few natural objects. The vagina for instance.” Mol (2002:40) argues that Butler ignores that “[P]erformances are not only social but material as well.”

To avoid any resonance with the Butlerian culturalist performativity, Mol (2002:41) proposes the term “enactment”: “I use another verb instead, enact, for which I give no references, precisely because I would like you to read it in as fresh way as possible. In practice, objects are enacted.”¹⁵ Through this term Mol (2002:43) highlights the fact that natural entities and objects do not only have a contested history but also “a complex present too, a present in which their identities are fragmented and may differ between sites.”

Methodologically speaking, such acknowledgement requires “describing the various performances –or enactments– of the object’s identities on stage” (Mol 2002:43). A new

¹⁵ The term enaction, however, does have references that can be found in the work of Francisco Varela.

dividing line between humans and nonhumans has been breached: (natural) objects, Mol (2002:44, emphasis in the original) explains, just as (human) subjects, can be “framed as part of events that occur and plays that are staged. If an object is real it is because it is part of a practice. It is reality *enacted*.”

Mol relates performativity –or enactment– to the situated practices of the actors. She argues, with Law, that actors enact each other by “making each other exist,” and, therefore, they also influence what exactly these actor may (or may not) “do.” Law and Mol (2008) apply this perspective to the study of the Cumbrian sheep. They discover that sheep are enacted in connection to the “doings” of other actors:

“You cannot learn what a sheep is by staring at a picture. It helps more to unravel the practices in which the sheep figure, in which they are enacted in one way or another. If we do this then we do not discover a sheep that is unified and coherent. Instead we find a ‘sheep multiple’. This is because a slightly different sheep is done in each practice. Even so, this multiplicity is not a plurality” (Law and Mol 2008:65).

Indeed, a Cumbrian sheep enacted as an economic entity “acts in an economic way. It does something that fits into economic calculations: it yields a price. But since it does not do so alone, it cannot begin to control the level of the price. Action is very different from control” (Law and Mol 2008:70). Methodologically, the “doings” that nonhumans are capable of emerge only relationally, that is, enacted through networks where they act in connection to other actors. Agency moves fluidly through these networks, while the “doings” of the sheep find unexpected ways of showing up:

“One might say that the Cumbrian sheep along with the farmers took revenge for being ignored by the most influential epidemiological modelers (...). Having being ignored in the dominant epidemiological model, the sheep found other ways of acting.

And, thus, in their own fluid way, they became politically dangerous” (Law and Mol 2008:69).

Although sheep lack intentionality, this does not impede their “doings” from becoming politicized in unpredictable forms: “the actor-enacted is complex. And that complexity only increases if we also attend explicitly to the *normativity* of all the activities in which it is involved” (Law and Mol 2008:73, emphasis in the original). Law and Mol (2008:72) conclude that “[W]hat a sheep is can only be known if we explore these practices (...) The list is endless. The reality of an entity is never exhausted.”

Callon (2006, 2009) also emphasizes the centrality that the fractality of an actor’s identity has in performing “the social.” In his case, in the making of markets. Economic experiments can never result in uniform outcomes, he argues. Although they may be based in the same economic models, in practice they interact with very different entities such as carbon molecules or fishes. These entities won’t be economized in the same way since they are not only material constraints or the scene where the economic model unravels, as the handicapped beings with a denied agency described by social disciplines:

“(...) an electron acts differently from a gene, which acts differently to a cell phone, and so on. All are engaged in courses of action that produce differences, alter the state of the world, produce unexpected events, and trigger changes that would not have happened without them (...). Nothing of what the world is or is becoming can be understood if these actants are disregarded” (Callon 2006:24).

2.4.5 From Ontological Multiplicity to Macro-social Performance

The material notion of “the social” settled the ground for the performative study of broader social processes and, so doing, paved the way for the two most important posthumanist developments upon which I build the notion of *ontological opening*: Political Ontology and

Economic Performativity. Both are built upon the key concept of ontological multiplicity developed by Mol (1991, 2002), introduced in Chapter 1.

Mol's multiplicity has been crucial for enabling the *ontological opening* of society. As result of her work, new questions and possibilities of ontological interrogation emerge. If the questions that guided ANT's first developments pointed to *how* reality is "constructed" through scientific statements, the questions derived from Mol's work point to *what* worlds can we contribute to perform (including the effects of the knowledges we produce and the texts we circulate). This is not, however, a simple matter of individual choices, as Mol clarifies, since enactments are always collective endeavors done by heterogeneous groups of actors, human and nonhuman, present and past, alive and even dead.¹⁶ It is fundamental, then, to make visible what Law (2008) calls "*the permanent struggle of competing realities.*" It is from there that the way in which reality is performed becomes politicized and that excluded or invisible worlds can be framed in non-hierarchical terms, freed from the fixity of their ontologically marginalized positions.

In an outstanding synthesis of performative understandings of scientific knowledges, Callon's work in economic performativity has focused on the role that economic theories have in the actual making of markets and economic actors. His central point is that the performative effect of economic statements is possible –not because any "intrinsic" economic rationality, such as that of *homo economicus*– but as effect of the material interventions that "produced" –or performed– the rationalities described by theories and, so doing, allowed markets and economic agents to function. Among these interventions,

¹⁶ As Latour (2001:227) notes "the political order becomes subverted by the enormous amount of delegate actions that impulse us to do things in favor of people that are not here any more or that we don't support."

Callon explains (Barry and Slater 2002:291), is the “double process of entanglement and dis-entanglement.”. Any economic good, he says, is not an abstract entity but one rich in attachments that produce the isolated place of the market and the alienated economic relations between strangers. We are, thus, confronted with a paradox: “to make disentanglement possible, economic agents heavily invest in the production of entanglements! To disentangle you have first to entangle better”, Callon explains (Barry and Slater 2002:293). Standards, measuring systems, organizations, laws, and technologies all play a role in making economic agents exist and allowing markets to function, demanding great efforts. The more institutionalized, naturalized, thing-like and material these investments become, the better they disentangle agents and objects from their contexts, setting them free to realize the model invented by economists (Holm 2007).

Callon’s economic performativity does not suggest that markets are planned but rather that they are more like experimentations based on trials and errors. In this line of thought MacKenzie (2007) describes how the gradual adjustments of the Black-Scholes economic formula allowed it to gradually fit the world it described and, simultaneously, put it into motion. This way, after many investments, a formula that had only functioned well on texts began to also function out there, in the wild, with the help of computers, algorithms, skills, and institutions: “[W]e could say that the formula has become true, but it is preferable to say that the world it supposes has become actual” (Callon 2006:14). What makes this actuality possible, Callon (2006:14) insists, “is the performative dimension of the statements and the trials that they allow (...) an adjustment that is never a given in advance and always requires specific investments.”

Callon (2006) proposes an additional step towards a deeper *ontological opening* of “the social” through the concept of *performance*, which I use extensively in this work, already introduced in Chapter 1. The term performance broadens the concept of performativity by adding historical depth to the understanding of “the real.” That is, by emphasizing that reality is always a temporary arrangement that results from unending struggles between competing ontologies. Through this notion, reality becomes an *inherently political and historically sedimented ontological process that may be seen to unfold gradually through time*. In order to account for such ontological unfolding we need to pay attention not only to the continuous investments involved in performing what actually exists, but also to the non-dominant underlying worlds that have not yet prevailed but which, through their continuous struggles to manifest themselves, have left behind traces “just as a living organism retains traces of its evolution” (Callon 2006:32).

The exploration of how alternative ontologies take form, exist and become visible is, precisely, one of the central inquiries of the emergent field of Political Ontology and one of the most relevant pursuits of Blaser’s work, framed within ANT and the Modernity/Coloniality Program. The most important contributions of Blaser’s (2009:886) ontological frame are that, on the one hand, it situates modernity “as one particular ontological formation among others” and, on the other, it describes non-modern ontologies based on their distinctive and positive features. That is, differing “from modernity not because, as Euro-modernity would pose it, they lack what modernity has, but because they distribute what exists and conceive their constitutive relations in a different way” (Blaser 2009:886).

In his 2009 paper “Political Ontology: Cultural Studies Without ‘Culture’?” Blaser argues that the recognition of non-modernities in their own terms is a critical task for the ontological politicization of modernity in general and of Euro-modernity in particular. For doing so, he argues, we need to abandon the concept of “cultures” since it frames cultural difference as expressions of different perspectives over the world. In doing so, it situates non-modern ontologies as primitive ways of being and relating, reinforcing that Euro-modernity is the only culture able to produce accurate (that is, scientific) representations of ontological the world. For only when we recognize modernity as a specific (and local) ontology “we can recognize that there are other worlds –not cultures– that are different from the modern one but certainly not traditional” (Blaser 2009:890).

He concludes that convergent historical processes –such as social and environmental threats imposed on indigenous territories– will continue to increase the visibility of ontological conflicts resulting in a further contestation of the two great divides of the Euro-modern constitution: nature/culture and modern/nonmodern. As effect, he argues, Euro-modernity also will become more visible as a particular ontology among others, while other forms of being modern and non-modern will increase their presence (Blaser 2009).

Blaser (2010) further develops this conceptual frame by applying it to the historical trajectory of colonial development in Paraguay and the resulting ontological struggle with the worlds performed by indigenous peoples. Perhaps the most important thesis developed in his work is that non-modern indigenous ontologies have increasingly become more “(corpo)real” –that is, acquired a stronger material actuality– as result of their struggles for recognition and the multiplication of the ties and connections they have been able to produce and sustain with local and global networks.

2.5 Research Questions

According to Law (2008:632, emphasis in the original), posthumanism has a particular way of framing questions: “instead of asking *why* things happen it asks *how* they occur. *How* they arrange themselves. *How* the materials of the world (...) get themselves done in particular locations for a moment in all their heterogeneity.” Accordingly, what I ask here is:

How did ARAUCO’s business model, Chile’s environmental frame, the Río Cruces wetland as a site worthy of protection and Valdivia’s identity come to exist as part of dominant performances of the world? What agencies, investments and interventions were involved? What ontological resistances did such networks of agencies and practices had to confront along in order to prevail?

How did the Río Cruces disaster provoke fractures –breakdowns, ruptures, and interruptions– of such normal states of the world? What specific events were involved in provoking such fractures and making them take further shape? How are such fractures and events accounted by the actors? How are nonhuman agencies involved in such accounts?

How did such breakdowns turn into long-lasting effects and how are they acknowledged and described by the actors? How can such long-term effects be traced back in connection to the disaster as a generative event?

How did the Río Cruces disaster bring about non-dominant human/nonhuman entanglements? How can they be described? How did they take shape and circulate? How did they inflect dominant ways of being and of relating to nature?

How were the identities and properties of nonhumans –in particular, of the swans, the river, and the wetland– inflected and transformed through the disaster? How were these

nonhuman actors performed in connection to the different networks of actors and their practices? How do such diverse enactments consider their entanglement to humans?

How do the actors describe the agency of nonhumans, such as the Valdivian swans? How did the Río Cruces disaster contribute to enact new properties and capacities of these nonhuman actors, and in particular of the swans? How did the swans display such new capacities and 'made other actors do' certain things?

Chapter 3: The Making of ARAUCO: How Erosion, Pines and Native Forests Took Part in the Performance of Chile’s Forest Giant¹⁷

Forest plantations are “*the most colossal concrete environmental contribution that has been made in our country*” (Eliodoro Matte 1994:14).

3.1 ARAUCO as the Incarnation of Chile’s Successful “Forest Model”

When the *Río Cruces* disaster exploded, the Chilean holding ARAUCO –an abbreviation for *Celulosa Arauco y Constitución* [Arauco and Constitución Pulpwood], named after the localities where its first factories were built– was considered the icon of what many described as Chile’s successful “forest model” (Katz, Stumpo and Varela 1999; Halpern 2007). This term was applied to the country’s forest export sector in order to highlight its centrality as a core component of the “neoliberal model” implemented since the 1970s.¹⁸

This connection between ARAUCO’s commercial results and Chile’s economic performance was not arbitrary. The making of ARAUCO was materially built upon decades of experimentation, investments, and geographic transformations involving state policies, landowners, naturalists, agrarian reforms and counter-reforms, erosion and one outstanding exotic species. All these agencies, and the practices they brought along with them, had been tested and perfected since the early 1900s, aligning themselves behind one key purpose: to promote the establishment of large-scale forest plantations of fast-growing species in Chile.

Indeed, ARAUCO’s success was materially connected to these decades of forest investments through a decisive factor: the ownership of huge expanses of fast-growing planted forests, mostly established through state subsidies. In 2004, the holding controlled

¹⁷ The translation of all the texts originally written in Spanish, including press notes and interviews, was conducted by the author.

¹⁸ By the use of the term “model,” I don’t refer to anything like an economic model such as the ones whose performativity is studied by posthumanist scholars. Rather, I make use of the common name used to describe the state-organized investments for giving shape to a forest export sector based on exotic plantations.

the largest area of forest plantations in South America, with 669 thousand hectares in Chile alone –30% of the country’s almost 2 million hectares of planted forests– 111 thousand hectares in Argentina, and another 20 thousand in Uruguay. These forests had been established in the more than 1 million 261 thousand hectares in ARAUCO’s possession:

“[T]he size of these forest plantations as well as the rapid growth rates of tree species in the Southern Hemisphere [give ARAUCO] a competitive edge with respect to producers in other regions of the world, in terms of both costs and the company’s ability to react to a growing demand” (ARAUCO 2005:41).

Such plantations had been strategically established to feed what by then was the holding’s main business: the production of pulpwood through five pulp-mills, four in Chile (Arauco, Constitución, Licancel and Valdivia) and one in Argentina (Alto Paraná). ARAUCO’s “success” was also tied to a decisive event: the transfer to private hands in the mid 1980s of Chile’s two largest pulp-mills, which were planned and built by the state in the late 1960s and early 1970s. The acquisition of these two state-owned facilities allowed ARAUCO to evolve into the global empire it had become by 2004.

As ARAUCO’s business expanded, the country’s forest sector coalesced into a core piece of Chile’s neoliberal program. The state support of private forest plantations that began in the 1930s was expanded in the mid 1970s under Pinochet’s regime, when forestation subsidies reached their highest rates. Notably, the neoliberal stage of Chile’s forest expansion enrolled into its development the robust and comprehensive backing that previous decades of state forest policies had gained. Therefore, it was no surprise that the democratic coalition that took control of the country in 1990 continued to promote the forestation of private lands. As a result, Chile’s forest exports grew to become the second largest after mining, while pulpwood, mainly coming from ARAUCO, turned into Chile’s

most important forest export product. Materially sustained by decades of forest development and the broad support that plantations and their industrialization historically had, ARAUCO's huge expansion served to confirm the success of Chile's "forestry model." Both turned into one and the same object of support or contention.

By 2004, ARAUCO was comprised by 19 subsidiary or associated companies in the areas of forest management, pulpwood production, wood processing, chemicals, commercialization, distribution, and techno-scientific research, also being the main sawn wood producer in the Southern Hemisphere and the strategic shareholder of two Chilean ports (ARAUCO 2005). With sales offices in more than 50 countries, ARAUCO's products were destined for Europe, North America, and China. Such globalization was the "consequence of the company's sustained industrial growth," which pushed ARAUCO "towards a continuous commercial expansion" (ARAUCO 2005:41).

The Valdivia pulp-mill was, by 2004, the holding's largest and most modernized operation. It had been critical in consolidating ARAUCO's leading position. Its annual productive capacity of 685 thousand tons of bleached kraft pulp allowed ARAUCO to surpass a total of 2 million tons of pulpwood per year. This record situated the company as the third highest pulpwood producer worldwide and Chile as the sixth highest pulpwood exporter (OECD 2005; FAO 2005). Thus, it was described by ARAUCO as a landmark achievement: "For the first time in our history, and as a direct consequence of the start-up of the Valdivia mill, the company broke the 2 million metric ton barrier in pulp sales, a 30% increase over sales in 2003" (ARAUCO 2005:41). Coinciding with a steady increase in the global price of long fiber pulp, in 2004 the holding also reached its highest level of profit ever: from

US\$ 140 million earned in 2001, US\$ 277 million in 2002 and US\$ 409 million in 2003, ARAUCO reached an historical record of US\$ 590 million in 2004 (ARAUCO 2007).¹⁹

When the Valdivian crisis exploded, ARAUCO was at the height of this expansion. It described itself as an efficient organization, diligently committed to fulfilling the demands of its final markets. Its 2004 report (ARAUCO 2005:41) highlighted the following:

“...an industrial operation design that allows production on demand (...) capable of precise analysis and evaluation of market scenarios at the local, regional and international level. The smooth interaction of these elements –dynamic market analysis and a flexible production system– together with the strength of its vast forest resources, give ARAUCO an exceptional position in its capacity to respond to the demands of international clients quickly, dynamically, and with long-term solvency.”

However, as we will see in the coming chapters, by mid 2005 this efficient, rigorously planned, and commercially successful forest giant was facing its worst crisis ever as a result of the *Río Cruces* disaster, enrolling many other actors along. In order to better understand the scale and depth of the fractures provoked by the Valdivian disaster in the “forest model” embodied by ARAUCO, it is necessary to put in perspective the nature and size of the networks and previous investments that were constitutive the company’s way of “doing” the forestry business. It was this dominant performance of Chile’s forest economy, with all the previous investments involved in its “success,” that came to be confronted and open to revision with the collapse of the Valdivian wetland and its colony of black-necked swans.

In what follows, I review the investments and agencies that led to the making of the globalized mega-holding that ARAUCO had become by the early 2000s. I show how the events that led to the company’s existence unfolded along a narrative of national

¹⁹ This amount corresponded, roughly, to a 0,66% of Chile’s Gross Domestic Product by 2004.

development through which ARAUCO's fate became inextricably tied to Chile's economic success. I describe the private endeavors and public policies involved in the unfolding of Chile's forest sector since the late 1800s, paying particular attention to some unplanned circumstances that led to the country's forest expansion. In order to emphasize the role played by nonhuman agents, I show how this process was materially entangled with one exotic species whose properties were crucial in shaping the industrial, pulpwood-focused orientation of the country's forest economy. In order to trace the emergence of non-dominant ontologies, I also analyze how the century of investments that created the conditions for the approval of ARAUCO's pulp-mill in Valdivia were confronted for the first time in the 1980s through competing performances around Chile's native forests.

3.2 Pines to Stop the Flying Sands

Designed as a response to the crude erosion that was affecting vast expanses of previously fertile lands, landowners and naturalists developed the first experimental plantations of exotic forest species in Chile in the late 1800s. The German naturalist Federico Albert was the key protagonist of this story (Hartwig 1994; Camus 2006). The Chilean government hired Albert in 1889 to classify the country's natural species. A decade later, he was appointed head of the Division of Zoological and Botanical Essays within the Ministry of Industry and entrusted to design a research program to acclimatize exotic plants and animals (Camus 2006). Albert classified 150 forest species adapted to the country's climatic and soil conditions and recommended the seven most adaptable to Chile's climatic and environmental conditions (Ministerio de Industrias 1908; Hartwig 1994).

As part of this mission, Albert was sent to Constitución, a previously fertile agricultural zone on the country's central coast that by then was severely desertified (Albert 1900). The

dunes –or “flying sands,” as they were called– in the county of Chanco, near Constitución, were 3 km wide and extended over 40 km of coast (Camus 2006). Not long before, these agricultural lands had shown the highest ever productivity registered in the country and were considered “true orchards” (Vial 1990). Established after the burning of dense forests in order to produce wheat during the California Gold Rush between 1848 and 1855, the fields were now deserts of dry, cracked soils. Albert estimated that by 1912, more than 11 million hectares of native forests had been burned (Camus 2003).

It was in Constitución that Albert began his experiments. His goal was to determine the most suitable forest species for the control of dunes. What he did not know was that these efforts would not only halt erosion but also pave the way for an economic activity that would replace the landscape of entire regions. Sixteen years after Albert began his experiments, more than 300 hectares had been planted in Constitución (Camus 2006). Today, giant trees planted by Albert himself stand as testimony to these pioneering efforts. Some decades later, one of Chile’s first pulpwood factories was also created in Constitución. ARAUCO had its origins in this same factory.

In the late 1800s and early 1900s, while Albert was fighting against the dunes, private landowners established the first industrial timber plantations. The criteria for selecting the best species were different, however. In 1888, Arturo Junge planted the first seeds of *pino radiata* on Cerro Caracol, a hill near the city of Concepción. As Maria Barbosa Lima-Toivanen (2012) recounts, Junge was carrying out experiments with seeds of North American pines bought in a German nursery in Erfurt. Mistakenly, the seeds included *Pinus radiata*, which is also known as *Pinus insignis*, or *pino insigne* in Spanish. The species is native to the central coasts of California and Mexico, where it is known as the Monterey

pine. Due to this “lucky event,” the radiata pines were able to reveal their extraordinary rates of growth under the extreme conditions of Chile’s eroded soils. They grew so fast that Junge acquired additional seeds and extended the planted area. Over the years, Cerro Caracol became one of Concepción’s most cherished recreation areas.

Junge’s German compatriots also adopted this species. Between 1907 and 1912, the engineer Konrad Peters planted 400 hectares of pino radiata to provide wood for the coal industry in Lota (Hartwig 1994). Similar efforts were carried out by Máximo Puffe in Laja, Guillermo Usler Gleisner in Yumbel, and Bernardo Timmermann in the Bio-Bio Province (Camus 2006). By 1920, 60 thousand hectares of plantations had been established, mainly due to these private endeavors and mostly consisting of pino radiata (Hartwig 1994).

Despite having the fastest growth of all the species studied by Albert, he did not recommend the pino radiata as the most suitable for Chile. Rather, he considered it as “inconvenient” for the country given the low value of its wood and its reduced range of uses. Moreover, Albert even campaigned against the mass planting of radiata pines (Camus 2006; Hartwig 1994). However, the outstanding properties of this species turned out to be more convincing than Albert’s arguments suggested.

Indeed, in Chile, pino radiata reached high annual increases per hectare (20 to 25 m³ on average, and 30 m³ in some cases) and grew to heights greater than those observed in other places (Katz et al. 1999; Carriere and Lohmann 1996). These impressive rates of growth meant that in Chile, rotation cycles could be from 20 to 25 years, that is, half the time of the cycle observed in Canada, a third of the one described for Sweden and even less than the cycle known for New Zealand, the lowest worldwide (Katz et al. 1999). In addition, radiata

pinos also showed a notable adaptability to Chile's climatic conditions and were notably rustic –that is, demanding no special care (Hartwig 1994). For all of the above reasons, it soon became the most popular species for forestation (Luraschi 2007; Camus 2006).

Once plantations of radiata pines reached a critical mass, their expansion could only continue to grow. As Hartwig (1994) explains, rather than experimenting with riskier alternatives, landowners preferred a species that had been tested and was known to grow faster and be easier to manage. Research programs on pino radiata, implemented through the collaborative work of Chilean universities and public entities such as the *Instituto Forestal* (INFOR) [Forest Institute] created in 1961, continued to enhance the centrality of this species in the country's forestation initiatives.

As Hartwig (1994) puts it, the pino radiata earned its Chilean citizenship because it allowed the fast recovery of sands, dunes and washed lands where no other species could grow. It was in these “pure sands with insignificant organic matter” where “the soil is so hard that the holes for planting the pines must be done with a pillory” that the pino radiata grew with extraordinary vigor, reaching sawing dimensions within 15 to 18 years in some cases (Bernarth 1940). Even in the clay soils of Valdivia, which are very thin and poor, constantly soaked by hard rains, and where “not even good grasses grow,” the pino radiata showed an annual growth of two meters in height (Bernarth 1940). As Máximo Puffe, one of the forestry pioneers, described it, these rustic plants, established with the unique care of protecting them from cattle, were not only cheap but grew to become “worth twice my entire life's work, more than my crop lands, my fruit trees, my cattle and all my industries; and I don't need to expend a cent in cutting them, for those interested come here and offer

me a price for each tree” (Keller 1956). Accordingly, Hartwig (1994) concludes, the pino radiata was only salvation for regions that had lost their productivity.

Despite his resistance to the massive use of pino radiata, Albert also contributed indirectly to its proliferation. Indeed, as a way of extending forestation in Chile, Albert established a network of public nurseries from which landowners could obtain trees at low costs with the support of the first forest tax exemptions and awards (Camus 2006). By 1914, these nurseries had sold to landowners or transferred to public entities 63,502 trees (Camus 2006). Another result of Albert’s work was that the first public agency specialized in forests – the *Sección de Bosques y Aguas* [Department of Forests and Waters] – was created in 1906 within the Ministry of Industry, becoming the *Inspección General de Bosques, Pesca y Caza* [General Inspection of Forests, Fisheries and Hunting] in 1911. Along with these new entities, Albert proposed the first drafts of a national forest law that incorporated both mechanisms for the conservation of native forests and tax exemptions for the establishment of forest plantations. Although the country’s first forest legislation was not approved until 1925, Albert’s drafts were of great influence in its preparation²⁰ (Cassals 1999).

The 1925 forest law also incorporated a distinction that would be decisive in the sector’s evolution: the notion of “forested lands.” These were comprised of state-owned forests or private lands whose owners were willing to commit them to long-term forest use (Camus 2006). During the 10 year period of a “forested land declaration,” these properties would be subject to forestation plans, tax exemptions for existing forests and rewards for new

²⁰ In particular, the 1925 “forest law” –known as the *Decreto Ley 656* of October 17, 1925– highlighted the strategic relevance of forests in the country’s economy through the production of wood and its by-products, the protection of soil, and the regulation and conservation of hydrological resources. All these objectives reflected Albert’s conception of forests.

forestation. In 1931, the “forest law” was modified, and tax exemptions were extended to 30 years. According to Camus (2006), landowners responded enthusiastically. A telling example was the creation in the 1940s of the *parcelas-bosques* [forests plots], long-term private investments based on plantations that was hugely adopted by associations of workers in order to increase their retirement funds (Camus 2006). The forest law remained untouched until 1974, when subsidies were expanded by the neoliberal restructuring.

3.3 The Agency of Pino Radiata and the Pressure for a Pulpwood Industry

In the 1930s, the Chilean state inaugurated a period of economic policies aimed at fostering endogenous industrialization that endured, with variations, until the 1973 *coup d'état* (Cardoso and Faletto 1969). Accordingly, a series of measures meant to regulate, intervene in and protect national markets while fostering domestic production were set in place under the label of the “imports substitution” program (Pinto 1962). The public entity *Corporación de Fomento de la Producción* (CORFO) [Corporation for the Promotion of Production], founded in 1939, promoted the creation of strategic state-owned industries for the provision of energy, steel and oil, also supporting the creation of private companies through low credit rates and financial endorsement.

The “imports substitution” program was crucial in the emergence of a forest industry. Its most effective mechanism was a forestation credit offered by CORFO. In 1943 alone, 4,000 ha were planted, and in 1947, a peak of 15,000 forested ha per year was reached (Camus 2006; Bluth 2013). This was a significant increase compared to the average of 2,580 ha planted during the previous decade (Camus 2006). By the mid 1940s, the total surface area covered by exotic forests was close to 150,000 ha (Bluth 2013).

As the rate of exotic plantations kept growing, they began to exert their agency. Like Albert had warned, since the pino radiata was not suitable for high-quality wood, the masses of planted pines were destined to become low-value products. In connection with networks of national and international actors, the great tracts of radiata pines began to pressure for a product highly demanded by global markets: pulpwood. Accordingly, a series of necessary investments were made for the making of a pulpwood industry in Chile. These included the devaluation of native forests, deemed useless for a competitive forest products industry.

In 1944, with the support of the United Nation's Food and Agricultural Organization (FAO), CORFO hired Irvine T. Haig, an expert from the United States Forest Service, to conduct the first aero photographic cadaster of Chile's forest resources. One of the mission's main findings was shocking to the Chilean government: the depletion of the country's native forests was occurring twice as fast as their rate of natural growth. According to the report, this meant that "Chile's forests would be completely exhausted in 107 years" (Haig et al. 1946:49). In the case of the country's most valuable natural forest species, such as *Laurel*, *Roble*, *Lingue* and *Raulí*, the projected rate of exhaustion was even more critical, ranging from 25 to 60 years (Haig et al. 1946). This catastrophic condition of natural forests evidenced decades of abandonment by the state and uncontrolled exploitation (Bluth 2013).

Haig's conclusion severely undermined CORFO's aspiration –which was part of the "imports substitution" program– of advancing towards a "modern" forest sector. However, the Haig mission, as it was known, also concluded that Chile had "promising" forest potential and that, under the proper conditions, a forestry industry could be developed and become one of the country's economic mainstays (Haig et al. 1946). Accordingly, the

mission also raised other consequential findings: a sustained expansion of exotic forests at the then-current rate of 4,800 ha per year could perpetuate these industrial resources, amounting to “an increase in plantation area of 92 percent in two decades” (Haig et al. 1946:53). Even for the worst levels of productivity, the report added, annual yields from plantations “would equal 196 million cubic feet, or precisely the present volume cut from all forests,” natural and planted (Haig et al. 1946:55). Haig et al. (1946:55) also confirmed that “a more than ample area is available for the establishment of the plantations anticipated above.” Haig et al. (1946:xii) concluded, “[I]t is recommended, therefore, that Chile, 1. Formulate a forest policy which will provide for adequate management of forestlands (...); 2. Provide for enlargement of public ownership and (...) an adequately managed and financed Forest Service (...); 3. Provide (...) for a program of public aid to private forestland owners (...); 4. Provide the immediate expansion of the forest industry.”

In order to fulfill the country’s industrialization goals, CORFO prepared the first national forest plan. It addressed the need to reinforce exotic plantations and included the construction of sawmills, wood-board factories, a wood impregnating plant and a chemical pulp-mill (Katz et al. 1999). The pulp-mill planned by CORFO was meant to feed the domestic market for paper production²¹ while also generating a surplus for exportation (Barbosa Lima-Toivanen 2012). With the support of FAO, CORFO began to invest in the technical and operational network required for an industrial forestry sector.

²¹ Chile’s paper industry was then very limited. Two small industrial facilities located in Santiago were merged in 1920 to create the *Compañía Manufacturera de Papeles y Cartones*, CMPC. By the end of the 1920s, CMPC’s annual productive capacity was only 9,000 tons of paper and cardboard (Camus 2006). Additional newspaper and cardboard plants were built by CMPC in Santiago in 1938, in Valdivia in 1951 and in Bío Bío in 1957.

Throughout the 1950s, FAO collaborated with the government, gathering statistics and elaborating guidelines to structure Chile's "modern" forest business. A training program for domestic technicians led to the creation of the first university-level Department of Forest Engineering, established in 1952 at the *Universidad de Chile*. Similar efforts were conducted in the south of the country. In 1955, the first Faculty of Forest Engineering in the region was created along the founding of the *Universidad Austral de Chile* in Valdivia, and in 1959 the Department of Forest Products was launched at the *Universidad de Concepción* (Camus 2006). Complementing these efforts, CORFO standardized forest management methods and launched a program of technical assistance for landowners (Nazer 2009).

In 1954, a decade after the Haig mission visited the country, CORFO obtained a US\$ 20 million credit from the World Bank to create the country's first pulp-mill in association with CMPC, owner of three small paper factories in Santiago and Valdivia (Katz et al. 1999). It consisted of a medium-sized operation located in Laja, close to the first pine plantations established in Chile's coastal range. It began to operate in 1959 and had an annual capacity of 70 thousand tons of bleached and semi-bleached crude pulp (Camus 2006). In the 1960s, this capacity was tripled while export sales grew exponentially, from US\$ 1.5 million in 1958 to more than US\$ 29 billion in 1970 (Camus 2006). Accordingly, the internal pressure for pulpwood exports increased, reinforced by a scenario of projected worldwide scarcity. It was expected that the global demand of pulp and paper would double by 1965, reaching 3 million tons per year, while surplus from traditional providers would diminish (Naciones Unidas 1957). These trends were confirmed by several international missions that visited Chile between 1947 and 1957 to assess the prospects of a pulp and

paper industry in Latin America.²² A report prepared in 1957 by the United Nations highlighted the advantages of planting *pino radiata* for Chile: “the plantations of this conifer are the ones that offer the best prospects, both from a technical point of view and from the economic angle, for the fabrication of paper and pulp” (Naciones Unidas 1957:73).

At that time, large-scale pulp industries were relatively recent. Only in the 1860s did the modern paper industry take off, marked by the appearance of pulp-mills based on old-growth native forests in North American and Nordic countries (Carriere and Lohmann 1996). These highly mechanized mills displaced smaller factories based on traditional technologies and inputs such as straw, hemp or grass. The economic effects were dramatic: by the late 1800s the price of paper had dropped by 85%, demand was rising, and the machines became more sophisticated and standardized than ever before (Carriere and Lohmann 1996). The industry shifted to softwoods such as pine and fir, which had longer cellulose fibers and, thus, were able to produce stronger and higher-quality pulps. By 1987, 46% of the world’s pulpwood came from pines (Carriere and Lohmann 1996). Under these circumstances, large companies able to afford increasing costs and control “large-scale” operations began to dominate the global market (Carriere and Lohmann 1996). The pulp and paper industry started to rely heavily on the re-engineering of landscapes in order to assure profitability (Carriere and Lohmann 1996). The only actors capable of such large-scale interventions were multinational corporations or governments. Both became key influences in the global expansion of the pulpwood industry (Carriere and Lohmann 1996).

²² In 1947, the UN expert M.A. Huberman visited the country to study the “forest problem,” and throughout the 1950s the United Nations Economic Commission for Latin America (ECLAC), along with the Forest and Agricultural Organization (FAO), prepared additional reports on the development of a pulpwood industry in Chile and Latin America: Comisión Económica para América Latina (1951) “Importancia de los bosques y de la producción forestal en la economía latinoamericana,” México; Naciones Unidas (1957) “Informe del grupo asesor en papel y celulosa para América Latina,” La Paz: CEPAL; Naciones Unidas (1954) “Informe de I Junta Latinoamericana de Expertos en la Industria de Papel y Celulosa,” Buenos Aires.

Meanwhile, the pulpwood industry was shifting from the natural forests of the North to the plantations of the South, where the highest rates of growth for commercial species occurred and the prices of land were lower (Carriere and Lohmann 1996). The extraordinary productivity of species such as *pino radiata* meant that the 1.6 million ha of replanted forests needed to feed a 500,000 ton per year pulp-mill in British Columbia, Canada, and the 800,000 ha required to do the same in Nordic countries, were reduced to “only” 50,000 ha under ideal conditions in Brazil (Carriere and Lohmann 1996). As Carriere and Lohmann (1996) insist, trees are *the* strategic driver that determines competitiveness in the pulpwood industry. Therefore, even if markets are located at great distances, pulpwood exports based on thousands of hectares of planted forests can still be a profitable business.

3.4 A New Impulse to Forestation: Conservationists Join the Forest “Feat”

While *pino radiata* plantations pressured for pulpwood industries, public forestation policies were reinforced in Chile. A new force was added to the state’s forestation efforts: a strong consensus about the critical condition of the country’s natural resources. In the 1950s, the country was shocked by the erosion of Chile’s south-central region (Elizalde 1958). Additionally, the devastation of native forests was so intense that, as said, it had been predicted that in a century they would be extinguished (Haig et al. 1946). The sense of “imminent catastrophe” and the need to take urgent action brought a very diverse group of actors into the forestation “feat,” taking it to the center of progressive political platforms (Elizalde 1958). President Eduardo Frei Montalva (1964–1970) declared on 6 August 1965:

“(…) one of the greatest aspirations I had in reaching the presidency, was to confront the problem of the tree in Chile. For me it is a sign, perhaps a test, of our nation’s

capacity (...) I have seen what perhaps is not technically accurate but translates well the idea: the advance of the desert is already touching the borders of Santiago.”²³

Frei's 1965-1970 National Forestation Plan, structured under the slogan “let's not allow the ground to reach the sea,” was presented as an imperative for development. Its goal was to plant 450,000 hectares of trees in five years with the purpose of not only addressing the depletion of native forests and the problem of erosion, but also, especially, to thwart the emigration of the rural population from degraded agricultural and forest regions (Camus and Hajeck 1998). As Camus (2006:193) puts it, “the struggle against erosion through forestation had the double purpose of conserving the lands, but, at the same time, of (...) replacing the traditional agrarian system in crisis.” Therefore, by the mid 1960s, the forestation endeavor initiated half a century was now also aligned with the state's objective of rural development. However, as acknowledged by Frei Montalva while explaining his National Forestation Plan, the “vision” behind these efforts was now much more ambitious: to gain a prominent position in the international market of paper and pulp.

Frei's forestation campaign received the direct support of United States President Lyndon Johnson, who personally offered him a hybrid seed of pino radiata developed by the US Department of Agriculture (Archivo Histórico Casa Museo Eduardo Frei Carpeta 72). The seed, received by researchers from the Universidad de Chile, was used by the network of public forest nurseries that occupied a key role in Frei's forestation plan. Public agencies began to tour the country for convincing medium and small landowners to convert their degraded lands into plantations. In 1965, during the first year of the plan, 25,930 hectares were planted, and in 1966 another 42,000 hectares were added. As Frei Montalva claimed

²³ Message in the Windsor Theatre, Santiago (Archivo Histórico Casa Museo Eduardo Frei Carpeta 175).

in 1967 during his third presidential message, this planted surface increased the average of 4,000 hectares planted during the previous five years by a factor of 10 (Camus 2006).

Aside from the free plants and the technical assistance offered to landowners, the plan lacked any substantive incentive. It is quite impressive, therefore, that thousands of hectares were converted to plantations by small and medium landowners who had to finance this establishment themselves, giving up alternative uses in the pursuit of an economic return that would come two decades later at minimum, if at all. Guillermo Álvarez, who was then in charge of the program within the *Servicio Agrícola y Ganadero* (SAG) [Agricultural and Livestock Service], describes the involvement of these landowners as follows:

“Through a personal contact, the land use change into forest plantations was proposed to peasants. It had a very good reception and showed optimum results despite the fact that we didn’t offer any type of monetary help, but only technical. Besides, the extension work was done with precarious means. We demonstrated the advantages of changing to the forest activity in order to detain the degradation [of soils] and increase the economic level of rural inhabitants” (Chong 1995:7).

Although Álvarez does not put it this way, the promise of rural development was tied to the vision of Chile as a world-class pulpwood exporter, like Frei Montalva had declared.

It soon became obvious that such a goal required additional incentives. The solution came from the mechanism of “forestation agreements” [*consorcios de reforestación*], through which planting costs were shared between landowners and the state. The mechanism was tested in 1969 in Colchagua, selected for the exhaustion of its soils and the lack of a forest tradition: “We knew that the merit of a success obtained there would be higher and serve as an example for other zones,” Álvarez explains (Chong 1995:7). The new forestation mechanism was officially launched in May 1970 through the creation of the *Corporación*

de Reforestación (COREF) [Reforestation Corporation]. In 1970, COREF planted 8,000 ha directly and another 99,000 ha through “forestation agreements” with landowners (Chong 1995). New territories were gradually added. In 1971, COREF reached Valdivia.

The efforts involved are attested to by the expansion that took place in COREF’s workforce. In 1970, right after its creation, 300 people worked in the agency. By 1973 –having changed its name to CONAF, *Corporación Nacional Forestal* [National Forest Corporation]– 18,000 workers had been enrolled in reforestation activities. This growth was connected to a key instrumental factor: those properties with forestation agreements or declared as “forested lands” by their landowners were protected from expropriation by the ongoing Agrarian Reform launched by Frei Montalva and intensified in the early 1970s under Salvador Allende’s *Unidad Popular* [Popular Union] (Camus 2006). This “political protection” of forested lands confirmed their strategic importance for the state. By 1973, 330,000 ha had been planted, the great majority with pino radiata (Hartwig 1994).

By the 1970s, the accumulated effect of forestation investments made since the late 1880s had *de facto* decided the “forest vocation” of Chile’s southern regions, from Concepción to Valdivia (Delamaza 2012). The plantations established in these regions were “pressing” for new forest industries. As Luraschi (2007) explains, it is the location of trees more so than that of any other strategic component of the pulpwood business –such as, for example, ports– that determines where the factories are built. Until the late 1960s, the strategic location of these industries was planned by both state agencies and corporations. Starting with the neoliberal turn of the mid 1970s, the planning of Chile’s forest sector and, in particular, the strategic pulpwood orientation of southern regions, such as Valdivia, responded more to the agency of planted surfaces of pino radiata, allocated by private

companies on their own lands, than to any state-driven plan. The performative power of the pine-industry alliance would only grow along with the planted lands.

3.5 The Making of ARAUCO

Given the projections of international demand for pulp, and considering that existing industries were insufficient to absorb the volume of planted trees, the Chilean state, through CORFO, decided to create two large pulp-mills in the localities of Arauco and Constitución, close to where Albert conducted his first forestation essays. The construction of the Arauco plant began in March 1968 with the creation of *Industrias de Celulosa Arauco Sociedad Anónima* [Arauco Cellulose Industries, Limited]. CORFO retained 60% of the ownership. Under Allende's administration, the state acquired the mill. It began operating in 1972, and its productive capacity was 122,500 tons of bleached kraft pulp per year.

The origin of the Constitución plant was different. As Camus (2006) describes, an assembly of residents from the city of Constitución, under the leadership of its mayor, demanded that the government install a pulp factory. CORFO had already requested feasibility studies from the Canadian H.A. Simons and, in 1968, decided to build the plant (Camus 2006). By mid 1969, CORFO had contracted the French company ENZA, from the Schneider group, to create *Celulosa Constitución* (CELCO), retaining 67% of the ownership (Camus 2006). In 1974, the CELCO plant was also acquired by the state – now under military control – but only began to operate in 1975, once Pinochet's regime neutralized the resistance that such public ownership generated amongst business actors (Katz et al. 1999). With these operations, Chile's forest industry was finally able to compete globally (Katz et al. 1999).

In 1973, after Pinochet's *coup d'état*, a complete restructuring of the Chilean economy took place. A mainstay of the neoliberal program was the diversification of exports. Until 1974, more than 80% of Chile's exports corresponded to minerals, and copper in particular. Starting in 1975, this proportion was gradually reduced, reaching less than 50% in 1987 (Clapp 1998). Meanwhile, the proportion of exports occupied by primary, low value-added products such as fresh fruit, fisheries and pulpwood grew.

For this to occur, a renewed forestation effort was needed. Indeed, by the mid 1970s, landowners' interest in planting trees had declined. The reason was simple: waiting 20 years to harvest the forests and sell them in a market controlled by two pulpwood giants limited the prospects for making a profit (Katz et al. 1999; Grass and Raga 1991). To give a new impulse to private forestation, the military regime designed additional incentives. The *Decreto Ley 701* [Law Decree 701] of forest promotion, approved on October 28, 1974, included new subsidies covering 75% of the costs of forestation (Ministerio de Agricultura 2005). Between 1974 and 1995, small landowners and indigenous communities received only 6.4% of the forestation subsidies, compared to the 60% destined to the largest holdings²⁴ (Barbosa Lima-Toivanen 2012; *Gobierno de Chile* 1995).

As a result of *Decreto Ley 701*, an impressive growth in forestation occurred, assuring the consolidation of a solid export industry (Hartwig 1994). Between 1974 and 1980, the annual average of planted lands reached 77,583 ha, three times the rates of the previous period. In 1984, a total of 1 million ha of exotic trees had been planted (Luraschi 2007,

²⁴ In 1998, the *Decreto Ley 701* of "forest promotion" put in place in 1974 was redesigned in order to fulfill the environmental requirements of commercial agreements and include social objectives so far left totally aside. Recent assessments, however, are critical with regard to the extent to which social and environmental objectives have been reformed by the law since the majority of forestation subsidies have continued to benefit the largest corporations, directly or indirectly (Reyes, Sepúlveda and Astorga 2014).

Hartwig 1994). Almost 70% of this planted surface had been financed by the state (Luraschi 2007).

Chile's pulpwood exports grew accordingly. They increased from 77,500 tons in 1974 to 308,700 tons in 1988 (INFOR 1999), and from US\$ 40 million in forest exports in 1970 to US\$ 2 billion in 1999 (Katz et al. 1999). To give a sense of this rate of forestation, in 1986 Chile's plantations of *pino radiata* were, according to the World Bank, the largest on the globe (World Bank 1986). Moreover, international bodies such as the Economic Commission for Latin America and the Caribbean (ECLAC) described Chile's forest sector as a "model" of economic development for Latin America, as it was labeled by this entity (Katz et al. 1999). It is no surprise that Pinochet's dictatorship presented these forestation rates as an achievement of its economic program, a claim that its business allies have also tied to nationalist discourses of development. Eliodoro Matte (1994), patriarch of the CMPC holding, has affirmed that the establishment of Chile's industrial forest mass constitutes a "feat" or "transcendental effort" that allowed for the "reconstruction of the forest cover" previously destroyed and converted into eroded lands (Hartwig 1994:28).

As part of the neoliberal restructuring, state-controlled industries were massively privatized.²⁵ *Celulosa y Forestal Arauco* was tendered by the state in 1977 and acquired by the already privatized holding *Compañía de Pretróleos de Chile* (COPEC) [Petroleum Company of Chile]. The industrial complex included a pulp-mill, 60 thousand ha of plantations and the most modern forest machinery available in the country (Camus 2006).

²⁵ In addition to the privatization of state-controlled companies, the military regime declared commercial freedom for all forest products, putting an end to the prohibition of exporting logs that had been enacted during the industrialization program of the 1930s (Camus 2006). Public lands and public forests created through the Agrarian Reform were transferred back to private ownership (Camus 2006), and forest nurseries owned by CONAF were privatized (Katz et al 1999). In turn, the forest sector began a process of property concentration reinforced by the expansion of the two major holdings, ARAUCO and CMPC.

Through a private bid, COPEC also became the owner of CELCO. According to María Elena Cruz and Rigoberto Rivera (1983), both mills were sold at 78% of their value. In 1976, COPEC also acquired the state-owned Arauco sawmill. The three companies were merged in 1979, giving birth to the ARAUCO holding, controlled by COPEC.

COPEC was in hands of the Cruzat-Larraín economic group, the largest corporate holding born from the restructured economy. In 1982, the global economic crisis provoked the group's bankruptcy and consecutive intervention by the military regime. As a result, the ARAUCO holding was tendered again in 1986. This time, an emergent company under the control of one man, Anacleto Angelini, acquired the majority of ARAUCO's ownership in association with a New Zealand partner, the Carter Holt Harvey forest holding. When Angelini took charge of ARAUCO, its factories were already producing 58% of the country's pulpwood, owned 25% of the country's forest plantations and amounted to 39% of the Chile's forest exports (Camus 2006).

Pinochet's forest policy was maintained and enhanced by the center-left *Concertación de Partidos por la Democracia* [Coalition of Parties for Democracy] that governed the country between 1990 and 2010. Under the first government of the *Concertación*, record forestation rates occurred: between 1990 and 1994, an average of 115,318 ha per year were planted with exotic trees²⁶ (Lara et al. 2000). As a result of these efforts, in 2004, the goal of 2 million ha of planted forests set by the military regime was finally reached, 70% of which were *pino radiata* (Luraschi 2007). By the early 2000s, when the Valdivia pulp-mill was

²⁶ These enormous rates were due, on the one hand, to the increase in lands planted with eucalyptus, a species that was suitable for the rainy, southern regions where "pino radiata" did not grow as well, and whose demand by international pulpwood markets showed a rising trend. On the other hand, the fact that the forestation subsidies would extinguish in 1994, after 20 years of application, acted as pressure to take advantage of this benefit (Lara et al. 2000). In 1998, however, the forestation rate began to recover when the "forest promotion" law was re-launched.

built, the control of Chile's forest sector was extremely concentrated. The two major forest holdings – ARAUCO and CMPC – owned 52% of plantations and 98% of the pulpwood production capacity (Luraschi 2007), while 40% of the country's forest exports came from ARAUCO (Delamaza 2012). By then, the value of Angelini's holding, estimated at US\$ 14.5 billion, amounted to 17.5% of the property owned by all the private corporations registered in Chile and 20% of the country's GDP (Delamaza 2012; Fazio 2004). The pulpwood industry had become the axis of the country's "forest model."

Since only a portion of radiata pines –the main raw input available– are suitable for fabricating pulpwood, complementary industries such as sawmills and wood-board factories had to be added to Chile's forest model. However, reinforcing the country's pulpwood orientation with a new species that was entirely convertible to pulp, the Australian eucalyptus had been extensively introduced since the 1980s, soon becoming the second most important forest species planted in Chile. The contrast between the properties of both species highlights how the pino radiata and its very specific properties were key in shaping the trajectory, organization and diversity of Chile's "forest model."

Two additional features characterize Chile's "forest model": its high levels of vertical integration and of labor exteriorization. Vertical integration is expressed in the direct control of every stage of the productive cycle by large corporations, from genetic improvement to research, from silviculture to extraction, and from primary and secondary industrialization to distribution and commercialization (Izquierdo 2002). This means that ARAUCO's products are not openly exchanged but transferred from one subsidiary company to another. This diminishes potentially positive effects on local economies while, in combination with highly concentrated property ownership, contributes to the collapse of

less competitive businesses, such as the various small- and medium-sized wood-board factories that have already disappeared (Barbosa Lima-Toivanen 2012; Luraschi 2007). Technological development has not been included amongst the activities of Chile's major forest corporations, concealing the positive effects of knowledge-related investments (Barbosa Lima-Toivanen 2012). An exception is the industry of genetic improvement, through which ARAUCO's subsidiary, Bioforest, developed a technology of pino radiata propagation in partnership with a Canadian company (Barbosa Lima-Toivanen 2012).

Chile's "forest model" is also characterized by a huge outsourcing of labor. According to CORMA, of the 18 thousand workers in the Chilean pulpwood factories by the mid 2000s, only 20% were directly hired by the major holdings. The remaining 80% was contracted by external providers of services such as transport, silviculture, and road construction.

Consistent with these figures, ARAUCO's 2004 report states the following: "ARAUCO's plantations in Chile, Argentina and Uruguay provide direct employment to 478 workers, and indirectly create over 12 thousand jobs through forestry service and transportation companies" (ARAUCO 2005:22). These exteriorized workers are subject to diminished labor conditions compared to those available to a small elite of managers, professionals, technicians and administrative personnel (Universidad de Concepción 2009). The outsourcing firms compete amongst themselves through bids offering the provision of services to the larger holdings. Amongst the conditions they must comply with in order to qualify as providers is a periodic renewal of machinery that can only be financed through credits. This increases risk and creates pressure for lower salaries, reducing at minimum the redistribution of profit that the major holdings enjoy (Universidad de Concepción 2009).

The greatest driver behind these distinctive features of Chile's "forest model" has been the reduction of costs. It is only because of a highly competitive cost structure that Chilean pulpwood exports can continue to be profitable despite their great distance from final markets located in China, Asia or Europe. Indeed, along with Brazilian companies, Chilean pulp industries are considered global "cost leaders," a position tied to contextual factors such as economies of scale, forestation subsidies, genetic improvement and, particularly, the extraordinary growth rates of commercial species (Barbosa Lima-Toivanen 2012).

Within this cost-oriented market, ARAUCO has been historically considered the toughest player. Its focus on efficiency surpasses that of its main Chilean competitor, CMPC, and has also led outsourcing companies to define ARAUCO as a boss that "squeezes" them to the limit (Universidad de Concepción 2009). This focus on cost reduction is part of an organizational culture that Charles Kimber, ARAUCO's Manager of Corporate and Commercial Affairs, defined in 2009 as the basis of its competitiveness: "The main strengths of the company are a solid financial position, its own forest patrimony, a modern industry, a commercial network with presence in nine countries and a culture of preoccupation with costs that makes it one of the world's most competitive forest enterprises" (Fundación Chile 2009).

The combination of concentration of property ownership, vertical integration and labor outsourcing has resulted in an additional feature characteristic of Chile's "forest model": its marginal contribution to local development (Vergara 2012; Nazif 2014). The country's forest regions tend to have the worst levels of social welfare and the highest rates of poverty. The Bio-Bio Region is particularly illustrative of this point. By 2011, 20% of this region's population was classified as poor by the official national survey CASEN,

surpassing the national average of 14.4% (Nazif 2014; Gobierno de Chile 2012). This poverty rate sharply contrasted with the 47% of the region's productive lands that were planted with exotic forests, corresponding to 46% of the country's plantations (Nazif 2014). As Iván Nazif (2014) explains, the correlation between forestation and poverty results from the way in which the major forest companies operate. That is, as enclaves oriented to global markets and detached from the surrounding, chronically impoverished local regions.

3.6 The Confrontation Between Plantations and Native Forests

According to the environmental historian Pablo Camus (2006), despite the magnitude of the territorial, ecological and social transformations resulting from large-scale forestation, no concerns about its negative effects are found until the 1980s. The dominant mode of performing Chile's forest sector has been in this manner represented as receiving broad support: from politically progressive actors who saw in plantations an economic alternative for depressed rural zones, from environmentally concerned actors who considered forestation as the best way of thwarting erosion and reducing the pressure on native forests, and also from business actors interested in promoting the forest industry (Elizalde 1958; Camus 2006). All of them acted as allies in what Matte called Chile's forestation "feat."

The pino radiata was the outstanding representative of this unusually transversal alliance. By the 1970s, this species had displaced native forests as an economic resource: while in 1930 the pino radiata amounted to only 0.5% of the total volume of sawn wood produced in the country, in 1973 it reached 67.7% (Camus 2006). A correlative territorial displacement of forest activities had occurred from the southernmost regions and the Andean mountain range, where the native forests were located, to the central and coastal regions, where exotic plantations had reached their commercial maturity.

Although silenced by the dominant performance of Chile's forest expansion, resistances had not only emerged but also confirmed the existence of non-dominant entanglements to forests. According to Thomas Miller Klubock (2006), in the 1930s and 1940s, peasants, squatters, and seasonal workers were opposed to forestation in Chile's southern regions. Landowners, whose properties were often established based on "indeterminate boundaries and fraudulent titles" (Klubock 2006:570), faced constant challenges to their estates, including those coming from the Agrarian Reform and unionization. They found a way of responding to these menaces through pine plantations, which helped "to assert their authority over the land" (Klubock 2006:570). Indeed, plantations were used by landowners as a tool for expelling an "increasingly restive rural labor force" from their properties (Klubock 2006:570). Underlying this struggle, Klubock found testimonies that reveal the alternative entanglements to native forests through which rural communities were confronting plantations. By demanding that the national government protect the native forests of public lands, which were illegally occupied by landowners and their pines, these communities were demanding that the state secure the customary status of native forests as a resource on which they could rely "for subsistence and survival" (Klubock 2006:547).

It was during the 1980s, however, that an intense controversy around the environmental effects of plantations emerged, publicly confronting for the first time Chile's "forest model." Due to their rapid expansion, forest plantations were not just being established on degraded lands anymore. Exotic monocultures were also colonizing lands previously covered with native forests and other fragile ecosystems, which were intentionally destroyed for that purpose. In particular, the last patches of endemic forest in central Chile's valleys and coastal range were being "substituted," as this practice was called, by industrial plantations

(Armesto, Villagrán and Donoso 1994; Estades 1994). The defense of native forests threatened by exotic species was performed as an ontological struggle in which industrial plantations were counter posed by non-dominant entanglements to natural landscapes.

The first public denunciations were made in 1983 by the *Comité de Defensa de la Flora y Fauna* (CODEFF) [Committee for the Defense of the Flora and Fauna] –a very influential environmental NGO and also Chile’s first– which affirmed that the replacement of native forests with *pino radiata* constituted Chile’s most urgent conservation problem (CODEFF 1983). In the coming years, “substitution” would also affect the endemic Valdivian rainforest, a biodiversity hotspot of global conservation priority (Dinnerstein et al. 1995).

The problem of “substitution” was, however, denied by the military regime and forest corporations alike, and, especially, by the influential association of foresters, CORMA. These actors argued that there was no proof that plantations were affecting native forests. In words of Eliodoro Matte (1994:14), CMPC’s patriarch: “[M]ore than 90% of these new forests have been established on terrains in the erosive phase or severely eroded, in lands impoverished by agricultural uses, or simply unproductive for other uses, such as dunes or sand hills.” In this manner, plantations were presented by forest-related actors as generating immense environmental benefits through impeding the most important of all ecological threats: the loss of soil (Hartwig 1994). For Matte (1994:14), plantations are:

“the most colossal concrete environmental contribution that has been made in our country (...) To this we must add the enormous socioeconomic impact of forest plantations, which sustain more than 85% of the sector’s economic activity and are projected to be in the future the second most dynamic economic sector after mining, and the first settled upon sustainable bases.”

Suffocated by the political repression of the 1980s, the controversy gained new vitality in the 1990s. In 1993, Antonio Lara and Thomas Veblen provided the first estimations of “substitution” rates: 18% of the native forests of the Maule Region’s coastal range, the location of some of Chile’s most threatened endemic forests, had been replaced by exotic plantations between 1978 and 1987. Two years later, the first comprehensive analysis of “substitution” was reported by a study prepared by Chile’s Central Bank, arriving at a shocking conclusion: annually an average of 26,134 ha of native forests had been “substituted” between 1991 and 1994 and another 80,000 ha of native forests had been degraded or overexploited (Lara et al. 1995). If these trends persisted, by 2025 half of the native forests still existing in Chile would disappear (Clapp 1998).

Major corporations and CORMA were furious, considering the estimations biased and condemning the arbitrary exposure of the supposed benefits of plantations to such irresponsible public questioning. The impact was such that the leader of the Central Bank’s green accountability unit was fired and the program suspended. Harsh critiques of the study’s methodology inundated the national press. It is a paradox, Matte (1994:14) claimed,

“that this immense environmental and economic achievement, broadly known by the public, has not been valued as it deserves. It calls attention to how certain environmental associations search for marginal arguments, sometimes mythical, in order to overshadow everything that is related to plantations, silencing their immense environmental benefits.”

The government also challenged the Central Bank’s study, aligning itself with the forest companies. The Minister of Agriculture, Emiliano Ortega, attacked its authors for being “irresponsible, ill-intentioned and childish”, arguing that they had damaged the reputation of Chile’s forest industry (El Mercurio November 8, 1995). Both the government and the

forest companies shared concerns about the effects that the exposure of such environmental misbehavior by domestic industries could provoke for the country's international trade of forest products, especially the selling of woodchips [*astillas*], which had become one of Chile's most successful forest exports beginning in the mid 1980s.²⁷

The woodchip “boom,” as it was called, was at the core of the controversy around the destruction of native forests. For business actors and representatives of forest companies, the Valdivian old-growth rainforests, now threatened by the woodchip industry, were dominated by “over mature” forests –that is, by “disordered” stands, “senescent” individuals and economically “worthless” species (Hartwig 1990). In this dominant mode of performing the forest business, woodchip exports were a way of making a profit from these “valueless” resources. Accordingly, Fernando Hartwig, manager of the *Compañía Chilena de Astillas* [Chilean Woodchip Company], proposed girdling ancient trees and converting them into woodchips in order to “rejuvenate” native forests (Clapp 1998). Ecologists countered that “to talk about over mature forests is an ecological aberration, valid only within a productive domain that lacks any sustainability criteria” (Armesto 1992:174).

Two emblematic woodchip projects triggered intense environmental conflicts and made evident the fierce struggle between native forests and plantations that was unfolding in Chile. The first was the *Astillas de Chiloé* [Chiloé Woodchips] project on Chiloé Island, located 1,100 km south of Santiago. It was developed by a joint venture between CORFO and the Japanese Marubeni and Sanyo Kokusaku Pulp Company, which in 1974 created the

²⁷ In 1986, Chile began to sell forest woodchips for the paper and pulp industries of Japan and Norway. From 13,900 tons exported that year, mainly coming from eucalyptus, the volume grew to 1 million 703 thousand tons in 1991, 55% of which came from native forests (CODEFF 1992).

Sociedad Factibilidad Astillas de Chiloé [Chiloe Society for Woodchip Feasibility] (Ábalos 1985). In 1978, CORFO announced the initiative (CORFO 1978). However, its “reserved” character raised concern and opposition.²⁸ Despite coinciding with the most repressive years of Pinochet’s dictatorship, a network of actors from academic circles and the Catholic Church campaigned to turn the project into a national controversy (Revista Hoy # 25 November 1977; Revista Hoy # 72 October 1978; Revista Análisis # 13 May 1979; Revista Chile Forestal August 1978). Japanese investors withdrew their support for the investment, and the government, finally, also desisted. This failure is considered an exceptional case of regionalism under the military regime (Boisier 2000). The struggle mobilized a particular way of conceiving “development” in connection to Chiloé’s landscapes and ways of life, anticipating the strength that non-dominant ontologies related to the defense of native forests would have in the decades to follow.

The second most emblematic conflict related to the woodchip industry exploded in 1990 near Valdivia. It involved the Terranova Project, a Swiss-Japanese joint venture created in 1987 for the production of native woodchips and the “substitution” of 23,000 ha of native forests with eucalyptus (Clapp 1998). It was projected that these plantations would feed a pulp-mill and a sawmill (Clapp 1998). Given the ecological value of the affected forests, the initiative generated strong resistance amongst Chilean NGOs, scientific actors –mainly from Valdivia’s university– and international allies, representing a crucial test for the country’s nascent environmental policies (Clapp 1998). The huge debate forced the

²⁸In any case, its contents were soon made public: the project consisted of the exploitation of 125,000 ha of native forests, 32,000 ha of which would be replaced by “pino radiata” and *Raulí* (a native species foreign to the island). Another 57,000 ha would be converted into agricultural uses (CORFO 1978).

government to rule out large-scale clear cuts and the “substitution” planned by investors. As a result, Terranova finally desisted²⁹ (Clapp 1998).

The woodchip decade (1986-1996), as it was called, came to an end when Japanese importers certified their operations and could not continue buying woodchips from Chile (Reyes, Sepúlveda and Astorga 2014). As confirmed by the first cadaster of Chilean native forests, completed in 1999, the woodchip “boom” left behind thousands of hectares of degraded native forests (CONAF 1999; Lara et al. 2010). It also left another legacy: the emergence of a diverse network of actors in defense of native forests who not only fought to impede the threats of “substitution,” but, in doing so, also performed alternative native forests entangled to non-dominant modes of conceiving development and relating to nature.

3.7 Competing Worlds Take Shape

The Terranova case was decisive in inspiring the preparation of a native forest law by President Aylwin, which was sent to Congress in 1992. Its purpose was to establish subsidies for the productive management of these ecosystems (Firmani 2008). Although environmentalists agreed with such incentives, the legal debate became increasingly complex. It took 16 years for its approval, which finally occurred in 2008. The intensity of the accompanying controversy illustrates well the ontological confrontation that coalesced around Chile’s “forest model.”³⁰

²⁹ Chilean investors started a partial “substitution” in 1991. Ceding to public pressure, these new owners declared bankruptcy and the property was acquired through a tender by the World Wildlife Fund and The Nature Conservancy, who created a private reserve in 2003.

³⁰ While environmentally concerned actors supported the banning of native forest “substitution” in the early 1990s as a way to stop its destruction, industry-oriented actors argued that to ban “substitution” in all private lands constituted an expropriation of property rights and, therefore, had to be compensated (Clapp 1998). Hence, industrial foresters proposed the zoning of native forests into three categories: “preservation” forests, basically comprised of state-owned protected areas; “protection” forests, subject to soil, water or species regulations; and “productive” forests, free of any restriction (Clapp 1998; Raga and Sierralta 1995).

Indeed, the fact that the single most relevant environmental issue of public debate in Chile from the 1980s through the mid 2000s was the debate around the “substitution” of native forests speaks of a deeply rooted confrontation. For most authors, this confrontation may be explained in “ideological” terms (Raga 1991; Clapp 1998; Lara 2004). Clapp, for example, argues that the ideology that sustains Chile’s “forest model” consists of an “economism” and a “developmentalism” in line with the country’s neoliberal environmental framework. According to this “ideology,” native forests should be “degraded or replaced entirely” unless they can be “made to produce a profit” (Clapp 1998:5). As well, a native forest “that could remain uncut to serve as wilderness, wildlife habitat, and a source of secondary forest products is scorned. Preservation is labeled a luxury, and its advocates are characterized as a wealthy and selfish band of ecological fanatics” (Clapp 1998:22).

What Clapp presents as an exclusively “ideological” confrontation between advocates of native and exotic forests was, in fact, a struggle between the different worlds performed around the country’s forest economy. Dominant performances had evolved in connection with practices associated with the degradation of native forests, the expansion of exotic plantations and the industrialized approach to forest development already described. Non-dominant performances, in turn, took shape in association with the defense of native forests, including both dispersed resistances and organized campaigns that performed native forests in alternative ways – that is, as ecosystems whose properties and, especially, whose entanglements to humans were distinctive from those of prevailing economic or techno-scientific descriptions. As a result, an ontological confrontation took shape in the form of a “war” between “Chilean” forests and “exotic” legions of planted trees.

Industrialists also recommended a “substitution” tax that landowners could pay for compensating the replacement of “protection” forests (Clapp 1998).

The defense of native forest was left in the hands of the local NGO *Defensores del Bosque Chileno* [Defenders of the Chilean Forest] and its charismatic president, Adriana Hoffman. Twelve public personalities –including the writer Isabel Allende, the biologist Humberto Maturana and the poet Nicanor Parra– backed the call made by *Defensores* in *El Mercurio*, a national newspaper, pointing to the urgent need for the creation of a forest policy, the obtainment of accurate information and the declaration of a moratorium on the destruction of native ecosystems (Törey 1994). While Hoffman emphasized the urgency of conserving Chile’s “ancient” forests, Maturana defined the controversy as an ethical and spiritual problem concerning the conscious formation, by humans, of a responsible relationship with nature (Aldunate 2001). In the span of only a few months, 20 thousand citizens backed the call (Törey 1994). The space was thus opened for the multiplication, circulation and enhancement of alternative, non-dominant modes of performing Chilean native forests.

A landmark event was the publication in 1999 of an iconic book, edited by *Defensores del Bosque Chileno*, entitled *La Tragedia del Bosque Chileno* [The Tragedy of the Chilean Forest]. Priests, ecologists, indigenous scholars, forest engineers, economists, businessmen, poets, sociologists and many others took part in the creation of this impressive volume, which includes many astonishing images of both natural beauty and its destruction. The non-dominant performances displayed through its pages emphasize the entanglement of native forests with rooted territorial identities and ways of living. These include investments that can assure the existence and protection of native forests through methods and uses such as sustainable management, high-value added wood industries, non-timber products, or protected areas. Evenly critical, these non-dominant performances made room for traditional ecological knowledge, indigenous names and narratives about the spiritual

value of things such as “cathedral forests,” “ancient trees” and “sacred species,” combining them with scientific arguments about biodiversity, endemism, and genetic uniqueness.

The forest sector responded with its own weapons. Conscious that they were losing ground and that the woodchip decade had eroded the support previously achieved by the forestation “feat,” in 2001 the two major forest holdings launched the campaign “*Bosques para Chile*” [Forests for Chile], which was implemented through CORMA, the foresters’ association. Neat images of homogeneously green plantations were presented in the nation’s largest newspapers and primetime TV shows as “Chilean forests” to be proud of. The campaign highlighted the efforts invested in these forests, the environmental and economic benefits they generated, and the contribution they made to Chile’s development. Soon after their release, CORMA’s ads were criticized for presenting monocultures of exotic trees as equivalent to native forests. The Chilean Botanical Society made public its official position in October of 2001 (Sociedad Chilena de Botánica 2001):

“This campaign purports to convince the public that there are no differences between native forests and pine plantations (...). A plantation of pine (...) definitely does not constitute a forest (...). An increase in pine plantations (...) does not favor the country’s native forests. First, because the growth of pine plantations has been traditionally made at the expense of native forests (...). Second, because (...) the Monterrey [or radiata] pine has an extraordinary invasive capacity. If we want to improve the native forests of our country there are better ways of doing so.”

As in the case of the struggle surrounding ARAUCO’s Valdivia pulp-mill, non-dominant modes of performing the forest economy had the capacity not only to enhance the ontology of alternative native forests, but also to inflect the trajectory of Chile’s “forestry model” by provoking salient changes in the practices of the country’s major forest companies. In 2002,

under the leadership of *Defensores del Bosque Chileno*, Chilean and international NGOs launched the most aggressive environmental campaign the country had ever witnessed. Through a full page ad in the *New York Times* directed at wood retail chains, the campaign demanded the certification from the Forest Stewardship Council (FSC) of all the Chilean forest products exported to the United States to guarantee that they had not resulted from any “substitution” of native forests. The image of a beautiful house built with wood produced in Chile set amidst a devastated landscape accompanied the note, and the Chilean writer Isabel Allende was featured as the campaign’s public face. The Chilean Minister of Agriculture declared that the government was considering taking the campaigners to the World Trade Organization (WTO) for obstructing the country’s international commerce. CORMA, in turn, sent a letter to Chilean congressmen warning about a potential boycott of the country’s forest exports to the United States (González 2002). Finally, a working group comprised by Chile’s main environmental NGOs and the country’s two major forest holdings –ARAUCO and CMPC– reached an agreement in November 2003: both companies accepted to protect native forests on their lands through ecosystem-based planning and refrain from buying any land or timber from third parties engaged in the “substitution” of native forest from 1994 onwards (Anderson 2004).

The problem of “substitution,” however, was not solved. In the Región de Los Ríos [Los Ríos Region] alone, where Valdivia is located, 20,122 ha were “substituted” between 1998 and 2008 (Universidad de Chile 2008). CMPC and ARAUCO obtained their FSC certifications in 2013 and 2014, respectively. As part of the obligations associated with certification by the FSC, both companies will have to restore 25,000 ha of the native ecosystems that were “substituted,” directly or indirectly, after 1994.

Until the mid 1990s, open confrontation with Chile's "forest model" by non-dominant performances was monopolized by NGOs. Local opposition against exotic forest expansion, such as the cases described by Klubock (2006) from the 1930s and 1940s, had been ignored. By the 2010s resistance to exotic plantations is widespread. The following quote from a rural neighbor to one of ARAUCO's plots, was recorded from a workshop during the company's process of FSC certification. It exemplifies the anguishing experience of being invaded by "deserts" of trees that have erased meaningful ties to a landscape previously populated by natural forests and the human modes of inhabiting alongside them:

"We were born in these places. The company arrived later. We have memories. We know how the zone was. And how now it is different. It is a nasty, invasive thing (...) we have seen how our nature is deteriorated. We know that the land belongs to ARAUCO (...) but it is really of all of us who have lived here. It is shocking to see that there are no places left to take a walk, to look, to enjoy nature. It is really anguishing. We sometimes feel the impotency of not been able to do anything about it. We are convinced that we have the right to decide how our territory is being changed" (ARAUCO 2011).

As the following chapter demonstrates, these resistances and their own ways of performing alternative worlds opposed to Chile's dominant "forest model" acquired particular salience in the mid 1990s in connection with ARAUCO's plans to build a pulp-mill in Valdivia.

3.8 Conclusions

Until 2004, when the "scandal of the swans" –as a business representative labeled it– took over Chile's public arena, the way of "doing" the forest business that ARAUCO had embodied was still dominant, enjoying social recognition and political protection. For such a business model to persist and function, that is, for it to work without excessive friction, a series of investments and agencies had to be set up. These included state policies for the

expansion of exotic forestation and the creation of pulpwood industries, as well as the neoliberal restructuring towards an export-oriented economy through which Chilean pulp producers became successful competitors in the global market. If these policies were successfully developed, it was also because they enrolled along and received the support of all manner of actors, including those concerned with environmental problems such as the large-scale erosion that affected vast tracts of central Chile.

The expansion of this dominant performance of Chile's forest business faced its first visible resistance when exotic forest plantations began to invade and threaten native forests. Along with such resistance, the first relevant fissures appeared in the country's "forestry model," framed as conflicts involving native forest "substitution" and the social impacts of exotic plantations in depressed and impoverished zones. Not only Chile's two forest giants—ARAUCO and CMPC—were forced in the early 2000s to subscribe to a public agreement to stop the "substitution" of native forests. Equally crucial, the expansion of plantations was confronted by non-dominant ways of entangling local development with the forest economy. Associated with them, alternative identities also acquired an unusual visibility in relation to the conservation of native species.

In this manner, two competing worlds gradually took shape around Chile's "forest model": a dominant one, tied to thousands of hectares of exotic trees destined for pulpwood export, and an alternative one, tied to rural landscapes that included traditional uses, natural areas and native forests. As the coming chapters will show, the ontological confrontation between these new emerging worlds and those represented by Chile's dominant "forest model" was expanded through new resistances that emerged precisely around the approval and operation of ARAUCO's pulp-mill in Valdivia.

Until 2004, the core of Chile's "forestry model," –its pulpwood industry and its practices– had remained untouched. Therefore, when the Valdivia pulp-mill began to function, and despite the fissures already affecting the country's exotic forest expansion, the dominance of Chile's pulpwood-oriented "forestry model" was not in doubt. Moreover, ARAUCO was a robust and well-reputed holding.

However, the Valdivian disaster exposed to public scrutiny for the first time the practices through which Chile's by then major private holding had built its pulpwood-oriented empire: a focus on external markets, an extremely efficient cost structure, and an arrogant style of relationing that had isolated ARAUCO not only from the communities affected by its operations, but also from its productive allies.

Chapter 4: The Making of the Sanctuary: How Earthquakes, Ornithologists, Plants and Swan Counts Took Part in Performing the *Río Cruces* Wetland as Worthy of Protection

*“Above the swimming snow
a long black question.”³¹
(Pablo Neruda 1966).*

4.1 An Inexistent Bond

After the *Río Cruces* disaster began, and particularly after *Acción por los Cisnes* –the Valdivian movement– emerged, it became commonplace to talk about the existence of an historical bond between Valdivians, the wetland and the black-necked swans. However, as this chapter illustrates, by the early 2000s such a link was not at all obvious. Besides the work of a few individuals involved in declaring the wetland a natural sanctuary and taking care of the new protected area, most Valdivians had a limited connection with it and its swans. Even for local scientists, the ecosystem and its species were of scarce interest.

This distance was in part related to the fact that the wetland was of recent “creation.” Indeed, it emerged in 1960 after several consecutive cataclysmic events hit the zone and drastically changed its landscape. The swans, in turn, began to slowly arrive in Valdivia more than a decade later and were still considered as “newcomers” as late as the mid 1990s. The scarce visibility of the sanctuary and the swans was such that in 1995, when ARAUCO publicly announced its decision to build a pulp-mill that would discharge its liquid wastes into the *Río Cruces* upstream the wetland, the company was surprised to learn that the area was protected by the Chilean state the Ramsar Convention. Furthermore, the main concerns voiced by citizens and public servants with regard to the future factory were centered not

³¹ The original poem reads in Spanish: “*Sobre la nieve natatoria / una larga pregunta negra.*”

on the swans, but –as the coming chapter shows– on the river. In fact, very few actors claimed the need to attend to the impacts that the mill might cause on the colony of swans.

Despite their reduced visibility, since the mid 1980s a program for the continuous monitoring of the Valdivian colony of black-necked swans was implemented in connection with the networks involved in establishing the sanctuary. Although the swans were only one of the 60 types of birds recorded in the *Río Cruces* during the 1980s, none of its other species has ever received any similar attention or protection efforts. Not even endangered species, such as the *huillín* (*Lontra provocax*), a highly threatened river otter that prior to 2004 had a privileged habitat in the sanctuary. As we will see, this monitoring program, expressed in scientific articles and, especially, in reports detailing the monthly swan counts in the wetland, was consequential.

In 2004, when the disaster exploded, the centrality of the swans grew steadily, tied to the monthly reports on their numbers. Gradually, a strong and unexpected bond began to form, linking the swans to Valdivians and their identity. Accounting how such a bond came to exist is critical in understanding how the *Río Cruces* disaster turned into an event of such sociopolitical relevance. As the coming chapters demonstrate, such relevance cannot be explained without the presence of the swans and, in particular, of their suffering.

This chapter explores the agencies involved in performing the *Río Cruces* wetland and its resident colony of swans as objects worthy of protection. Such agencies include the geotectonic cycles that have shaped Valdivia's landscape as well as the work of a Valdivian zoologist who was a key figure in legally protecting the wetland and carrying out the efforts involved in taking care of it. They also include two less obvious agencies that have been

determinant in materially shaping the *Río Cruces* Sanctuary and its protected values: the “doings” of the birds and plants that inhabit the wetland.

In acknowledging these nonhuman agencies I seek to expand our understanding of how “the social” –in this case, the wetland as a protected area– is created and sustained through “doings” that are not only human. I also seek to contribute to our ontological humility by paying attention to the agentive properties of nonhumans that tend to remain invisible under dominant technocratic knowledges such as that involved in the environmental assessment of investments. Such descriptions reproduce the passiveness of “natural” species under broad generalizations that are consistent with the dominant Euro-modern ontology and its natural/social dualism. By annulling the unique properties and interactions that nonhumans can develop amongst themselves and with humans, these generalizations also cancel out alternative modes of performing human/nature entanglements and, along with them, the inherent multiplicity of the world. Therefore, a crucial task required to make room for non-dominant ontologies is to pay attention to the specific properties of nonhuman actors, which always show up and unfold relationally, that is, in interaction with other actors.

4.2 The Making of the Río Cruces Wetland

The Valdivian landscape has long been characterized by an abundance of wetlands. According to a preliminary inventory, the *Región de Los Ríos* [the Region of the Rivers], of which Valdivia is the capital, has the highest proportion of its territory classified as wetland (7.42%)³² out of the country’s 15 regions³³ (MMA 2011). Chroniclers and historians have also highlighted the dominance of water bodies in the Valdivian landscape. Gabriel Guarda

³² This region comprises 18,420 km².

³³ Far behind is the Region of the Lakes (5.5%) and the Aysén Region (5.4%) (MMA 2011).

(1953), the Valdivian historian, notes that during the sixteenth and seventeenth centuries, large lagoons were found within or nearby the city. The largest was the San Antonio Lagoon, which inundated what today are the city's "lower neighborhoods," an area that circles its downtown and retains the contours of the lagoon. It was precisely because of these bodies of water, and the San Antonio Lagoon in particular, that Valdivia was known as "the city of the lake." Guarda (1953:37) describes as follows the urban landscape that existed in 1599, prior to an indigenous uprising that destroyed the city:

"(...) it had a wall, whose doors where 'high and strong' (that still existed in 1643 when the Dutch arrived). Its plan was of a regular shape, determined by the unevenness of the terrain, the lagoons that surrounded it and the proximity of the river (...). Bridges crossed over the lagoons and streams (...) connecting the most distant neighborhoods."

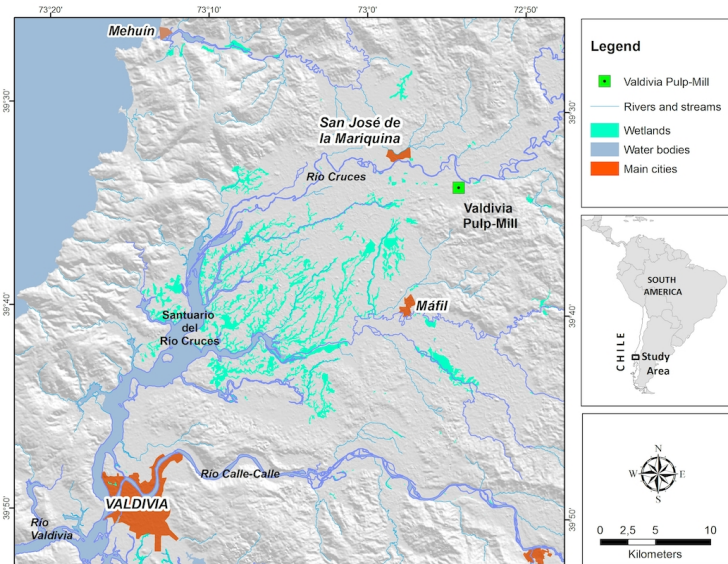
As Guarda (2009:24) also notes, the lagoons were gradually converted into wetlands and later disappeared as they were drained and filled so the city could grow:

"The old lagoons have been transformed into wetlands, now designated as 'gualves' (...). Since 1846, they have been submitted to a process of artificial filling with a heterogeneous mix of silt, sand with 'rubble, wood and wastes'; in 1856 they were auctioned, turned into private property and, since then, have allowed housing; the earthquakes of 1960, by lowering the land, made them recover their wetland character; soil of awful quality for building."

The *Río Cruces* wetland (39°35'-39°49'S and 73°07'-73°15'W) is not only the largest in the Valdivian region but also one of the largest in the country (Marquet et al. 2012; Palma et al. 2008). Geologically, it is a site of recent formation, having originated following the cataclysmic 9.58 Richter earthquake –the strongest in recorded history– that hit the coastal valleys from Valdivia (39°48'30"S) to the Chiloé Island (42-43°S) with particular force on

May 22, 1960 (Lilies 1970, quoted in Schlatter 1991a). The movement caused land subsidence of one to two meters throughout 130,000 km², sinking vast areas and creating extensive shallow banks around existing rivers (Reinhardt et al. 2010). An ensuing tsunami, with wave crests from 10 to 15 meters, caused large-scale erosion, deepening the channels of rivers up to two meters (Reinhardt et al. 2010). As a consequence of both events –the earthquake and the tsunami– great expanses of endemic scrub and lowlands were permanently flooded, turning Valdivia’s agricultural landscape into a system of wetlands. ,

Figure 1: Location of Valdivia, its Main Rivers, the Sanctuary and ARAUCO’s pulp-mill



Source: Prepared for this research by Aldo Farías.

Two months after the earthquake a huge wave of 7,500 m³/s passed downstream along the basin of the Calle-Calle River, further altering the emerging landscape. It had been released by the controlled breach of a landslide that was blocking the outlet of Riñihue

Lake, threatening the city. The wave’s back-flooding effect deepened the *Río Cruces* channel in two more meters, further shaping the unfolding system of wetlands (Reinhardt et al. 2010).

The “tectonically originated” *Río Cruces* wetland is located 32 km north of Valdivia, where the river flows south and parallel to the coastal range after travelling some 125 km from its eastern headwaters in the pre-Andean Cordillera (see Figure 1). Before the 1960 earthquake, it was a navigable river. Upstream of Valdivia, the river meandered through agricultural

lands and native shrubs. Its channel was 250 to 400 meters wide and one-and-a-half to three meters deep, and marshes existed along its banks. Currently, it runs through 25 km of permanently submerged floodplains that give shape to the Río Cruces wetland, ranging from one-quarter to two meters deep and are up to two km wide, with a demarcated channel of four to eight meters deep (Marín et al. 2009).

Given its pluvial nature, the river shows broad water level fluctuations that range from a minimum of 7.1 m³/s in summer to a maximum of 214 m³/s in winter, with an average of 87.2 m³/s (Muñoz-Pedreros 2004) and a historical peak of 925 m³/s in 1969 (Reinhardt et al. 2010). The wetland also receives fresh water inputs from smaller tributaries such as the Nanihue, Cudico, Pichoy, and Cayumapu Rivers (Lagos et al. 2008; Schlatter et al. 1991a, 2002). Some two km before reaching Valdivia, the Río Cruces meets, through the tidal channel Cau-Cau, the Río Calle-Calle, and together they form the Río Valdivia, which has one the highest flow rates of all Chile's rivers. Critically for the events that I am examining here, this river system is subject to the marine and tidal influence of the Pacific Ocean, constituting a vast estuary (Schlatter et al. 1991a, 2002; UACH 2005b).

The *Río Cruces* wetland, including its plants and birdlife, has been the object of various studies since the 1970s (Etcheverry 1993; Muñoz-Pedreros 2004). Until the 1990s, these studies were primarily motivated by the ecological salience of the site and its legal protection. Most studies published after 2004 are related to the controversy sparked by the *Río Cruces* disaster. One of these works corresponds to a paper by Eduard G. Reinhardt and colleagues (2010), which was financed by ARAUCO and intends to reinforce the theory that the wetland's changes are part of a "natural" process of ecological succession.

Working with 1944 aerial photographs and sediment history, Reinhardt et al. determined that the rate of sediment accumulation since the 1960 earthquake has been 60 to 80 cm of substrate in the sanctuary's shallow banks (Reinhardt et al. 2010). Based on this evidence, they predict the return of pre-1960 conditions –that is, of agricultural lands, marshes and shrubs– in less than 100 years (Reinhardt et al. 2010). A similar argument was raised by the company in the mid 1990s, when Roberto Delmastro, then ARAUCO's environmental manager, argued in favor of the mill's approval by claiming that the wetland was “receding” and that in 50 years it would no longer exist (Diario Austral de Valdivia January 17, 1998). Interestingly, these predictions match with the description provided by a map kept in the General Archives of the Indies in Seville, Spain (Didyk 2011). The map, dating from 1742, shows a wetland of almost the exact shape of the *Río Cruces* Sanctuary, confirming that its emergence and disappearance is a distinctive property of the Valdivian landscape and closely tied to its geotectonic cycles.

Despite being a protected area, the *Río Cruces* wetland has been subject to intervention and transformation through its interaction with humans. Significant volumes of waste have been discharged into the river through agriculture and forestry activities, as well as by other industries and also by cities. This has increased the river's sedimentation and its level of nutrients. In fact, the impacts of such discharges were a matter of concern when, in the mid 1990s, ARAUCO's pulp-mill underwent its environmental assessment. As early as the late 1970s some local voices concerned with the wetland's protection warned about the degradation affecting it: “(...) it is subject to environmental impact (...) revealed by the deterioration of its wildlife quality due to habitat destruction. Amongst its causes are water pollution, draining of inundated zones and sedimentation from road construction”

(Kennedy 1977, quoted in Muñoz-Pedreros et al. 1993:33). In turn, a document with observations on the mill's assessment, prepared by the Committee for the Defense of Flora and Wildlife [*Comité Nacional de Defensa de la Flora y Fauna* (CODEFF)] (Mardones and Leal 1995), insisted on the need to consider the effects that harvesting 5,000 ha of forest plantations per year would have on the *Río Cruces* basin and its wetland, which were already subject to significant levels of intervention. Despite the importance attributed to these sources of pollution, by the late 1990s, when ARAUCO's mill was approved, no in-depth assessment had been made of their effects on the *Río Cruces* wetland. Consequently, there is a total lack of understanding about the type and magnitude of ecological changes that were already affecting the wetland when ARAUCO's mill started to function.

What is clear is that the dominant description of the *Río Cruces* Sanctuary is that it is “receding,” as Delmastro put it. This description was backed by the zoologist Roberto Schlatter, from the local *Universidad Austral de Chile* (UACH), who, as we will see, is the most seasoned witness to the changes that have affected the wetland. At the end of 2003, a few months before the mill's start-up, Schlatter stated his concern about the sediments deposited in the wetland's floodplains, noting that during low tides “there is mud instead of water” (*Diario Austral de Valdivia* November 16, 2003). Similarly, in 2005, a scientific report commissioned by the government concluded that “extensive areas of the sanctuary and its tributaries (...) are entering into a process of siltation” (UACH 2005b:436).

As a consequence of the 2004 disaster, this dominant performance was reconfigured. For example, in the trial pursued since 2005 against ARAUCO, the State Defense Council concluded that, despite the pre-existing pollution, the wetland was a “healthy” and “stable” ecosystem until the pulp-mill began to discharge its wastes into the *Río Cruces*: “Before the

start-up of the Valdivia mill in the year 2004, the *Río Cruces* wetland was ecologically stable and in good environmental conditions” (Consejo de Defensa del Estado July 30 2012). Similarly, the communities that live in its vicinity describe the river as a place where, before 2004, they used to swim and fish, and animals safely drank water, which contrasts with the polluted mud that had come to dominate the floodplains.³⁴ A similar narrative was put forward by the Valdivian movement emerged in response to the disaster.

In summary, the *Río Cruces* wetland is an ecosystem in continuous transformation, shaped by both tectonic cycles and human practices. The discharge of chemicals and organic pollutants along with the sedimentation that result from land use changes and forest harvest along its basin are the two most critical factors of the wetland’s degradation. The rate at which the wetland is “receding” –that is, returning to an agricultural landscape– and the extent to which this process is “natural” or anthropogenic are controversial issues that, as we will see, have been critical to the way of performing the relation between the discharges of ARAUCO’s pulp-mill and the disaster. The answers that these issues have prompted from the competing ontologies –which are confronted over the consideration of the wetland as a site worthy of protection or, instead, already in process of “naturally” disappearing– have produced salient material effects, beginning with the fabrication of the disaster itself.

4.3 The Making of the *Río Cruces* Sanctuary

In 1974, after completing his doctoral studies, Roberto Schlatter arrived in the Institute of Zoology of the UACH, a budding private university founded in Valdivia in 1952. Inspired by the work of his mentor, Dr. William J.L. Sladen³⁵, he conducted waterfowl observations

³⁴ Interviews conducted by the author for this research.

³⁵ Schlatter did his doctoral studies with Dr. William J.L. Sladen, a British physician and zoologist who developed his academic career in the United States at Johns Hopkins University. After several years studying

in the Calle-Calle, Valdivia and Cruces rivers (Schlatter, Navarro and Corti 2002). Schlatter became aware of the ecological significance of the Río Cruces wetland and asked for the support of CONAF, which is in charge of Chile's protected areas, and the UNORCh, the national union of ornithologists, to study one of the wetland's species: the black-necked swan (*Cygnus melancoryphus*, Molina 1782).

By the mid 1970s, the black-necked swans were classified as endangered across their Neotropical distribution in the Southern Cone of South America (Chile, Argentina, Uruguay and Brazil). In Chile, its most important populations were located in the Torca and El Peral Lagoons, some 900 km north of Valdivia (CONAF 1978). In Schlatter's view, the recently formed character of the Río Cruces wetland, and especially its proximity to the city, explained why this local colony was so small and unstable.

Schlatter and his colleagues developed their own counting methods. Perhaps because of their preliminary nature their results were never published. In any case, 600 to 1,500 swans were registered between 1975 and 1985, just before an official census program began (Schlatter et al. 1991a:92). These data, as we will see, would be crucial in performing the

Antarctic penguins, Sladen turned to the North American swans (Sladen, Gunn and Cochran 1970). Schlatter joined Sladen in the first expeditions to Chesapeake Bay for marking whistling swans with neck-collars and studying their migration patterns (Sladen 1972). Sladen launched his research program in the late 1960s after a collision between a Viscount airliner and a flock of whistling swans, which occurred 1,800 meters over Maryland and resulted in the deaths of 17 passengers. This catastrophic swan-human encounter sparked new questions that scientists sought to answer: How does the environmental change provoked by humans affect the migratory behavior of swans? Can "swan-aircraft hazards" be minimized? (Sladen 1972). Sladen and colleagues gave shape to a nationwide effort aimed at tracing the routes of the four species of North American swans (Sladen 1972) and reestablishing those that had been disrupted (*The Baltimore Sun* December 6, 1992). In particular, Sladen tested different marking methods –metal or metal and color tarsus bands compared with neckbands– and developed a protocol for the International Waterfowl Research Bureau (Sladen 1972). This work also contributed to the creation of new organizations for the protection of North American swans such as the Trumpeter Swan Society, founded in 1968. As a result, the trumpeter swan, classified as near extinction in the mid 1930s when only 69 individuals were counted, is now considered a "conservation success story." See also: "Profile of the Trumpeter swan (*Cygnus buccinator*)" by Arkvive.org. <http://www.arkive.org/trumpeter-swan/cygnus-buccinator/>. Retrieved: June 27, 2014.

Río Cruces wetland as an ecologically valuable site. Moreover, the number of swans inhabiting the wetland would turn into a politically controversial issue.

Schlatter conducted the first appraisals of the Río Cruces' swans based on his knowledge of the two other stable colonies that already existed in Chile. By comparing the ecological conditions under which these northern colonies were thriving, he tried to anticipate the trajectory for the Río Cruces site. Schlatter found that the Río Cruces colony was a floating population of juvenile and non-breeding individuals that, after reaching their sexual maturity at three to five years old, were in search of appropriate sites to begin their reproductive life. Such sites should offer an adequate food supply and safe patches of grasslands or reeds suitable for building nests.

In 1985, about 20% of the Valdivian colony had become breeding pairs. In contrast to the steady numbers observed in the northern colonies, the swan population in the Río Cruces began to grow fast and unusually steadily. Given its ecological features, Schlatter anticipated that the Río Cruces had enormous potential. The site also had patches of scrubland well protected from hunting and secure for nesting:

“I really liked the landscape, its botanical richness. It was only fifteen years after the earthquake, so the ecological succession was just beginning and the marshes were deeper. There were only a few swans, and they were still being hunted. But I thought, ‘this has huge potential’.”³⁶

What Schlatter was witnessing were the initial stages of a new reproductive colony of black-necked swans whose biological importance for the entire species would increase over

³⁶ Interview conducted by the author for this research.

the years. He was delighted: “All this occurred here. It occurred precisely here (...). Of course! Here! Yes, this thing was marvellous. Marvellous!”³⁷

Schlatter’s mentor had suggested that he connect his work with the Convention on Wetlands of International Importance for Waterfowl Habitat declared in Ramsar, Iran, in 1971 and enacted in 1975. The convention’s secretariat had invited Chile to attend through a letter sent in 1975 to the National Committee on Scientific and Technological Research [*Comité Nacional de Investigación Científica y Tecnológica*, CONICYT].³⁸ The military regime probably saw in this invitation a means of diminishing its international isolation, and appointed Schlatter as Chile’s representative. As a scientist strongly motivated by his work, Schlatter saw the inclusion of the Río Cruces site in the Ramsar network of wetlands as an opportunity to overcome the isolation that was also affecting the Chilean academia.

In Valdivia, the retired colonel Gustavo Dupuis Pinillos had been appointed in October of 1973 to take charge of the UACH as a “delegate Chancellor,” a euphemism for the military interveners placed by Pinochet at the head of Chilean universities. In the midst of these tough and uncertain moments –which included the expulsion and detention of professors and the murder of students³⁹– Schlatter gained the backing for his waterfowl studies from Colonel Dupuis. With this official support, he contacted Ramsar’s Secretariat.

³⁷ Interview conducted by the author for this research.

³⁸ The original letter was lost in a fire that destroyed the Faculty of Sciences of the Universidad Austral de Chile in 2006.

³⁹ During the coming years, professors and administrative personnel would be persecuted, detained and harassed, while a complete reorganization of the university by the military –openly supported by UACH’s Senate– allowed the expulsion of academics and the dismantling of many research units (González 2013). Students, in turn, were suspended, obligated to completely re-enroll, and even detained or murdered (González 2013).

In 1976, Dupuis sent the first map with the proposed protected wetland to Ramsar's Secretariat. In 1980, Schlatter was confirmed as Chile's representative by the Ministry of Foreign Affairs and traveled to Cagliari, Italy, where he secured the convention's commitment to accepting Chile's membership once the Río Cruces site was legally protected. The corresponding decree, signed by Pinochet in June 3, 1981, stated:

“Considering the interest of the Supreme Government to preserve our natural patrimony (...) the riverbed, islands and flooding areas of the Río Cruces (...) are declared a Natural Sanctuary” (Ministerio de Educación Pública 1981). On July 27, 1982, Chile became the first South American country to join the Ramsar Convention, and the Río Cruces became the first Neotropical wetland to be declared an official Ramsar site (Lopetegui et al. 2007).

The creation of the sanctuary “did” more than change the legal status of the wetland and its swans; it also brought about long-lasting effects in Valdivians' relationship with this natural heritage. However, such effects would not become visible until two decades later, when the disaster began. Meanwhile, only a few Valdivians considered the sanctuary to be a site that was worthy of special protection⁴⁰ (Kennedy 1976). As a Valdivian scholar interviewed for this research explains: “Valdivia did not pay attention [*no pescaba*] to the sanctuary. That remained a great question for me. Why?”⁴¹

The management of the protected sanctuary was put in the hands of CONAF. In 1982, the first permanent warden was hired and the first censuses of the area's birdlife began. The monitoring, conducted under Schlatter's direction, was based on counting naked eye from a

⁴⁰ A report prepared in 1976 by the *Sociedad de Vida Silvestre de Valdivia* [Valdivia Wildlife Society] described the wetland as an ecologically distinctive habitat for wild species and early proposed the need to legally protect it: “the area (...) offers unique habitat conditions and is probably the major reservoir of black-necked swans (...) and other important birds (...). Because of all these unique characteristics, the conservation of this place is necessary from every point of view” (Kennedy 1976:20).

⁴¹ Interview conducted by the author for this research.

rowboat with the help of binoculars, a spotting scope, and a manual counter. A boatman was hired so the warden could cover the almost 5,000 hectares of permanently flooded lands that comprised the Sanctuary. In 1985, the monitoring program became more stable when a new permanent warden joined CONAF. Regular monthly censuses of swans began to be conducted (Schlatter et al. 1991a). In addition, the monitoring of swan nests was conducted starting in 1986 to determine the site's breeding potential. It included the counting of the breeding population (number of pairs) and of the number of eggs and cygnets per pair (Schlatter et al. 1991b). The locations of nests were marked using poles with acrylic numbers and regularly patrolled beginning in 1988.

The first demographic descriptions of the Río Cruces' swans were published after six years of monitoring (Schlatter et al. 1991a). The results showed that the effective protection of the site had diminished the pressures from "egg collectors, hunting and other human interference" and was the "key factor responsible for the increase of the breeding population" (Schlatter et al. 1991a:88). Enhanced hunting regulations approved in the late 1990s also contributed to the strengthening of the Río Cruces swan colony.⁴² In fact, the swan population grew notably faster after 1985, when a second warden was hired.

Interestingly, the swans of Río Cruces showed a comparatively prolonged breeding season, which Schlatter and colleagues attributed to the "[L]ack of overall nesting sites for breeders (...), intraspecific interactions and/or inadequate food" (Schlatter et al. 1991b:270).

From 800 birds registered in 1982-83 the colony reached more than 2,000 swans in 1985-86, doubling for three seasons in a row (Schlatter et al. 1991a). The highest monthly

⁴² In September 1996, a new hunting law (N° 19,473) incorporated conservation measures for the first time. Fines were significantly increased and the concepts of "legal offense" and imprisonment were included.

average was registered in 1996 – with 8,000 individuals per month – while the single highest count occurred in April 1997, when 14,000 individuals were censused (Schlatter et al. 2002). Between 1985 and 1999, the wetland supported an average of 550 breeding pairs with a productivity of 2.5 cygnets per pair/per year (Schlatter et al. 2002). Nests showed significant growth, from 55 in 1986 to 243 in 1989, which Schlatter and colleagues attributed to “an important influx of new breeders, most probably inexperienced ones as can be concluded from the low average clutch size in recent seasons”⁴³ (Schlatter et al. 1991b:270). The year 1989 also saw the largest population increase ever registered in the sanctuary –from 2,178 to 6,426– due to a severe drought in Argentinian Patagonia.

These numbers demonstrated that, contrary to available descriptions, the species was capable not only of short and opportunistic displacements, but also of long distance movements (Schlatter et al. 1991a). Valdivian swans also showed seasonal fluctuations associated with rainfall: the lowest numbers were observed in winter (June to August) when the depth of the water made it difficult to feed from submerged vegetation, and the highest concentrations occurred in summer (December to March) during the reproductive season.

When Schlatter initiated his studies of the Valdivian wetland, the movement patterns of Neotropical water birds, particularly of southern South American species, were poorly known (Schlatter et al. 2002). It was assumed that the migratory movements of southern swans were not the same as those of their northern relatives, but it was unclear how they differed (Hansen 1973; Schlatter et al. 2002). Schlatter discovered that the black-necked swans did not follow periodic migratory patterns but moved opportunistically in search of

⁴³ The average number of eggs per pair was 5.4 for the 1986-87 season, 2.9 for the 1987-88 season and 2.4 for the 1988-89 season, with most pairs (around 70%) hatching one to three cygnets (Schlatter et al. 1991b).

food and stable habitat. Such opportunistic movements were associated with seasonal changes and climatic conditions (Schlatter et al. 2002). Once these swans found appropriate habitat, they tended to remain in it, as had happened with the Río Cruces wetland. However, lacking suitable habitat, they could adapt to the most adverse conditions: “I have seen them reproduce in the most squalid conditions that you can imagine. Even on top of rocks in the intertidal zone. And also all piled up! We have found nests of twelve pairs altogether, one beside the other.”⁴⁴ It was a trait that would be critical in the swans’ response to the disaster.

Schlatter and his colleagues developed partial studies on the swans’ migratory movements with the use of neck collars, but with inconclusive results.⁴⁵ The continuity of these studies failed due to a lack of financial support. In particular, the National Fund for Scientific and Technological Research [*Fondo Nacional de Investigación Científica y Tecnológica* (FONDECYT)] rejected Schlatter’s proposals as constituting “mere” descriptive studies.⁴⁶ Today, no clear picture exists of how these swans move between sites in Chile and the rest of South America, a knowledge gap that has affected our understanding of how the Río Cruces disaster has impacted the species’ overall demography.

Based on the accumulated evidence described above, Schlatter et al. (2002) suggested that the Río Cruces wetland was the core site of a network of suitable swan habitat. With 20% of the population present as breeding pairs who were permanent residents and 80% consisting of non-breeders that moved opportunistically across a Chile’s coastal cordillera, the Río Cruces was also the main source of new birds for less stable sites across the species’ range (Schlatter et al. 2002). The biological significance of the wetland was thus reinforced.

⁴⁴ Interview conducted by the author for this research.

⁴⁵ Of the 100 swans marked with a “c” for Cruces in the early 1990s, two were resighted in the Torca Lagoon.

⁴⁶ Interview conducted by the author for this research.

One of the specific behaviors of the Valdivian swans studied by Schlatter and his colleagues corresponded to food habits. Contradicting previous studies that had described the black-necked swans as able to feed on animal matter,⁴⁷ Schlatter and colleagues found that, like other relatives⁴⁸, the Valdivian swans were exclusively herbivorous (Schlatter et al. 1991b). Their main food source in the sanctuary was the aquatic plant *luchecillo* (*Egeria densa*), which constituted the 99% of their feces. By the early 1990s, *Egeria densa* represented between 90% and 100% of the submerged vegetation of the wetland at an average depth of two meters, which was appropriate for the aggressive feeding habits of the swans: “Plants are bitten off or pulled out completely” (Schlatter et al. 1991b:270). Close to nesting areas, “depletion of food” was observed (Schlatter et al. 1991b:270). Since the ‘*luchecillo*’ was an abundant aquatic weed, no concern existed about its availability (Schlatter et al. 1991b). However, the plant was known to have a weak calorific value that could affect the breeding success of swans and the calcification of cygnets.⁴⁹

By the early 2000s, the Río Cruces Sanctuary was considered one of the two most stable and salient colonies of black-necked swans in their entire range (Norambuena and Bozinovic 2009; Schlatter et al. 2002; Lopetegui et al. 2007). Only Laguna Llancanelo in Argentina had a larger population of breeding pairs (Martínez et al. 1997). However, during climatic peaks of the non-periodic El Niño Southern Oscillation (ENSO), which came with severe droughts, the Río Cruces was the species’ most stable reproductive site. During

⁴⁷ Johnson and Goodall (1965) described black-necked swans feeding on animal matter, while Jaime Rau (1980) described them feeding from the wastes of a slaughterhouse in Puerto Natales, Magallanes Region.

⁴⁸ The North American trumpeter swan (*Cygnus buccinator*) and the Eurasian mute swan (*Cygnus olor*) and Bewick’s swan (*Cygnus bewickii*) are also exclusively herbivorous.

⁴⁹ A decade earlier, Lore Steubing et al. (1980) attributed the death of 20 juvenile swans in the Río Cruces with wing deformities (“angel wing”), articular problems, lack of calcification and stomach parasites to the “poor nutrition” caused by a diet based exclusively on *Egeria densa*.

these dry years the “declining water levels in surrounding wetlands push[ed] birds to more stable wetlands like the Río Cruces” (Schlatter et al. 2002:115).

Regardless of the recognition of the ecological significance of the Río Cruces colony, and despite the national and international network that he built around their protection, Schlatter’s endeavor was rather isolated within the academic community. He made several efforts to involve the university and his colleagues in a research program for the wetland and the swans that could be connected with the monitoring already conducted in alliance with CONAF. However, he found scarce interest, reflecting the lack of a stronger link between the wetland and its swans and the Valdivian community of academics.

Despite this lack of support, the work of Schlatter –and the response to it by the swans– was instrumental for the success of the Río Cruces colony. As Schlatter has explained, the establishment of a stable breeding colony in the Sanctuary was the result of a unique combination of events. These included the 1960 cataclysmic earthquake that flooded extensive areas, the colonization of the emerging water body by a cosmopolitan weed that was an appropriate food for these herbivores, and severe regional droughts in Argentinian Patagonia that forced the swans to search for suitable habitat in Valdivia’s coastal range.

Schlatter’s work also represents the expression of a nascent bond between Valdivians, the Río Cruces wetland and its swans. This bond was just beginning to take further shape in the 1990s and 2000s when ARAUCO’s mill was assessed, approved and put to work: “[The sanctuary] was slowly beginning to become famous [in Valdivia] until this thing [the mill] was approved.”⁵⁰ In the process, the swans not only mobilized their agency by means of

⁵⁰ Interview conducted by the author for this research.

their charismatic presence, they also contributed, as we will see, to materially shaping the wetland as a suitable habitat through their very particular interaction with the *luchecillo*.

4.4 Who are these Swans, Anyway?

The appeal of the Valdivian swans was described early in the city's history by the chronicler Diego de Rosales (1877:311), who included the next account in his "*Historia Jeneral del Reino de Chile*" [General History of the Reign of Chile], written in the 1670s:

“There are in this Reign many swans, and in the Valdivia River in particular they are very white and very beautiful, low beyond the city. During the day they are continuously in the water feeding on fish, and their meat is hard, black and indigestible (...). Their most frequent sites are in lagoons and large rivers, where they swim with such glamor that they seem well decorated gondolas, and provoke no small amount of leisure to the eyes in seeing a vessel of white feathers navigate with such lightness over the white foam.”

Other European travellers also dedicated special attention to black-necked swans.⁵¹ In Chile, it was the chronicler Ignacio Molina (1740-1829), a Jesuit abbe, who provided a first description in his "*Saggio sulla Storia Naturale del Chili del Signor Abate Giovanni Ignazio Molina*." In this work, published in Bologna, Italy, in 1782, he named the species *Anas melancoripha*, or “the Chilean swan,” describing it as having:

“the same size as the European swan, which it resembles in the figure of its body but is distinguished from in the color of the feathers that cover the head up to half of the neck, and which are of a beautiful black color, when all the other feathers have a color that is shining white. The female raises six chicks that she never leaves

⁵¹ In the notes from his journey through the Strait of Magellan in August of 1670, Sir John Narborough mentions the species (*Encyclopaedia Britannica* 1911, Volume 26), while Louis Antoine de Bougainville sighted them in 1763 in the Malvinas Islands, noting the following: “Amongst the birds of palmed feet, the swan occupies the first position. It does not differ from that of Europe but for its neck of a velvety black, that makes an admirable contrast with the whiteness of the rest of its body” (Bougainville 1771, quoted in Mouchard 2013).

abandoned in the nest, carrying them on her back anytime she goes out looking for food” (Molina 1782:234, 344).⁵²

A century later, the French naturalist Claudio Gay, hired by the Chilean government to produce a political and natural history of the country, included the black-necked swan in the first of the 28 volumes comprising his “*Historia Física y Política de Chile*” [Physical and Political History of Chile], published in 1847 (Gay 1847). Gay (1847:446) classified it as *Cygnus nigricollis*, describing it as follows:

“This swan is very common in southern America and especially in La Plata, where its peel is commercialized. It is found in Chile’s lakes and mountain plains: it can only escape in the water; this is how countrymen kill them, with sticks when they find them on the ground. It makes its nests in the mobile islands of the Taguatagua Lagoon, etc., not badly built, in which it lays six or seven eggs of a dirty white color, two or three times larger than those of the Turkey, of good flavor and that are sold in markets: their chicks come out covered with a white fluff, and only after a month show the black of their scrag” (Gay 1847:446).

As Gay notes, during the Spanish colonization the skins of these swans were exported to Europe, where they were considered a precious object for the fabrication of make-up applicators called “swan down puffs” (Mouchard 2013). According to Mouchard (2013), the hunting method used was the same described by Gay. The flocks of swans were scared so they would be unable to take flight, led to solid ground and then beaten with sticks.

In 1911, when the Encyclopaedia Britannica was published, the species had been reclassified as *Cygnus melancoryphus*, one of South America’s “two very distinct birds commonly regarded as swans,” and described as “very handsome” and already “introduced

⁵² This strong attachment to her cygnets is, for Mouchard (2013), characteristic of the species and occasionally leads the female to die of hunger while taking care of the nest.

into Europe” (*Encyclopaedia Britannica* 1911, Volume 26). In fact, black-necked swans are the only representatives of the genus *Cygnus* that are native to the Neotropics (Corti and Schlatter 2002; Figueroa, Galaz and Merino 2006). Their distribution extends from the south of Brazil, near the Tropic of Capricorn (24°S), to Paraguay, the coast of Uruguay, and most of Argentina –including the Malvinas and Shetland Islands– and from Chile’s central valleys to its southern extreme (Corti and Schlatter 2002). In Chile they have been recorded as far north as the Huasco Valley (34°S) and as far south as the Antarctic Peninsula (Lazo and Yáñez 1989; Orgeira and Fogliatto 1991). To the west, they also have been sighted in the Juan Fernández Archipelago (Figueroa et al. 2006).

Photograph 1: A Copuple of Black-Necked Swans in the Río Cruces Wetland



Black-necked swans populate lakes and wetlands up to 1,200 meters (Figueroa et al. 2006) and coastal areas of shallow water (no deeper than 60 cm) with abundant vegetal biomass. Due to their nomadism, they are also found as transients in rivers, reservoirs, and

oligotrophic lakes (Schlatter et al. 2002). Since Chile is biogeographically a marginal area for most water bird species, it is assumed that they arrived from their ornithogeographical center of La Plata, Argentina, after the Pleistocene glaciations (Fjeldsa 1985; Schlatter et al 1991a). However, no genetic studies have confirmed these distribution patterns.

As described by naturalists, black-necked swans have a completely white plumage except for their neck and head, which are black. They have a white eyebrow and long stripe around the eye that reaches the nape. Their feet are pink. The male has three wattles (fleshy protuberances over the beak) while the female has a shorter neck and two wattles.

They are considered strong birds, able to fly long distances and take part in aggressive fights in defense of their territory (Corti and Schlatter 2002). They can swim fast, fluttering powerfully over the water to move away from danger. On average, they are 110 to 125 cm in length (Figueroa et al. 2006). Males have an average weight of 5.3 kilograms and females of 4.4 kilograms, which can increase to 8.1 and 5.7, respectively, during the reproductive season (Corti and Schlatter 2002). In Chile, they are the largest waterfowl.

Black-necked swans are gregarious, forming large groups, but they also may be observed alone, especially juveniles (Corti 1996). They need ample space to take flight, and it is common for flocks to fly in formation. During the night, they search for deep waters to rest. Their reproductive phase is protracted. In the Río Cruces Sanctuary, the first eggs are laid in June and the last ones in December, and occasionally as late as in January (Corti 1996). Females and males build their nests together, but it is the males who finish them. Nests are voluminous, with diameters of 70 cm and heights of 20 to 25 cm, and they are generally located in areas of reeds. According to Schlatter (1998), in the Río Cruces they commonly lay 3 eggs, which is considered a low number compared to the northern swans. The mother incubates them for 34 to 36 days. It is common to see both females and males transporting the cygnets on their backs, especially in the first days after hatching (Schlatter 1998).

Despite their charisma, these swans have gone quite unnoticed by science during long periods. After the early 1900s, acknowledgment of the species disappears from naturalistic, historical and scientific descriptions. In 1948, they reappear in a catalogue that describes these swans as having migratory routes similar to North American ones (Hellmayr and Boardman 1948). In Chile, no specific studies are reported –aside from general descriptions and population estimates– until the first works by Schlatter in the mid 1970s.

However, given the abundance of wetlands in Valdivia, and based on their opportunistic movements, it may be assumed that these swans were old inhabitants of this landscape. In fact, as the traces followed by this research confirm, black-necked swans were long a part of the human diet in Valdivia, as elsewhere in Chile's countryside. Schlatter himself recounts that in the 1970s, their meat was appreciated by Valdivians of all ranks and their eggs were sold in the city's riverside market (Schlatter, personal communication). Moreover, swan-hunting blinds existed at that time in the Río Cruces area, while in the countryside and the city's margins swan nests were poached.⁵³ In addition, scientists who studied swans used shotguns to collect them.

Interestingly, the almost invisible existence of the "Chilean" swans in historical and scientific accounts until the 1980s was counterbalanced by their repeated appearance in literary descriptions and, in particular, in the poetry of outstanding Chilean authors such as Augusto Winter (1868-1927), Pablo Neruda (1904-1973), Nicanor Parra (1914-), and Lorenzo Aillapán (1940-).⁵⁴ With the exception of Parra, all of these poets were born or lived near Budi Lake,⁵⁵ 150 km north of Valdivia in the Region of the Araucanía, which has

⁵³ Swan hunting still exists in Valdivia today, albeit restricted to occasional events (Radio Bio-Bio December 19, 2011).

⁵⁴ Aillapán, known as the "bird man" –Üñümche in Mapudzungun, his indigenous language– for his onomatopoeic imitation of the songs of Chilean native birds, has included the black-necked swans of Budi Lake, where he lives, in his book *Twenty Winged Poems from Chilean Native Forests [Veinte Poemas Alados de los Bosques Nativos de Chile]* (2005). Aillapán recounts the swans as follows⁵⁴: "This bird of long neck goes, / Inhabitant of the ancient salty Budi Lake, / This I Heard from my grandfather nine pumas, Aillapangi, / Noble bird, symbol of the Budi Lake / Its wings sing when flying / And its song produces an extraordinary sadness / Piu piu piu piu wikür wikür wikür wikür / Piu piu piu piu wikür wikür wikür wikür. // Since Budi Lake has existed / Flocks of black-necked swans, / Secretly nest amongst the scrublands, / And then the cygnets appear jumping / They are four, they are five they are six / Father and mother take turns to care for them / Piu piu piu piu wikür wikür wikür wikür / Piu piu piu piu wikür wikür wikür wikür. // But once outsiders arrived, / People from other places who brought disgrace / They began chasing every bird they encountered / That is how they began disappearing / the Mapuche hen and the black-necked swan / this is why today, / its song for coming and going is sorrowful / Piu piu piu piu wikür wikür wikür wikür / Piu piu piu piu wikür wikür wikür wikür."⁵⁴

⁵⁵ Located on the coast of the Araucanía Region, the Budi Lake is characterized by its biological productivity

historically harbored an important population of swans. With the exception of Parra, they also share in common the fact that they have dedicated moving lines of verse to witnessing the suffering of the swans at the hands of hunters who used cruel killing methods. For example, in *The Escape of the Swans* [*La Fuga de los Cisnes*], Winter (1927) wrote⁵⁶:

“(…) the beautiful swans of velvet black necks / and white silk plumage like foam / have gone far for the misgivings of man (...) when feeling / how implacably they were chased by hunters, / they sadly searched for a place where they could now live unnoticed.”

Neruda, in turn, wrote a famous and delicate passage detailing the mark imprinted on him as a boy by a suffering black-necked swan.⁵⁷ The passage, included in his posthumous 1974 book *I Confess that I Have Lived* [*Confieso que he Vivido*] under the section “My First Poem” [“*Mi Primer Poema*”] (Neruda 2004:28-29), reads as follows⁵⁸:

“Now I am going to tell a story of birds. In the Budi Lake they chased the swans with fierceness. They approached them silently in the boats and then quickly, very quickly, they rowed... The swans, like the albatross, undertake flight with difficulty, they must run skating over the water. They take up their big wings with difficulty. They were caught up and beaten with sticks that finished with them.

and unique salty water. However, its population of swans has never been as prominent as the Río Cruces colony. Until the 1960 earthquake, it was connected by a channel to the Pacific Ocean, which explains its saltiness.

⁵⁶ Translation done by the author.

⁵⁷ This is not the only text that Neruda devoted to the black-necked swans. In his 1964 book *Memorial of Isla Negra* [*Memorial de Isla Negra*] (1997:415-16), he included the poem “The Lake of the Swans” [“*El Lago de los Cisnes*”], dedicated to the swans of the Budi Lake, where Winter described the hunting. It reads as follows: “Lake Budi, somber, dark heavy Stone, / unburied water between high forest, / there you opened, like a subterranean door, / near the solitary sea at the end of the Earth. // We galloped over the infinite sands / joined to the flowing richness of spume, / not a house, not a man, not a horse, / only time going by, and that green and white shore, / that ocean. // Then towards hills, and, of a sudden, / the lake, a solid, secretive water, / compact light, gem of an earthly ring. / A flight, white and black: swans being banished, / long necks of nocturnal darkness, webs of scarlet skin, / and the clear snow flying over the world. // O flight from water’s meaning, / thousand bodies destined to beauty unshaken / like the lake’s pellucid permanence. // Suddenly, the whole, was a rush over water, / motion, sound, turrets of full moon, / and then wild wings making order from whirlwind, / a grandeur, flying, a beating, / and then, absence, white tremor of void.” Translation by A.S. Kline, 2000. “Pablo Neruda. Selected Poems in Translation.” Retrieved: April 23, 2015 (http://www.poetryintranslation.com/PITBR/Spanish/Neruda.htm#_Toc12957965).

⁵⁸ Translation done by the author .

They brought me a dead swan. It was one of those marvellous birds I have never seen again around the world, the black-necked swan. A snowy ship with a slender neck as if tucked into narrow black silk panty hose. The beak orangish and the eyes red.

This was near the sea, in Puerto Saavedra, Imperial del Sur.

They brought it to me almost dead. I bathed his wounds and pushed little pieces of bread and fish into his throat. He returned everything. However, he began to recover from his injuries and to understand that I was his friend. And I began to understand that nostalgia was killing him. Then, carrying the heavy bird between my arms through the streets, I took him to the river. He swam a little close to me. I wanted him to fish and pointed to the pebbles in the bottom, the sands through which the silvery southern fish slid. But he stared into the distance with sad eyes.

Each day like this, for more than twenty, I took him to the river and back to my home. The swan was almost as big as me. One afternoon he was more introverted, he swam close to me, but was not entertained by the tricks through which I wanted to teach him how to fish again. He remained very quiet and I took him in my arms to take him home. Then, when I had him at the height of my chest, I felt a ribbon unfurling, something like a black arm that was skimming my face. It was his long and wave-like neck that was falling. This is how I learned that swans do not sing when they die.”⁵⁹

⁵⁹ The original passage reads: “Ahora voy a contarles una historia de pájaros. En el lago Budi se acercaban a ellos sigilosamente en los botes y luego rápido, rápido remaban... Los cisnes, como los albatros, emprenden difícilmente el vuelo, deben correr patinando sobre el agua. Levantan con dificultad sus grandes alas. Los alcanzaban y a garrotazos terminaban con ellos. / Me trajeron un cisne muerto. Era una de esas maravillosas aves que no he vuelto a ver en el mundo, el cisne de cuello negro. Una nave de nieve con el esbelto cuello como metido en una estrecha media de seda negra. El pico anaranjado y los ojos rojos. / Esto fue cerca del mar, en Puerto Saavedra, Imperial del Sur. / Me lo entregaron casi muerto. Bañé sus heridas y le empujé pedacitos de pan y de pescado a la garganta. Todo lo devolvía. Sin embargo, fue reponiéndose de sus lastimaduras comenzó a comprender que yo era su amigo. Y yo comencé a comprender que la nostalgia lo mataba. Entonces, cargando el pesado pájaro entre mis brazos por las calles, lo llevaba al río. El nadaba un poco, cerca de mí. Yo quería que pescara y le indicaba las piedrecitas del fondo, las arenas por donde se deslizaban los plateados peces del sur. Pero él miraba con ojos tristes la distancia. / Así cada día, por más de veinte, lo llevé al río y lo traje a mi casa. El cisne era casi tan grande como yo. Una tarde estuvo más ensimismado, nado cerca de mí, pero no se distrajo con las musarañas con que yo quería enseñarle de nuevo a pescar. Se estuvo muy quierito y lo tomé de nuevo en mis brazos para llevármelo a casa. Entonces, cuando lo tenía a la altura de mi pecho, sentí que se desenrollaba una cinta, algo como un brazo negro me rozaba la cara. Era su largo y ondulante cuello que caía. Así aprendí que los cisnes no cantan cuando mueren.”

Finally, Parra, Chile’s most influential living poet, dedicated a poem of his 1983 text *Political Poetry* [*Poesía Política*] to these swans, highlighting the political significance of their defense several decades before the Valdivian mobilization occurred.⁶⁰ The piece, titled “Dear Students” [“*Estimados Alumnos*”], seems to forebode the Valdivian struggle⁶¹:

“farewell dear students / and now to defend the last black-necked swans that are left in this country / with kicks /with blows /with whatever it takes: / poetry will thank us.”⁶²

In contrast to their saliency in the narrative of Araucanian poets, swans left no traces in the prolific Valdivian literature. They are also absent from other forms of artistic expressions well cultivated by Valdivians, such as music or painting. Only after 2004, as an effect of the disaster, did they begin to appear in the work of Valdivian artists such as the street muralist Felipe Smides, whose paintings now cover the city with figures of dominated, rebellious, and sometimes also liberated swans.⁶³

Therefore, as the sources and testimonies gathered through this research confirm,

Photograph 2: Rebel Swans by Felipe Smides: “Organize” and “Breakdown the Structure”



Author: Claudia Sepúlveda

⁶⁰ Parra also used the figure of the swan to offer a welcoming tribute to Neruda as an academic member of the Faculty of Philosophy and Education of the University of Chile on March 30, 1962. Then a full-time professor, Parra read his welcome text in the university’s Hall of Honor, in a ceremony chaired by Chancellor Juan Gómez Millas. He described Neruda as follows: “I just want to salute the noble / Pilgrim of fifty countries. / Some see in you / The hummingbird transfigured into a rifle / The sword-fish, the polar bird / The gladiator riding a swan.”

⁶¹ Translation done by the author.

⁶² The Spanish text reads as follows: “adiós estimados alumnos / y ahora a defender los últimos cisnes de cuello negro que van quedando en este país / a patadas / a combos / a lo que venga: / la poesía nos dará las gracias.” The translation is mine.

⁶³ See: <https://www.flickr.com/photos/felipesmides>

when the black-necked swans established a permanent colony in the Río Cruces wetland in the late 1970s, they were seen as “newcomers” to this landscape. One of my interviewees, a social activist born in Valdivia, tells of how he “discovered” the swans’ presence:

“I have known the natural sanctuary since I was a child because we always went there to the procession of the Virgin of Punucapa. I remember that the boats went out very early, at six o’clock in the morning, and we could see all that nature, all those birds, all that world full of life. When I returned to Chile [after exile], I encountered other inhabitants there, such as the swans.”⁶⁴.

Meanwhile, for scientists, the species did not generate any particular interest. As Roberto Schlatter et al. (1991a) explain, until 1971, when the first census of swans was conducted in the Region of Magallanes in the extreme south of the country, their number, distribution and habits were poorly known. By the early 1990s, the total population of black-necked swans was estimated at close to 100,000 individuals: 20,000 in Chile, 50,000 in Argentina, at least 20,000 in Uruguay, and about 3,000 in southernmost Brazil (Schlatter et al. 1991a). The number estimated for Chile was based on preliminary data (Markham 1971; Drouilly 1976; Salazar 1988; Villa 1988) since their total population had never been censused.

Additionally, until the late 1990s, there was great uncertainty and confusion regarding these swans’ migratory behavior.⁶⁵ It was not until the early 2000s, as noted, that Schlatter and colleagues reported their opportunistic movements. Such behavior was related to the instability of suitable habitat, particularly in relation to climatic cycles. In the case of the Valdivian landscape these dynamics were also geological, as tectonic activity determined

⁶⁴ Interview conducted by the author for this research.

⁶⁵ While Hellmayr and Conover (1948) described their migratory habits as similar to the northern swans, which was repeated by many others (Ogilvie 1972, Blake 1977, Madge and Burn 1988), in the 1990s it was accepted that, at least, they wintered in their southern range (Vuilleumier 1997) and some migrated regularly to northern zones (Venegas 1994).

the emergence and disappearance of wetlands over longer periods of time. These landscape dynamics probably shaped the adaptation of the species to large-scale ecological events and the ever-changing availability of wetlands, a characteristic that was critical in making the success of the breeding colony in the Río Cruces Sanctuary possible. This adaptive capacity was, however, surpassed by the 2004 disaster and its ecological consequences.

In the 1980s, black-necked swans were classified as endangered nationally and internationally.⁶⁶ The red list of endangered species published by CONAF in 1988 defined them as vulnerable, as did the first national strategy for bird conservation, published in 1992 by the UNORCh, the Chilean association of ornithologists (Rottman and Callejas 1992), and the Red Book of Chilean Terrestrial Vertebrates [*Libro Rojo de los Vertebrados Terrestres de Chile*] (Glade 1993). Until 2004, their population in Chile had been steadily recovering. Due to this recovery, the reclassification of their conservation status to a more favorable one was proposed in 2002, two years before the Río Cruces disaster (Didyk 2011; Estades 2001). No studies have analyzed the overall effect of the disaster on the species. It could be significant considering that, as stated, the Río Cruces wetland hosted the most stable reproductive colony of the species for at least two decades and was one of the main sources of new birds throughout its range.

4.5 The “Submerged” Agency of *Luchecillo* and its Assemblage with the Swans

As a geologically young region, Chile is characterized by oligotrophic glacial lakes with scarce endemic vegetation (Schlatter et al. 1991a). These water bodies, especially those close to human settlements, are vulnerable to colonization by cosmopolitan water plants.

⁶⁶ Black-necked swans were listed as an endangered species and their hunting was prohibited by the CITES Convention (ratified as national law in 1975) and the Convention on Migratory Species (ratified in 1981). In 1996, Chile proposed to list the Chilean population of black-necked swans in Appendix I of the Bonn Convention on Migratory Species (CMS). See: Corti and Schlatter (1996).

The permanently submerged marshes of the Valdivian landscape that resulted from the cataclysm of 1960 were colonized by a rich aquatic vegetation dominated by *luchecillo* (*Egeria densa*), a submerged, freshwater perennial macrophyte that is considered an invasive species or “weed”⁶⁷ (Cook and Urmi-Köenig 1984; Hauenstein and Ramírez 1986).

Due to its invasive character, *luchecillo* can be found in wetlands around the world except in Antarctica (Yarrow et al. 2009). It was reported outside its native range for the first time in 1893, when it was collected on Long Island, New York (Yarrow et al. 2009). Currently, it is what ecologists call a “naturalized” weed. It has adapted to conditions in at least 27 countries within subtropical and temperate regions (Yarrow et al. 2009). In Chile, its presence was described for the first time in the early 1900s, when it was detected in the Valdivia River (Castillo and Dey 1908, quoted in UACH 2005a). Today it has an widespread but discontinuous distribution in the country (Hauenstein 2004).

Luchecillo can live in lentic (still) as well as lotic (running) freshwater environments. It roots between one and two meters below the water’s surface⁶⁸ (Yarrow et al. 2009). It can propagate vegetatively, presents high rates of growth (up to 800-1000 g dry wt/m²) and covers extensive spaces, forming monoespecific stands (Yarrow et al. 2009). *Egeria densa* has a simple anatomy, with thin leaves⁶⁹ and stems that grow until they reach the surface, reaching up to about three meters long (Yarrow et al. 2009). Its annual life cycle includes a critical stage during the spring when the plant’s dead mass (necromass) exceeds its living

⁶⁷ The *luchecillo* is native to southern Brazil including the state of Minas Gerais, as well as the coastal areas of Uruguay and of northern Argentina. In the early 1900s, it was used as a fresh water “oxygenator,” effective for eradicating mosquitos (Cook and Urmi-König 1984). Nowadays, it is commonly sold as an aquarium plant (Boettcher 2007).

⁶⁸ It has been described rooting seven meters deep in lakes of high altitude (Yarrow et al. 2009).

⁶⁹ Its leaves have only two rows of photosynthetic cells that are in contact with the environment (Ramírez et al. 2006).

biomass, after it has come out of its winter rest (Ramírez et al. 2006; Boettcher 2007). Thus, it is during spring when the species is most sensitive to environmental changes (Ramírez et al. 2006), while in the fall it reaches its highest productivity (Boettcher 2007). Fall is also when swans have higher feeding requirements due to their preparation for breeding.

The flowers of luchecillo grow up to three centimeters above the water's surface, where they are pollinated by insects. In Valdivia, only male plants exist (Hauenstein 2004). This condition –which also occurs in California, Oregon, and New Zealand– explains why, in the Río Cruces wetland, the luchecillo reproduces vegetatively through small pieces of stem (10 to 20 cm long) that birds, animals or boats detach (Ramírez et al. 1982). These pieces float freely until they reach a place of quiet and shallow water where they can root (San Martín et al. 2011). It is worth noting, then, that the reproduction of luchecillo may be facilitated by the habits of the swans who, as described, aggressively pull out the plant.

Despite its broad distribution, there are a low number of cases in which luchecillo has threatened endemic biodiversity (Yarrow et al. 2009). As we will see, this is related to the capacity that *Egeria densa* has to produce environmental conditions that also favor other species, like the Valdivian swans. Nevertheless, its high biological productivity may sometimes become a problem: in California it has been classified in the highest category of invasiveness and in Brazil its expansion has blocked hydroelectric equipment.

Two environmental conditions affect the survival of luchecillo. One is water turbidity and the light reduction that it causes⁷⁰ (Hauenstein 1981; 2004; Tanner et al. 1993). It is in clear, transparent waters that this plant can thrive and become dominant (Yarrow et al. 2009).

⁷⁰ According to Chris Tanner et al. (1993), under concentrations of suspended solids above 30 mg/m³ or a light attenuation coefficient of over two, it is unlikely that *Egeria densa* can become established and survive.

Since freezing has been described as lethal to this plant (Leslie 1992), the second condition is low temperature. However, leaves only become vulnerable to freezing when they are exposed to the air⁷¹ (Hauenstein 1981).

Amongst the most notable features of *Egeria densa* is its ability to modify the environments it inhabits. To do so, the plant can create physical structures that “affect the light and nutrients available to other organisms” (Yarrow et al. 2009:300). This ability is associated with the species’ unique physiological traits and, in particular, to a highly flexible mechanism of carbon incorporation that allows the plant to proliferate under a great diversity of conditions and explains its success as an invasive species⁷² (Casati et al. 2000; Yarrow et al. 2009). In addition, luchecillo can extract nutrients from both the sediment and the water column (Yarrow et al. 2009).

Based on these traits, Yarrow et al. (2009) propose considering luchecillo as an “autogenic ecosystem engineer.”⁷³ This label describes a species with able to modulate ecosystems by using its own physical structures⁷⁴ –including living or dead tissue– to create the biotic or abiotic environmental conditions under which individuals of both its own species and other species can flourish (Lawton 1994). Specifically, submerged stands of *Egeria densa* can attenuate the speed of water and the action of waves, impeding the resuspension of

⁷¹ Hauenstein (1981) found that plants died in less than one hour when exposed to the air at freezing temperatures.

⁷² *Egeria densa* can display a C4-like metabolism, that is, a physiological adaptation that increases photosynthetic efficiency under conditions of low carbon dioxide (CO₂) (Casati et al. 2000). However, unlike C4 plants, which have developed distinct morphological and biochemical changes, *Egeria densa* employs the C4-like mechanism in a single cell, switching to it whenever necessary (Yarrow et al. 2009)

⁷³ This term was first proposed by John Lawton (1994) and by Lawton and Moshe Shachak (1994), and further developed by Lawton and Clive Jones (1995). Other examples of autogenic engineers are corals and trees.

⁷⁴ In contrast, allogenic engineers, such as woodpeckers, beavers and many plants, transform biotic or abiotic materials by mechanical or other means.

sediments. In so doing, the plant can greatly improve the transparency of water bodies (Sand-Jensen and Pederson 1999). Since the lucheillo needs stable sediments to root, the environmental conditions created by the plant are critical for its capacity to colonize new areas, a typical behavior of an ecosystem engineer (Yarrow et al. 2009). By also favoring the burying of tissue through rapid biomass production, the dominance of *Egeria densa* can lead to negative feedback loops such as increasing turbidity, as described in the Río Cruces in the mid-1990s (Ramírez 1995). In turn, the sudden loss of an ecosystem engineer –as occurred in the Río Cruces wetland– can impair ecological processes and reduce the ability of an ecosystem to withstand and recover from extreme events (Lawton 1994).

The overall effect of the successful establishment of *Egeria densa* in shallow waters has been described by Antonio Tironi (2012) as a “clear water regime.” In Concepción, located in central Chile, the plant has even shown the capacity to modulate a shift from eutrophic to oligotrophic conditions⁷⁵ (Yarrow et al. 2009). In the case of the Río Cruces wetland, *Egeria densa* seems to have contributed to a “clear water regime” prior to the 2004 disaster. As Ramírez et al. (1991) note, the plant covered extensive areas of the wetland, especially shallow zones, entrapping sediments and improving water quality. By generating these conditions in the sanctuary, *Egeria densa* was also crucial for the successful establishment of the resident colony of swans, providing them with sufficient food as well as appropriate feeding conditions (i.e., clear waters). Moreover, *Egeria densa* may have also counteracted

⁷⁵ Noteworthy is the case of the San Pedro Lagoon in Concepción, 400 km north of Valdivia (Urrutia et al. 2000). The lagoon was undergoing a process of eutrophication for decades. When *Egeria densa* was introduced in the 1980s, the lake shifted to an oligotrophic state associated with clear waters despite the increase in sedimentation that continued to be recorded across the landscape and the sustained load of nutrients to the lagoon (Yarrow et al. 2009).

the high levels of sedimentation and eutrophication described in the 1990s in the Río Cruces basin, upon which the “naturalistic” explanations of the disaster have been based.

So far, the fundamental role of *Egeria densa* in shaping and maintaining the ecological productivity of the Río Cruces wetland has not been addressed. Rather, the plant has been primarily described as a waterweed whose presence indicates human interference and eutrophication and, thus, environmental degradation (Schlatter et al. 1991a; Matthei 1995; UACH 2005). In addition, the relationship between the luchecillo and the swans has been downplayed, ignoring evidence about its potential ecological significance to the sanctuary that has been available since the mid 1990s.

Indeed, during the preparation of the baseline studies for the assessment of ARAUCO’s mill, the student Paulo Corti, under Schlatter’s guidance, conducted his undergraduate thesis on the feeding habits of the wetland’s swans. Corti concluded that the swans were playing a key regulatory role in the ecological succession of the sanctuary’s marshes (Corti 1996). He established that Valdivian swans, like geese, had physiological limitations in digesting cellulose and vegetal fiber, using only 21% to 34% of the plant matter they ingested.⁷⁶ To compensate for this disadvantage, they ate up to three times their body mass⁷⁷ (Figuroa et al. 2006). The combination of the swans’ low digestive capacity and the low caloric properties of luchecillo (Steubing et al. 1980) meant that swans were able to “affect plant growth, especially of introduced hydrophytes like *E. densa*” and, as a species,

⁷⁶ Physiological limitations to digesting vegetables are especially relevant for females, in whom a deficient diet may affect the ability to reproduce as well as clutch size (Corti and Schlatter 2002).

⁷⁷ Corti also found that the nutritional requirements of these swans varied throughout the year, with fall being the most critical season as the wetland reached its highest depth and demanded increased feeding efforts, while swans changed their plumage and prepared for courtship and breeding (Corti 1996).

act as “a regulator of aquatic plant biomass, thus contributing to a delay in ecological succession” (Corti and Schlatter 2002:10).

Therefore, the black-necked swans of the Río Cruces wetland not only helped maintain deeper marshes and an ecosystem of high productivity (Corti 1996), but, in so doing, also contributed to shaping the sanctuary’s environmental conditions in their own favor while enhancing the conservation value of the wetland and its success as a protected area. As already described, the feeding habits of the swans also helped the luchecillo to succeed in its vegetative reproduction in the wetland. This way of performing the luchecillo-swam interaction sharply contrasts with the dominant description that has emphasized the role of the swans in the disappearance of the plant:

“black-necked swans submerge their body and head in order to pull out and uproot the plants (...) large pieces of entire and up-rooted plants beached on the banks (...). This is also how the populations of luchecillo that survived submerged in the waters have been reduced” (Ramírez et al 2006:81).

In the mid 1990s, Corti (1996) suggested that changes in the swans’ feeding habits could be indicative of broader ecological changes in the sanctuary, such as pollution or nutrient increase. He also proposed that the movement of the swans to unusual sites could be symptomatic of droughts and other large-scale environmental changes (Corti 1996). None of these suggestions were considered when, in the fall of 2004, the swans showed evident changes in their feeding behavior and movement patterns associated with the massive death of luchecillo. Moreover, while it had been proposed that, because of their visible presence and their role in ecological succession, the abundance of swans should be “a sign of relative health” of wetlands (Corti and Schlatter 2002:10), this suggestion was dismissed by ARAUCO during the preparation of its mill’s assessment.

While the swans were flourishing in the sanctuary from the mid 1980s onward, enjoying the combined effects of their own agency and the legal protection of the site, there was no visible expression of a significant relationship with citizens of Valdivia. Furthermore, they remained unattended by the local community of scientists despite the efforts of Schlatter to engage colleagues in their study. This would drastically change in 2004, when the Río Cruces disaster exposed the existence of a novel and powerful entanglement between Valdivians, the wetland and the resident colony of swans.

4.6 Counting Birds

“They are tame, these little birds” [*“Son mansitos estos pajaritos”*], said one of the sanctuary’s wardens as he guided me through face-to-face encounters with the Valdivian black-necked swans on March 27, 2014. The wetland’s three permanent wardens and I ranged the protected area in a motorboat during a five-hour tour while they conducted the monthly census of swans. It was autumn. The day was cold but not rainy. It was my second attempt to join the census. The first one, in October of 2013, had failed due to a blustery wind that impeded our aquatic trip. “We cannot count the swans with this weather,” the warden had explained to me. “The wind creates big waves that hide them from our sight.”

Having taken part in the census, I understand what he meant: the counting relies entirely on the human capacity to see and register each individual swan. It is an “eye-crafted” census supported by very simple tools. Modest would be a better word: a paper notebook, a pen, a pair of binoculars, and a hand-counter. While the crew’s leader drives the boat, a second warden watches and counts. If the groups of swans are small and close enough, he counts them directly, based on the naked eye. If the numbers are higher he uses the hand-counter, finger-pressing each sighting while visually scoping the whitish, densely packed

flocks. When we could not approach the swans closely enough, the counter also resorts to the binoculars. Sometimes, he uses both the binoculars and the hand-counter when a group of swans is too large and far away.

The third warden takes notes. He carefully writes down the numbers reported by the counter. He also records any other species sighted during the trip as well as unusual events, such as the dead, floating swan that we approached in the middle of the wetland. The record-keeper picked up a paddle and took the swan out of the water. The bird's head was missing and its neck showed several injuries. "This is the work of the 'visón' [mink]", he explained, an introduced North American species (*Neovison vison*) that has turned into a dangerous scourge in southern Chile. The warden took some pictures of the dead swan and threw the corpse into a dense zone of reeds.

The recorder-keeper's notes are written in a small notebook. There are no pre-existing tables or forms to help with the recording. It is pure writing with blue ink in a white page. He will later take the notebook home and produce a final count, which he will hand to his boss at the Valdivia office of CONAF, in charge of the country's protected areas. This report will become the basic input for a document simply titled "Santuario de la Naturaleza Carlos Anwandter Humedal del Río Cruces" [Carlos Anwandter Nature Sanctuary Río Cruces Wetland], which is put together every month by CONAF's Valdivia staff. The document, prepared since the mid 1980s, is the only official source indicative of the ecological state of the wetland. It succinctly describes the methodology used—which has not varied much through the decades—and reports the total numbers of the species counted. At the end it includes selected observations about things such as the color of the water, the presence of lucheillo, and the discovery of dead swans. The sanctuary's wardens also

monitor the reproductive activity of the swans through a register of pairs, nests, eggs and cygnets. In addition, they maintain a handwritten record of the daily patrolling of the wetland.

Since the creation of the sanctuary in 1981, counting swans and patrolling the wetland have been routine activities for the local crew. After 2004, however, they turned into something different. The number of swans, handwritten by the keepers in their humble notebooks, acquired a political significance that grew as the birds decreased. In February 2004, when ARAUCO's mill began to operate, 6,266 swans were counted. One year later, in February 2005, only 258 swans were sighted. In April 2009, they reached an historical minimum of 90 (CONAF April 2012:18).

As the number of swans decreased and the causes remained undetermined, the tasks of swan counting and wetland patrolling became highly controversial. Questions abounded as to whether the wildlife keepers were reporting the "real" number of swans, why they failed to warn of the changes affecting the wetland, and whether their reports of abnormal events could have been "censored" by CONAF. The fact that one of the sanctuary's wardens testified as a witness for ARAUCO in the trial brought against the company by the State Defense Council fed these doubts (Rosas April 2, 2009), especially because this testimony reinforced the company's "naturalistic" hypotheses about the disaster's causes. For example, the warden testified that in some areas of the wetland, "the luchecillo was detached because of an overpopulation of swans" (Rosas April 2, 2009, folder 426:6). He also claimed that the plant had experienced a massive die-off resulting from "low tides that exposed the luchecillo, without water, to the heat and high and low temperatures, sometimes freezing on the shores" (Rosas April 2, 2009, folder 426:3). Finally, the warden

asserted that “from the year 2000 on, “the slick” of sediments [a key actor that took shape through the disaster, as we will soon see] was already being observed, mostly during the summer season, when the tides are lower” (Rosas April 2, 2009, folder 426:5). All statements that backed ARAUCO’s strategy of attributing the disaster to “natural” events.

In any case, during the trial pursued by the state against ARAUCO, the handwritten observations registered in the wardens’ notebooks were decisive in providing evidence about the connection between the operation of the mill and the changes occurred in the wetland. My own review of these notes confirms that the “signs” of the ecological collapse were registered by the wardens on a daily basis. Moreover, they reported such findings to Schlatter early on, probably expecting that he would have a better idea of what to do.

The first discovery of a swan dying for unknown reasons after the pulp-mill began to function was made in March 2004 during a monthly census. The written register reads: “Census, southern sector, in Punucapa, an adult swan was found dead of unknown causes” (CONAF-Valdivia March 2004:n.p.). This type of finding was not necessarily uncommon, though. According to the legal testimony of one of the wardens, until 2004, an average of 15 swans were found dead each year in the Sanctuary, mainly due to collisions with electric cables, animal attacks or hunting. However, the number of swans dying of unknown causes grew abnormally throughout 2004, reaching a peak of 24 in November 2004. Swans reported as ill, severely injured (e.g., broken wings) or malnourished also grew abnormally in November 2004 (CONAF-Valdivia November 2004:n.p.). In that same month, *Acción por los Cisnes* was formed in Valdivia.

In addition, the wardens' notes warned of an unusual decline in the number of swans. From 7,997 swans counted in April, the number drastically dropped to 3,411 in August and to 2,180 in October (CONAF April 2012:18). In July, the wardens recorded the first adult swan that was unable to swim, recording that it was handed – with other birds found dead – to Schlatter: “07-05-04: San Ramón, Valdivia. Two adult dead swans are given to Dr. Roberto Schlatter”; “07-10-04: An adult swan that presented difficulties for swimming was handed to Dr. Roberto Schlatter” (CONAF-Valdivia July 2004:n.p.). Swans with strange feeding behaviors and evident signs of malnourishment were also recorded. On August 16, 2004, the handwritten notes reported “swans that are feeding in the pastures. About 40” (CONAF-Valdivia August 2004:n.p.). An additional comment is written at the end of the notes in August: “In the 2003 season, during the month of August, more than 311 swan nests were found. August 2004, there are no nests” (CONAF-Valdivia August 2004:n.p.). In October 2004, the keepers first described changes in the vegetation: “A depletion of a plant called *guatona* [*Limnobium laevigatum*] is observed, which swans, ducks and *taguas* [coots] use to build their nests. Now, they feed from it” (CONAF-Valdivia October 2004:n.p.). Notes about the swans' diet were also included: “The feeding of swans currently consists of sprouts and new leaves of *sauce* [willow] (...) sauces are left without any leaves to the height that swans can reach” (CONAF-Valdivia October 2004:n.p.).

However, other handwritten notes reflect not what the keepers were observing, but rather the “conversations” in which they became involved as the controversy unfolded. During March 2005, after several months of reporting high numbers of dead or ill swans, the notebook reads: “there is an increase of 200 swans with respect to the February census” (CONAF-Valdivia March 2005:n.p.). This recovery may have been a result of the pulp-

mill's temporary closure between January and February of 2005. However, the notebook adds: "the individuals that are inside the sanctuary are in good condition, in July or August they should be nesting" (CONAF-Valdivia March 2005:n.p.). It seems unlikely that the swans could have been in good condition after several months of food shortage, during which not a single nest had been sighted. The notebook includes a final comment suggesting a "naturalistic" explanation for the observed changes: "During 2005, the lowest tides in 23 years have been registered" (CONAF-Valdivia March 2005:n.p.). Curiously, the hypothesis of the disaster being caused by a combination of historically low levels of water and particularly low temperatures during 2004 and 2005 –which could have, allegedly, killed the prairies of *luchecillo* by freezing them– was one of the "naturalistic" theories circulated with the support of ARAUCO (Marín et al. 2009).

Despite these contradictions, the daily registers show that the sanctuary's wardens were doing their work as it always had been done and continues to be. The 6,000 ha wetland and adjacent areas are routinely patrolled in an uncovered motorboat year-round. If it rains or storms –which commonly happens in Valdivia– they wear rain clothes. Sometimes, they join the police patrol boat, which is better protected. In 1982, when the patrolling of the wetland began, the wardens had only a rowboat. Occasionally, CONAF hired local people to do the rowing through Pinochet's special employment programs. In 1985, they received a Zodiac, and in 1989, a 10 HP outboard motorboat was acquired. The sanctuary's wardens know their work well. The eldest of them was hired by CONAF in 1982. He knows what it is to patrol the wetland in a rowboat. The youngest of the crew was hired in 1987.

The monthly censuses of swans have been done in essentially the same way since 1982. In brief, the wetland is divided in zones; each zone is covered directly by approaching the

largest groups of swans across the sanctuary. Observations also are conducted from land stations on the wetland's shores. At each of these sighting points, on water or land, the counting is done visually, as described.

The census method is described in CONAF's official documents. However, I observed some important differences (CONAF-Valdivia April 2012). While CONAF's report states that there are 10 land stations from which the swans are censused, during our tour we only visited two of them. It may be that the remaining eight stations were left out because the swans were concentrated in other places. I also observed that the counting was not always done in a replicable mode. In many zones where large groups of swans were gathered, the counter simply estimated their total number without even attempting the counting procedure. Since they are based on his considerable experience, these estimations are probably accurate. In fact, since 1988, aerial surveys undertaken from a Cessna high wing airplane flying at 700 meters have provided a counter-check of the water census. On average, error does not exceed six percent, and it has never exceeded 10% (Schlatter et al. 1991a). Finally, CONAF's reports assure that the water patrolling is done at an appropriate speed to prevent the movement of birds (CONAF-Valdivia April 2012:3).

In addition to the above, I observed something else. First, patrolling was conducted at a very high speed in some sectors. This caused the birds to fly away from the approaching boat, evidently complicating the count. It was unclear how we could be sure that the birds that were flying away while being counted were not going to be counted again at a different observation point. What surprised me most, though, was that in a sector of narrow channels, where we sighted some of the few cygnets registered that day, the boat advanced so fast that the birds had to violently move out of its path. I saw a scared mother jump out of our

way while two cygnets fell from her back and became disoriented in the midst of the big waves generated by the boat. Additionally, several juveniles desperately flapped their wings trying to get themselves to a safer place.

In any case, regardless of my undoubtedly limited observations of the counting methods applied by the sanctuary's wardens, the fact that for more than three decades, and in the context of the general precariousness of Chile's protected areas, the swans of the Río Cruces wetland have been censused monthly and patrolled daily, must call our attention. Even if these activities were insufficient to effectively assure their protection and prevent the disaster, probably very few wildfowl populations in the world are considered worthy of such sustained attention. Notably, these efforts were carried out by a small number of individuals. Beginning in the fall of 2004, these humbly crafted reports, prepared by the local crew of wardens with the help of Schlatter, were critical to revealing the massive death and decline of the swans in the wetland. Moreover, they were instrumental in multiplying the previously limited attention given to these birds in Valdivia and beyond. They would also constitute key evidence in the trial that, in 2013, ordered ARAUCO to repair the damage caused in the wetland. The censusing had exerted its agency.

4.7 Conclusions

As this chapter shows, due to their charismatic presence, black-necked swans have long drawn the attention of travellers, naturalists, and poets. Despite their wide distribution along the country's wetlands, lakes and coastal zones, with the exception of descriptions made by chroniclers in the 1600s no other specific traces of their presence in Valdivia are found until the late 1970s, when the species established a colony in the Río Cruces wetland. Gradually, a bond between these swans and Valdivians began to take shape, although it was

still weak and tenuous two decades later, in the mid 1990s, when ARAUCO submitted its pulp-mill to environmental assessment.

Several nonhuman agencies have taken part in the making of the Río Cruces Sanctuary as a site worthy of protection due to its biologically salient characteristics, specifically for its capacity to host an internationally relevant – that is, reproductive and stable – population of “Chilean” swans. The notable trait that these swans have of searching for viable habitat through opportunistic movements across vast landscapes was decisive in the sanctuary becoming a significant site for the species. It was as a result of this unique migratory behavior that the species gradually established a reproductive colony in the wetland. The possibility that this colony could become a stable one motivated first their study and monitoring and, after that, the declaration of the wetland as an officially protected area.

Moreover, the swan’s permanent residency in the “new” wetland was a turning point in the environmental trajectory of the ecosystem, as the feeding habits of the species contributed to the success of another nonhuman actor: the “luchecillo.” This aquatic plant –which is the swans’ main food source in the sanctuary– had developed a particular interaction with these birds. Contrary to descriptions that reduce its properties to those of an aggressive weed, the presence of luchecillo modeled the ecosystem in a way that favored conditions allowing both species –the swans and the luchecillo– to thrive.

These fundamental nonhuman properties –and in particular those of the swan-luchecillo interaction– have not been acknowledged as intervening in the material shaping of the wetland into a site that deserved to be protected. Rather, birds and plants have been presented as passive objects that are accidentally occupying in the wetland, as in the case of

the luchecillo, or opportunistically settling there to take advantage of already existing ecosystem traits, as in the case of the swans. Thus, the capacities of these species to intervene in the creation of favorable conditions for their own well-being have been systematically ignored. In particular, the outstanding ways in which swans and luchecillo reinforced each other's success has been entirely downplayed. Moreover, the fate of both species –that is, to be protected for its values or condemned for its invasiveness– has depended not on their actual “doings,” but rather, on how humans enact their capacities.

Chapter 5: The Approval of ARAUCO's Pulp-mill: How Oceans, Rivers and Past-Industries Enrolled Competing Ontologies into the Making of Chile's Forest Sector⁷⁸

The Valdivia Pulp-Mill will be “*a true explosion of development for Valdivia*” (Gabriel Valdés, past Senator of Valdivia).

“*We are connected to the sea because the sea is part of our life, of our culture, of our religion, and of our society*” (Boris Hualme, Lafkenche Spokesperson within the Committee for the Defense of the Sea).

5.1 The Wetland Shows Up

In 1981, the same year that the Río Cruces wetland was declared by Pinochet as an officially protected area –a natural sanctuary– ARAUCO made the decision to build the Valdivia pulp-mill. As the previous chapter shows, the entanglements between Valdivians and the protected wetland, and with its colony of black-necked swans in particular, were still loose and fragile. In fact, the visibility of the sanctuary was so weak that ARAUCO did not find out about its protected status until in the mid 1990s. Although which would be ARAUCO's most modern mill was not yet designed, the company had already decided its location: it would be built near the town of San José de la Mariquina and its fluid discharges, after a secondary treatment, would be dumped into the Río Cruces, 50 km upstream of Valdivia. Soon after, it began to make the investments that its future operation would require more than two decades later.

Between 1979 and 1980, ARAUCO had conducted a feasibility study for an industrial project in the surroundings of Valdivia⁷⁹, and in 1982, after the creation of *Forestal Valdivia* [Valdivia Forests], a subsidiary of ARAUCO, the first exotic plantations were

⁷⁸ The translation of all the texts originally written in Spanish, including press notes and interviews, was conducted by the author.

⁷⁹ The factors considered were the amount of deforested land, the soil and climatic conditions, the characteristics of the existing vegetation, the ownership of lands, the existence of roads and communication infrastructure, the demographic distribution, and the availability of services (Delmastro 1990).

established. Roberto Delmastro⁸⁰ (Diario Austral de Valdivia January 17, 1998), by then *Forestal Valdivia*'s CEO, explained how the location of the pulp-mill was decided:

“We began searching for suitable places for installing the pulp-mill [in 1987]. Fifteen localities were elected within the Province of Valdivia (...). Many properties were bought (...) the location that always obtained the best evaluation was Mariquina. That is why the design of the mill considered that location and not any other. Once the place was defined, the remaining plots already bought were destined for plantations.”

In 1995 –when the company announced that its mill would be submitted to environmental assessment– complementary facilities such as sawmills and a wood-board factory were already operational (Diario Austral de Valdivia January 17, 1998). Moreover, 90 thousand hectares had been planted by ARAUCO in Valdivia's surroundings. The coming industry was already tied to a forested landscape shaped in response to the external demand for pulpwood. As Delamaza (2012) highlights, the materialization of the Valdivia pulp-mill revealed the workings involved in the making of Chile's “forest model,” which was carried out by corporations oriented to pulpwood production within a highly unregulated context.

In April 1994, an important piece was added to the investments involved in the performance of the country's “forest model”: the first-ever environmental law was approved. The legal framework was designed by the first government of the *Concertación* – the coalition that run the country for two decades, right after dictatorship– as response to the pressures from international markets and their environmental standards. Thus, it was seen as strategic for the competitiveness of the country's exports.

⁸⁰ Delmastro left *Forestal Valdivia* in 1989. He was ARAUCO's environmental manager between 1996 and 1997, just when the Valdivia pulp-mill was undergoing its environmental assessment. In 1998, he was elected Deputy for Valdivia, and he was re-elected in 2002 and 2006. From this position he acted as a member of the Parliamentary Commission of Natural Resources and the Environment, which was in charge of investigating ARAUCO's responsibility in the *Río Cruces* disaster.

Consistent with Chile's elitist politics, the new law was negotiated between political and economic elites, excluding environmentally concerned actors (Carruthers 2001). And consistent with the reigning neoliberal consensus, the agreed-upon design minimized state interventions in favor of the free operation of markets (Tecklin et al. 2011).

The SEIA [*Sistema de Evaluación de Impacto Ambiental*, Environmental Impact Assessment System] was the core piece of the nascent framework, clearly reflecting the neoliberal approach (Rojas, Sabatini and Sepúlveda 2003). Designed as a “one-stop shop” (*ventanilla única*) for environmental permits, it minimized the transaction costs involved in complying with environmental regulations and provided a unique review of investments through a case-by-case assessment (Tecklin et al. 2011). Key functions such as the preparation of ecological baselines and impact assessment reports, as well as the monitoring of impacts, were left in the hands of investors (Sepúlveda and Villarroel 2012). In addition, as Eduardo Silva (1996) has pointed out, fundamental regulations such as standards for specific processes were restricted to end-of-the-pipe emissions and omitted critically polluting activities such as pulp and paper industries.

Consequently, proponents were left free to choose the locations considered appropriate for their projects. This would become a particularly conflictive issue given the absence of land-planning mechanisms in the country and, moreover, considering that the SEIA –as then-President Frei Ruiz-Tagle clarified– was not intended to reject investments but to improve their environmental standards: “no project will be stopped for environmental considerations,” he stated (Rojas et al. 2003). The failure to include land-use planning also impeded the assessment of the cumulative impacts that the forest expansion was already causing. In addition, the environmental framework fell short of providing a space for public

involvement.⁸¹ These limitations caused frustration amongst communities that underwent participatory processes and fuelled environmental conflicts (Sabatini and Sepúlveda 1997). The case of the Valdivia pulp-mill was no exception (Sepúlveda and Mariángel 1998; Sepúlveda and Villarroel 2014).

The new environmental law created the *Comisión Nacional del Medio Ambiente* (CONAMA) [National Commission for the Environment], a coordinating agency subordinate to the Ministry General Secretariat of the Presidency whose main task was to manage the SEIA. As a decentralized agency, CONAMA had regional offices. The office whose jurisdiction included Valdivia was located 200 km south in Puerto Montt, the capital city of the *Región de Los Lagos* [Region of the Lakes] (to which Valdivia then belonged).

It was at CONAMA's office in Puerto Montt, in June of 1995, that ARAUCO's representatives met with the agency's regional director, Raúl Arteaga, to inform him of their intention to submit the pulp-mill to the first-ever environmental assessment to be conducted in the region. Since the regulations of the SEIA were not yet being enforced, the assessment was voluntary.

The final decision about ARAUCO's project was to be made by the *Comisión Regional del Medio Ambiente* (COREMA) [Regional Commission of the Environment], a political entity run by the *Intendente* [Regional Governor] –who was appointed directly by the President– and comprised of regional directors of public services, also appointed by national

⁸¹ Although the participatory mechanisms within the SEIA were unprecedented for the Chilean context, they were still extremely limited. Basically, they consisted of written observations about the proposed investments, which were presented by the concerned parties within a window of 60 days once the impact assessment report was officially submitted by the investor. Therefore, public involvement began after fundamental decisions about the technological design and the location of projects had already been made. Meaningful changes eventually made to the projects during the environmental assessment process, once the 60-day period for public involvement was over, were excluded from participation.

authorities. As CONAMA's regional director, Arteaga also acted as COREMA's Technical Secretary and was the technical manager of the SEIA in the Los Lagos Region.

After receiving ARAUCO's announcement of the pulp-mill's assessment, Arteaga did not know how to proceed.⁸² His team was minimal –just him and his secretary– and he had no previous experience with environmental assessment, let alone of such a huge industrial operation. Arteaga summoned COREMA's Technical Committee, comprised of professional cadres of public servants with environmental competence, to prepare a response for ARAUCO. Simultaneously, he asked for help from CONAMA's national unit of environmental assessment, suggesting that “given the magnitude of the investment and the type of project, it would be prudent to consider the possibility of hiring an external consultancy” (CONAMA X June 9, 1995).

The proposal of Terms of Reference (ToR) prepared by ARAUCO for the mill's assessment received several comments by regional public services. These included the need to clarify the design of the effluent treatment, the points of discharge to the Río Cruces, and the probability of accidents, all of which were specified by the Department of Waters [*Dirección General de Aguas (DGA)*] (DGA July 19, 1995). The DGA (DGA July 19, 1995) also demanded the study of at least one complete seasonal cycle of the ecosystem's water quality instead of the one-month study proposed by ARAUCO. In any case, the DGA added (DGA July 19, 1995), at least one summer campaign should be considered in order to cover the river's conditions under minimum flow. In addition, the need of a physico-chemical analysis of the river, upstream and downstream of the wetland, along with preventive and mitigation plans in case of impacts on its flora and wildlife, were required

⁸² Interviews conducted by the author for this research.

by CONAF (CONAF July 21, 1995), which is in charge of Chile's protected areas. CONAF insisted that the assessment should consider the protected status of the wetland and the government's commitment to report to the Ramsar Convention any ecological change resulting from pollution or other type of human intervention (CONAF August 18, 1995).

Based on these revisions, Arteaga informed ARAUCO's representatives that the most sensitive issues of the coming assessment would be related to the impacts that the pulp-mill could cause in the Río Cruces Sanctuary. It was then that ARAUCO found out that, aside from being a wetland, the site also had an officially protected status from both Chile and the Ramsar Convention. ARAUCO's representatives were surprised. Until then, the assessment of the planned pulp-mill had been handled by the company without much consideration for the territory in which it would be located, its inhabitants, or their mutual entanglements. From this point forward, the company would confront an unprecedented opposition to its plans from previously unknown actors related in unique ways to local inhabitants and their identities: Valdivia's rivers and Mehuín's ocean.

In this chapter, I first present the history of the Valdivia pulp-mill's approval in the mid 1990s, describing the workings of Chile's nascent environmental agencies and how they dealt with a giant investment that they were not prepared to assess. I examine the questions raised about the pulp-mill's effects, particularly concerns regarding the protected Río Cruces wetland. I also detail the environmental conditions included in the mill's final approval and how they dealt with the potential impacts of their operation.

Additionally, I describe the local resistances that touched for the first time ever the core of Chile's "forestry model" –the production of pulpwood– after ARAUCO submitted its future industry to environmental assessment. I explain how such resistances were

articulated around the defense of Valdivia's rivers, enacted as constitutive of the city's identity. I also describe ARAUCO's response, which involved reviving the memory of Valdivia's lost and longed for industrial past and tying it to the mill as a promise of new development. The result was an ontological confrontation centered on different modes of performing Valdivia's development. Finally, I describe the emblematic resistance against ARAUCO's plan to build a pipeline in the fishing village of Mehuín and how it made room for the surfacing of human/nature entanglements that gained strength and visibility through the struggle. I attend to the emergence of an ontologically reconfigured ocean, defined through its bonds with humans and expressed in a new collective identity: "to be *of* the sea." By making room for these non-dominant worlds, such resistances prepared the way for the ontological struggle that would later emerge in Valdivia, articulated around another nonhuman sphere: that of the black-necked swans. Indeed, I argue that the intense response that the Río Cruces disaster provoked in Valdivia since the mid 2000s cannot be fully understood unless we attend to these alternative, non-dominant modes of conceiving Valdivia's development that began to gain ground in the mid 1990s. Moreover, the defense of the swans was built upon such non-dominant ontologies, which had emerged a decade earlier in connection with people's deep bonds to rivers and oceans.

5.2 The First Environmental Concerns and the Demand for Relocation

In August 1995, an agreement on the ToR for the preparation of the mill's assessment was signed by the Intendente on behalf of COREMA and by Victor Renner, the Valdivia pulp-mill's manager. ARAUCO hired Geotécnica, a consulting company from Santiago, to prepare the assessment. In turn, the consultancy contracted scientists from the Universidad Austral de Chile (UACH) in Valdivia to conduct the baseline studies of the river and the

wetland. As I describe in Chapter 7, the reports prepared by UACH's scientists compromised the quality of the assessment: the baselines were methodologically weak and uncritical of the mill's impacts. UACH's involvement not only was instrumental for the mill's approval but also a controversial episode that, while overlooked, still generates discomfort.⁸³ Among other things, this is due to the fact that –as my interviewees reported– the company intervened in the reports of these scientists. I expand on this in Chapter 7.

On October 6, 1995, the pulp-mill's assessment report was officially submitted to COREMA by ARAUCO. The pulp-mill was designed for the production of 550,000 tons of kraft pulp per year, which would be bleached with chlorine dioxide. Water requirements would be 250 lts/sec for refrigeration and 900 lts/sec for industrial processes. Liquid wastes would be discharged into the Río Cruces after a primary (mechanical) and secondary (biological) treatment.⁸⁴ The factory would have a life cycle of 20 years, with an investment of US\$ 1.045 billion for its construction and US\$ 300 million in plantations (Celulosa Arauco y Constitución 1995). The amount of raw materials demanded would amount to nearly 5,000 ha of plantations per year⁸⁵ (Celulosa Arauco y Constitución 1995).

During the process of public involvement, the NGOs *Comité de Defensa de la Flora y Fauna* (CODEFF) [Committee for the Defense of Flora and Wildlife] and its Valdivian chapter, *Unión de Ornitólogos de Chile* (UNORCh) [Chilean Union of Ornithologists], Greenpeace-Chile and the *Centro de Estudios Agrarios y Ambientales* (CEA) [Center for

⁸³ Interviews conducted by the author for this research.

⁸⁴ Liquid wastes would correspond to an average of 900 lts/sec (77,760 m³/day) of industrial waters and 250 lts/sec (21,600 m³/day) of cooling waters, with a total discharge of 1,150 lts/sec (99,360 m³/day).

⁸⁵ Corresponding to 2,240,000 m³/year of pino radiata and 563,000 m³/year of eucalyptus.

Agrarian and Environmental Studies] submitted their written observations to CONAMA⁸⁶ (Sepúlveda and Mariángel 1998; CONAMA September 4, 1995). They argued that chlorinated compounds, heavy metals and pulp fibres could alter an ecosystem that was already polluted by agriculture, forestry, industry and urban activities, surpassing its biological capacity to absorb pollutants (CODEFF-Valdivia 1996). They also argued that the mill's secondary treatment did not eliminate the risks involved in the use of chlorine dioxide for bleaching. In addition, they pointed out that large-scale "substitution" and clear cuts could increase the river's sedimentation and the wetland's eutrophication.

CODEFF-Valdivia, in particular, questioned the baseline studies prepared by UACH's scientists, which the NGO considered "partial and incomplete" because they lacked "the minimum scientific rigor that indicates that, at least, a natural environment has to be studied throughout a full annual cycle" (CODEFF-Valdivia 1996:2). Critically, CODEFF-Valdivia also pointed out one of the wetland's properties to which nobody had yet attended, one which would be determinant in the occurrence of the disaster: its hydrodynamics:

"Many substances to be discharged in the river are highly toxic, and although the company argues that their concentrations are going to be low, *the dynamics of the river's waters and of the sanctuary* could make them accumulate in the backwaters or in the sediments, provoking accumulation in organisms (bioaccumulation) and reaching toxic levels in the (...) food chain, which may affect, for example, fishes, swans and river otters, effects that will only be observed in the mid-term, when there will be no remedy" (CODEFF-Valdivia 1996:3, emphasis added).

⁸⁶ The *Sociedad Agrícola de Valdivia* (SAVAL) [Agricultural Society of Valdivia], a traditional organization of farmers dedicated to cattle ranching and milk production, expressed their concern about acid rain that could affect pastures and natural ecosystems, also warning about harmful changes in the temperature and transparency of the river (Sepúlveda and Mariángel 1998).

The main demand of these NGOs was the relocation of the mill's discharges: "we oppose the installation of the pulp-mill in the Río Cruces and propose that its relocation be studied in a different place, where it does not carry dangers for human health and for wildlife" (CODEFF-Valdivia 1996:3).

These concerns were disseminated through meetings, documents, press notes, and, especially, by word of mouth. Although with limited resonance, they helped to raise doubts about ARAUCO's project amongst environmentally concerned sectors, including the members of COREMA's Technical Committee. In response, the company –as well as authorities and politicians who supported the project– advanced a campaign to demonstrate that ARAUCO's mill was key for Valdivia's development. This narrative found fertile terrain in the dominant notion of development that then prevailed in Valdivia.

5.3 The Promise of Development and the Defense of the Río Cruces

The dominant narrative of Valdivia's identity figured it as an economically depressed zone whose industrial past had been devastated by the 1960 earthquake.⁸⁷ ARAUCO built its campaign in favor of the pulp-mill upon this longing for a lost industrial past. As explained by Delmastro (1990:96), the manager of Forestal Valdivia, an important reason for choosing Valdivia to locate the new industry was that "it was characterized as an economically depressed region, with severe and numerous examples of extreme poverty, both rural and urban, and with low possibilities of creating new sources of labor." Therefore it was evident, Delmastro added (1990:96), that "a large-scale forestation project" would be of "immediate benefit" through "intense labor recruitment" and a "renewable and

⁸⁷ On May 22, 1960, the strongest earthquake ever recorded hit the zone of Valdivia, reaching a level of 9.6 on the Richter scale.

permanent resource” –the plantations– that would demand “more workers, creating wealth and providing welfare.” In sum, Valdivia was performed as needing a large investment to save its people from chronic economic depression.

Accordingly, ARAUCO developed an aggressive campaign centered on the benefits the factory would generate for the local economy. An important Valdivian lawyer recalls: “I remember massive communications saying that Valdivia was going to become (...) the forest capital of the south (...) it mentioned the billions of dollars invested, the number of jobs, and nothing else.”⁸⁸ The campaign was officially backed by the *Corporación de Desarrollo de la Provincia de Valdivia* [Corporation for the Development of the Province of Valdivia], the *Comité Nueva Región* [New Region Committee], the city’s *Cámara de Comercio* [Chamber of Commerce] and the *Central Única de Trabajadores de Valdivia* [Valdivia Central Union of Labor]. In turn, the *Diario Austral de Valdivia*, the local newspaper, also backed the mill through its editorials and articles (Leal and Negrón 2012; Sepúlveda and Mariángel 1998).

Political authorities, including Valdivia’s senator, Gabriel Valdés – a respected politician who played a critical role as leader of the democratic transition – as well as the Provincial Governor, the Intendente in charge of COREMA, the mayors of Valdivia and Mariquina, and even then-president Eduardo Frei, all campaigned in favor of the mill’s approval despite the fact that COREMA’s decision was still pending. A renowned academic recalls how authorities campaigned in favor of ARAUCO’s project:

“One day Senator Gabriel Valdés told me, ‘ARAUCO’s high executives are coming (...) and I want you to talk with them’ (...). There were three managers. They spoke

⁸⁸ Interviews conducted by the author for this research.

wonders. That the technology was extraordinary, to the point that the liquid wastes came out so pure that you could drink them directly.”⁸⁹

This message found great support not only in productive and labor associations, but also in UACH’s academics and in social organizations (Sepúlveda and Mariángel 1998). As recounted by a social leader of one of Valdivia’s traditional working-class neighborhoods,

“(…) the Intendente and great personalities summoned Valdivia’s social leaders to inform us that they were bringing an extraordinary project, a progressive project... That we had been chosen and had to feel extraordinarily happy because the pulp industry was going to give ‘real work’ to more than 8,000 people. Many didn’t understand what a pulp-mill was, but they did know that there was plenty of unemployment. Enthusiasm was widespread amongst working-class neighborhoods: work is coming, the industry is coming!”⁹⁰

For those who still had doubts about the mill’s impacts, this official support neutralized their worries, as a Valdivian teacher and member of *Acción por los Cisnes* –the movement emerged in response to the Río Cruces disaster– describes:

“(…) when the project of the pulp plant came I was afraid that it would pollute because I knew what had happened in other cities. But they [authorities and scientists] answered: ‘this is clean production (...) it will be a large company that comes with all the best technology.’ And I believed that story.”⁹¹

Moreover, those who declared their opposition to the mill within academic or political circles were openly censored and socially excluded, as an influential scientist recounts:

“My first experience was at home of the university’s eldest professors (...) They asked: ‘what do you think about the project?’ I was totally against it (...) I irritated very important Valdivian people who (...) did not greet me for years! They were

⁸⁹ Interviews conducted by the author for this research.

⁹⁰ Interviews conducted by the author for this research.

⁹¹ Interviews conducted by the author for this research.

outraged because, for them, this was progress for Valdivia, something great. They felt lucky that something like this was going to be built (...). One of those most upset with me was senator Gabriel Valdés, who was very enthusiastic about the project.”⁹²

In response to this narrative, in May of 1996 a local network of environmental and human rights NGOs from Valdivia grouped together as *Acción por los Ríos*⁹³ [Action for the Rivers] to make known the dangers that ARAUCO’s industry represented for the Río Cruces and its wetland. They also raised the first concerns about how ARAUCO’s mill would put the viability of an alternative mode of conceiving development, one connected with Valdivia’s natural and cultural assets, at risk (Sepúlveda and Mariángel 1998).

In its first public declaration, *Acción por los Ríos* (May 1996) described itself as follows:

“[A] citizen’s organization that (...) aims to analyze and disseminate existing knowledge that may provide reliable bases to generate proposals for the use of rivers and other wetlands. Its first action is to analyze, debate and raise awareness about the implications of a pulp-mill in San José County.”

After enumerating the negative effects that would be generated by the mill, beginning with the pollution of the river and the sanctuary, the declaration stated, “we believe that only pressure from the community can detain this nefarious initiative.” It concluded by proposing “the relocation of the mill to a zone where it will generate fewer environmental impacts. We firmly support development initiatives, as long as they respect our right to live in a healthy environment” (*Acción por los Ríos* May 1996).

⁹² Interviews conducted by the author for this research.

⁹³ The coalition was comprised of individual citizens such as Claudia Rosales, Silvia Haverbeck and Vladimir Riesco, local environmental NGOs such as CEA and CODEFF, and the local chapter of the human rights organization *Comité de Derechos del Pueblo*, CODEPU [Committee for the Rights of the People], represented by José Araya, who acted as its president. Araya would play a decisive role in the foundation of *Acción por los Cisnes* eight years later.

Evidently, for *Acción por los Ríos* the protection of Valdivia's rivers was not opposed to development; in fact, it was fully integrated with alternative notions of development. In the words of one of its directors, Enrique Couve, Valdivia's development should be "oriented to the preservation of the *Río Valdivia*" (Diario Austral de Valdivia n.d. 1996). In particular, he added, "besides the evident risks" that the mill represented for "the natural sanctuary, it could also compromise current and future tourism projects, which are in themselves sources of sustainable development for the province" (Diario Austral de Valdivia n.d. 1996).

The choice of the river as the target of this campaign was not accidental. Valdivia is a fluvial city located at the confluence of two major rivers –the Calle-Calle and the Cruces– that together to form the *Río Valdivia*, which has the second highest volume of flow of all the rivers in Chile. A series of other rivers of different sizes and, notably, a large number of wetlands, give shape to a landscape where the presence of water is the defining element, further highlighted by an annual average rainfall of nearly two meters. The city itself is located upon fluvial-estuarine deposits and a network of wetlands that Cristóbal Osorio (2009) has called "the great wetland of Valdivia." These ecosystems have shaped not only the landscape, as Chapter 4 describes, but also the lives of its inhabitants. This does not mean that the relation is without tension. Rather, the wetlands located in or around Valdivia have historically been objects of contention due to the pressures of urban expansion.

In contrast with such tensions, the *Río Valdivia* has historically been performed as the city's "icon" (Rodríguez 2014). Valdivia is a "city-other," Laura Rodríguez (2014) claims, because it is shaped not by the Spanish grid that prevailed elsewhere, but by sinuously following the meanders and physiography of its "mighty" river. The presence of the *Río Valdivia* was impossible to ignore for the Spanish conquerors who founded Valdivia –the

fourth city they founded in Chile— considering the size and strength of its nevertheless “gentle” waters (Rodríguez 2014).

The aesthetic value of Valdivia’s rivers has been highlighted since the sixteenth century.

The chronicler Diego de Rosales wrote, “What makes this city’s plan most celebrated and delightful is the beauty and greatness of the river that bathes it” (quoted in Guarda 1978:38).

Accordingly, Valdivia’s river was soon integrated as part of the city’s life:

“(…) since the sixteenth century the river has served for several gatherings and welcoming events (..) from every governor during the monarchy to Lord Cochrane, the bishops, and presidents, all have been honored [*agasajados*] with different entertainments that only the fluvial city could offer”⁹⁴ (Guarda 2001:755).

However, the appreciation of Valdivia’s fluvial landscape has not only been aesthetic. In fact, its rivers were key actors in the actual making of the city. From the sixteenth to the eighteenth centuries, Valdivia was one of the Spanish crown’s most important military positions due to the strategic location of its oceanic and fluvial ports. The Río Valdivia became a regional means of transoceanic transportation and commerce and an obligatory stop for the ships coming from the Atlantic⁹⁵ (Guarda 1965). The economic relevance of Valdivia’s rivers was also reflected in its flourishing shipyard industry that, by the early nineteenth century, was considered the largest in all the “Reign” (Guarda 2001).

By opposing the risks represented by ARAUCO’s mill to Valdivia’s rivers, Acción por los Ríos was mobilizing deep-rooted connections that local inhabitants had historically built

⁹⁴ This tradition continues today through the city’s most important celebration: the “Valdivian Night” [*Noche Valdiviana*], a fluvial parade that commemorates the city’s founding. It is said that the Valdivian Night has its origin in a protest against the Spanish governor, García de Mendoza, that occurred in 1561, during which fires were lit by a group of boats located in the river.

⁹⁵ Regular routes were also established during the nineteenth century, in 1862 with the Chilean port of Valparaíso and in 1872 with Hamburg (Bernedo 1999).

with these ecosystems. Indeed, through this campaign, ARAUCO's industry was performed as a threat to a complex system of rivers that were not excluded from urban life – as in the majority of Chilean cities – but, on the contrary, were important elements of the particular Valdivian mode of inhabiting the territory, which was in turn closely entangled with the properties, forces and capacities of these nonhumans actors.

Although brief and unsuccessful in its immediate purpose, this campaign constituted the first well-articulated expression of the ontological confrontation that the installation of the pulp-mill was beginning to provoke. The rivers performed by Acción por los Ríos were entirely different from those enacted through ARAUCO's assessment. They had the capacity to provide territorial identity and meaning, offering a potential basis for small- and medium-scale investments compatible with the aesthetic values of Valdivia's rivers and their wildlife, along with fishing, transportation, navigation, celebration, and aquatic sports. In brief, the world mobilized by Acción por los Ríos was built upon the acknowledgement that anything that would harm the river was also going to affect the dense ties that existed between these ecosystems and Valdivian identities, as well as the alternative paths of development materially connected to such modes of inhabiting.

The rivers performed by ARAUCO, in turn, were already polluted and, thus, appropriate receptacles for waste disposal. Furthermore, they would eventually be able to dilute toxins. This way of performing Valdivia's rivers also had deep roots in the city's identity.

After the decades of economic depression that followed Chile's independence,⁹⁶ as well as two big earthquakes in 1835 and 1837, Valdivia was a city characterized by a devastation

⁹⁶ For the new national government, Valdivia was an economically peripheral and sparsely populated territory,

that sharply contrasted with its bygone centrality to the Spanish empire. Pérez Rosales, the presidential delegate in charge of organizing the German immigration to Chile, captured this historical moment in his 1850 account of the city: “We arrived at Valdivia. My God! If the founder of that town (...) had accompanied me on this trip, for sure he would have turned back” (Rosales 1957, quoted in Bernedo 1999:8).

After the first groups of German immigrants arrived to Valdivia between 1846 and 1850, several industries were established. Many were the first of their kind in Chile, such as breweries⁹⁷ and tanneries.⁹⁸ Others were greatly expanded, such as shipyards.⁹⁹ What distinguished these Valdivian industries from those in other Chilean cities is that they were, as Bernedo (1999) describes them, “properly modern.” That is, they made intense use of steam and electric machines, were vertically and horizontally integrated within regional economies, were organized through salaries and, in some cases, applied productivity incentives, which were then unknown (Bernedo 1999). In brief, according to Bernedo (1999), the Valdivian industrialization was unique in being based on a properly capitalist organization of production and labor, breaking with a still dominantly agrarian society.

far from being a priority for the country’s reconstruction. The local government, in turn, was bankrupt, and the few wealthy families who remained soon moved in search of a better future (Bernedo 1999).

⁹⁷ In 1851, Karl Anwandter opened the country’s first brewery in Valdivia (Bernedo 1999). It not only became a commercial success in Chile – according to SOFOFA it was the largest and most reputable Chilean brewery by 1889 (SOFOFA 1889) – it also exported beer throughout Latin America. In addition, it impacted Chile’s agriculture by introducing hops and barley, until then unknown crops (Bernedo 1999). The brewery grew from 50 workers hired in 1870 to 900 permanent workers in 1914 (Bernedo 1999).

⁹⁸ The tanning industry had a similar development. Between 1860 and 1880, 24 tanneries were created in Valdivia and its surroundings, transforming what was a small-scale business into a capitalist endeavor (Bernedo 1999). Their growth was such that in the 1890s, the Rudloff tannery began exporting an average of 2,700 tons of hides to Germany per year (Bernedo 1999). This volume not only amounted to 80% of the tannery products exported from Chile, but also placed hides as the country’s fourth most exported industrial product between 1890 and 1903, after saltpeter, wheat and copper (Bernedo 1999). By 1900, Valdivian tanneries were the most important employers in the region (Bernedo 1999).

⁹⁹ The shipyard industry is another example. Alberto Behrens started the first shipyard in the late 1890s (Bernedo 1999). By 1904, his factory had already produced 24 ships and was working with 170 operators. By 1912, 180 ships had been built by Behrens (Bernedo 1999). At least four large shipyards operating in Valdivia in the 1910s were among the most important in the country (Bernedo 1999).

By the 1990s, Valdivia's prosperous industrial past had long vanished, having been undermined by a series of concomitant factors that included not only the 9.6 earthquake that hit the city in 1960 but also less favorable economic contexts. Despite the long decades that had passed, local elites continued to long for such industrial splendor. Several Valdivian business associations that were founded during the prime of those successful years –such as the *Cámara de Comercio de Valdivia* [Valdivian Chamber of Commerce] founded in 1907, the *Cámara Industrial de Valdivia* [Valdivian Industrial Chamber] founded in 1909, and the local chapter of the influential Sociedad de Fomento Fabril (SOFOFA) founded in Valdivia in 1884– acted as allies of ARAUCO's project, which they saw as strategic for reviving Valdivia's once prominent industrial development.

Therefore, by opposing Valdivia's material ties with its rivers and the worlds that came along with them, as well as the damaging effects of ARAUCO's industry, Acción por los Ríos was giving shape to an intense ontological confrontation: Valdivia's industrial past, constitutive of its history, was being challenged as a meaningful project for the city and region's future development. In its place, a new notion of development entangled with very different elements of Valdivia's identity –such as its natural landscapes, its university, and emerging tourism and a film industries that would flourish in the coming years– was quietly beginning to take form as a possible, albeit still non-dominant, world. As we will see, the Río Cruces disaster served, precisely, as a force that expanded the ontological density of these alternative, non-dominant modes of conceiving Valdivia's development by revealing the costs of the industrial past as well as local people's deep bonds with rivers and natural landscapes. In 1995, however, these alternative associations were weak, unable to assemble themselves into possible worlds.

Through the assessment report of its future mill, ARAUCO made an explicit promise to substantially contribute to Valdivia's development, which was decisive for the factory's approval (Celulosa Arauco y Constitución 1995:2):

“Besides its important contribution to employment (...) the project will have positive effects in many other economic activities of the region, such as commerce in general, road and railroad transportation, and electric and mechanical services, especially in those localities near the new mill. *Celulosa Arauco y Constitución S.A.* [ARAUCO] (...) is very motivated by the challenge of making the future Valdivia mill an important element of the Tenth Region's [Region of Los Lagos] development.”

Finally, on January 31, 1996, COREMA's Technical Committee (Comité Técnico COREMA 1996) made its recommendation: ARAUCO's assessment report should be rejected. Their recommendation was founded on seven critical aspects that coincided with the concerns already raised by citizens and NGOs. The committee determined that the assessment presented “methodological weaknesses, non-compliance with parts of the terms of reference, and insufficiencies in the content of the Base Line and Description of the Project” (Comité Técnico COREMA 1996:n.p.). The committee explained that since ARAUCO's project was still “in its phase of conceptual engineering,” the company had “not yet outlined technical aspects necessary for an environmental assessment”¹⁰⁰ (Comité Técnico COREMA 1996:n.p.). Also lacking was the information on “the net contribution of metals in the discharge” to the river (Comité Técnico COREMA 1996:n.p.).

In addition, the committee emphasized that the assessment of potential impacts on the sanctuary was deficient, questioning the fact that the baseline studies of the Río Cruces included only one field survey in the winter—a season when its volume is 20 times higher

¹⁰⁰ These included: the effluent treatment system, the control of atmospheric emissions, the intake engineering works, the effluent diffuser engineering works, and the liquid waste disposal system.

than in summer. In addition, it criticized the superficial treatment of socioeconomic and cultural impacts –especially related to tourism– as well as air emissions of sulphur dioxide. Finally, it concluded that the assessment was “insufficient to justify that the industrial discharges are not dangerous for the sanctuary” and, therefore, that the environmental viability of ARAUCO’s mill could not be assured (Comité Técnico COREMA 1996:n.p.). The committee’s recommendation was now the basis for COREMA’s decision.

The committee’s review intensified the controversy. Crude responses came from economic and political actors who supported ARAUCO’s mill. COREMA, in turn, began to negotiate with ARAUCO the conditions under which the pulp-mill could be made environmentally viable. Accordingly, on March 1, 1996, then-President Eduardo Frei Ruiz-Tagle visited Valdivia to lay down the first stone of ARAUCO’s mill. Two months later, on May 30, 1996, COREMA gave its approval to the new factory (COREMA May 30, 1996).

The approval included several conditions that implied the project’s redesign. The most important one referred to the mill’s liquid discharges: a tertiary chemical treatment had to be added before discharging into the Río Cruces, or, maintaining the secondary treatment originally designed, the point of final disposal had to be changed (COREMA 1996). In the second case, ARAUCO would have to submit a new environmental assessment.

ARAUCO argued that a tertiary treatment was economically unfeasible and decided to direct its liquid wastes to the Maiquillahue Bay, 28 km west of the mill in the Pacific Ocean. This decision triggered one of the most intense and emblematic environmental conflicts in Chile’s history. Meanwhile, questions about the effects that the mill’s discharges could cause in the Río Cruces and the sanctuary grew stronger in Valdivia.

5.4 Unexpected Resistances: Ocean, Fishes, and Nondominant Ontologies

ARAUCO's new design consisted of 35 km long and one-meter wide pipeline to transport the pulp-mill's liquid wastes to the Pacific Ocean, directly in front of the fishing village of Mehuín, where about 1,500 people lived from fisheries, aquiculture and tourism. The bay hosted a rich estuary at the mouth of the *Río Lingue* that was critical for key several fisheries and the cultivation of the Chilean mussel (*Mytilus chilensis*). After reaching the coast, the pipeline would travel another 1.45 km out to sea and 15 m beneath the surface.

Until this moment the people of Mehuín had remained disconnected from the controversy about ARAUCO's project. However, on June 17, 1996, local residents noticed unusual activity on the beach: a consultant bureau –*Geovenor*– had been hired by ARAUCO to conduct the pipeline's assessment (Skewes 2004). Locals reacted with rage for not being informed of ARAUCO's plans to bring its industrial waste to their shores and forced the team of consultants to leave Mehuín. An assembly was summoned, giving birth to the *Comité de Defensa de Mehuín* [Committee for the Defense of Mehuín] (Skewes and Guerra 2004). The committee included neighborhood leaders, fishers' unions, business and tourism representatives, religious and educational organizations and the indigenous association of seashore peoples, *Coordinadora Mapuche-Lafquenche* (Sepúlveda and Mariángel 1998). The position of the nascent association was soon defined: it would strongly reject the pipeline but not the pulp-mill.

Shortly afterward, the new Committee met with the mayor of Mariquina, the commune to which Mehuín belongs, along with Valdivia's Governor and ARAUCO's representatives. According to the committee's leaders, ARAUCO's representative declared that the company "would use all its influence" for the pipeline's approval: "[H]e wants us to

accommodate their plans,” they concluded (Diario Austral de Valdivia June 21, 1996). The committee questioned the fact that authorities and the company were taking the pipeline’s approval for granted. In their view, the pipeline’s environmental assessment was only a “whitewashing” of a decision already made by COREMA (Comité de Defensa del Mar 1996b). In the committee’s view, if the decision was established beforehand then it, along with the mechanisms for public involvement, lacked any legitimacy. Therefore, the people of Mehuín decided to completely refrain from taking part in the assessment process, refusing to be “a piece in the museum of the prehistory of Chilean environmental institutions” (Comité de Defensa del Mar 1996b).

Mehuín’s inhabitants determined that the only way in which they could impede the approval of the pipeline was also impeding its assessment. This meant a sabotage of the measurements required for preparing the pipeline’s baseline. The community organized itself to patrol the area. Whenever a “stranger” approached the bay and the shore by land or by sea, the fire siren was turned on and dozens attended the call (Pino 2005). This strategy would become the core of the committee’s activities, which involved the whole town acting with an extraordinary cohesion (Skewes and Guerra 2004). Every entrance was being watched and every house had a poster saying, “NO, to the pipeline.”

The impacts that worried the people of Mehuín most were related to the effects that chlorinated compounds and heavy metals could have on human health –through the consumption of polluted food– and the reproductive rate of fish, which could have consequences for local fisheries (Comité de Defensa del Mar 1996a). They were also concerned about the consequences that the discharge of lignin could provoke in the

adherence of mussels. Additionally, they warned about changes in the color of the sea that could affect the landscape and tourism-related businesses.

The technical basis of the Committee's position unfolded along with the struggle and was influenced by an outstanding combination of traditional and scientific knowledge. Indeed, local ways of relating and knowing in Mehuín were connected to the work of scientists: an ocean laboratory was established in the bay in 1959 by the UACH's recently created Institute of Zoology (Skewes 2004). The building functioned under the care of a local resident, Pacían Castro, hired by UACH (Skewes 2004). Pacían and his family were responsible for measuring and registering parameters of the weather, winds and ocean.

Fishers and other residents helped scientists with their studies, accompanied them into the sea, or provided supplies and services (Skewes 2004). Through this relationship, the people of Mehuín learned about the distinctiveness of their seashore, unique for its level of conservation and biological productivity (Skewes 2004). Scientists and students, in turn, learned how to manage a boat, attend to marine currents, and observe the ocean through new lenses (Skewes 2004). In 1978, UACH created a marine reserve of 6 ha, and Eliab Viguera, a diver, was hired as its keeper (Skewes 2004). The laboratory became a model for the discipline of marine biology in Chile¹⁰¹ (Moreno February 27, 1997).

Mehuín's committee demanded a public statement from UACH's scientists, who had studied and protected their bay for almost four decades. They expected that public backing of Mehuín's position about the pipeline would help to counter the strong political support

¹⁰¹ This success can be measured by the laboratory's scientific productivity, represented by dozens of publications and postgraduate students. Additionally, the laboratory was instrumental in the design of a management model for benthic resources legally implemented in Chile since the 1990s, which favors the biological and commercial recovery of valuable resources facing serious conservation threats (Moreno February 27, 1997).

that ARAUCO's project already had. The response was disappointing. In a private letter sent by the Director of the Institute of Zoology, UACH's scientists explained that the only way in which they could support Mehuín's claim was through monitoring the effects of the pipeline. Thus, as a prerequisite for helping to protect the bay, scientists required that the mill was built and its discharges disposed in the ocean. Only then could they provide the evidence that locals demanded (Skewes 2004). The director also clarified (Pequeño 1996, quoted in Skewes 2004) that no scientists from the Institute were involved in the studies for the pipeline but that this "did not rule out the possibility that in the future this institute could take part in such studies, given an eventual call made by competent authorities."

For the committee, this response constituted a betrayal of their longstanding collaboration with UACH's scientists. Just as they had expelled consultants from the beach, they proceeded to close the laboratory and block its researchers from entering the town and the bay. The laboratory ceased its operation and remains closed to this day.

These actions were highly controversial and sparked intense responses to what many saw as the committee's unlawful behavior: "It is risky to oppose only for opposing," the Intendente and President of COREMA declared, arguing that the baselines were needed to "demonstrate" that the pulp-mill was environmentally innocuous (Diario Austral de Valdivia November 23, 1996):

"There are pulp-mills, even inside national parks, and it has been reliably demonstrated that there is no kind of problem (...) the company should be allowed to do the studies so it can be demonstrated to everybody, scientifically, that there is no type of pollution and that no ecological harm is going to happen in the bay."

If the president of COREMA, in charge of the region's environmental assessment system, had such an understanding of the nature of the decision that had to be made and the role that baseline studies should have in it, it can be better understood why the people of Mehuín found it difficult to trust in the impartiality of the process.

To reinforce these criticisms of the committee, the president of ARAUCO's board, Felipe Lamarca, declared that if the project was not allowed it would be relocated to another city or even to another country (Diario Austral de Valdivia April 25, 1997). Valdivia's City Council stated that it was observing "with anguish" that the mill "could be definitively lost due to the opposition, outside the law, by a group of neighbors from Mehuín" (Diario Austral de Valdivia March 12, 1997). ARAUCO's CEO expanded these fears by warning that Mehuín's boycott could result in the failure of the pulp-mill as a whole:

"(...) if the community, finally, maintains this hard position, the board will have to decide if the company is or is not available to work in the bay under the protection of the police (...) the possibility exists that the project will not be materialized in this region, because everything has a limit" (La Nación September 30, 1996).

Making visible the competing worlds that were taking shape through Mehuín's controversial strategy, influential actors declared their public support, not of the environmental frame and its capacity to determine if the project was or was not ecologically viable, but to ARAUCO's pulp-mill and the world of economic possibilities that it would open for Valdivians: "The pulp-mill is the motor that we need to 'take off'," declared Luis Ibarboure, the president of the *Corporación para el Desarrollo de la Provincia de Valdivia* (CODEPROVAL) [Corporation for the Development of the Province of Valdivia] (La Segunda October 16, 1996). This is "the major industrial project of the history of our province," declared the city council, and its materialization "will be an important step to

come out of the economic backwardness in which we have been mired for many years” (Diario Austral de Valdivia March 12, 1997). Valdivia’s most important productive and labor associations published the “Manifesto of Valdivia,” stating:

“Valdivians responsibly inform the country that we are firmly united in defense of what we consider our genuine aspiration to make true the reality of the growth and development of this province (...). We just want to claim our right to access progress” (Diario Austral de Valdivia April 3, 1997).

Finally, Senator Gabriel Valdés affirmed that ARAUCO’s pulp-mill would be “a true explosion of development” for Valdivia (La Segunda March 19, 1997).

Consistently, authorities presented Mehuín’s resistance as an opposition to development and, moreover, as “a war against progress”: “Valdivia declares war against Mehuín due to millionaire pulp project,” said the headline of a Santiago newspaper (La Segunda October 16th 1996). Valdivians are “outraged,” the press report continued, and “will not forgive Mehuín if there is a failure” (La Segunda October 16, 1996). Moreover, the influential business magazine *Capital*, (Revista Capital February 1997) described Mehuín’s strategy as an opposition to modernity:

“What is happening in Mehuín is strange (...). A small bay of fishers has organized itself in war against modernity. What lies behind? Vested interests? Cheap ecologism? The future construction of a pipeline to dump the wastes of a new pulp-mill produces fear in Mehuín. They fear that the project –so auspicious in terms of development– could end, as the [19]60s tsunami, destroying all the town.”

Valdivia’s Senator, Gabriel Valdés, went even further. He declared that Mehuín’s committee did not have the right to question the pipeline because they were “ignorant” of its impacts, which he, in contrast, knew well:

“I have seen documents, pictures and films of mills that are identical [to the Valdivia mill] (...) it has been proven that (...) phosphorus and other products act as fertilizers (...). Why would a product that in itself is not poisonous or doesn't smell bad, or affect health and that has nothing to do either with wildlife, cause any harm?” (La Segunda March 19, 1997).

The president of CORMA –the national association of foresters– also criticized Mehuín's committee: “with the excuse of protecting the environment, they severely hinder our growth, generating a real environmental psychosis that is detaining an increasing number of economic projects” (Ojeda 2006:61).

Confronted with this extremely adverse context, the people of Mehuín realized the need to enhance their position. The path chosen was unusual for a rural community: they decided to produce their own analysis of the pulp-mill's potential effects based on what they had learned from scientists in the marine laboratory. Teresa Castro, the daughter of the laboratory's keeper, took a key role. She had been part of the laboratory's staff herself, taking part in different research projects (Skewes 2004). Teresa became a translator, able to incorporate the language of science in the defense of the bay (Skewes 2004). Under her direction, Mehuín's committee prepared sophisticated arguments while familiarizing the local community with scientific facts. The committee's first bulletin affirmed the following:

“Amongst the chemical substances that will be carried by the pipeline there are synthetic organochlorinated compounds (toxic substances, many of which still remain unknown). Two types of organochlorinated compounds are particularly dangerous: dioxins and furans (...) although we cannot see them or smell them, small amounts of these substances will accumulate in the bay (...). There is real risk that the population of fish may diminish its reproductive rate (...). This will also affect tourism (...). Since in Chile there is no technical capacity to monitor these substances in the waters,

no claims could be made for the loss in marine resources or the impacts caused to the health of our inhabitants due to the pulp-mill” (Comité de Defensa del Mar 1996a).

Through their anthropological work, Juan Carlos Skewes and Debbie Guerra (Skewes 2004; Skewes and Guerra 2004; Guerra and Skewes 2008) describe that this local appropriation of scientific facts functioned as a process of self-discovery, a definition of their own notion of the dangers involved in the pulp-mill’s discharge, and a reshaping of relations with the local environment. In the view of Eliab Viguera, one of the committee’s main leaders, these scientific arguments were crucial for their defense of the bay. Skewes (2004:33) translates Viguera’s testimony as follows:

“(…) many might believe that it was only the force. That is, to say no for saying no (…) but we advanced notably in information about the project (…) about what we could say could happen with the project, in a more scientific way. Authorities began to see all that, and, I mean, it was not only a town that was opposing for opposing (…) these things were acquiring more weight.”

This appropriation of scientific facts was incorporated into a broader process whereby, in articulation of what Skewes (2004) and Guerra and Skewes (2008) describe as local knowledges, the ocean was –in my terminology– *ontologically reconfigured*. Indeed, the threat represented by the pipeline created the space for the defense of the sea and this, in turn, made room for a reconfigured entity. *A new sea took shape*, not only based on the different local knowledges and their ways of performing what the “sea is,” but also, especially, based on the new modes of relating to the sea that the struggle made visible.

During the struggle, the *Mapuche Lafkenche* people, for example, framed the sea as follows:

“(…) the ocean is the same as if we were speaking about the land (…). We are connected to the sea because the sea is part of our life, of our culture, of our religion,

and of our society (...). And if natural resources are gone, the *nguenmapu*, the spirits and owners of (...) a stream, a river or a sea, are also impoverished or die (...) they go away to other places and mentally, psychologically, spiritually, the Mapuche is also impoverished” (Boris Hualme, interviewed by Skewes and Guerra 2004:225).

For fishers, in turn, the sea was described as an extension of the land, and their modes of existence were defined in relation to it: “[we] were fighting for our ideals so we could continue living from the sea” (Torno, November 2, 2002, quoted in Guerra and Skewes 2008:22). For the neighbors that worked in tourism and commerce, the sea was, overall, an object of aesthetic contemplation and the basis of a way of life: “Suddenly, I am looking to the sea and I marvel at how God did something so marvellous” (Castro, November 10, 2001, quoted in Guerra and Skewes 2008:22-23). All of these specific human/nonhuman entanglements, tied to local knowledges and identities, were put to work through the resistance against the threats that the pipeline represented for their survival.

The result was the *ontological enactment of a new entity*: the threatened sea, whose material defense was an imperative for the social and cultural reproduction of the community (Guerra and Skewes 2008): to defend the sea was to defend Mehuín’s way of life, and vice versa. The material ties between the sea and local identities became stronger than ever giving way to what Guerra and Skewes also call “a new ontology,” that is, an ontology through which the people of Mehuín could “conceive themselves as part of the sea” (Guerra and Skewes 2008:31). This reconfigured ontology was not based on any previously settled identity, but shaped through the struggle that moved locals to ask themselves about “who we are in relation to the sea.” The identity that emerged was, as Guerra and Skewes (2008) describe it, ontologically linked to the sea: “to be *of* the sea.” According to these authors it is this new identity what allows to understand the intensity of Mehuín’s struggle.

Mehuín's resistance is still considered an exceptional case of local mobilization in Chile. However, its ontologically reconfigured identity was fractured when, in 2007, ARAUCO reached an economic agreement with some of its fishers unions. The agreement consisted in a monthly payment for those fishers that committed their support to the pipeline's baseline studies and further construction, and who also desisted from legal actions in case the discharges provoked harmful effects. In Mehuín, the agreement provoked deep divisions within families and neighbors, most of whom still considered the pipeline to be incompatible with their ways of life.

Such a controversial agreement was the result of the pipeline's relaunching in July 2005 by then-President Ricardo Lagos, who declared it to be the best solution for the disaster in Valdivia's sanctuary. Furthermore, ARAUCO required the pipeline in order to double the production of its mill from 550,000 tons to one million tons per year, which the company could not do if its discharges remained in the polluted wetland.

Finally, after several revisions, the pipeline was approved by the COREMA in January 2010. The company has not yet attempted its construction, and several permits, in particular those that affect the *Lafkenche* territory, are pending. The Committee for the Defense of the Sea –which replaced the Committee for the Defense of Mehuín– has warned that they will do whatever is needed to impede the construction of the pipeline. The Valdivian movement in defense of the sanctuary, in turn, has insisted that the pipeline is sociopolitically infeasible and that it will not count with their support even if it means the continuity of ARAUCO's discharges in the *Río Cruces*. At least temporarily, Mehuín's ocean is still safe.

5.5 Conclusions

As this chapter demonstrates, ARAUCO's project to build a pulp-mill that would discharge its liquid wastes to the *Río Cruces* clashed in Valdivia and Mehuín with totally unexpected resistances articulated around nonhuman actors. A forcible response came from dominant narratives of development, aggressively mobilized by economic and political elites in alliance with associations of workers. What resulted was a collision between competing worlds or ontologies, expressed in completely different modes of conceiving entities such as rivers and oceans and, especially, of conceiving the place that they should occupy in the country's development.

In Valdivia, the defense of the *Río Cruces* and, consequently, of the *Río Valdivia* – coalescing elements of the city's history – gave way to new rivers, ontologically reconfigured. In contrast to those performed through the mill's assessment, which were already polluted and capable of receiving huge volumes of new discharges, the reconfigured rivers were not only gradually becoming worthy of protection –as described in Chapter 4– but also capable of sustaining economic activity compatible with such protection and opposed to their industrial use.

Through these processes, alternative notions of development emerged in competence to ARAUCO's mill and its promise of development, also challenging Valdivia's longed for industrial past as a meaningful project for the city's future. Instead, new modes of imagining development arose tied to the protection of natural landscapes and emerging tourism and film industries that could grow –as they did– in the coming years. A world that

was non-dominant and weak, yet possible, was beginning to materialize, reshaping Valdivia's identity in connection to its rivers.

While making room for these reconfigured entities, the struggles in defense of Valdivia's rivers and Mehuín's ocean also gave shape to new local identities structured around redefined human/nature relationalities. As we will see, when the disaster of the Río Cruces began in 2004, these reshaped identities and the non-dominant worlds that came along with them were expanded and densified through the defense of the wetland and its swans. As such, these struggles between competing worlds can be seen as historical layers of the unfolding performance of Valdivia's identity.

Chapter 6: ARAUCO on Its Knees: How the Río Cruces Disaster Took Part In the Fracture of Dominant Ways of Performing Chile’s Forest Business

The Río Cruces disaster “marks an epochal change with respect to the socially privileged role of private corporations” (past minister during Ricardo Lagos’ administration, interviewed for this research).

“(…) the public opinion of Chileans, and perhaps of many of [ARAUCO’s] minority shareholders, is inclined in favor of the swans (...). Chile’s largest private company must adapt to this new context” (Leonidas Montes, May 15, 2005).

6.1 Facing the Cameras

On June 8, 2005, the recently appointed president of ARAUCO’s board, Alberto Etchegaray, announced to the press that the company had decided to voluntarily shut-down the Valdivia pulp-mill inaugurated in February 2004 (ARAUCO 2005). At his right sat Charles Kimber, ARAUCO’s Manager of Commercial and Corporate Relations. At his left was Matías Domeyko, the recently appointed CEO. Dozens of cameras and microphones recorded the scene that would become the biggest public spectacle in ARAUCO’s history. Chile’s forest giant was not only facing the worst moment of the controversy sparked by the death of the Valdivian swans, it was experiencing its worst ever episode.¹⁰²

By the time Etchegaray faced the cameras, ARAUCO was being fiercely criticized by citizens, the government and economic elites. The Minister General Secretary of the Presidency, Eduardo Dockendorff, who was in charge of the Chile’s environmental agency, had declared a few days before Etchegaray’s press conference that “Chile’s international image, the country’s competitiveness and the disrepute of our institutions” were direct victims of ARAUCO’s “wrong environmental behavior” (El Mercurio June 4, 2005).

Thousands of TV and press reports about the case were published during a period extending from the end of 2004 and continuing throughout 2007, when its salience began to decline.

¹⁰² Interview conducted by the author for this research.

More than 3,000 articles on the issue appeared in Santiago's newspapers during this time.¹⁰³ According to Daniel Halpern (2007), 90% of them blamed ARAUCO for the death of the swans or questioned its behavior.¹⁰⁴ This level of public attack against a private company was unprecedented in Chile at this time, especially in the case of ARAUCO, a company with an excellent reputation earned thanks to its leading market position.

The fracture in ARAUCO was so deep that soon after the disaster, the company was forced to make major organizational changes, announced by Etchegaray at the June 8, 2004 press conference. Etchegaray was clear: ARAUCO's restructuring and the closure of the Valdivia pulp-mill were the company's response to the critiques raised against its behavior. Only one interpretation was possible: the intense scrutiny to which ARAUCO's environmental practices had been exposed by the disaster were forcing the company to change.

For the first time ever, ARAUCO was subordinating its business to Chile's environmental frame. As José Ignacio Letamendi, then president of CORMA –*Corporación Chilena de la Madera* [Chilean Wood Corporation]– acknowledged, the costs paid by ARAUCO were “the strongest blow that such an emblematic company had ever received” and marked a “before and after” in the environmental management of Chilean companies because of “how unprecedented it was for a US\$1.3 billion investment to be stopped because of its environmental impact” (El Mercurio June 10, 2005).

Adding drama to ARAUCO's unusual announcement, the possibility of a definitive closure of the Valdivia pulp-mill had become a real threat and was being pondered by the

¹⁰³ Interview conducted by the author for this research.

¹⁰⁴ The articles of the local newspaper *Diario Austral de Valdivia* presented ARAUCO's arguments in the most prominent place while situating critical views of the company in a secondary position. This can be explained by the close commercial links between this local media and the company. See Leal and Negrón (2012).

company's board, as implied by Etchegaray's final words to the media: "This company puts the detention of its mill, humbly and respectfully, at the service of Chile in order to reach an agreement. If that is possible, fine. If it is not, it would be regrettable" (El Mercurio June 9, 2005). These words confirmed that the shock caused to ARAUCO by the disaster was so huge that, as its Manager Charles Kimber publicly acknowledged almost a decade later,¹⁰⁵ the continuity of the company's entire business was at risk.

With similar clarity, representatives of Chile's major industrial associations openly questioned ARAUCO –breaking with an unwritten tradition of mutual support in this type of crisis– blaming it for the destructive effects that its inappropriate way of handling the Río Cruces controversy was having on the reputation of the business sector as a whole. As Letamendi, president of CORMA, declared, "the errors committed by ARAUCO's plant are not easily forgivable by society." Letamendi added that CORMA's members were worried of being "polluted" by the Valdivian case (El Mercurio June 15, 2005). In turn, Eliodoro Matte –owner of ARAUCO's main competitor, the *Compañía Manufacturera de Papeles y Cartones* (CMPC) [Paper and Cardboard Manufacturing Company]– spoke unusually loudly in saying that "the ARAUCO issue has been extremely unfortunate and harmful for all the industry" (El Mercurio June 15, 2005).

The blow provoked by the "scandal of the swans," as a major business leader labeled it, was so intense that Bruno Philippi, then president of the *Sociedad de Fomento Fabril* (SOFOFA) [Society for the Promotion of Industry] –Chile's influential association of industries– acknowledged that it had occupied the bulk of the bimonthly sessions of the

¹⁰⁵ Presentation made in the Round Table "Celulosa y Sustentabilidad" during the Summer School "Negocios, Medioambiente y Globalización" organized by the Faculty of Economic and Administrative Sciences at the Universidad Austral de Chile, Valdivia. January 21-25, 2013.

organization's executive committee for several months (El Mercurio October 30, 2005). Also, as some interviewees reported, government authorities along with the company had received messages of concern about the events occurring in Valdivia on behalf of other governments, international organizations, and Chile's pulpwood "clients" around the world.

The fact that international markets were increasingly demanding in terms of their environmental standards did nothing but reinforce the disruptive potential of the Valdivian disaster, adding pressure to a government that was eager to demonstrate its reliability as a world-class commercial partner. In the words of then-president Lagos:

“This is a very serious, a very complex issue (...). My obligation is to ensure that the part of Chile's wealth that corresponds to the forest industry has the level it needs to have in the world from the perspective of respectability towards environmental norms” (El Mercurio June 7, 2005).

The consequences that the Río Cruces disaster began to create far beyond ARAUCO can only be understood in light of the strategic, central position that ARAUCO had come to occupy –as Chapter 3 describes– at the core of the networks involved in making and sustaining Chile's “successful” pulp-wood-oriented forest sector. Not only the country's most modern and largest pulp-mill, which many saw as *the* most important national story of economic success, was at stake. It was Chile's entire forest sector and, further, the country's then dominant business model what were trembling. ARAUCO's largest pulp-mill was also Chile's most modern factory operating within the most strategic business of the country's forest sector: the production of pulpwood for external markets. As then-president Lagos put it, “What is at stake is the country's credibility, not only with respect to this company, but with respect to the forest industry” (El Mercurio June 7, 2005).

In sum, ARAUCO's behavior was being subjected to an unstoppable cascade of hard criticism and exposure involving not only the company but also Chile's export-oriented forest sector and, furthermore, the business sector as a whole.

In what follows, I describe how ARAUCO's way of "doing" the forest industry was thoroughly involved in the fabrication of the Río Cruces disaster and, through it, consequently exposed to sustained public scrutiny and its devastating effects for the company. To do so, I outline the company's unlawful behaviors and noncompliance, which I view as demonstrative of its practices –its environmental practices in particular. I also describe the fissures that began to affect ARAUCO's way of "doing" the forest business as the company attended to the unprecedented responses and questioning that its actions provoked from authorities and competent agencies, including the president. Such emerging fissures not only made room for the exposure and revision of such environmental practices, they also called into question the until then dominant mode of performing the forest business in Chile, of which ARAUCO had been the most outstanding incarnation. In this manner, the "scandal of the swans" was giving shape to the *ontological opening* of Chile's dominant business model and its connections with the workings of environmental institutions and international markets.

6.2 The Return to the River

On October 30, 1998, COREMA finally approved ARAUCO's pulp-mill. To assure that no significant impacts would affect the sanctuary, the entity included several conditions in the corresponding environmental permit, beginning with a tertiary or chemical treatment of its liquid wastes that had to operate continuously (COREMA X 1998):

“(…) the liquid effluents of the project can never be discharged to the Río Cruces without a tertiary treatment, which means that in the case of a failure that cannot be supported by the system of temporal storage [of liquid wastes] or another internal procedure, the mill should stop its operation” (COREMA X 1998:n.p.).

The tertiary treatment constituted the fundamental preventive measure through which authorities assured that no impacts would occur in the protected wetland. COREMA (COREMA X 1998:n.p.) stated that the fulfillment of this condition would guarantee that

“the effluent won’t generate any perceptible effect on the natural sanctuary in relation to (…) the reduction of diluted oxygen in the river, chronic or acute toxic effects on the biota, an eventual thermal barrier causing the displacing and acceleration of natural processes, or the trophic increase of the wetland.”

In addition, COREMA’s resolution tried to remedy the weaknesses of the sanctuary’s baselines prepared by UACH scientists, which, as Chapter 7 further explains, impeded the assurance that no significant impact would occur in the wetland. To do so, COREMA ordered ARAUCO to implement a monitoring program aimed at, on the one hand, producing a detailed description of the ecosystem prior to the mill’s operation, and, on the other, establishing permanent measurements in order to detect any relevant ecological change that might result from the mill’s operation¹⁰⁶ (COREMA X 1998).

Twice a year, ARAUCO would have to conduct a complete assessment of the sanctuary’s aquatic communities, evaluating their ecological state, diversity, abundance, and biomass. Reports on variations in the wetland’s vegetative coverage was specifically included. The company would also have to monitor the bioaccumulation of heavy metals in the aquatic

¹⁰⁶ Amongst the requirements of the monitoring program were daily, weekly and monthly reports of the liquid wastes’ quality, along with monthly monitoring of the Río Cruces’ and sanctuary’s waters. In addition, three measuring stations had to be located upstream from the factory and another three downstream, one of them in the river and the other two within the wetland

plant lucheillo (*Egeria densa*) –“because of its importance to the sanctuary’s birds and wildlife” (COREMA X 1998)– in the *huillin* (*Lutra provocax*) or southern river otter and in freshwater mussels (*Diplodon spp.*). ARAUCO was also obligated to conduct analyses of toxicity in sediments and bioassays in order to determine the chronic and acute effects of its industrial wastes in different species (COREMA X 1998). Most of these measures had to be fulfilled before or during the construction of the mill so a complete baseline could be available when the factory began to operate.

Reinforcing the permit’s preventive approach, COREMA ordered ARAUCO to prepare monthly monitoring reports during the mill’s start-up phase, also requiring that any unforeseen impacts be reported immediately. Finally, anticipating that these exigencies might not be sufficient, the resolution added that additional conditions could be included “to prevent possible impacts on the Río Cruces” (COREMA X 1998:n.p.).

On December 2, 1998, the Valdivia pulp-mill’s CEO, Víctor Renner, appealed to COREMA’s resolution and demanded CONAMA’s National Council of Ministers [*Consejo Directivo*] to modify several of its conditions. The ministers removed critical aspects that later proved to be determinant in the disaster’s fabrication¹⁰⁷ (CONAMA 1999). The most important were the study and monitoring of the sanctuary and its biological communities prior to the construction of the pulp-mill. Such studies –intended to provide an accurate baseline of the wetland– only began to be conducted in April 2004, once the disaster was already occurring (Didyk 2011). The lack of such a baseline impeded the establishment of a clear relation between the mill’s discharges and the changes in the sanctuary: “the lack of

¹⁰⁷ The National Council of Ministers rejected ARAUCO’s petition to raise the maximum temperature of the mill’s discharges from 30 to 40°C, as well as the elimination of the studies of heavy metals in the effluent.

information about the state of such communities for recent periods does not allow for conclusions about the dynamics of such processes [of ecological damage]” (Zaror 2005).

CONAMA’s National Council also left out of the mill’s permit the need for studies to determine the bioaccumulation of heavy metals in the lucheillo and freshwater mussels, as well as the monitoring of the local population of *huillín*. Similarly, two measuring stations upstream of the pulp-mill were eliminated, significantly reducing the availability of information about other industrial discharges.¹⁰⁸ This lack of data would become critical when, in November 2004, ARAUCO’s CEO claimed that the mill’s effluent represented only one percent of all the industrial discharges into the Río Cruces, and there was no register against which to compare such statements (La Tercera November 27, 2004).

Although the mill’s trial run phase began in December 2003 (Sánchez 2011), ARAUCO reported to the *Superintendencia de Servicios Sanitarios* (SISS) [Oversight Agency for Sanitary Services] –the entity in charge of controlling industrial discharges into bodies of water– that the factory would start operating on February 25 (Primer Juzgado Civil de Valdivia 2013). No information exists about the mill’s discharges and impacts during its first weeks of operation, when the technological adjustments that are typical to a new industry –especially of this scale– can generate uncontrolled emissions with potentially acute environmental effects. As we will see, this behavior was constitutive of ARAUCO’s

¹⁰⁸ The measuring station located at the beginning of the wetland and downstream of the mill was also eliminated, while the frequency of ecosystem monitoring was reduced from once a month to once every three or six months, depending on the specific studies involved. CONAMA’s National Council also modified the condition through which COREMA was responsible for authorizing ARAUCO’s monitoring program, as well as the entity in charge of its execution. Now, both could be selected directly by the company.

environmental practices and revealing of its failure to comply not only with the conditions defined in the mill's environmental permit, but also with the country's legal frame.¹⁰⁹

6.3 Pollution and Death

Meanwhile, most Valdivians were unaware that ARAUCO's pulp-mill was already functioning. Such ignorance would not last long. On February 28, 2004, intense odors were perceived in the city, 50 km south of the factory, provoking the first reactions in Valdivia: "When I opened the door of my house and sensed the bad smells for the first time, I said, 'I cannot live here anymore.'"¹¹⁰ Episodes of intense air pollution occurred in the following days. If by March 15 the condition of Valdivia's air had become critical, in the small localities closest to the mill, it was unbearable. Health impacts such as vomiting in children and asthma in elders were reported by rural physicians.

The first organized responses emerged in Valdivia when citizens found out that according to the environmental permit, no odor associated with the mill's operation should be perceptible beyond 500 meters of it. The response from the authorities was disconcerting. The *Intendente* [Regional Governor], Patricio Vallespín, then-president of COREMA, affirmed that the conditions established by the permit for the mill's air emissions could simply not be fulfilled, and thus, the "solution" was that Valdivians should become accustomed to bad smells. Nevertheless, a punitive process against ARAUCO for noncompliance with the environmental permit was set in action by COREMA. In May the company was fined and in August ARAUCO installed air filters which, despite being part

¹⁰⁹ According to Chile's law, a new industrial operation must announce its start-up 90 days ahead of its first industrial discharges (Primer Juzgado Civil de Valdivia 2013).

¹¹⁰ Interview conducted by the author for this research.

of the mill's design, had not been included in its original construction. The smells diminished considerably in Valdivia.¹¹¹

Simultaneously, two conspicuous changes were occurring in the wetland and were recorded in the blog of the sanctuary's wardens (Lagos 2008): the massive death of the luchecillo and the unusual behavior of the black-necked swans. Masses of necrotic luchecillo were seen floating downstream in the river.¹¹² Nelson Lagos (2008) estimates that the 2,000 ha of luchecillo prairies that existed in the sanctuary at that time, died in their entirety between February and July of 2004. Coinciding with this event, as Chapter 7 describes, beginning in July 2004 a mass of dense, brownish waters with high concentrations of heavy metals, which was called "the slick" (*la mancha*), began to move from the wetland to Valdivia.

Since no accurate baseline was available, little is known about the impacts caused to the more than 119 species of birds, 17 species of fishes, 19 species of mammals and 8 species of amphibians that were common in the sanctuary (Didyk 2011). However, the disappearance of the luchecillo certainly affected herbivores, and particularly birds, many of which showed signs of ecological stress.¹¹³ Threatened mammals –such as the southern river otter, or *huillín* (*Lontra provocax*), and the *coipo* (*Myocastor coypus*)– also stopped being seen in the wetland (Didyk 2011).

¹¹¹ In localities closer to the factory, such as Tralcao, local people affirm that bad smells can still be perceived. Interviews conducted by the author for this research.

¹¹² Interview conducted by the author for this research.

¹¹³ The historic records kept by the wetland's wardens demonstrate, for example, a huge decline in the local population of *taguas* (*Fulica armillata*) and *taguitas* (*Fulica leucoptera*), two formerly common species of aquatic birds (Didyk 2011). The wetland's average population of 9,000 taguas had decreased to 640 by February 2005 and to 104 by December 2010 (Didyk 2011). Certain threatened bird species, such as the coscoroba swan (*Coscoroba coscoroba*) and the *cuervo del pantano* [white-faced ibis] (*Plegadis chihi*), disappeared from the keepers' registers since the second half of 2004 (Didyk 2011).

The exception with regard to ecological monitoring was the resident population of swans, a species that had been surveyed since the wetland's declaration as a protected area in 1981. According to the records of the sanctuary's wardens, the swans began to show strange behaviors in May 2004. First, they moved from the heart of the wetland to its tributary rivers. As a witness recalls:

“My attention was drawn to the swans grouping in Cayumapu (...). Weeks later, we began to see masses of burned lucheillo coming down the water. I immediately knew that it was not natural (...) the penny dropped [*me cayó la teja*]: the swans were not escaping from the smells, they did not have any food left upstream”.¹¹⁴

From June 2004 onward, the swans abandoned the wetland and migrated to distant and unusual sites such as the seashore, Andean lakes, urban wetlands, temporary rainfall lagoons, and dumps in Valdivia's surroundings. They were also seen abnormally grazing on land. By then, the wetland's wardens confirmed that no signs of swan nesting – which begins between July and August – had occurred during 2004.

The keepers also recorded an increase in swans dying from unknown causes (Lagos 2008). Historically, their main cause of death was injury resulting from collisions with electricity cables during episodes of intense fog. Only in exceptional situations were swans found dead for other reasons, such attack by predators (Didyk 2011). According to the official records of the *Servicio Agrícola y Ganadero* (SAG) [Agricultural and Cattle Service], the entity in charge of protected species, since May 2004 a total of 350 dead swans had been registered by various means. Based on the monitoring of the wetland's wardens, Lagos (2008) estimates that the mortality rate of swans increased by 640% and 1,030% during 2004 and 2005, respectively. These estimations do not include the swans that were found

¹¹⁴ Interview conducted by the author for this research.

dead outside the wetland or the corpses that were never encountered. Considering that 80% of the wetland's area is not easily accessible and, in any case, is not patrolled, it has been estimated that only 20% of the total number of dead individuals was ever found (World Wildlife Fund 2005). Thus, a conservative estimation would be of 1,000 to 1,500 dead swans, amounting to 16% to 25% of their population in the sanctuary by early 2004 (World Wildlife Fund 2005). What is certain is that the number of swans inhabiting in the wetland dropped dramatically, with counts of 7,983 in May 2004 compared to only 518 in May 2005 and less than 100 in April 2009 (CONAF April 2012).

Many of the swans that died for unknown reasons showed a severe weight loss. Later analyses determined high levels of heavy metals in their hearts, brains, kidneys and livers (Lopetegui et al. 2007). In addition, swans with neurologic abnormalities were found in the wetland and nearby zones, a symptom never described before for this region (Didyk 2011).

While these events were observed in the wetland, the review of ARAUCO's first trimonthly environmental self-monitoring report –covering February to April of 2004– was made public on July 2004. Public services concluded that the report presented several deficiencies, including lack of critical data (CONAMA X August 2004). The second self-monitoring report, covering May to July of 2004, also omitted key information, in this case, measurements of AOX (halogenated organic compounds) in the sediments and waters of the Río Cruces. The company was fined.

At the same time, the regional office of CONAMA received an independent report by MA&C Consultancy assessing the mill's operation (MA&C 2004). The consultants identified 19 abnormalities. The three most severe were the construction of a factory with a

productive capacity that exceeded between 20% and 60% of the level originally permitted, the duplication of the volume for the emergency lagoon –used to accumulate untreated wastes– and a non-authorized emergency duct¹¹⁵ (MA&C 2004). These and other instances of noncompliance led COREMA to fine ARAUCO for environmental misbehaviors.¹¹⁶

The first denunciations related to the disaster in the wetland were made in September 2004. In October, the case exploded in the national press, provoking the first marches by the beginning of November, when *Acción por los Cisnes* [Action for the Swans] was born. By then, besides the fines imposed on ARAUCO, the main measure implemented by the government was to commission a study from the Valdivian university Universidad Austral de Chile (UACH). In five months, the study would determine the origin of swan mortality.

Impatience grew amongst citizens who were demanding, based on ARAUCO's noncompliance, the immediate preventive halt of the mill. The movement presented a *Recurso de Protección* [Appeal of Protection] in Valdivia's Appeals Court urging that the mill's unauthorized changes undergo a new environmental assessment. In turn, COREMA's president, Intendente Jorge Vives, argued that despite ARAUCO's failures to comply, no legal mechanism existed that could enable the government to suspend the mill's operation, even temporarily (Sepúlveda 2007).

¹¹⁵ Other instances of noncompliance included a deficient management of liquid and solid wastes, the preparation of trimonthly monitoring reports instead of the monthly reports required for the trial run phase, the lack of ecotoxicological studies, and the systematic surpassing of the maximum levels for several parameters in the mill's discharges to the Río Cruces, including sodium, phosphorus, chlorate, resinic acids, temperature, and biochemical oxygen demand (MA&C 2004).

¹¹⁶ These included discharging refrigerated waters into the rainfall collector, inappropriately managing the primary and secondary industrial muds, oversizing the emergency lagoon for untreated liquid wastes, and dumping unauthorized wastes into the Río Cruces (*Acción por los Cisnes* 2006).

The records of the mill's daily production during 2004 allowed citizens to demonstrate that, contrary to what the Intendente had asserted, ARAUCO was running the plant at an unauthorized productive capacity. This meant that the company was not only failing to comply with the mill's permit, it was also generating unassessed and, therefore, unauthorized discharges. In sum, it was violating the law (Sepúlveda 2007). This led to an unprecedented measure: the mill was temporary closed, confirming the fracture that was beginning to take form in ARAUCO's environmental practices.

6.4 The Exposure of ARAUCO's Environmental Practices

ARAUCO's environmental misbehaviors soon turned into overt unlawfulness. On December 27, 2004, representatives of CONAMA, the SISS, the DGA and the *Servicio de Salud de Valdivia* [Valdivian Health Service] visited the mill for a regular inspection. Public servants detected that 350 lt/sec of unauthorized groundwater, not declared in the environmental assessment, was being extracted. Even more critical, 70 lt/sec of this groundwater was being used to *dilute* the mill's effluent before discharging it into the Río Cruces (DGA December 29, 2004). Until then, the company had systematically denied such use of unauthorized water sources (DGA December 29, 2004).

Based on these mounting violations, January 18, 2005, COREMA ordered the temporary closure of the pulp-mill despite the Intendente's previous statement about the lack of legal mechanisms for such a measure to be carried out. As a former minister recalls, "[S]trictly speaking (...) we didn't have the legal capacity [however] we made the decision that the mill had to be closed. We didn't know how, but it had to be closed."¹¹⁷

¹¹⁷ Interview conducted by the author for this research.

In the closure resolution COREMA argued that the accumulation of ARAUCO's failures to fulfill environmental regulations and, in particular, the use of a productive capacity of 658,000 tons of pulp per year –that is, at least 20% higher than the volume authorized, as the citizens had charged– were sufficient to justify a preventive halt (COREMA X January 18, 2005). COREMA's resolution also mentioned ARAUCO's concealment of critical information such as unauthorized groundwater used to dilute the effluent and, therefore, to cover the real concentration of pollutants in the mill's discharge. Such behavior, COREMA stated, was not only contrary to the mill's environmental permit but also to the country's legal frame. COREMA also imposed new monitoring conditions, including two audits that, in consistency with the neoliberalized environmental frame, ARAUCO contracted directly.

The mill's unprecedented closure marked the beginning of a deep fracture in the company's environmental practices. The long list of ARAUCO's violations and noncompliance was revealing of systematic rather than unplanned behavior. Especially for a company that then described itself as “capable of precise analysis and evaluation” and able to control all the aspects involved in its operations (ARAUCO 2005:43). The disaster exposed the exact position that environmental issues held in ARAUCO's particular mode of “performing” the forest business. One of ARAUCO's executives puts it in the following terms:

“[The company had] an ethical behavior in what concerns the compliance with the law (...) and the international standards. But without much conviction (...). Those other aspects (...) [like environmental ones] we didn't understand them so well.”¹¹⁸

ARAUCO's meager conviction with regard to environmental norms was clearly expressed by the way it faced the legal obligation of conducting the mill's self-monitoring program.

¹¹⁸ Interview conducted by the author for this research.

The program included a weekly measurement of the mill's effluent based on an automatic composite sample taken over the course of 24 hours, which represented an "average effluent" for that given day (Didyk 2011). These weekly samples covered 14% of the total volume of liquid waste discharged by the mill during a year. Although ARAUCO was not legally obligated to report the composition of the mill's remaining effluent, it was obligated to conduct a permanent self-monitoring of its discharges.

However, when in 2010 Valdivia's Civil Court required ARAUCO to provide copies of such self-monitoring, the company responded that "the operational sheets were not stored over time" and that the information was "not available for all the period demanded" but only for a few weeks between December 2003 and February 2005¹¹⁹ (ARAUCO 2010, quoted in Didyk 2011). Since this messy execution of the mill's self-monitoring sharply contrasts with the efficient management of ARAUCO's productive and commercial tasks, it must be seen as constitutive of its way of dealing with the environmental effects of the pulp-mill, moreover when such risks had been early anticipated by the company.

In effect, as declared in 1998 by Roberto Delmastro –ARAUCO's then environmental manager– the company knew that the sanctuary was a fragile ecosystem and described it as a "receding" wetland, that is, as an ecosystem that was undergoing a process of ecological succession and, therefore, would disappear in a few decades (Diario Austral de Valdivia January 17, 1998). This ecological prediction fits with ARAUCO's insistence on downplaying the potential changes that it was convinced would occur anyway, "natural" or otherwise, in the protected wetland. In particular, it fits with ARAUCO's actions to

¹¹⁹ The company reported that operational sheets were only available from June 18 to 24 of 2004, December 23 to 31 of 2004, and from January 1 to February 9 of 2005.

eliminate, first from the mill's assessment and later from the environmental permit, the monitoring of two of the wetland's critical species: the black-necked swans and the lucheillo. As described in detail in Chapter 7, as long as it was tolerated by a weak and complicit environmental frame, the company performed the wetland as a poorly known ecosystem whose state and trends were uncertain.

Since such lack of ecological understanding was the most favorable scenario in case significant impacts occurred, ARAUCO intentionally contributed to the “production of ignorance.” As stated in the 2013 ruling of the civil court in Valdivia (Primer Juzgado Civil de Valdivia 2013:n.p) –which ordered ARAUCO to repair the damage caused to the wetland– after more than 40 years of operating pulp-mills in Chile the company should have been aware that its factory would generate potentially harmful discharges:

“[The company] knows perfectly well the activity that it executed with severe harm to the environment, because it (...) develops such activity at a large scale (...). It is inexplicable that it causes damaging actions and omissions (...) [for] it always knew the conditions it had to execute in order to protect the environment and (...) counted with the means to do so.”

The same argument was made by Enrique Sánchez (2011) in his report as an independent expert during the trial against ARAUCO. Sánchez (2011:100) states that the mill comprises “equipment and a series of processes of high complexity (...) that make the management of the start up phase difficult and complicated, more so with primarily new personnel without experience.” However, he adds, “[T]he operations involved in the start up of the pulp-mill (...) were conducted with scarce consideration of their environmental impacts, with insufficient controls and monitoring and a lack of reporting to the competent authorities.” In the first year of operation alone, Sánchez (2011:100) detected “354 detentions of more

than 8 hours,” which amounts to “an average of one daily event of ‘out of control’ (...) [with] logical implications for the treatment pools, which must have been already full of discarded [untreated] liquid wastes, and eventual discharges to the Río Cruces.”

Sánchez’s conclusions are also consistent with the results of ARAUCO’s self-monitoring. Although incomplete, these reports show the effects caused by the mill during its start-up phase. As confirmed by Claudio Zaror, a chemical engineer hired by CONAMA to analyze ARAUCO’s first reports, various “events” of toxic discharges were detected in the river and the wetland during the first year, the two largest in April¹²⁰ and August¹²¹ of 2004. Zaror’s final report (2005b) coincides with the conclusions reached by World Wildlife Fund-Chile (2005) and by Walter Di Marzio and Rob McInnes (2005), an expert mission recommended by the Ramsar Convention. All agreed that the mill’s tertiary treatment did not function efficiently during the first year and, furthermore, was structurally deficient:

“[The mill’s] purifying system, briefly consists in (...) primary and secondary treatments and a final treatment with flocculants for the removal of color (information provided by the company). That is, **it does not conduct a real tertiary treatment with regards to the removal of nutrients**” (Di Marzio and McInnes 2005:28, emphasis in the original).

Since the mill’s tertiary treatment was, as stated, the most important preventive measure included in the environmental permit granted by COREMA in 1998, its proper operation was central to ARAUCO’s legal compliance. If such treatment was not effective and,

¹²⁰ Zaror’s report (2005a:6) states, “The samples of April 4, 2004 show high levels of concentration of chlorates, aluminum and resinic acids in station E2 (downstream of the mill). It must be stated that the Valdivia mill was not producing pulp at the time (the report of the company claims there was no production between April 1 through 7), although the discharge of liquid wastes continued. The cleaning and maintenance operations done during these days were probably responsible for these effects.”

¹²¹ Zaror (2005a:8) says that resinic acids –a proven biocide– reached 9.00 mg/L in the river, that is, 270 times the maximum level of concentration authorized (of 0.033 mg/L), in 57% of the measurements, attributing the presence of this toxin in the river to a major “lack of control of the effluent’s conductivity, indicating possible leaks of the mill’s black liquor.”

moreover, had been deficiently designed and operated, it meant that ARAUCO had been violating from the outset the most fundamental condition of the mill's approval.¹²²

In sum, by 2004 ARAUCO managed its industrial and commercial operations with an efficiency that sharply contrasted with the disrespectful and unlawful way of complying with the environmental conditions legally established for the Valdivia pulp-mill. Further, ARAUCO actively impeded the monitoring or recording of the compounds discharged into the Río Cruces and of the impacts that they were causing in the wetland. It was this way of performing the forest business and its corresponding organizational culture that became subject to profound interrogation and revision through the Valdivian disaster. As a past national authority describes it, “they wanted to be leaders everywhere by having the major investments, the major processes. And *that mode was fractured at its axis*”.¹²³ It fractured not only ARAUCO but, as we will see, Chile's entire business sector.

6.5 The Exposure of the Business Model Incarnated by ARAUCO

In 2006, Alberto Etchegaray, ARAUCO's new board president, acknowledged during an interview with the sociologist Gonzalo Delamaza that Anacleto Angelini –the holding's owner– had been pressured by then-president Lagos to start the operation of the Valdivia mill (Delamaza 2012). Etchegaray's acknowledgment is revealing of the close links between ARAUCO and the country's elites. As one of Lagos' past ministers explains:

¹²² In 2008, during the trial for environmental damage against ARAUCO, Valdivia's Civil Court required the firm AF-Process –hired by ARAUCO to design the Valdivia pulp-mill– to testify about the effluent treatment (Didyk 2011). The expert Staffan Eskilsson, leader of the team that designed the mill, confirmed from Sweden that the technological specifications described on page 212 of document #160 prepared by AF-Process for ARAUCO were correct, and that they took into account the parameters of the corresponding environmental permit (Didyk 2011). If this testimony is truthful, the mill's toxic discharges were not a problem of design but of the way in which the mill was built and operated.

¹²³ Interview conducted by the author for this research.

“All these projects go through a political filter at some level. An important senator... The president (...). And sometimes, also some ministers. Then, when the project is submitted to the SEIA, it is too late to [review] political decisions.”¹²⁴

This key aspect of what by 2004 was the dominant business model existing in Chile was explicitly recognized by ARAUCO’s former CEO, Alejandro Pérez, who publicly declared that many of the company’s fundamental decisions had been made with a “call to *La Moneda*,” bypassing legal procedures (Delamaza 2012). In the words of a past minister:

“Alejandro Pérez, in his classes of engineering (...) used to say, almost sarcastically and with contempt, that there didn’t yet exist a public servant or minister who could question his decision about where to locate one of the company’s mills.”¹²⁵

As Delamaza (2012:169) recounts, until the early 2000s this dominant business model was characterized by a conservative view –backed by economic and political elites– according to which the “social responsibility” of private investors consisted exclusively in “making profit, creating jobs and complying with the law.” If there was a company that represented this philosophy well, it was ARAUCO and its “culture of preoccupation with costs,” as the company’s Manager, Charles Kimber, proudly called it (Fundación Chile 2009).

ARAUCO, the business giant, had built its empire by taking advantage of this dominant mode of performing private business in Chile. As a past minister describes it, “the company, mounted on the symbolic prestige that the business world had in Chile, was *untouchable*, (...) [and accordingly, it] received [from the state] the support that it should have never been granted”.¹²⁶ The approval of the Valdivia pulp-mill cannot be understood detached

¹²⁴ Interview conducted by the author for this research.

¹²⁵ Interview conducted by the author for this research.

¹²⁶ Interview conducted by the author for this research.

from such “symbolic protection” granted by governing elites to private corporations. One of president Frei’s past ministers puts it in the following way:

“(…) the business culture that dominated in Chile during the 1990s, in particular when this mill was approved and built, was like a great bet that under the governments of the center-left, the country could continue developing its model of growth and investment (...). [B]usinessmen had to trust that those from the center-left would not behave as crazy and unseat the country (...) and the government had to [demonstrate] that it wouldn’t put up too many obstacles for investments (...). The Valdivia mill was understood within that logic.”¹²⁷

When the “scandal of the swans” exploded, this dominant business model still enjoyed high levels of legitimacy, shielded by an atmosphere of political and economic stability and a deeply fragmented civil society (Delamaza 2012). However, the Río Cruces disaster began to expose ugly details of the practices through which companies like ARAUCO were “doing” their business. As a past Minister puts it:

“(…) the episode of Valdivia marks a before and after in the cultural predominance that private corporations had as producers of wealth, opportunities and success (...). [The role] of private companies as the great motor, the axis, the guide and catalyzer of development (...) reaches its maximum peak and a revision begins, that is later translated into institutional changes introduced to the state.”¹²⁸

Therefore, when on January 18, 2005, COREMA announced the unprecedented closure of the pulp-mill –a measure never before applied and beyond the legal frame– a deep fracture in the dominant business practices involved in the making of ARAUCO and, along with it, the country’s “forest model,” began to coalesce.

¹²⁷ Interview conducted by the author for this research.

¹²⁸ Interview conducted by the author for this research.

COREMA's decision had resulted from the actions of two simultaneous networks of actors entangled with the Río Cruces disaster and, more specifically, with the decline of the Valdivian swans. On one side, there was the network of citizens mobilized to denounce the institutional fabrication of the disaster, as described in Chapter 8. On the other, there was a political-economical coalition concerned about the harm that ARAUCO's environmental misbehaviors was causing to Chile's position in the global economy and, in particular, to the country's goal of incorporation as a full member of the Organization for Economic Cooperation and Development (OECD), the select club of the world's 30 largest economies.

The country's inclusion in the OECD was seen as a landmark achievement of Chile's efforts to consolidate its globalized economy. This is why then-president Lagos worked so hard to obtain it. Now Lagos was convinced that ARAUCO's environmental misbehaviors were putting Chile's inclusion in the OECD at risk by inflicting costly damage to the country's reputation. This conviction shaped the government's response to the disaster.

One of the most complex requirements for Chile to become a full member of OECD—a goal finally achieved in 2010—was an assessment of the country's environmental conduct. Such revision was considered a major challenge given the deficiencies of the country's environmental policies and a subordination to economic growth that became particularly acute under Lagos' administration.¹²⁹ After receiving OECD's assessment at the end of 2004, an official delegation led by Minister Dockendorff travelled to Paris in January 2005

¹²⁹ Lagos' most celebrated achievement was an agreement signed with Chile's business associations known as *Agenda Pro Crecimiento* [Pro-Growth Agenda]. The agenda was intended to "reduce the obstacles for entrepreneurship and also marked a new way of working together, between public and private sectors, in order to confront the country's problems" (SOFOFA 2006:6). In addition, during Lagos' administration, Chile signed seven commercial agreements with individual countries or unions of countries, including the United States, the European Union, Korea, the European Free Trade Association, Central America, China and India. He also put forward a strict fiscal rule that, according to SOFOFA's past president, Bruno Phillipi (2006:6), "has granted strength and stability to our economy."

to present the government's responses in front of a peer review panel. The panel was comprised of experts and environmental ministers from OECD countries. This examination was described by Dockendorff as "the most difficult filter" before Chile could be accepted into the OECD (El Mercurio January 26, 2005).

The criticisms to Chile's environmental behavior raised by the panel in Paris were evidently shaped by the events unfolding in Valdivia. As an attendee to the meeting describes, "The Finnish and German [ministers] were very harsh (...). First, we touched on the general themes, and afterwards we dug into the CELCO [ARAUCO] issue."¹³⁰

Although the panel was flexible on the recommendation to create a Ministry of Environment –which Chile then lacked– in light of the Río Cruces disaster, the experts were intransigent regarding the deficiencies in environmental monitoring (El Mercurio January 26, 2005). However, these critiques were smoothed by a key measure taken by the government less than a week before the meeting held in Paris: the temporary closure of the Valdivia pulp-mill. As an international press agency described it (Inter Press Service January 28, 2005):

“(...) to a certain extent, Chile responded to the criticisms made of weak environmental monitoring on the 18th of this month with Regional Environmental Commission of the Lakes District decision that temporarily closed a pulp plant, possibly responsible of the degradation of the Río Cruces natural sanctuary.”

Accordingly, former minister Dockendorff declared (La Tercera March 7, 2005; El Mercurio January 26, 2005) that the “firm hand” showed in the case of the Valdivia pulp-mill had “served much” to ameliorate and even revert some of the toughest critiques to

¹³⁰ Interview conducted by the author for this research.

Chile's environmental behavior made by the members of the OECD. An interviewee who was also in Paris on behalf of Chile's government has a similar opinion:

“Chile's destiny would have changed if we had [to face] the scandal of the swans' death in Valdivia by explaining, ‘Look, it was built in a wetland, but we don't have any power to close the mill, and besides [the company] could sue us’ (...). They [OECD] would have completely destroyed us [*nos hubieran hecho pedacitos*].”¹³¹

Although the wetland's ecological collapse continued and new evidence about ARAUCO's unlawful behavior was known, the mill's closure was soon reversed by COREMA (Zaror 2005b). Simultaneously, the two preliminary reports prepared by UACH were made public, confirming what was already known: the sanctuary's swans had died or migrated en masse as a result of the disappearance of their main food supply, the *luchecillo*, and this plant had died due to high concentrations of heavy metals in the wetland (UACH 2004, 2005a).

Despite the mill's reopening, the practices through which ARAUCO had built its success were already fractured. One of the most visible signs was the harsh –although still subterranean– questioning of ARAUCO's behavior by the country's elites. Publicly, industrial associations declared that the mill's closure had inflicted damage on Chile's entire private sector. As Juan Claro, then-president of SOFOFA, wrote:

“the shutdown of the Valdivia mill (...) ordered by authorities (...) was the cause of great concern in the industrial sector, for it constituted an *extreme measure* that certainly does not correspond with the steadfast efforts displayed by the Chilean industry in the sphere of sustainable development” (SOFOFA 2005:6).

¹³¹ Interview conducted by the author for this research.

However, in private, these same actors were openly critical of ARAUCO and felt denigrated by its behavior. Lago's influential Minister of Finances, Nicolás Eyzaguirre, declared to *El Mercurio* (June 26, 2005):

“You would be surprised to know the number of businessmen who have sent me messages. What they say the most is that I should be harsher [with ARAUCO], because we all could go down through the sink pipe (...) since we are increasingly competitive [and] we are harming very big international interests (...) they are looking for an excuse to limit us in the markets.”

The fracture in ARAUCO's environmental practices was beginning to take shape when on April 18, 2005, UACH released its final scientific report stating that ARAUCO's discharges had been *sufficient* to cause the collapse of the wetland (UACH 2005b). That same day, Valdivia's Appeals Court ruled in favor of the Appeal of Protection presented by citizens some months earlier, ordering a new environmental assessment of the unauthorized changes introduced to the mill –including the increase in its productive capacity. While the assessment was underway, the mill needed to stop operating.

Soon after, on May 18 and May 24, 2005, the *Comité Operativo de Fiscalización* (COF) – the committee of public services in charge of overseeing compliance related to the mill's environmental permit– released its own report based on UACH's final conclusions. The COF concluded, in line with the court's ruling, that ARAUCO had to submit to a new environmental assessment of the unauthorized compounds that its mill had been discharging without reporting their presence. The COF highlighted that some of these compounds were, according to UACH's conclusions, causally connected to the disaster.

6.6 The Bowing of Chile's Forest Giant

The scientific confirmation of the mill's responsibility created a new scenario: the possibility of an extended or definitive shutdown of ARAUCO's factory became stronger. Raúl Arteaga –the former Regional Director of CONAMA, now in charge of the country's SEIA– assured the leaders of the Valdivian movement that the government would order a new environmental assessment of the factory, as recommended by the Valdivian court and the COF. This meant halting the mill. What citizens did not know was that the government also was seriously discussing the option of a definitive closure.

Indeed, as every former national and regional authority interviewed for this research acknowledged, by April 2005, after UACH's final conclusions were known, the certainty of ARAUCO's responsibility was established within the government. Moreover, all of these interviewees also confirmed that president Lagos was willing to back a definitive shutdown if such a measure was appropriately founded on the available evidence: “[H]e was in favor of closing the mill. He wanted to put a lock on it and fix things along the way.”¹³²

ARAUCO also knew that a shutdown was being discussed (El Mercurio May 23, 2005).

The uncertainty regarding the mill's future was not only a concern for the company. In Valdivia, a tense atmosphere was growing due to rumors of a definitive shutdown. In particular, this caused alarm amongst ARAUCO's workers. In light of this potential scenario, a new demand emerged and gained strength. Focusing on the damage that the mill's closure could cause them, ARAUCO's workers –mostly hired by subcontractors– advanced a harsh campaign accusing the Valdivian movement of causing an unemployment catastrophe. Workers directly and indirectly associated with the Valdivia pulp-mill

¹³² Interview conducted by the author for this research.

organized a group defined in opposition to the present Valdivian movement, calling themselves “*Acción por el Trabajo*” [Action for Work].

In May and June of 2005, hundreds of trucks, coming from as far away as 500 km north, and thousands of workers, raising their functioning chainsaws (without chains) or riding their off-road motorcycles, took over the city on three occasions. The city’s downtown was invaded by an army of men marching in aggressive defense of their jobs in front of astonished observers (Sepúlveda 2007). A profuse display of national symbols –such as the country’s flag and anthem– and a discourse in explicit defense of “private enterprises” presented ARAUCO as an icon of patriotism for its contribution to Chile’s economic development. The aesthetics and discourses of these mobilizations resembled those of Chile’s authoritarian past. *Acción por el Trabajo* warned that in the event of the mill’s permanent closure, the coming mobilizations “won’t be pacific (...) 600 trucks will be blocking the highway” (El Mercurio May 23, 2005).

The workers’ demonstrations were effective in getting the media’s attention and the backing of national actors. The president of the Chilean National Confederation of Forest Workers [*Confederación Nacional de Trabajadores Forestales de Chile*], Sergio Gatica, visited Valdivia to support “all the people linked to the Valdivia mill (...) who will lose their jobs if the closure is ordered” (Diario Austral de Valdivia May 11, 2005). *El Mercurio* (May 10, 2005) reported that an eventual closure would directly affect 4,500 service providers and 10,000 indirect workers, also highlighting its financial effects: US\$ 1 million lost daily in sales and US\$ 250 thousand lost daily in profits during the industry’s shutdown. The shares of COPEC –ARAUCO’s parent company– had already dropped 9.4% in the previous month (El Mercurio May 10, 2005).

Now it was in COREMA's hands to make a final decision. The debate about UACH's scientific report was still unfolding when an additional, forceful controversy exploded, fuelling the rage of President Lagos and stamping its mark onto COREMA's resolution. In convenient coordination, on May 31, 2005, the Supreme Court reversed the Valdivian court's ruling that one month earlier had ordered a new environmental assessment of the mill (Corte Suprema May 31, 2005). As Chapter 7 further explains, the ruling dismissed UACH's conclusions about the link between ARAUCO's discharges and the sanctuary's collapse. This interpretation was based on a report provided by ARAUCO to the Supreme Court, titled "Río Cruces Balance-Valdivia Mill's Sector of Effluent Discharge." Dated May 17, 2005, the report was attributed to the Universidad de Concepción. However, one day after the ruling, this university denied being the author of the document (La Tercera June 3, 2005). Furthermore, it turned out that the report, critical in ARAUCO's exculpation, had been prepared by the company.

If the government had feared that ARAUCO's misbehaviors could damage the country's international reputation, this new controversy involving Chile's highest court exceeded any previously imagined harm. As *El Mercurio* (June 4, 2005) describes, the Supreme Court scandal provoked strong reactions from many actors:

"(...) congressmen and Chilean ecological groups harshly questioned Arauco: '(...) This is extremely serious because we have never seen an attempt to deceive the maximum court of the country', declared the deputy Guido Girardi, from the governing coalition (...). He announced a judicial charge of 'false testimony', an offense punishable by up to three years in prison."

Lagos could not tolerate any suspicion of collusion between ARAUCO and the Supreme Court. As he declared in the aftermath, "the mistake put at risk the credibility of the country

and the forest industry” (El Mercurio June 8, 2005). The president was so shocked that he abruptly ended the strategy that had placed the case’s key decisions in the hands of regional authorities in order to demonstrate that –as he insisted– “in Chile, institutions work.”¹³³

Lagos became heavily involved. First, he asked Minister Dockendorff to meet with ARAUCO’s president, Etchegaray, and demand immediate reparatory measures from the company (El Mercurio June 4, 2005). Second, as one of his closest collaborators reported to me, Lagos decided to intervene in the final decision about the future of the pulp-mill, voicing his intentions as follows:

“Look, I want (...) a report about your position on this issue. Whatever you recommend that I have to do, I will do. If you consider that CELCO [ARAUCO] is guilty, I will find a way of closing it [the mill] and finish with this. If you say, instead, that there are no reasons to close it, that there are no certainties, then we won’t close it, because we are a serious country.”¹³⁴

The authorities in charge of recommending a final decision were facing a complex challenge. There was a lack of legal mechanisms to change the mill’s permit. Additionally, as detailed in Chapter 7, a definitive closure of the mill demanded the scientific confirmation of ARAUCO’s responsibility, which, in the view of these authorities, was missing from UACH’s final report: “We didn’t have any norm to recall in that moment (...). That is why what happened with the UACH was so frustrating (...). What could we do?”¹³⁵ In their understanding, UACH’s report was not only insufficient but controversial. Thus, despite their settled conviction about ARAUCO’s responsibility, national authorities were

¹³³ Until then, Lagos’ main intervention had been a call made to Angelini in January 2005 to notify him about the mill’s temporary closure ordered by COREMA.

¹³⁴ Interview conducted by the author for this research.

¹³⁵ Interview conducted by the author for this research.

unable to support the closure of the mill upon the evidence they had: “Based on UACH’s study, we could not conclude that there was guilt on the part of CELCO [ARAUCO].”¹³⁶

As described in Chapter 7, the failure of their science-based strategy left authorities without a plan. Only one course of action appeared to be legally feasible: to increase the requirements of the mill’s environmental permit through a new resolution from COREMA. This included the reduction of the levels of unauthorized compounds until then illegally discharged,¹³⁷ and a 20% of reduction of the mill’s annual production until a point of discharge of its liquid wastes other than the Río Cruces was established. ARAUCO was technologically unable to comply with the new exigencies, considered “extreme” by its board (La Nación June 12, 2005). Thus, as Etchegaray announced to the press, due to this “level of uncertainty,” the company decided to bring the mill’s operation to a halt.

The scale of the changes applied by COREMA to an environmental permit already in force went far beyond the legal framework and was unprecedented in the country. This measure was consequential not only for the company but also for the country’s entire environmental edifice. Its deepest effect was the government’s partial disentanglement from the way of “doing” the forest industry that ARAUCO had, until then, embodied. The measure also contributed to weakening the ontological density of Chile’s environmental frame by backing the evidence of its serious failures, those that had been denounced by citizens. As a result, the conditions for the 2009 environmental reform also began to take further form.

¹³⁶ Interview conducted by the author for this research.

¹³⁷ The new requirements included an important reduction in the concentration of several compounds that the pulp-mill had been discharging into the Río Cruces without the impact assessment required and, thus, without the corresponding legal permit (COREMA X Resolution 377 June 6, 2005). Many of the compounds illegally discharged in great volumes had been simultaneously identified by UACH’s report as causally linked to the disaster (Sepúlveda and Bettati 2005).

The government's most energetic action was yet to come: Lagos summoned Anacleto Angelini –ARAUCO's owner– to the presidential palace in Santiago. On June 6, 2005, Angelini arrived at La Moneda at the same time that, 1,000 km to the south, COREMA held its conclusive meeting. There was no additional witness to the one-hour conversation between the president and Angelini. However, the media described it as tense and dramatic. According to a press report (La Tercera June 19, 2005), Lagos had just received a message from the OECD: since the entity was unsatisfied with the country's response to its environmental assessment, the measures taken by the government in the Valdivian disaster would be taken into account in further decisions regarding Chile's prospective membership. In turn, Alejandro Pérez (Revista Qué Pasa June 17, 2008) –at that time ARAUCO's CEO of 15 years and Angelini's right hand– revealed that during the meeting, Lagos told Angelini that “the government *had* to take drastic measures.” Interviewed for this research, an indirect witness of the encounter, one of Lagos' close collaborators at the time, reported that the meeting “was very dramatic because Angelini broke into tears (...). For him, this mill was a project longed for over many, many years.”¹³⁸ The president demanded that Angelini make “a major gesture,” pointing to radical changes in ARAUCO's structure (La Tercera June 19, 2005). This meant the resignation of Alejandro Pérez¹³⁹, who was the main party responsible for both ARAUCO's success and the Río Cruces disaster. The decision was announced by Etchegaray during the historic press conference described at the beginning of this chapter. The lawyers involved in the Supreme Court scandal, who had worked for ARAUCO over 15 years, also resigned.

¹³⁸ Interview conducted by the author for this research.

¹³⁹ Pérez continued to be part of Angelini's holding as a member of COPEC's board and shareholder of *Inversiones Angelini* [Angelini Investments], the exclusive circle in charge of managing the businessmen's fortune (El Mercurio June 19, 2005).

At his eighty-nine years old, Angelini was devastated. By 2004 he was Chile's wealthiest man and, according to Forbes, number 205 amongst the world's richest (*Forbes* February 26, 2004). He was widely respected and admired in Chile. Even in 2006, a year after the events here described, then-president Lagos declared (*La Tercera* March 5, 2006): "Both Andrónico Luksic (...) and Anacleto Angelini deserve my admiration. When I was a boy there was a book called *The Makers of Chile* (...) My perception is that they [Luksic and Angelini] are the architects of this era" (*La Tercera* March 5, 2006). Angelini could not understand how, from being admired for his life-long contribution to the country, he was now openly accused of damaging Chile's reputation. What had changed so dramatically? Despite his annoyance with ARAUCO, Lagos gave Angelini an option that alleviated the old man's sorrow: instead of another closure of the mill ordered by the government, the company could stop the factory voluntarily (*El Mercurio* August 14, 2005). As one of ARAUCO's high-ranking directors recalls:

"[W]hen president Lagos said that this company, with its actions, was risking Chile's credibility... a declaration like that, made by the president ... (...). That same day the operation [of the mill] was halted and the CEO resigned (...) he did not resign spontaneously. His resignation was demanded [by the board]."¹⁴⁰

Chile's wealthiest man left the presidential palace feeling that the world in which he had built his empire no longer existed. After meeting with Lagos, Angelini headed to ARAUCO's headquarters. That was the last time he visited his office, as he had done daily for decades (*Revista Qué Pasa* June 17, 2008). Angelini died on August 28, 2007 amidst the situation that he had most feared: at that time, ARAUCO's reputation and his own were still heavily polluted by the Río Cruces disaster.

¹⁴⁰ Interview conducted by the author for this research.

This was certainly a different country from the one in which Angelini's empire had grown. As a business representative graphically put it, to stressing how deeply things had changed, "[I]f [President] Aylwin had acted in this way against a private company in 1990, he would have unleashed a *coup d'état*" (La Tercera June 12, 2005). Indeed, the episode surrounding the encounter between Lagos and Angelini marked an historic turning point in the relations between *La Moneda* and private holdings. As Delamaza (2012) proposes, this is "*the event that inaugurates a transition to a new way of performing private businesses in Chile*. If, as Minister Dockendorff (El Mercurio August 14, 2005) put it, "[F]or many years the companies thought that conflicts were solved with a call to La Moneda," since 2005 the call began to be made the other way around, as Lagos (La Tercera December 13, 2012) reflected some years after his encounter with Angelini: "[I]n my government institutions were respected (...). I made clear decisions. I met with Angelini, we debated, and the issue was solved. Now the swans have returned."

For ARAUCO, accepting the new conditions determined for its mill was not trivial. The board interpreted them as an expropriation of the property rights acquired through the corresponding environmental permit. Therefore, in ARAUCO's view, by accepting these additional measures the company was voluntarily resigning to such rights: "we renounced a property right that we had in order to accept superior demands that, in our judgment, left the COREMA satisfied."¹⁴¹ Precisely because of such resignation and the precedent it marked, ARAUCO's acceptance of the changes introduced to its mill were harshly criticized by business associations who also saw COREMA's resolution as a threat to

¹⁴¹ Interview conducted by the author for this research.

property rights (Apablaza, Hormaechea, and Villanueva 2008).¹⁴² As Fernando Agüero, councillor of the influential SOFOFA, put it, the changes introduced to the mill's permit questioned the stability of "the entire environmental frame" (El Mercurio August 26, 2005). This heated debate would mark the coming environmental reform.

At this point, ARAUCO had the worst reputation of any Chilean company (Delamaza 2012). In addition, the holding's relations with its business partners were tenser than ever, and unusually fierce critiques from other companies circulated in the media. Even Felipe Lamarca, the former and respected CEO of the COPEC holding –ARAUCO's parent company– as well as past president of SOFOFA and someone very close to Angelini, recognized that his own resignation to COPEC was caused by his disagreement with the way in which the "scandal of the swans" was managed. "There are two cultures [in ARAUCO]," Lamarca explained. "One is more inclined towards a vision closer to the community, and the other more inclined to growth, the control of costs, commercial development" (La Tercera June 15, 2005). For Lamarca, the second vision had won so far in ARAUCO. Lagos' influential Minister of Finances, Nicolás Eyzaguirre, also made unprecedented critiques of ARAUCO:

"(...) the people of CELCO [ARAUCO] were a little out of place. And pulled the elastic over the limit (...). They had a very acceptable business culture, but of costs reduction (...). They were accumulating a gigantic environmental liability (...). A project was approved with certain standards. Those standards began to be systematically violated. They were notified on numerous opportunities, and when there was a chance of making a detour, they did it" (El Mercurio June 26, 2005).

¹⁴² Productive associations conceived of environmental permits as property rights authorizing them to develop an investment under predetermined conditions, such as a particular technology, location, volume of production, and regulated impacts. Any revision to such conditions could threaten the continuity of already approved investments, affecting the property rights involved. In 2005, the issue was still being debated based on the resolutions of the country's General Comptroller. See Apablaza et al. (2008).

Finally, ARAUCO also began to be commercially affected by the disaster as a consequence of a damaged reputation. According to Alejandro Pérez, ARAUCO's historic CEO, the mill's voluntary shut-down unleashed "a world-scale criticism" that generated significant costs for ARAUCO: there was a "commercial impact due to the damage provoked in front of its clients" and also "larger financial costs (...) of about US\$ 500 million" due to the readjustments of clients' portfolios. Following the "scandal," he added, ARAUCO "sold less in Europe and more in Asia, but at lower costs. Its operational debt increased, elevating the risk that, therefore, also became more expensive" (Revista Qué Pasa June 17, 2008).

This was certainly a bleak moment for those in charge of managing the crisis within ARAUCO, as some of the company's main managers interviewed for this research recall:

- "It was very hard! Very hard! (...) the level of exposure was so huge and the event was so traumatic for an organization that (...) was like a giant with a sense of pride, of a great power."¹⁴³
- "The impact that everything we experienced in Valdivia had for the company was extraordinarily strong. It touched its deepest roots. A company that was accustomed to being celebrated by everybody, to seeing that its effort was acknowledged, along with the leadership it had gained and the success of its process of globalization."¹⁴⁴
- [It was] a very complicated event. A breaking point (...). [It] was a company very badly prepared to understand what this was all about. (...) [It] was overwhelmed.¹⁴⁵
- "It was very hard, very hard. The country somehow concentrated in this issue all the negative image that it could have about corporations."¹⁴⁶

Moreover, as one of the company's oldest leading executives explains, the deep fracture provoked by *the Río Cruces disaster put the holding's entire pulpwood business at risk*:

¹⁴³ Interview conducted by the author for this research.

¹⁴⁴ Interview conducted by the author for this research.

¹⁴⁵ Interview conducted by the author for this research.

¹⁴⁶ Interview conducted by the author for this research.

“It risked not only the Valdivia pulp-mill but the continuity of the entire company (...) the shutdown [of the mill] could have been permanent (...). The conflict (...) could have scaled (...) internationally. We could have had financial risks, with banks. We could have had commercial risks (...). We were just starting in Argentina (...) to stop a project like this in Valdivia (...) would have been a very different story (...) the company was not going to die. But... it could have been sold.”¹⁴⁷

The effects of the Valdivian disaster are described by another ARAUCO executive as a turning point that obligated to a tough self-assessment in order to recognize that the identity and practices upon which the company had built its reputation were falling to pieces:

“An immediate effect was (...) the pressure of the country over the company (...) it reached a very high, visible level –that you say, wow, this thing is heavy!– with the resignation of the CEO, Alejandro Pérez (...). From that moment on we observed like a sudden change of direction.”¹⁴⁸

In sum, by mid 2005, ARAUCO –the giant– was “on its knees,” as suggested by one of *El Mercurio*’s headlines (May 1, 2005). During nine intense months of an unstoppable crisis the company had been obligated to halt for 64 days its most modern and largest factory, to conduct 13 national and international audits, and to accept unprecedented exigencies introduced to the Valdivia mill’s environmental permit. As well, although ARAUCO continued to reject its responsibility in the disaster, the company’s president acknowledged that “sloppiness” and “errors” were committed in Valdivia and declared the willingness to rectify them. Even more, as many interviewees noted, ARAUCO began to make historic changes to its structure and practices, reflecting the depth of the lessons coming from the

¹⁴⁷ Interview conducted by the author for this research.

¹⁴⁸ Interview conducted by the author for this research.

disaster.¹⁴⁹ Nonetheless, it would take several years for the company to implement such changes in its operations in Valdivia.

6.7 Emerging Practices

One of the first changes that the disaster triggered in ARAUCO was a different mode of working within its board. As one of my interviewees –who has been part of the company for almost two decades– describes, before the disaster, the board was exclusively focused on the holding’s commercial behavior and detached from key decisions regarding the impacts of its operations and the way of relating with public actors and communities:

“ARAUCO’s board (...) [was] too, really too, financial (...). The main focus was placed on the achievements of our business, from the point of view of (...) production, costs, sales, marketing (...). You have to consider that this was one of the first Chilean companies to place an ADR [American Depositary Receipt] bond in New York (...). And it also had to respond to Chile’s main trading company, COPEC [ARAUCO’s parent company] (...). Thus, it was a board with very scarce information (...) almost null [regarding] operational aspects (...). Now, there still are a lot of numbers, but also a chapter with broader explanations about these issues.”¹⁵⁰

As the board’s new president –appointed in January 2005 in response to the Valdivian crisis– Etchegaray became directly involved in the company’s operations, especially in relation to its environmental behavior. An interviewee, who has been in charge of implementing many of these changes inside ARAUCO, details his actions:

“Etchegaray arrived, and arrived giving orders. We had never seen a president of the board so involved in the company’s management. He began to make field visits. He went to every installation, and provoked changes (...). One was the environmental management itself (...). A second axis was the relation with society and communities.

¹⁴⁹ Interview conducted by the author for this research.

¹⁵⁰ Interview conducted by the author for this research.

To relate, to be more open. Third, to be open from the point of view of social media. And the relation with authorities was a final axis.”¹⁵¹

If before the disaster ARAUCO solved conflicts “with a call to La Moneda,” as the minister described, now it was willing to submit to the consequences of its unlawful behavior. This meant, in concrete terms, a new relation with authorities and public services in charge of the environmental framework. As one of ARAUCO’s high-ranking directors accounts, this relation changed radically: “The relation with mayors gained a lot of relevance, as well as the relation with (...) the Intendente (...). The way in which [public] services (...) were sometimes looked down upon [by ARAUCO]... That relation changed.”¹⁵²

Simultaneously, more intensive monitoring efforts began to be conducted by environmental agencies, which modified their own practices by applying –perhaps for the first time ever– a more preventive approach. ARAUCO had no other option than to respond. The same interviewee involved in implementing the company’s restructuring explains how the new behavior of public agencies affected ARAUCO:

“[When the disaster occurred] we were fully involved in building the Nueva Aldea pulp-mill¹⁵³ [adjacent to the Itata river], which was a huge investment, larger than the one in Valdivia. The way we had been managing Nueva Aldea changed because of what happened in Valdivia (...). A much more intense monitoring from the part of public agencies began (...). The building of Nueva Aldea was paralyzed (...). We had to prepare a new impact assessment study for a discharge to the ocean [replacing the original discharge to the river] (...). It was like a reaction from the public apparatus, in the sense of approaching Nueva Aldea in a more preventive way... to take every

¹⁵¹ Interview conducted by the author for this research.

¹⁵² Interview conducted by the author for this research.

¹⁵³ The Nueva Aldea pulp-mill is located 450 km north of Valdivia. Its construction faced a heated conflict only a few months after the Río Cruces disaster exploded, sparked by the fear that its operation could provoke effects similar to those occurring in Valdivia. ARAUCO was able to settle a working table with the fishers’ that opposed a pipeline into the Pacific Ocean demanded by authorities.

possible safeguard (...). The duct for Nueva Aldea had a cost of more than 100 million dollars. And it is entirely an investment for environmental safeguard.”¹⁵⁴

Simultaneously, due to the Valdivian disaster, ARAUCO underwent a revision and restructuring of its environmental and social practices: “The entire company reviewed all its procedures. It reviewed all its industrial operations, throughout Chile.¹⁵⁵ As two of ARAUCO’s managers describe, when the Río Cruces disaster occurred, its environmental policies were designed not to address the impacts of its operations, but rather, to comply formally –in the terms already described in this Chapter– with the Chilean law or, much more pressing, with the environmental standards demanded by international clients. Both were seen as external exigencies. Therefore, the country’s regulations were followed *without conviction*, as stated by one of ARAUCO’s oldest managers already quoted. To approach norms and standards in a form that would make them constitutive to ARAUCO’s way of “doing” the forest business demanded deep changes, as two of the company’s main executives describe:

- “[Before the disaster] there were units in charge of environmental topics, but they had been created and were functional, basically, according to the requirements of clients (...). [As well], the company had implemented the [ISO] 14001 standard (...) but it was a formal achievement (...). [It’s managers] didn’t see it as an opportunity to assure the continuity of operations, or even of reducing costs.”¹⁵⁶
- “Before [the disaster], each mill was in charge of complying with the norms. That was the logic (...). [After the disaster], it was like incorporating more environmental management, beyond just complying with the law.”¹⁵⁷

¹⁵⁴ Interview conducted by the author for this research.

¹⁵⁵ Interview conducted by the author for this research.

¹⁵⁶ Interview conducted by the author for this research.

¹⁵⁷ Interview conducted by the author for this research.

The restructuring of ARAUCO's environmental standards was expressed concretely in the creation of an environmental unit directed by the company's first ever environmental manager and consisting of specialized teams in topics such as biodiversity, hydrology and watersheds. While before the Valdivian crisis ARAUCO's environmental staff was limited, not specialized and had marginal influence, the new unit –which today employs approximately 80 professionals– gained increasing power. In fact, many operational decisions began to depend on their approval. The company also developed its own environmental standards. These went beyond those already in force (e.g., ISO 14001) and led to the technological improvement of its oldest operations:

- “The issue of the swans caused such an important effect that (...) we had to review the technologies that existed in the different mills (...) we said, ‘we have to standardize’ (...). The treatment systems that existed in Constitución, that basically were a thing that dumped to the beach, were converted into a formal system of subaquatic disposal.”¹⁵⁸
- “Valdivia had a decisive effect in all of ARAUCO's (...) mills (...) [the resulting investment] surpassed a total of 300 million dollars in processes, dryers, all the systems for the smells, and the liquid discharges (...). It was because of Valdivia that the cone for removing bad smells was installed in the Constitución mill, which existed since [it] was built [in the 1970s].”¹⁵⁹

In turn, the restructuring of ARAUCO's social practices was perhaps the deepest change ever in the company. A large, new unit devoted to public affairs and social responsibility was created. As mentioned, prior to the Río Cruces disaster, ARAUCO was completely detached from the surroundings in which its operations were located. A past member of the board explains it as follows:

¹⁵⁸ Interview conducted by the author for this research.

¹⁵⁹ Interview conducted by the author for this research.

“There was no history of relating with communities (...). [No] awareness of (...) the need for talking about the projects at early stages, of reaching agreements with the community (...). [That] culture that was not in the company’s DNA. That’s the truth! (...). [The philosophy was]: I work, I pay taxes, I produce for the country and, on top of that, I make donations.”¹⁶⁰

The unit of public affairs –currently comprised by 32 people– put specialized teams to work capable of establishing collaborative relations with communities and other actors and also of dealing with complex situations, from environmental conflicts to indigenous territorial demands and labor strikes (ARAUCO 2012). These teams oriented their tasks to enhancing the connections between the company and the territories where its operations occur. A good example of what these new practices have engendered is the way in which ARAUCO approached the process of applying to the Forest Stewardship Council (FSC) certification. After FSC’s rejection in 2009, the company decided to address the process in a different way. Instead of hiring a team of experts to conduct an assessment and define how the standards should be met, ARAUCO summoned the actors affected by its operations and involved them in defining how the company should comply with FSC’s requirements. One of ARAUCO’s main managers describes the process as follows:

“The traditional way would have been to say, ‘Ok, what do we have to comply with?’, and make a check list of the changes and ask, ‘Ok, did we comply? Yes. Are we ready? Yes. Ok. Done. Let’s get certified now’ (...). But we said, ‘No, we have to address this more openly (...) we have to ask others for their opinion, to involve NGOs, communities, workers’. This way of handling the process was longer –it took us three years– (...) but it had to do with becoming aware that, first, we don’t have all the knowledge. It may seem obvious, but for the company it wasn’t. Thus, we needed help from other actors to improve our projects, our processes (...). And second, (...)

¹⁶⁰ Interview conducted by the author for this research.

the stakeholders demanded being lead actors in solving problems (...). That is what we have learned.”¹⁶¹

Another example of these new practices is the research center established by ARAUCO for the monitoring of its Nueva Aldea mill, which was under assessment when the Valdivian disaster exploded. Public services demanded ARAUCO to add a duct –not previously considered– for disposing the liquid wastes of the new mill into the sea. The duct created a controversy around the impacts that could occur in the ocean. Four hundred questions were raised during the public involvement and many remained unanswered: What will happen to the fish larvae? Will the fish numbers be impacted? How much? The environmental permit granted to the new mill included the creation of a research program that could address these questions. Instead of a conventional design led exclusively by experts, ARAUCO summoned the stakeholders for the creation of a research center –the *Programa de Investigación Marina de Excelencia* (PIMEX) [Program of Excellence in Marine Research]– comprised by universities, researchers and the organizations of fishers that had opposed the duct.

Through PIMEX, ARAUCO learned that relying on comprehensive ecological information produced through a process accountable to the affected parties was critical to generating the credibility needed for stronger relations with stakeholders. This was in opposition to what ARAUCO had done in Valdivia, where, on the contrary, the company had promoted what I describe as the “production of ignorance.” One of ARAUCO’s managers who knows the PIMEX program well describes this experience as follows:

¹⁶¹ Interview conducted by the author for this research.

“We realized that studying the sea, all the area, well before the duct began to work, was a way of safeguarding and giving confidence to fishers and authorities (...) we not only apply the regular monitoring program that authorities ask for. We also apply a program of strategic research (...). Also for corporate defense.”¹⁶²

In sum, beginning in 2005, and as a direct consequence of the Valdivian disaster, ARAUCO advanced a series of changes in its structure and practices, reflected in new ways of relating with actors, managing conflicts, and dealing with scientific information. As detailed in the book *Abierta* [Open] (2011) by the sociologist Eugenio Tironi, one of the company’s closest advisors, such adjustments were the company’s response to what he defines as “the” main impact of the Rio Cruces disaster on ARAUCO: an epistemological fracture derived from the fact that the opinion of experts –such as the “commissioned” scientists hired by the company, whose role I analyze in Chapter 7– had lost the authoritative power to solve by themselves a controversy like the Valdivian one. In Tironi’s terms, the legitimacy of expert knowledge depended more than ever on the allies it was able to mobilize. Accordingly, Tironi (2011:21) proposed that ARAUCO put forward an “open” approach to deal with controversies. This meant bringing stakeholders into the deliberative process of “producing a knowledge that experts by themselves are unable to generate.”

This “open” approach –inspired in the “hybrid forums” described by Callon et al. (2009)– has been fully incorporated into ARAUCO’s practices. The company’s 2012 Social Management Plan [*Plan de Gestión Social*] explains (ARAUCO 2012:34) that “hybrid forums” are amongst its main tools for relating with local communities:

¹⁶² Interview conducted by the author for this research.

“(…) a method that consists in building solutions for key controversies by incorporating the knowledge of a diversity of people, from within and outside the organization, who hold different wisdom and experiences.”

These approaches and measures do not guarantee that ARAUCO’s operations have stopped generating significant impacts. As recent reports confirm, ARAUCO continues to confront strong criticism for the way it manages environmental and social impacts as well as for its relations with communities, workers, subcontractors and other actors (Universidad de Concepción 2009; Frene and Núñez 2010; Barbosa Lima-Toivanen 2010).

Moreover, during the first months of 2016, while I worked in the final revision of this dissertation, the Oversight Environmental Agency [*Superintendencia del Medio Ambiente, SMA*] charged ARAUCO with eleven unfulfillments in the operation of the Valdivia pulp-mill (SMA January 8, 2016; January 11, 2016). Based on the monitoring conducted since 2013 by different public agencies, the SMA determined that ARAUCO’s mill discharged untreated wastes into the river, also failing to report them on time to the corresponding authorities. Such misbehavior falls into the most severe type of offense within Chile’s environmental framework, being potentially punishable with the revocation of the mill’s environmental permit. The SMA has also suggested that such untreated wastes caused the massive death of fish occurred in the Río Cruces during the summer of 2014.¹⁶³

ARAUCO, in turn, has appealed attempting to demonstrate that during the past three years the company has complied with the most substantive aspects of the Valdivia mill’s environmental permit (ARAUCO February 12, 2016). Therefore, most of the unfulfillments identified by the SMA do not involve environmental misbehaviors but are rather the

¹⁶³ A similar event of massive death of fish was also reported in the Río Cruces in the summer of 2015, although no direct connection with the operation of the Valdivia mill has been officially provided so far.

consequence of superposed and contradictory resolutions by public agencies. ARAUCO has also affirmed that no untreated or unreported discharges coming from the Valdivia mill has reached the Río Cruces during the period under analysis and, therefore, the industry has no connection with the death of fish reported in the river (Lignum February 23, 2016).

These events are too recent for providing here any clearcut opinion. Nonetheless, they evidence that, on the one side, for ARAUCO the “old way” of doing the forest business will continue to inflect –directly or indirectly– its internal struggle for giving shape to environmentally and socially more responsible practices. On the other side, they also reveal that public agencies in charge of the country’s new environmental law still need to adjust their abilities to increasingly complex decisions, which demands flexibility, ability for dialogue and ecosystemic approaches, all capacities that are not always available amongst Chilean public servants.

Regardless of these tensions the changes already implemented by ARAUCO –and described along this chapter– constitute a significant transformation of the previously dominant business model that the company had embodied until 2004, and which had remained basically untouched for around three decades. Therefore, if in 2004 ARAUCO was considered to be the most backward and old-fashioned of the forest companies existing in Chile, in 2015 at least some knowledgeable local experts notably consider it as one of the country’s leading firms in terms of its environmental and social standards.¹⁶⁴

In Valdivia, despite the operational adjustments made to its mill, ARAUCO persisted for years in doing things in the “old way.” Entrenched in its insistence on denying any

¹⁶⁴ Interview conducted by the author for this research.

responsibility, the company arrogantly defended itself by feeding the scientific controversy about the disaster's causes through several "commissioned" studies, such as the ones discussed in Chapter 7, causing severe harm in the already damaged reputation of scientists. ARAUCO also insisted in building a pipeline to Mehuín, as then-president Lagos proposed, with disastrous effects on the local community, as Chapter 5 describes. Finally, ARAUCO continued to menace with lawsuits those who dared to insist on blaming the company for its connection to the death of the Valdivian swans, as described in Chapter 9.¹⁶⁵

It would not be until the local ruling which, in July 2013, called for ARAUCO to repair the wetland, that the company began to show a consistent willingness to change its historically dominant practices in Valdivia as well. In an unprecedented change of its legal strategy, ARAUCO accepted the ruling, abstained from appealing and assumed the responsibility determined by the court. Nine years had passed for this act of reparation, demanded largely by citizens, to occur. A new scenario resulted. The company and the affected parties began to work together on the design of the measures ordered by the Valdivian court. After a traumatic disaster that unveiled and exposed to open criticism the dominant business practices that ARAUCO embodied for so long, the company's mode of performing the forest business in Valdivia finally began to make room for the worlds inclined in favor of the swans, as one of *El Mercurio*'s columnists had put it a decade earlier:

“(...) in the twenty-first century the public opinion of Chileans, and perhaps of many of [ARAUCO's] minority shareholders, is *inclined in favor of the swans* and their necks straight up (...). Chile's largest private company must adapt itself to this new context” (Montes, May 15, 2005).

¹⁶⁵ Interview conducted by the author for this research.

Chapter 7: Exploring the Performative Effects of “Commissioned” Knowledges

“We had to move in an ocean of uncertainty” (past national environmental authority, interviewed for this research).

7.1 Hiring Experts

On April 18, 2005, the Chancellor of the *Universidad Austral de Chile* (UACH) handed the *Comisión Nacional del Medio Ambiente* (CONAMA) [National Environmental Commission] the report with the final conclusions of the study launched six months earlier to determine the causes behind the death and decline of the Valdivian swans. Having identified in two preliminary reports that the swans were dying for lack of their main food source, the *luchecillo* (UACH 2004), and that the disappearance of this aquatic plant was linked to the presence of heavy metals in the wetland (UACH 2005a), UACH’s (2005b:2) final conclusions left no room for ambiguities: “based on all the analyzed data, it is concluded that the activities of CELCO’s [ARAUCO’s] Valdivia Mill have significantly impacted the environmental changes in the Río Cruces wetland during the past year.” The report (UACH 2005b:434) specified that “the concentration of chemicals” discharged by ARAUCO was “sufficient to explain the flocculation¹⁶⁶ and deposit of heavy metals” in the ecosystem, adding that the traces of such compounds were “registered in the sanctuary’s sediments with a dating that approximately corresponds to the autumn of 2004.”

Critical for its legal implications, UACH’s final report also found that ARAUCO had been discharging great volumes of unauthorized and unassessed compounds –in particular, aluminum, manganese, chlorides and sulphates– and that some of these elements were consistently found in the organs of swans, the tissue of the *luchecillo*, and the wetland’s waters and sediments. Furthermore, the report determined that the presence of such

¹⁶⁶ The process of formation of small clumps or masses comprised by the compounds discharged by the mill that result from the use of chemicals (flocculants) in the tertiary treatment.

chemicals in the ecosystem was linked to the explanatory mechanism or “key” to the sanctuary’s collapse, summarized as follows (COREMA June 6, 2005):

“(…) the iron-aluminum interaction [is] the clue to what has occurred in the (…) sanctuary, having been recognized in the discharge of the ‘Valdivia’ mill a form of active or flocculant aluminum $-Al(H_2O)_3^{+3}$ that would be the key to the phenomena.”

UACH’s conclusions were received with joy and relief by the Valdivian movement, generating expectations about the response that would now come from environmental authorities. Citizens were hoping that, finally, ARAUCO’s responsibilities would be determined, the pulp-mill’s compatibility with the ecosystem would be reassessed, and measures to recover the wetland and prevent health risks would be implemented. These expectations were reinforced by the ruling of the Valdivian Court of Appeals that, on April 18, 2005, ratified the Appeal of Protection presented by citizens, ordering the mill’s detention until a new assessment of its unauthorized changes was concluded.

However, to the surprise and dismay of many, the authoritative power of UACH’s conclusions was severely eroded by criticisms from other scientists, other courts and the government itself. A first criticism came through a document with devastating comments to UACH’s report published by the prestigious –English named– *Center for Advanced Studies in Ecology and Biodiversity* (CASEB) from the *Universidad Católica de Chile* [Catholic University of Chile] (CASEB 2005). CASEB’s comments were prepared in response to a collaboration agreement signed by the said university with ARAUCO (Pontificia Universidad Católica de Chile 2005). The agreement’s scope was not broad –as could be expected from an alliance of two large organizations– but focused on a specific project to be conducted by CASEB: “Integrated study of the black necked swan in the Río Cruces

wetland: ecological and biodiversity context” (Pontificia Universidad Católica de Chile 2005). After stating that “ARAUCO has as one of its priority objectives (...) the protection of the environment (...) of the geographic areas under the influence of its industrial operations,” the agreement stated that its objective was to establish “a research program focused on understanding the possible causes” of the decline of the Río Cruces’ swans and to “review alternative hypotheses” in order to “build scientific support for enabling verified opinions with respect to reports prepared by third parties” (Pontificia Universidad Católica de Chile 2005, emphasis added).

It was in compliance with this agreement, and before they had generated any new data about the Río Cruces wetland, that CASEB’s scientists published their critiques of UACH’s report. In doing so, as Javiera Barandarian (2013) notes, they violated scientific codes by publishing criticisms of an academic work outside peer-review mechanisms and lacking any additional evidence. This agreement not only made visible the ways in which Chilean scientists were willing to collaborate with private corporations. It also evidenced the consequences that the authoritative power of prestigious scientists can entail within ongoing controversies. Why did CASEB’s scientists agree to work for ARAUCO? As Barandarian (2013) argues, the answer does not lie in a simple narrative of a science captured by corporate interests but points rather to the context within which Chilean scientists conduct their work.

In this chapter, I review the practices that, shaped by such material conditions, have become dominant amongst Chilean scientists and that I here call “commissioned science.” This term describes a science oriented to producing knowledge in the service of the needs of private corporations that pay for it in the context of potentially controversial decisions,

such as the environmental approval of an investment or the study of an ecological disaster. The practices that characterize this “commissioned science” are different from those involved in producing knowledge through competitive funds. The differences include the absence of peer-review mechanisms, as already mentioned. Additionally, as will be explored in this chapter, this “commissioned science” may also tolerate the intervention or censoring of scientific reports by funding entities.

The focus of this chapter is the ontologically generative effects of the scientific descriptions produced by commissioned studies within the context of environmental decision-making. I describe how, by performing the Río Cruces as an unknown but already polluted ecosystem, such technocratic descriptions have been consequential for this ecosystem’s disprotection. In describing the wetland as such, these descriptions reinforced what by the mid 2000s were ARAUCO’s dominant environmental practices –which I detail in Chapter 6– focused, precisely, on impeding or downplaying accurate descriptions of the ecosystem while emphasizing that it was “already receding.” Thus, I show that this dominant technocratic knowledges produced by well-reputed and “commissioned” scientists did not necessarily contribute to a more robust decision-making process oriented to the sanctuary’s protection. Rather, they fed scientific uncertainty and the “production of ignorance,” inflecting the performance of the country’s environmental frame in favor of ARAUCO’s interests.

7.2 CASEB’s Commentary: A Consequential Intervention

CASEB’s comments on UACH’s report had immediate effects, generating the scepticism of authorities with regard to the disaster’s causes proposed by the UACH team. They also helped to “build the scientific support” –as the agreement called it– that ARAUCO needed to continue rejecting what the company considered “unfounded” accusations.

In order to do so, CASEB's scientists claimed that what a case like the Río Cruces disaster demanded was not complex explanations such as those proposed by the UACH team. Rather, a rigorous study within the field of ecology should begin by providing "parsimonious" explanations. That is, simple or "mechanistic" hypotheses based on "strictly natural" causes. Only when such parsimonious hypotheses proved to be false could other factors –including the mill's discharges– could be incorporated into new explanations.

Through this claim, CASEB questioned the scientific rigor of UACH's report. This did not demand a great effort. The institute had renown reputation as a world-class center in ecological sciences. Created in 2002 with the support of the National Commission of Scientific and Technological Research (CONICYT)¹⁶⁷, CASEB was one of the country's first "research centers of excellence." By 2012, it employed 120 active researchers, at least 12 of whom were involved in studies related to the Valdivian sanctuary (Asesorías para el Desarrollo 2009; Jaksic June 9, 2009). Its solid reputation was built on the lifelong trajectories of its senior researchers and in particular of its director, the ecologist Dr. Fabián Jaksic, who by 2004 was also President of the *Sociedad Chilena de Biología* [Chilean Biological Society]. In sum, CASEB's opinions were influential in Chile and beyond.

CASEB's critiques of UACH's report were extensive and detailed. They pointed to methodological deficiencies in sampling and experimental designs, incorrect statistical analyses and inappropriate interpretation of data. Based on these weaknesses, CASEB's document determined that of UACH's 37 conclusions, nine were correct, 13 were incorrect and 15 were dubious, that is, lacking sufficient empirical support (CASEB 2005). A

¹⁶⁷ Through CONICYT's Fund for Research Centers in Priority Areas, CASEB received US\$ 6,000,000 per year for a decade until 2012.

particular set of critiques were of special importance: those pointing to the weak description of the mechanisms involved in the disappearance of more than 2,000 ha of lucheillo, which UACH's report linked to the discharges of ARAUCO's mill, particularly iron.

CASEB's document asserted that UACH's report failed to explain, first, the origin of the iron found in the environment, second, the iron's solubility (or bioavailability), and third, the mechanisms that connected the iron with the massive death of the lucheillo. While some of UACH's conclusions proposed that the lucheillo was intoxicated after absorbing iron, other conclusions stated that the lucheillo was not able to undergo photosynthesis due to a colloidal film –mostly comprised by iron– deposited over its leaves. These explanations are not necessarily contradictory. However, CASEB's scientists questioned the lack of consistency that each of them had with the evidence provided by UACH's team.

In particular, CASEB's document questioned the evidence about the origin of the iron found in the wetland. Through its self-monitoring program, ARAUCO measured on average five kilograms per day of iron in the mill's effluent. After comparing the iron in the river, upstream and downstream the mill, UACH's scientists measured a load of 295 kg/day of the metal. This meant that there were 290 kg/day whose origin had to be explained. For CASEB (2005:15), “rather than thinking that ARAUCO is responsible for all the load, possible sources that discharge such quantities of the metal should be searched for.”

That is exactly what UACH's team had done, although CASEB's scientists did not attend to this aspect of the work conducted by their Valdivian colleagues. Looking for alternative sources of iron UACH's team concluded that besides the pulp-mill, no other industrial discharges existed in the section of the river where the increase of the metal was measured.

Nonetheless, UACH's report did not attribute the iron directly to ARAUCO's factory, stating rather that such origin remained "an open question" [*una incógnita*] (UACH 2005b:433). Attempting an answer, UACH's team came out with what they called the "key," or explanatory, mechanism of the disaster (UACH 2005c). This mechanism pointed to the potential interactions between the iron that was already present in the ecosystem in a non-soluble state and other chemicals dumped by the mill that could be making it bioavailable.

This explanatory "key" was articulated by UACH's scientists in the following "industrial hypothesis" (UACH 2005c: 32, 77-78): ARAUCO had been using excessive amounts of the flocculant aluminum sulphate used in the mill's tertiary treatment. The reasons could range from overproduction to an inappropriate industrial design or mere mismanagement. Given the impossibility of the mill for "retaining" the entirety of such over-applied chemicals, a portion of them –containing an active or flocculant aluminum– had been reaching the river. Once in the ecosystem, this active aluminum interacted with the iron of the environment, making it soluble and, thus, bioavailable –that is, ready to be adsorbed by the *luchecillo*. In this manner, the iron also entered into the trophic chain of swans and other herbivores.

To support its "industrial hypothesis," UACH's team demonstrated that ARAUCO's mill had been exceeding the quantity of flocculants authorized in its environmental permit by 49.6% to 166.25% (UACH 2005c:32-33). Furthermore, they demonstrated that the authorized flocculant –alumina– had been replaced by aluminum sulphate. According to Boris Didyk (2011), this new compound is a more active form of flocculant, one capable of generating the type of effects observed in the wetland. Moreover, since aluminum and iron

are able to alter the roots of plants, they also could have contributed to the abnormal proportion of roots observed in the *luchecillo*¹⁶⁸ (Didyk 2011).

CASEB's document (CASEB 2005:3, emphasis added) concluded that, while agreeing that "the mortality and migration of black-necked swans was due to the disappearance of their food resource," UACH's explanations pointing to compounds discharged by ARAUCO's mill as "the main cause, direct and unequivocal" of the disappearance of the *luchecillo* were "*scientifically questionable with the information currently available.*" Thus, CASEB's experts directly questioned the disaster's "key" or causal mechanism proposed by UACH's scientists. The scientific authority of UACH's work was this way seriously challenged.

CASEB's critiques had huge consequences. To begin with, they served to "build scientific support" for another "expert" pronouncement that not only reinforced the questioning of UACH's conclusions, but was decisive in enabling the continuity of the mill's operation.

On May 30, 2005, the Supreme Court revoked a local ruling that had ordered the assessment of unauthorized discharges by ARAUCO's mill along with its detention until such an assessment was conducted (Corte Suprema de Chile 2005). To support this revocation, the Supreme Court questioned the conclusions of UACH's report. The judges centered their arguments on the same claim of CASEB's scientists: that ARAUCO's mill was not responsible of the 295 kg/day of iron measured in the Río Cruces by UACH's scientists, but only for the 5 kg/day reported by the company in its effluent.

¹⁶⁸ Didyk (2011) has also recently argued that the balances of iron prepared by ARAUCO were misleading since they only measured the diluted state of the metal without considering the portion absorbed as particles in the mill's final discharges. Didyk also identified other sources of iron –so far unassessed– coming directly from the Valdivia mill's operations, such as the chemical cleaning of its machinery. Between 2004 and 2005, at least 182 chemical cleanings were done, and the wastes were dumped directly into the river (Didyk 2011).

To prove their point, the Supreme judges made an additional claim: the water of the Río Cruces being used by the mill contained higher levels of iron than that being discharged into the river. Therefore, they argued, the mill was “cleaning” the river of pollutants: “there is no sort of proof that the Río Cruces (...) has been polluted by Celulosa Arauco S.A. (...) or that a threat of pollution may exist,” the Supreme Court concluded (Corte Suprema de Chile 2005:n.p). As described in Chapter 6, the judges based this second argument in a report wrongly attributed to the *Universidad de Concepción*, which had in fact been prepared by ARAUCO. The episode provoked a great scandal that resulted in the definitive public exposure of ARAUCO’s practices. Despite their mistake, the judges maintained the substance of their ruling. Until today the mill’s illegal discharges have never been assessed.

7.3 The Performative Power of Scientific Descriptions

CASEB’s critique of UACH’s work brought about further and even more erosive consequences. By defining what should or should not be considered valid scientific knowledge, CASEB’s comments enforced or dismissed alternative descriptions of the Río Cruces wetland and its ongoing collapse, with vast performative effects. In their comments on UACH’s report, CASEB’s scientists defined “the” scientific method as a hypothetico-deductive approach through which

“the rejection of a hypothesis has more force than its acceptance. This is because, even when a certain hypothesis may be accepted, it does not eliminate the validity of other alternative hypotheses that have not yet been tested and that account for the same phenomena without invoking more complex factors (the so called criteria of parsimony)” (CASEB 2005:3).

The criteria of parsimony was further explained as follows by Jaksic (June 5th 2009, Folder 64:579) during the trial pursued by the State Defense Council against ARAUCO: “The

scientific method uses the proposition of hypotheses that compete amongst themselves in explaining the phenomena under observation using the least possible number of assumptions while accounting for the major part of the said phenomena.” Therefore, Jaksic added (June 5th 2009, Folder 64:579, emphasis added), “in environmental sciences *an hypothesis of natural change is always considered more parsimonious than an hypothesis of changes induced by man and his economic activities.*”

According to this notion of science, CASEB’s experts argued that, first, the connection between the presence of iron and the mill’s effluents, and, second, the causal relation between such discharges and the ecological changes observed in the wetland, as proposed by UACH’s team, were spurious rather than parsimonious explanations. In order to submit them to the scientific method –as defined by CASEB– several assumptions still had to be tested, beginning with the flocculant properties of aluminum and sulphates, which “are not part of scientific knowledge,” as Jaksic (June 9, 2009, Folder 69:597) argued in the trial.

Moreover, according to CASEB’s scientists, in order to be seriously considered, UACH’s explanations had to be founded on observable evidence about a relation between the discharges of chemicals from ARAUCO’s mill and the changes in the wetland. In CASEB’s view, such observable evidence was missing. For example, if toxic discharges from ARAUCO’s factory had really happened, Jaksic explained during the trial against ARAUCO (June 5, 2009, Folder 64:574), “a massive mortality of animals and plants” and especially of fish should have already been observed in the wetland. Such events would in fact occur more than once in the coming years.¹⁶⁹

¹⁶⁹ In January 2014 and January 2015, a massive death of fish occurred in the Río Cruces downstream of

In sum, then, in the view of CASEB’s scientists, until the most parsimonious, that is, “mechanistic” hypothesis of the Río Cruces disaster was dismissed –one involving “natural” rather than anthropogenic causes– there was no reason for seriously considering UACH’s “industrial hypothesis.” This was further supported, as Jaksic argued (June 5, 2009, Folder 64: 579), because “when a hypothesis is only expressed in reports (...) it is impossible for scientists to assess it (...) [and] the iron hypothesis has never been published. That is why it has not yet been refuted.” In sum, based on this notion of science, for CASEB’s experts (2005:3, emphasis added) UACH’s explanations were only “*reasonable working hypotheses that deserve to be tested through data still to be obtained, rather than definitive conclusions.*”¹⁷⁰

CASEB’s team was right in that UACH’s report did not apply the hypothetico-deductive logic systematically. In fact, it was contradictory. It included evidence pointing to competing explanations, and explained the disaster through mechanisms that –as CASEB’s experts argued– had never been observed in the wetland or in a laboratory, and for which no model had been tested either.

UACH’s final report was built on 13 different studies designed for addressing 7 major research problems such as the death of swans and the lucheillo; the changes in the wetland’s water, sediments, and organisms; the polluting sources discharging to the Río Cruces; and the relation of these factors to the damages that occurred. Each of the 13 studies applied different disciplinary methods with unavoidable inconsistencies between

ARAUCO’s mill. By the time this dissertation was finalized, in January of 2016, the Oversight Environmental Agency [*Superintendencia del Medio Ambiente, SMA*] charges ARAUCO with untreated and toxic discharges of its Valdivia pulp-mill assumed to be causally connected with such massive death of fish in the Río Cruces.

¹⁷⁰ Notably, in their report, UACH’s scientists declared to have used the same hypothetico-deductive method that CASEB’s scientists described as the only type capable of producing valid knowledge. This type of knowledge, therefore, was revealed by the disaster as dominant amongst the Chilean community of ecologists.

them. And each also formulated one or more hypotheses. While some hypotheses were submitted to a relatively strict falsification a majority were crafted through a less structured and messier approach, closer to the trial and error logic described as typical of the “fabrication” of scientific facts (Latour and Woolgar 1986).

Indeed, 4 of the 7 major problems studied were “tested” through a unique hypothesis instead of submitted to a systematic falsification. In all the cases, such unique hypotheses were accepted with no further counter-tests. What this suggests is that, contrary to what UACH’s team described, rather than a strict hypothetico-deductive approach the method applied by these scientists was primarily inductive. This was acknowledged by one of the scientists involved in the study:

“If I find a trace of pollutants, of heavy metals in the sediments, that fact does not require a statistical explanation. There is a salient disturbance that left a mark that will remain forever in the sediments (...) a peak of pollution by trace metals (...). Then, in terms of cause-effect there was nothing else. It was not the sewers of nearby cities, it was not agricultural wastes (...) there was no space for doubt.”¹⁷¹

An inductive approach like this is not necessarily inferior. As M.T. Mentis (1988:8) has argued, an inductive method can provide coherent and robust explanations for complex and unique events based on otherwise non replicable or fragmented evidence that cannot be easily analyzed through a hypothetico-deductive approach:

“[F]or large-scale systems (lakes, catchments, drifting continents, etc.) it is impracticable or impossible to replicate (...). Upstream and downstream of the input of a pollutant into a river might differ in ways other than pollution (...). If true replication is not or cannot be practiced then inferential statistics are not valid. Consequently numerous situations arise in ecology where there is a bundle of

¹⁷¹ Interview conducted by the author for this research.

inseparable correlates and the attempt to unravel cause and effect is hindered by inherently poor falsifiability.”

Moreover, Mentis (1988) adds, an inductive approach is recommendable in the case of incomplete ecological knowledge, when a deductive method may be inappropriate to capture still unknown relations and interacting properties. Furthermore, he argues that the criteria of falsifiability that is proper to a hypothetico-deductive approach may be inadequate when there is a poor theoretical understanding that impedes the building of a scale model of an ecosystem, “particularly with respect to so-called emergent properties.” Therefore, “[E]ven if the hypothetico-deductive approach is preferred, the state of current knowledge might be insufficient for postulating non-trivial hypotheses” (Mentis 1988:10). Even more critical to the insistence on deduction in the face of poorly known events, Edward Rykiel (1996:239) has stated that “[S]ingle-minded focus on falsification is a superficial treatment of a complex subject,” adding that “prematurely imposing rigorous testing requirements can result in rejection of correct or at least useful theories.”

It is precisely for this reason that many ecologists consider inductive logic as appropriate for addressing problems of the scale and complexity of the Valdivian disaster. For example, Eduardo Fuentes (2005) –one of Chile’s most well-reputed ecologists– argued that the deductive approach demanded by CASEB’s team was not possible in the case of the Río Cruces disaster. In order to apply it, Fuentes (2005) stated,

“we would have needed to make an experiment at a level that was commensurable with the phenomena (...). What does that mean in practice? That we would have had to (...) reconstruct the sanctuary, place a pulp-mill and demonstrate that for ten times unequivocally the emission of liquid wastes (...) produced as an effect the

disappearance of the lucheillo. This is unfeasible. This cannot be done. There is no chance of advancing in this direction.”¹⁷²

Rather than judging whether a deductive or an inductive method is in itself superior, or even determining which one was more appropriate for analyzing the existing evidence in the case of the Río Cruces disaster, here I want to point to the scientific workings involved in performing the wetland as an unknown ecosystem and their generative effects.

The lack of an appropriate baseline for the wetland, performed through ARAUCO’s insistence on downplaying the need for the rigorous monitoring of the ecosystem, as Chapter 6 describes, made it difficult to model or replicate its state through a deductive rationale. Therefore, the impossibility of applying a “rigorous” deductive approach, such as that demanded by CASEB’s scientists, to the explanation of the Río Cruces disaster was not a “spurious” event. Rather, it was the result of continuous efforts made for more than a decade by the company, with the complicit support of environmental agencies, to conceal or impede a more robust understanding of the wetland. The overall effect of these practices –constitutive of the company’s way of performing the forest business, as Chapter 6 describes– was to perform the Río Cruces Sanctuary as a poorly known ecosystem. Therefore, if UACH’s team lacked of a more robust understanding of the ecosystem, it was mainly due to the previous investments made by the production of technocratic knowledge related to the assessment and monitoring of ARAUCO’s mill.

¹⁷² Intervention in the panel “La ciencia del Santuario y el Santuario de la ciencia,” held on November 16, 2005 in the San Francisco Convent, in Valdivia, within the Citizen Convention “Agua, Ciudadanía y territorio: ideando nuevas regiones sin contaminación,” which was organized by Action for the Swans on November 14-19, 2005, Valdivia.

7.4 The Workings of Scientific Uncertainty

CASEB's questioning of UACH's report had additional consequences. It provoked deep hesitations amongst those in charge of making key decisions about the future of the mill. As described in Chapter 6, based on the extensive list of unlawful behaviors in which the Valdivia mill was involved, environmental authorities came to be convinced of ARAUCO's responsibility. However, since they lacked legal tools for ordering the mill's detention, these authorities expected that UACH's report could provide an irrefutable demonstration of the causal links between the mill's discharges and the disaster.

Indeed, the government's strategy for dealing with the disaster had entirely relied on the conclusions to be provided by UACH's scientists. In fact, the hiring of the Valdivian university constituted the fundamental action taken by authorities thus far. By turning UACH's report into an inconclusive document, the critiques made by CASEB's influential and well-reputed ecologists were overpowering and paralyzing. This was particularly true for those authorities that had to recommend to then president Lagos the definitive course of action for ARAUCO's mill that he had demanded, as Chapter 6 describes. As a past national authority, who played a key role in the disaster, describes:

“It was awful. Awful! (...). Because we had bet so much on it [UACH's study] (...). In the face of an episode like [the disaster] one wants to be populist, and say ‘No! (...) to the company’ (...). That was not our role! (...) We had to understand the situation and take the measures that were consistent with it, with the accumulated knowledge... We lacked it! Although you may not believe it, we lacked it!”¹⁷³

¹⁷³ Interview conducted by the author for this research.

Unable to deal with limited scientific answers, authorities gave up on a satisfactory understanding of what had happened in the wetland. Instead, they managed to make decisions in the midst of broad uncertainty: “we had to move in an ocean of uncertainty”.¹⁷⁴

On June 6, 2005, a month and a half after receiving UACH’s final report, COREMA (June 6, 2005) announced its definitive resolution: the Valdivia pulp-mill could continue operating, although subject to additional conditions.¹⁷⁵ Although these measures made the mill’s environmental permit more burdensome, they expressed the uncertainties and tensions affecting the scientific reassurances needed to sustain COREMA’s resolution. On one hand, COREMA (June 6’ 2005:2) backed UACH’s conclusions by acknowledging that ARAUCO’s mill was directly linked to the changes in the wetland:

“(…) it has been established that the operation of the ‘Valdivia’ mill has had a significant impact in the environmental changes to the Río Cruces wetland (…) which resulted in a process articulated in the conclusions (…) of the report “Study of the origin of mortalities and population decrease of aquatic birds in the Carlos Anwandter Natural Sanctuary, in the Province of Valdivia.”

However, at the same time –although it was not an official report– COREMA quoted CASEB’s document as one of the sources considered in its decision. This ambiguous treatment of UACH’s study –enough to accept the mill’s connection to the disaster but insufficient as a foundation for more drastic measures– resulted in an inconsistent resolution: while ARAUCO was required to find an alternative location for its liquid wastes,

¹⁷⁴ Interview conducted by the author for this research.

¹⁷⁵ These conditions included a temporary reduction of the mill’s authorized level of production by 20% and the regulation of various compounds in its liquid wastes that had not been declared, and for which, therefore, the mill lacked the corresponding environmental assessment and permit. More substantially, COREMA ordered ARAUCO to find an alternative point of discharge for the liquid wastes of its Valdivia pulp-mill, one different from the Río Cruces. The company was also required to improve the balance and control of the mill’s chemical inputs, to conduct a study to determine the origin of the high amount of sulphates found in the river by UACH’s study and to finance a public program for the integrated management of the wetland (COREMA June 6, 2005).

environmentally unassessed and legally unauthorized discharges, such as aluminum and sulphates, were administratively “normalized.” That is, granted an administrative permit to be discharged even while being causally linked to the disaster according to UACH’s report (Sepúlveda and Bettati 2005). As a result, the program for the wetland’s protection that COREMA also ordered –and that ARAUCO had to finance– lost any sense of purpose. How could the wetland be protected if the compounds linked to its collapse continued to be dumped into the Río Cruces? These contradictions reflected the depth of the uncertainties resulting from the controversy between UACH’s report and CASEB’s comments.

In fact, despite their conviction about ARAUCO’s responsibility, authorities ended up agreeing with CASEB’s team in that UACH’s conclusions were, for the most part, “only” good hypotheses. As a past national environmental authority bluntly put it, “clearly, that report did not sustain itself (...) we could not conclude that there was guilt on the part of CELCO [ARAUCO].”¹⁷⁶ Another past authority, who was key in deciding the mill’s future and convinced of its responsibility, affirms, “I was unsatisfied with the study (...) it had errors of a magnitude that to this day I cannot explain how nobody has accounted for.”¹⁷⁷

The confusion shown by environmental authorities in the face of UACH’s conclusions also reflects their lack of understanding about what they could (or could not) expect from the scientific study they had commissioned and upon which the government had centered its response to the disaster. For example, the type of evidence that authorities needed in order to legally back any drastic measure regarding ARAUCO’s mill –such as a definitive closure– remained undefined. Not only had authorities naively expected scientists to have

¹⁷⁶ Interview conducted by the author for this research.

¹⁷⁷ Interview conducted by the author for this research.

the capacity to provide them with an irrefutable explanation, as a national authority explains: “the most regrettable point of all was that the scientific world never helped us to find a way out.”¹⁷⁸ More surprisingly, to this day these authorities attribute the incapacity to reach such an explanation to the limitations of scientists rather than to the nature of scientific knowledge: “it speaks about the precariousness of our own knowledge.”¹⁷⁹

As Barandarian (2013) notes, this restricted level of understanding that environmental authorities had of the production of scientific knowledge is characteristic of Chilean “civic epistemologies.” This term was developed by Sheila Jasanoff (2005) to describe the particular “ways of knowing” through which different societies make decisions involving science. These “ways of knowing” –and of ignoring– take form through institutionally embedded modes of producing and dealing with scientific facts.

In Chile, such “ways of knowing” rely on ad-hoc bodies of experts, generally focused on narrow or predefined topics, instead of more regular, open and accountable spaces where large problems are publicly debated in line with the available scientific evidence and the methods involved in its production (Barandarian 2013). Lacking such permanent spaces where scientists can take part in public deliberations along with other actors, Chilean civic epistemologies are characterized by high levels of scientific seclusion (Callon et al. 2009). This term refers to the isolation of scientists and their work from more open deliberative spaces and decision-making processes. As the episode surrounding UACH’s report reveals, this seclusion can result in misunderstanding amongst authorities regarding what can or

¹⁷⁸ Interview conducted by the author for this research.

¹⁷⁹ Interview conducted by the author for this research.

cannot be expected from a scientific report, as well as their incapacity to publicly deal with the consequences of officially commissioned studies.

In spite of the dissatisfaction of environmental authorities with UACH's conclusions, in April 2005 the National Director of CONAMA handed the scientific report to the State Defense Council [*Consejo de Defensa del Estado*]. After pondering the evidence provided, the council decided to pursue a lawsuit for environmental damage against ARAUCO. After a trial that lasted more than eight years, on July 27, 2013 the First Civil Court of Valdivia finally concluded that ARAUCO was responsible for causing the "abrupt" ecological collapse of the Río Cruces wetland (Primer Juzgado Civil de Valdivia 2013). The court based its decision on a significant amount of new evidence that largely exceeded the findings of UACH's 2005 study. Interestingly, the ruling did not apply the deductive logic that CASEB argued was the only appropriate means to reaching an irrefutable conclusion. Rather, the court's reasoning was inductive. Emphasizing the long list of unlawful behaviors committed by ARAUCO, the Valdivian court determined that the company was "deemed" responsible for the abrupt changes occurred in the wetland.

In sum, in the face of what they considered to be insufficient scientific evidence, Chile's environmental authorities did not opt to better understand what had happened in the sanctuary in order to solve the disaster. Rather, they decided to *administer the ongoing damage* by reducing –to the degree that was feasible without further proof of causality– the discharges they *believed* to have provoked it, while also partially improving their monitoring. Therefore, many of the resulting decisions –in particular, the mill's continued functioning– were full of contradictions and ineffective to ensure the wetland's recovery.

Consistent with Chile's "civic epistemologies," CONAMA's opinion about UACH's study was never made public. Such silence had consequences. Most importantly, it made room for at least three major counter-studies financed by ARAUCO, each one raising alternative explanations about the sanctuary's collapse (see Lagos et al. 2008; Ramírez et al. 2006; Reinhardt, Nairn and López 2010).

Besides a study commissioned to CASEB –which I will soon cover– the second most notable of these counter-studies was that prepared by the botanist Carlos Ramírez. Ramírez had been part of UACH's team. Regarding the death of the *luchecillo*, he had originally concluded that the heavy metals coming from ARAUCO's mill had caused the massive die-off of this aquatic plant (UACH 2005a; 2005b). Now, hired directly by the company, Ramírez challenged the explanation that he himself had developed by proposing that the *luchecillo* had died as a result of an increase in ultra violet radiation (Ramírez et al. 2006). Notably, this counter-study was backed by past president Eduardo Frei –who pressured for the mill's approval in the mid 1990s– in his new role as Valdivia's senator.¹⁸⁰ In 2006 Frei accompanied Ramírez to present his "exculpatory theory" at the Chilean Congress. As with UACH's report, the opinion of environmental authorities on these counter-studies was never known, giving them the power to be considered as qualified knowledge.

The result was a confusing war of hypotheses and mutually contradicting evidence. This war was broadcast and expanded through hundreds of interviews, reports and letters

¹⁸⁰ In March of 2000, Frei Ruiz-Tagle left the presidency with only 28% of support according to the CEP (*Centro de Estudios Públicos* [Center for Public Studies]) survey, the lowest for any administration of the *Concertación* coalition of parties (1990-2010). A year later, on March 21, 2001, he was appointed by then President Lagos as a "for life" senator, a position created by Pinochet and later eliminated. In this case, Frei was appointed as Senator for Valdivia. In 2005, Frei competed for the same position and, this time, he was elected. Facing a severe drop in electoral preference amongst Valdivians, on 2013 he announced his retirement from politics.

published by newspapers and TV stations in which scientists defended the most diverse hypotheses and attacked competing ideas. As Barandarian (2013:133) asserts, more than a case of scientific “co-production” (*sensu* Jasanoff 2004), the Valdivian controversy turned into a dramatic demonstration of scientific “co-destruction.” Instead of helping to clarify the disaster’s causes, this heated debate revealed the controversial workings involved in the production of consequential knowledge by “commissioned” ecologists working for private corporations. Such exposure included the attention of the public being drawn to things such as the origin and amount of resources involved in each research, the objectives commissioned by the parties in conflict, and the influence that scientific reports had on decision-making processes and legal rulings. The “scandal” involving the Supreme Court illustrates well what this exposure revealed. The mistrust that citizens showed from the onset toward the work of scientists –as Chapter 8 describes– did nothing but increase.

Within this context, and despite its influence on the government’s decisions, CASEB’s document was also criticized. Interviewed during the Annual Meeting of the Chilean Biological Society, held in October 2005, Jaksic acknowledged (El Mercurio October 18, 2005) that the work prepared for ARAUCO had been “the kiss of death,” pointing to the high costs that such collaboration had imposed on CASEB’s reputation. These critiques of CASEB’s role also affected ARAUCO. As Alejandro Pérez –ARAUCO’s CEO until 2005– describes, for him they constituted the breaking point that made evident the depth of the fracture the disaster had inflicted on the company. When asked in what moment he felt the issue was getting out of control, Pérez answered:

“Precisely when UC’s [Catholic University’s] report was handed over and it was very badly received. We were accused of turning Chilean universities into enemies, we

were told that it did not have any validity because we had paid for it. Then I realized (...) that a verdict already existed. And the verdict of authorities, of the media and of citizenry was of guilt [of ARAUCO]” (Revista Qué Pasa 2008).

ARAUCO, however, found other productive ways of taking advantage of the agreement signed with Catholic University. This role included the preparation of counter-evidence during the civil trial carried out by the State Defense Council against ARAUCO.¹⁸¹ In addition, Jaksic –CASEB’s Director– acted as one of the company’s witnesses during the trial. In this role, Jaksic questioned the hypotheses pointing to ARAUCO’s responsibility, presented by the state. When explaining this role, Jaksic (June 5, 2009, Folder 64:584) testified that: “I want to clarify that I did not say that there is no relation of the Valdivia mill with regards to the changes occurring in the sanctuary, but rather that there is a lack of scientific evidence about such a relation.” During the trial, Jaksic also reinforced the validity of “naturalistic” explanations, expressing that in arriving at his own understanding of the disaster he did not need to consider any aspect of ARAUCO’s mill operation:

“(...) we [ecologists] only comply with studying the biological and ecological components (...) we don’t need to be informed about engineering issues, such as the use of inputs or discharges that have no relation to the biological assessment of the wetland’s state and the changes occurred” (June 9, 2009, Folder 69:599).

If any doubt persisted about the place of ARAUCO’s mill and its discharges in Jaksic’s understanding of the ecosystem, he referred to the law: if the mill “complies with the norm of emission there is no need to make an environmental assessment of any input, because *the regulating agency already decided under or over which threshold we need to worry*” (Jaksic, June 5, 2009, Folder 64: 584, emphasis added). Acting as a witness in defense of

¹⁸¹ Interview conducted by the author for this research.

ARAUCO, Jaksic enacted the practices of a “commissioned scientist.” Not only did he reinforce uncertainties about available knowledge of the wetland. He also implied that under the reign of the neoliberalized, techno-scientific knowledge upon which Chile’s environmental frame operates there is no need for such ecological knowledge at all. For it is legislators and public officials, after negotiating with the representatives of firms, who determine, through norms, what ecological changes should be of concern to scientists.

7.5 “Commissioned Knowledges” for the Mill’s Approval

By far the most striking aspect of the role of scientists in the Valdivian struggle corresponds to the involvement of a group of experts from UACH during the preparation of the Valdivia mill’s ecological baselines. These scientists –all of whom were well-regarded researchers at that time– were hired by ARAUCO through a contract managed by the consultant group *Geotécnica*. The group was comprised of Dr. Hugo Campos, a limnologist, in charge of studying the Río Cruces and the wetland; Dr. Carlos Ramírez, a botanist, responsible for the studies of the sanctuary’s flora and vegetation; and Dr. Roberto Schlatter, a zoologist, who had been actively involved in declaring the Río Cruces wetland as a protected area and was in charge of the studies on its birdlife and fauna. All of them were amongst the most knowledgeable experts in their respective topics, in Chile. Thus, they knew and in most cases also authored the publications and studies of the ecosystem and its features.

Interestingly, the ecological studies commissioned by Chile’s major forest holding were considered by Schlatter and his colleagues as a scientific research effort that lacked any sociopolitical implication. In particular, Schlatter saw the “commissioned” studies as an opportunity to conduct basic research for which he otherwise lacked the needed funds.

This uncritical involvement in the assessment of ARAUCO's mill was also favored by two contextual factors. The first one, discussed in Chapter 5, was the broad support that the coming factory had from the majority of Valdivians.¹⁸² The second was that, as an interviewee recalls, this was the first time that a group of UACH's scientists was hired to conduct a "commissioned" study: "(...) it was an exotic thing, and the first experience of an extra payment for a private job [*pituteo*]. Moreover, those who did not take part, some of them were upset, like, why didn't you bring us in?"¹⁸³ Hence, regarding the uncritical understanding of the mill's potential effects, as the same interviewee adds: "it [the mill] was like something in the future, that maybe (...) would never be built."¹⁸⁴

In addition, as noted in Chapter 4, in Valdivia the sanctuary was not seen as having a salient position.¹⁸⁵ Rather, as a Valdivian scientist recalls, "the sanctuary was weak."¹⁸⁶ That is, it was not yet entangled with the city and its inhabitants in a way that could serve to confront or resist the approval of the mill. To illustrate this idea, the same interviewee recalls that when the factory was undergoing its environmental assessment, a group of academics gathered to discuss how to proceed: "We were 20 guys! And we did not have strength! (...). I mean, I saw it as a lost cause."¹⁸⁷

The relationship between ARAUCO and UACH's team of scientists was, however, not exempt of conflict. Some of the Valdivian experts openly questioned the location of the pulp-mill's discharges upstream of the sanctuary, which they considered "an atrocity."¹⁸⁸

¹⁸² Interview conducted by the author for this research.

¹⁸³ Interview conducted by the author for this research.

¹⁸⁴ Interview conducted by the author for this research.

¹⁸⁵ Interviews conducted by the author for this research.

¹⁸⁶ Interviews conducted by the author for this research.

¹⁸⁷ Interviews conducted by the author for this research.

¹⁸⁸ Interviews conducted by the author for this research.

“Look, this is a Ramsar site,” one of UACH’s scientists had argued to Víctor Renner, the mill’s manager. “Really? And what is that?” Renner asked. “It is a site of international importance,” the scientist replied. “Oh. I see. We are going to fix this,” Renner announced. We do not know what he exactly meant. What we do know is that the sanctuary turned into the most controversial aspect of the mill’s assessment, both for public servants and for citizens and NGOs: “One of the most sensitive aspects of the project’s environmental impact assessment process is the presence of the natural sanctuary inside the area of influence” (Comité Técnico COREMA January 31, 1996:n.p.). ARAUCO did, in fact, have to “fix it.” The solution came through the work of these “commissioned” scientists.

The most controversial aspect involved in the production of these “commissioned” knowledges has to do with the intervention that ARAUCO made to the reports prepared by UACH’s scientists. According to my interviewees, Víctor Renner –by then the manager of the mill– was in charge of overseeing the work of UACH’s experts. Renner complained about what he considered unnecessary environmental concerns: ““You are constantly annoying [*fregando*] me with the scientific stuff!’ (...). He made a scandal,” one of my interviewees recalls.¹⁸⁹ Renner’s complaint did not end with this quarrel. He demanded the scientists eliminate sensitive aspects from their reports, openly censoring their work.¹⁹⁰

It should not be surprising, then, that none of the baseline reports prepared by UACH’s scientists made clear statements about the threats that the mill could represent for the wetland, nor did they recommend considering a different location for the factory or its discharges. Further, UACH’s baselines were of scarce help to the public servants

¹⁸⁹ Interviews conducted by the author for this research.

¹⁹⁰ Interviews conducted by the author for this research.

responsible for the reviewing the mill's assessment. The involvement of UACH's scientists with ARAUCO not only left these public servants with no independent experts with whom to consult, the deficiencies of the baselines they prepared also put the public servants in the complicated position of criticizing the work of those who, at that time, were considered "the" experts on the issues being assessed.

Indeed, the report with which ARAUCO submitted the Valdivia pulp-mill to environmental assessment in October 1995 was based on very limited and partial ecological studies that had been prepared in only three months –between June and August of 1995– covering only the ecosystem's winter conditions. For a river that fluctuates from 7 to 214 m³/s and has an historical peak of 925 m³/s, seasonal variations are ecologically significant. The reports of UACH's scientists also left out critical knowledge that was then available.

As mentioned, these weaknesses were such that on January 31, 1996, COREMA's Technical Committee concluded that the mill's assessment should be rejected, mainly due to the methodological weaknesses of its baseline studies. The committee declared that given such limitations, the assessment was "insufficient to justify that the industrial discharges are not dangerous for the sanctuary" (Comité Técnico COREMA January 31, 1996:n.p.). More specifically, public services criticized the lack of "a clear presentation of impacts" and the inattention to the sanctuary and nearby urban centers –that is, Valdivia– "as impact recipient components" (CONAMA X n.d. 1995:n.p.). In addition, they questioned why the sanctuary was not "evaluated as a whole" to identify "the cumulative, interdependent and synergistic effects" (CONAMA n.d. 1995 n.p.).

The ecological baselines had also failed to establish relations “between wildlife and different vegetational habitats,” between “biotic and abiotic components characteristic of aquatic environments,” and “between limnological parameters and communities of birds and aquatic mammals” living in the wetland (CONAMA n.d. 1995:n.p.). Moreover, the baselines had failed to describe “the current state of fragility of the ecosystem and its capacity to assimilate nutrients and toxic elements” while “the impact of the effluent through bioaccumulation (...) has been omitted” (CONAMA n.d. 1995:n.p.).

In sum, as Carlos Ritter, Regional Director of CONAF, argued, the baselines prepared by UACH’s scientists “describe the vegetation, fauna, and limnology of the Río Cruces, but do not express any relation amongst these topics,” which are treated “without connection to ecological processes that could serve as basis for the assessment of impacts and the subsequent monitoring.” These impacts included the effects of the mill’s discharges on the wetland’s functioning, as expressed in “the increase in eutrophication (...), population variables for threatened species (otter, swan) (...), trophic chains (...), [and] reproductive seasons of birds and aquatic vertebrates” (Ritter November 13, 1995:n.p.).

These deficiencies were only partially repaired by an additional field campaign conducted during the following summer (December 1995 through February 1996), which was included in the mill’s second assessment report submitted in August 1997. Therefore, when the pulp-mill was approved on October 30, 1998, the baselines’ fundamental weaknesses had not been resolved. In fact, they never were. Rather, these partial, fragmented and superficial descriptions of the wetland became the “official” knowledge based upon which the environmental permit for ARAUCO’s mill was granted. Moreover, it was based on such

knowledge that the mill's environmental permit included –or excluded– certain indicator species or the need to monitor particular impacts.

In sum, the baselines prepared by UACH's scientists were ontologically generative. They performed the wetland, its species, and their capacities in a way that –as we will see– turned out to be critical for presenting ARAUCO's mill as compatible with the wetland. In doing so, these “commissioned knowledges” enabled the disaster's fabrication.

7.6 An “Unknown” and Polluted Ecosystem

Basically, UACH's baselines enacted the Río Cruces Sanctuary as an “unknown” ecosystem. To do so, UACH's scientists downplayed available ecological knowledge that could have been sufficient at that time to identify the wetland's vulnerabilities in light of the potential impacts coming from ARAUCO's mill. “Knowledge about this river is scarce and in some aspects nonexistent,” claimed Hugo Campos, UACH's limnologist in the report prepared for ARAUCO, while citing only two studies from a long list of existing publications referring to the Río Cruces river, the wetland, and its species (Campos 1995:2).¹⁹¹

By performing the wetland as “unknown,” these “commissioned” scientists also downplayed the ecological values that had led to declaration of the sanctuary 15 years earlier. Moreover, the notion of an “unknown” ecosystem was ontologically productive for another reason. Confronted by a supposed lack of knowledge, the descriptions provided by UACH's experts could be general and superficial, presenting the wetland as a simplified, static, and fragmented ecosystem, that is, deprived of its unique properties and capacities.

¹⁹¹ Dürrschmidt (1980), Dürrschmidt (1982), Dürrschmidt and Steubing (1983), Salazar (1988), Hauenstein and Ramírez (1986), Medina (1988), Salazar (1989), Campos (1973), Ramírez et al. (1991), Schlatter et al. (1992), San Martín et al. (1993), Muñoz-Pedreras et al. (1993), Nempu et al. (1993), Pino et al. (1994), Nelson (1996), Contreras (1998), Pino and Fuentes (2001).

The most important of these annulled properties of the wetland corresponded to its hydrodynamics. This was a feature that, as explained in Chapter 4, was already known and considered key for understanding the cumulative effects of industrial discharges in the sanctuary. Consistently, the wetland's hydrodynamics turned out to be determinant in the unfolding of the disaster. However, this central ecosystemic feature was completely omitted from the reports prepared by UACH's scientists.

Again, it was not that more complete knowledges were unavailable. In fact, the comments prepared by the NGO CODEFF emphasized, precisely, the need to attend to the sanctuary's hydrodynamics: "The penetration of water in the estuary reaches the Río Cruces, which opposes scarce resistance to the pressure of high tides (Dürschmidt and Steubing 1983)" (Mardones and Leal 1995:28). These authors criticized on the stark omission of this estuarine character in the baselines prepared by Campos, UACH's limnologist:

"No point of water analysis included in the baseline considered zones with marine influence. Besides, in no place [do the baselines] describe 'the variations in the height of the waters that result from the periodic tides and the counter-currents created by high tides' (Hauenstein and Ramírez 1986), that in great part of the sanctuary are clearly evident to the naked eye" (Mardones and Leal 1995:28).

It must be noted that these comments were based on studies about which Campos had direct knowledge, as we will see. Nonetheless, they were left out of the "commissioned" reports he prepared for ARAUCO.

UACH's baselines also enacted the wetland as an already "polluted" and, therefore, "receding" ecosystem. The report prepared by Campos noted "the presence of heavy metals and organic compounds, such as pesticides, in high concentrations, both in the mass of

water and in the sediments” of the river (Campos 1995:34). He added that analyses of sediment organisms “revealed the bioaccumulation of organochlorinated pesticides,” concluding that the river was an oligo-mesotrophic one, that is, classified “in the limits of clean waters, which means that these are being loaded with nutrients” (Campos 1995:35).

Moreover, pollution and sedimentation, which had been considered threats to the sanctuary’s protection since the 1970s, were now presented as indicators of an inevitable trend that would soon lead to the wetland’s disappearance. According to the vegetation baselines prepared by Carlos Ramírez, the ecological succession then occurring in the wetland “will fill the marshes [*bañados*] and allow the regeneration of the terrestrial vegetation that disappeared during the quakes of May 1960” (Ramírez 1995:17). “This natural process is only restrained by the river’s current,” he added (Ramírez 1995:20).

Enacted as a “polluted” and “receding” wetland, the sanctuary’s character as a protected area was ontologically weakened. Along with it, the ecosystem’s vulnerabilities were minimized and its complexities annulled by describing it as subject to a linear trajectory of ecological succession that would lead to its inevitable disappearance. In consequence, the potential impacts coming from ARAUCO’s mill were also downplayed. An already polluted and temporary wetland was not “worthy” of protection.

This was the exact argument by ARAUCO’s environmental manager, Roberto Delmastro, who in 1998 declared that, based on the baselines prepared by UACH’s botanist Carlos Ramírez, “it can be determined that the sanctuary will begin to disappear in 20 years and that in 50 years, it won’t exist” (Diario Austral de Valdivia January 17, 1998). Therefore, he concluded, the wetland was “no impediment to installing the mill.”

In brief, by bringing into existence a wetland that was, simultaneously, unknown, polluted and in the process of disappearing, the sanctuary was performed as a valueless and transitory ecosystem to which ARAUCO's discharges would not make any difference. In other words, the ecosystem was enacted as totally compatible with ARAUCO's pulp-mill.

7.7 The Ignored Agency of the River

Despite the criticisms of UACH's baselines, the ecosystem enacted through them became a dominant ontology that gained its definitive birth certificate when ARAUCO's factory was officially approved. This unknown, simplified, fragmented, polluted, and receding wetland produced by the "commissioned knowledges" hired by the company displaced the less visible but more complex and unpredictable ecosystem that had been –albeit partially– described by previous studies. These unofficial knowledges lost the salience and capacity to influence decision-making processes. This was the case, for example, for the swan-luchecillo interaction and for the capacities of both swans and luchecillo to inflect the sanctuary's ecological succession, detailed in Chapter 4.

This alternative wetland, with all its complexities, capacities and interrelations, would drastically re-emerge once the disaster exploded, making visible the previously ignored agencies and, in particular, the hydrodynamic properties of the river and the estuary.

In the case of the luchecillo, the silence in UACH's baselines regarding its specific properties was partially counter-posed by the work of public agencies. A public servant from the *Servicio Nacional de Pesca* (SERNAPESCA) [National Fisheries Service] at Puerto Montt suggested to the Regional Director of CONAMA –Raúl Arteaga– the need to

use the species as an indicator of the pulp-mill's impacts.¹⁹² Another public servant recalls that the luchecillo appeared as “a particularly sensitive species within the sanctuary, so it should be monitored as a bio-accumulator of heavy metals, for if anything happened in the wetland it would be the first [species] to be affected.”¹⁹³ He adds that in CONAMA, “we had the certainty of having come across a key element” for the monitoring of the mill's effects on the sanctuary.¹⁹⁴ Accordingly, COREMA's final resolution approving ARAUCO's mill determined that the luchecillo had to be monitored.¹⁹⁵

The swans were not as fortunate. According to the interviews conducted for this research, UACH's scientists proposed to include them as an indicator species during the preparation of the mill's assessment. However, ARAUCO's executives ordered the removal of this recommendation from the reports prepared by UACH. Interestingly, no particular mention of the need to monitor the swans was made by any public service or NGO. As a public servant involved in the mill's assessment confirmed to me, “swans were not considered then. The truth is that their relationship [with the luchecillo] was not realized.”¹⁹⁶

This neglect of one of the wetland's key avian-plant relationships –only briefly mentioned in the baselines prepared by UACH's scientists– reveals the failure of these experts in effectively contributing to the proper assessment of ARAUCO's mill. Similar omissions affected other herbivores. According to previous work done by Ramírez himself, “[T]he conservation of the flora of these places is very important, since the survival of permanent and seasonal fauna depend on it” (Ramírez et al. 1991:75). In the same study, Ramírez

¹⁹² Interviews conducted by the author for this research.

¹⁹³ Interviews conducted by the author for this research.

¹⁹⁴ Interviews conducted by the author for this research.

¹⁹⁵ As detailed in Chapter 5, this requirement was appealed by ARAUCO and finally eliminated by the National Council of Ministers.

¹⁹⁶ Interviews conducted by the author for this research.

quotes Oscar Prochelle and Hugo Campos (1985), UACH's limnologists, to affirm that the *coipo* (*Myocastor coypus*) –a native and protected mammal that used to live in the sanctuary– “depends exclusively on it [luchecillo] throughout the whole year” (Ramírez et al. 1991:75). The reasons for ignoring these key relationships remain a mystery.

However, as noted, the most remarkable erasure from the baselines prepared by Valdivian scientists referred to the wetland's hydrodynamics and the estuarine character of the Río Cruces Sanctuary. This fundamental ecosystemic trait was only casually mentioned in the reports prepared by UACH's experts, despite the knowledge available (Dürschmidt and Steubing 1983; Hauenstein and Ramírez 1986; Ramírez et al. 1991; Schlatter et al. 1991a; San Martín et al. 1993). Campos, UACH's limnologist, not only knew some of these studies well, but also had co-authored previous publications that touched on the estuarine properties of the Río Valdivia's watershed, to which the Río Cruces belongs (Campos 1973; Campos, Bucarey and Arenas 1974). Nonetheless, in the ecological baselines he prepared for ARAUCO, Campos completely omitted the existence of the estuary and the visible daily movements of tides in the river and the wetland. Further, Campos also ignored the salinity of the wetland's water,¹⁹⁷ indicative of its estuarine character, which he had studied in depth only some kilometers away (see Campos 1973).

The abrupt changes that occurred in the sanctuary a decade later reveal the magnitude of Campos' omission. Indeed, *his silence was instrumental to the disaster's fabrication.*

¹⁹⁷ The only mention of this key ecosystemic feature was made by Campos in Annex 6 of his final report. When commenting on isolated data from a measuring station in the Río Cruces, he says that the unusual values observed could be due to “the influence of salt water” (Campos 1995: Annex 6). No further consideration of the wetland's estuarine dynamics was present in his report.

Indeed, one of the main conclusions of the report prepared by UACH's scientists in 2005 was, precisely, that the huge accumulation of heavy metals in the wetland's sediments had resulted from the ecosystem's estuarine dynamics:

“[A]n estuary is a system of coastal, semi-closed waters, freely connected to the ocean, where a considerable and measurable dilution of salt water within continental waters occurs. It is always affected by tides (...). The Valdivian Estuarine Complex is comprised of the major estuaries of the rivers Valdivia, Tornagaleones and Cruces (...) [and] the estuary of the Río Cruces has huge sub tidal and intertidal plains produced by the tectonic sinking associated with the 1960 quake. This great surface of shallow waters is frequently perturbed by short period tides, especially caused by the southern winds (summer). During these low tides (...) [the ecosystem shows] a great capacity to resuspend sediments” (UACH 2005b:19).

The scientific report adds that, although there was a lack of information about the spatial movements of the salt water within the Río Cruces estuary under each tide condition and season, it is evident that the greatest part of the tidal effect within the basin occurs in the Río Cruces. UACH's report (2005:23) describes how the estuarine condition of the sanctuary turned out to be determinant in the material fabrication of the disaster:

“(...) high and generalized levels of pollution registered in the waters and sediments of estuaries are related to their particular tidal dynamics. The tidal wave moves up (...) in a speed that is proportional to the depth of the channel. This means that during high tides (...) the speed of the tidal wave that moves up is higher than the speed of lower tides (...) the upward movement is very brief (2 to 3 hours), with high speeds, and the downward movement is very long (9 to 10 hours), with low speeds.”

As a result of these speed differentials, the polluted substances –especially when they are in colloidal or particle states– “start to accumulate in the higher zones (towards the

headwaters) of the estuary” (UACH 2005:23). In the case of the sanctuary, *this accumulation was amplified by the fact that this estuary is also a wetland.*

In brief, then, according to UACH’s 2005 report, the particles and colloidal aggregations of heavy metals discharged into the Río Cruces were pushed upwards into the wetland’s headwaters, at a high speed, during high tides. Then, during low tides, these same polluted particles moved very slowly in the opposite direction, remaining for several hours and even days in the ecosystem. When they reached the shallow marshes, these particles were deposited in the sediments for even longer periods. This caused an increased concentration of pollutants in the ecosystem.

These estuarine dynamics were constitutive of the disaster’s “key,” as proposed by UACH’s 2005 report, and also determinant of the high levels of pollutants found in the organs of swans, the tissue of the luchecillo, and the waters and sediments of the wetland.

Notably, the estuary’s hydrodynamics were revealed by the “doings” of the wetland itself. During the spring of 2004, and coinciding with the abrupt ecological changes occurring in the sanctuary, a dense mass of brownish water began to move slowly downstream from the wetland into the clear waters of the Río Calle-Calle, reaching Valdivia’s downtown and causing alarm (Lagos et al. 2008). The mass of brown water, called “*la mancha*” [“the slick”], was described in detail by UACH’s 2005 report. According to this study, the slick became “one of the most obvious and visible characteristics of the sanctuary (...) since the end of the winter of 2004” (UACH 2005b:206). What was most striking about *la mancha* was that its waters remained a separate mass, not mixing into the cleaner, bluish waters distinctive of the Río Calle-Calle.

The physico-chemical and biological composition of la mancha was analyzed by UACH's 2005 report and compared with the uncolored waters of the Río Cruces and the Río Calle-Calle (UACH 2005b). Within the brownish mass of water, the temperature levels, conductivity, suspended solids, nutrients, heavy metals –in particular iron–

Photograph 3: “La Mancha” [The Slick] Moving Through Valdivia: December 18, 2004



Author: Eduardo Israel

and phytoplankton were significantly higher than in the uncolored water. UACH's team also found that la mancha's composition was not influenced by the tides of the estuary (i.e., level of salinity). Rather, periodical tides moved the dense mass of polluted water up into the wetland and down again into the city, literally “bringing” the sanctuary's pollution to Valdivians, who were reminded daily that the transparent, bluish waters of the wetland no longer existed. Therefore, la mancha represented, materially and symbolically, *the entry of the disaster into the life of the Valdivians*.

As an effect of its particular hydrodynamics, the wetland was able to retain the traces of the disaster, as a Valdivian scientist interviewed for this research explains:

“Sediments are what register the human presence (...). If pollution was continuous but diffuse over time, it was going to be hard to find a trace. But if it had peaks, high concentrations [of pollutants], we knew that in the estuary these signs endure (...). [In the sanctuary] there is a peak of pollution by trace metals (...) that is preserved inside the sediments.”¹⁹⁸

¹⁹⁸ Interview conducted by the author for this research.

The permanent traces of pollutants left by the disaster in the wetland's sediments are, as one of UACH's scientists explains, equivalent to

“what nature does in thousands of years (...) in this case occurred in only four months (...). This is something unique (...) there is no similar history in the world's literature where a body of water like the Río Cruces suffered such deep changes that will remain imprinted in its geological records for 1,000 or 10,000 years” (Pino 2005).

By exposing the processes involved in the disaster's fabrication, UACH's 2005 report “did” something with vast and lasting effects to for the sanctuary: it performed the Río Cruces wetland as a complex, living and unpredictable ecosystem, able to display a series of interrelated agencies that sharply contrasted with the simplified, static, fragmented wetland that was predetermined to be disappearing, as the “commissioned” baselines of the mid 1990s had described it. In brief, despite its limitations, UACH's 2005 report performed the sanctuary as fully inhabited by biotic and abiotic agencies complexly entangled with their own “doings,” as well as with those of humans and their industries.

Such way of performing the wetland notably contrasted with a different one made by another group of “commissioned scientists” who, after the disaster occurred, insisted on enacting the sanctuary in terms consistent with the dominant and technocratic knowledges generated through the mill's assessment: CASEB's team and the experiments and papers they prepared on demand for ARAUCO's defense. As detailed, the sociopolitical power of the knowledge produced by CASEB was mediated by its capacity to perform the ecosystem simultaneously as simplified, fragmented, and unknown.

A good example of these “doings” are found in CASEB’s “mesocosmos” experiment, which was conducted between 2005 and 2008. According to the paper where its results were published, the experiment was designed to

“fill the need for understanding the potential link between the effluents resulting from the operation of the CELCO [ARAUCO] pulp-mill (...) and the occurrence of a generalized ecosystem alteration first observed in the Río Cruces between 2004 and 2005” (Palma et al. 2008:393).

To do so, the paper explains, the experiment recreated “the conditions that would best simulate the natural system receiving these effluents, isolating factors while maintaining environmental realism” (Palma et al. 2008:393). What CASEB’s scientists in fact measured, though, were the effects of the pulp-mill’s treated effluents on the *luchecillo* and a native species of freshwater crab. Five *luchecillo* plants were placed in 1,000 liter tanks. Two different treatment levels were applied: plain river water obtained upstream the mill, and river water with a 4 to 5% concentration of the mill’s treated effluents. Such concentration was assumed to be similar to that of the river downstream of the mill’s discharge. The experiment considered 10 replicates for each treatment level, that is, 10 tanks with plain river water and another 10 with the water containing the mill’s discharges. After conducting the experiment for almost a year, scientists concluded that the plants placed in the tanks with the mill’s discharge grew faster than those placed in plain river water (Palma et al. 2008:393). Despite the quality of CASEB’s experimental design and the novelty of its results, these were inconclusive regarding the disaster’s cause due to the impossibility of inferring from the 20 experimental tanks what had happened in the wetland. In any case, by assuming that the Río Cruces wetland could somehow be replicated through the “mesocosmos” experiment, CASEB’s scientists performed the sanctuary as a simplified

ecosystem, capable of manipulation and lacking in internal complexity, dynamic interactions or agentic capacities, such as those involved in its estuarine hydrodynamics.

Equally revealing of the performative power of CASEB's experiment are the comments made about it by, Jaksic, its director. During an interview to introduce the coming paper, he contradicted this publication with regards to the experiment's objective when explaining that it did "not look to provide an answer to the episode that caused the ecological disaster in the wetland" (La Nación September 24, 2007). At the same time, Jaksic highlighted that the "mesocosmos" experiment demonstrated that "the liquid industrial wastes originating in the Valdivia pulp-mill did not have a negative effect on the growth and development of the system's primary producers" (La Nación September 24, 2007). However, as Didyk (2011) has argued, one of the possible causes of the massive death of the *luchecillo* in the sanctuary could be related to the abnormal proportion of roots observed in the wetland's plants. A feature that clearly showed up in CASEB's experiment:

"(...) the magnitude of variables like the formation of new apical leaves, the formation of nodes, or total biomass was greater in the plants kept inside the tanks receiving effluent compared to those kept inside control tanks receiving pure river water (...) [In addition] apical length, formation of lateral branches, and the *number of roots*, exhibited the same trend over time" (Palma et al. 2008:393, emphasis added).

Nonetheless, CASEB's scientists failed to make any correlation between this abnormal rate of root growth in their experimental tanks and the one already observed in the wetland's plants. Despite this important omission, Jaksic closed the said interview affirming that the "mesocosmos" experiment "does not allow us to know what could have happened before [in the wetland], since we ignore the conditions that existed prior to our study. What happened in the Río Cruces is something that still eludes the complete understanding of the

scientists who have been involved” (La Nación September 24, 2007). Again, as in the baselines prepared by UACH’s “commissioned” scientists in the mid 1990s, the wetland was performed as fragmented, unknown, and compatible with ARAUCO’s discharges.

At this point, a question begs to be answered: why did well-reputed scientists from UACH agree to take part in the preparation of the ecological baselines commissioned by ARAUCO in the mid 1990s under conditions that were contrary to academic rigor, to the point of contradicting their own knowledges and tolerating the censorship of their recommendations? In turn, why did scientists from CASEB, Chile’s most prestigious ecological center, agree to take part in a research program aimed at ARAUCO’s need to dismiss its responsibility in the Río Cruces disaster? The answer points to the broader context in which the production of “commissioned knowledges” has evolved and flourished in Chile.

“Commissioned science” emerged in Chile along with the dismantling of public financing for universities that began in the mid 1970s. This restructuring reduced the amount of public resources for universities and, at the same time, increased competitiveness for such funds. Between 1980 and 1990, public funds allocated to Chilean universities decreased by 41% (OECD 2009). To compensate for this drastic reduction, universities raised their student fees in the mid 1980s or began charging them for the first time ever. Over the years, this tendency kept growing. By the mid 2000s, Chile was amongst the few nations in the world where students paid more than US\$ 1,000 per year to pursue an undergraduate degree in a public university (OECD 2009).

Today Chile invests 0.3% of its GDP in its tertiary education system, a notably low number compared to an average of 1% for countries with similar GDPs (OECD 2009). Discounting

the resources that come from student fees, public universities must generate 72% of their budgets through different means, including contracts with private companies (OECD 2009). The proportion of public and self-generated funds varies case by case. In 2006, for example, UACH received 47.1% of its total revenues from the state and generated 30% of its budget through other sources. In contrast, the Catholic University of Chile –to which CASEB belongs– obtained only 11.6% of its budget from public funds while generating 60% of its budget through alternative means (OECD 2009).

It is in this context that we can better understand the way in which the authorities of the Catholic University, an academically reputable institution, frame CASEB's collaboration with ARAUCO. The Dean of the Faculty of Biology, to which CASEB belongs, considers the relation between CASEB and ARAUCO as an example of a successful association that “brings applied scientific and technical knowledge closer to the private world and to the country's productive development, in the attempt to make this more sustainable and with a larger respect for biodiversity” (Asesorías para el Desarrollo 2009). There is not a single mention of the risks involved in such collaboration, or to the costs that the university and CASEB have paid given the criticisms from other scientists and from citizens.

7.8 Conclusions

This chapter shows how the disaster made evident the stark limitations of the knowledges involved in the approval of ARAUCO's mill. Even more, it shows how the disaster revealed the practices involved in the production of certain types of scientific knowledges, in this case those required by the environmental assessments of ARAUCO's industry.

Such technocratic knowledges performed the Río Cruces wetland as compatible with the operation of the Valdivia pulp-mill. Furthermore, through such performances, available knowledge about critical aspects related to the ecosystem's capacities and dynamics were downplayed or made invisible. If seriously considered, such available knowledge could have been enough to sustain warnings about the harmful effects that the mill's discharges could produce in the wetland. These omissions, then, had far-reaching ecosystemic and sociopolitical consequences, as they were instrumental in the disaster's fabrication.

Indeed, the specific "properties" of natural entities that turned out to be decisive in the unfolding of the disaster were downplayed, omitted, or intentionally made invisible by the technocratic and "commissioned knowledges" involved in the mill's approval. In this way, the ecosystem and its species were performed as passive and fragmented objects, already polluted and condemned from the outset to an inevitable extinction and thus compatible with their role as receptacles of industrial discharges. In this performance, the capacity of the wetland and its inhabitants to "do" things with the potential to modify the ecosystem's trajectory or evidence the impacts provoked by ARAUCO's discharges was totally ignored.

Through the workings of environmental decision-making, this particular performance of the ecosystem, as a passive, fragmented, polluted, valueless and, overall, unknown wetland, turned into the official and dominant ontology, displacing or excluding alternative understandings. Despite these silences, however, natural entities such as birds, plants and estuaries had the capacity to "act" and inflect the world performed through such "commissioned knowledges."

Indeed, the same properties of the ecosystem and its species excluded and ignored by this dominant ontology took shape and acquired a stark visibility through the disaster's unfolding. The abnormal behaviors of birds and plants –such as the interruption of basic biological functions or their massive and dramatic deaths– made evident the large-scale and novel threats affecting the wetland. Furthermore, the traces left by the mill's pollution in the water and sediments of the sanctuary, and in the organs and tissue of swans and the *luchecillo*, revealed the effects of the heavy pollution coming from the mill's discharges.

In particular, the characteristic hydrodynamics of the sanctuary –determined by its estuarine nature, but totally ignored by the pulp-mill's baselines– were critical in the absorption and retention of pollutants by the wetland and its inhabitants. Through the configuration of “*la mancha*,” the brownish mass of polluted water that moved down from the wetland to Valdivia's downtown, such hydrodynamics were also key in “revealing” the mechanisms involved in the disaster's fabrication. The same sort of revelation occurred through the particular capacities of the *luchecillo* and the black-necked swans, as detailed in Chapter 4.

The ecosystem that took shape through the ecological catastrophe provoked by ARAUCO's discharges turned out to be very different from the one described and performed through the “commissioned knowledges” produced a decade earlier for the mill's assessment. The properties and internal relationalities revealed through the disaster corresponded to those of a complex, adaptive, living, and unpredictable wetland. By revealing this complex and until then non-dominant sanctuary, the disaster ontologically multiplied the world.

Recent events such as the ruling that in 2013 sentenced ARAUCO to repair the damages caused in the wetland have contributed to enhancing the “(corpo)reality” of the emerging

sanctuary, closely entangled with the citizen's mobilization in its defense. However, these events still run parallel to an open scientific debate in which the wetland that continues to dominate is the fragmented and unknown ecosystem in which swans and the lucheillo are passive spectators of the changes occurring in the sanctuary.

In effect, the exposure of the workings of "commissioned science" and their connection to the disaster's fabrication have not produced fractures equivalent to those that the disaster provoked in environmental institutions or in the forest industry. Rather, the internal fissures that occurred in dominant knowledges as effect of the Valdivian crisis are still being worked out by the actors involved. What is clear, however, is that the role of "commissioned knowledges" in the resolution of ecological controversies has been deeply unsettled in Chile.

Chapter 8: Swans, Rivers, Wetlands and a Multitudinous Fracture: the Collapse of Chile's Environmental Framework and the Remaking of Valdivia's Identity

"[I]n the movement Acción por los Cisnes all of us became swans. All of us turned into marching swans"
(One of Valdivia's historic social leaders, interviewed for this research)

8.1 A Movement is Born

An assembly of fifty people convened on November 2, 2004 in a small film exhibition room in downtown Valdivia. The meeting was summoned by two former members of *Acción por los Ríos* [Action for the Rivers] –the network that opposed ARAUCO's pulp-mill in the mid 1990s, as detailed in Chapter 5– in response to the first press notes that had reported on unusual events in the Río Cruces wetland. Those attending the meeting were dismayed by the news of dying swans. They feared that whatever was causing such death could also affect Valdivians. The sense was that an invisible threat was looming over the city, particularly because the main suspect –ARAUCO's recently inaugurated pulp-mill– was known to be dumping its wastes into the Río Cruces, the same river that, after passing through the sanctuary, reached the city. If the wetland was polluted, so was Valdivia.

The assembly was dominated by a cascade of questions regarding ARAUCO's pulp-mill and its relation to the disaster. The city had already been exposed to intense episodes of air pollution coming from the factory. It seemed entirely possible that now, the mill could also be polluting the water. Those present wondered: Who knows what type of wastes is the mill dumping into the river? How can scientists ignore their possible effects? How many swans have died? Has somebody analyzed their corpses? Are these results available? Could we in Valdivia also be affected by whatever is killing the swans? Can we safely drink tap water?

By then, the government had already defined the strategy to be followed: a scientific study commissioned from the *Universidad Austral de Chile* (UACH) at Valdivia would determine within five months the exact causes of the swans' massive death and migration. As Chapter 7 explains, through this strategy the government transferred to scientists and their capacity to reach definitive conclusions, the responsibility of settling the controversy and defining the measures that should be taken. Until such conclusions were available, as Eduardo Jaramillo –the scientist in charge of UACH's team– put it, the relation between the discharges of the mill and the death of the swans would remain “a mere hypothesis.”

For citizens who feared that the pollution could also be affecting them and who were alarmed by the increasing number of dead swans, the postponement of any official measure until UACH's conclusions were available left them with a sense of having been abandoned by the government. Moreover, citizens were worried that even if UACH's scientists reached unambiguous conclusions, these could be counter-posed by alternative explanations.

Recognizing the limits of scientific answers but also based on their own distrust of the work of scientists, the assembly agreed on demanding the mill's preventive closure until its direct connection to the death of the swans could be definitively ruled out. To do so, citizens would send a letter to the National Director of CONAMA, Chile's environmental agency, demanding such preventive measure. In addition, they would summon a *Cabildo Ciudadano* –an open assembly– to be held two weeks later at the city's waterfront, on the riverside, inviting national and regional authorities. Citizens agreed to sign as *Acción por los Cisnes* [Action for the Swans]. The movement was born.

A second assembly was held a week later at the same time and place. More than one hundred people arrived, overcrowding the small room. People were now shocked by the news about swans that were falling from the sky over Valdivia's houses and yards. Again, the debate focused on the study that CONAMA had contracted UACH. The meeting was engulfed by an avalanche of questions regarding the credibility of local scientists. As detailed in Chapter 7, a decade earlier, UACH's scientists had been hired by ARAUCO to prepare the ecological baselines for the mill's assessment. Although the baselines were considered insufficient by the public entities in charge of the assessment, for many Valdivians the involvement of local scientists –and their silence about the mill's impacts– had been a guarantee of the factory's harmlessness. This sense of security had been reinforced after authorities assured that the addition of a tertiary treatment would eliminate any risk of pollution of the sanctuary. Ten years later and now confronted with the ongoing disaster, Valdivians were facing the consequences of these precarious technologic assurances and the limited technocratic knowledges upon which they had been founded. How could scientists that had worked for ARAUCO ten years prior and been instrumental in the mill's approval now claim to be independent? Why were they remaining so silent about the disaster's causes and keeping their distance from this nascent movement?

The assembly decided it was time to take to the streets. The first march, prepared in only five days, summoned more than one thousand people. "Life to the Swans!" was the headline of the local newspaper published the morning after. The newspaper reported that citizens wanted to raise awareness about "the ecological tragedy that the death of these beautiful birds signifies," and that they were calling on authorities "to join this arduous

fight for the benefit of the life of these birds” (Diario Austral de Valdivia November 15, 2004). From the outset, then, the swans were at the core of the demands of Valdivians.

After that first street demonstration, the citizens’ assembly met each Tuesday at seven o’clock p.m. for more than three years. Several other marches followed. Fluvial navigations, information stands, educational campaigns, street performances,¹⁹⁹ concerts, art exhibitions, seminars and a national convention were also organized by the movement, amongst many other activities. Valdivian interviewees involved in previous protests that had occurred in the city –such as those for the recovery of democracy– agree that the massiveness and breadth of the response to the Río Cruces disaster was unusual in the city:

- “It was not comparable to any other mobilization that had previously occurred in Valdivia. This was much more massive... super massive.”²⁰⁰
- “(...) businessmen also supported the ‘swans.’”²⁰¹
- “Working-class neighborhoods had a lot of empathy with the movement.”²⁰²
- “I remember encountering many people during the marches (...), ordinary people without a political stance (...), people that I have never seen in any other protest (...) many citizens that were simply hurt by what was happening.”²⁰³

Local organizations and territorial communities, including the association of fluvial ship-owners, Valdivia’s chapters of the Medical and Veterinary Colleges, the indigenous council of the Mapuche southern territory and the city union of neighborhood associations, joined the movement, signing its press releases, taking part in official meetings with the government and summoning the demonstrations. This self-financed and horizontal network

¹⁹⁹ These were enacted by “*Los Cuello Negro*” [“The Black-Necked”], a street performance group who performed highly publicized actions.

²⁰⁰ Interview conducted by the author for this research.

²⁰¹ Interview conducted by the author for this research.

²⁰² Interview conducted by the author for this research.

²⁰³ Interview conducted by the author for this research.

overwhelmed the country with its unusual character: a multi-vocal movement that took to the streets peacefully, often involving entire families, as citizens and past ministers describe:

- “We never offered a message (...) that was politically violent.”²⁰⁴
- “It was very peaceful. Not at all confrontational (...) no street blocking (...) people marched without disturbances (...) It was Europe. Switzerland.”²⁰⁵
- “(...) it reminded me of the citizen mobilizations in Germany.”²⁰⁶

Simultaneously, Acción por los Cisnes displayed the capacity not only to make well-founded denunciations, but also to generate legal, technical or political proposals for solving the problems highlighted. This combination of proactiveness and professionalism was fundamental to the respect that the movement earned and, therefore, also fundamental to its broad resonance. As a government official and a politician describe it:

- “It was a more technical assembly, more scientific. People came with hard data (...) about chemical components, the behavior of the swans, and the lucheillo (...). It wasn’t just an environmental opposition (...). [This message] reached deeply (...)

Photograph 4: Two Swan Activists and a Policeman During a Visit of Bachelet to Valdivia



Author: Daniel Boroschek

an ‘intellectual world’, with brackets, a professional world...”²⁰⁷

- “(...) the movement (...) had an enormous capacity (...) in its discourse, in its way of speaking... a lot of seriousness. Well, and a lot of passion (...). That is, it spoke in technical terms (...) this was a well prepared movement.”²⁰⁸

To the production of such “technical” documents, reports, brochures and presentations, Acción por

²⁰⁴ Interview conducted by the author for this research.

²⁰⁵ Interview conducted by the author for this research.

²⁰⁶ Interview conducted by the author for this research.

²⁰⁷ Interview conducted by the author for this research.

²⁰⁸ Interview conducted by the author for this research.

los Cisnes added videos, cartoons, posters, costumes, T-shirts and all sorts of creative outlets through which citizens could express their call in defense of the swans. As one of the movement's spokespersons describes:

“In the same document, medical, technical, veterinary, scientific, sociological and other arguments were included and, on top of that (...) an artistic presentation (...) it was a very forceful message that of the ‘swans’, very difficult to respond to.”²⁰⁹

Such a profile was not only new in Valdivia but also in the country as a whole. Thus, the movement began to be considered as a sign of a wider sociopolitical awakening that was just beginning to take form, as past national authorities, congressmen, and ministers express:

- “This is a movement that becomes emblematic (...). Like students are now.”²¹⁰
- “A beautiful movement (...). The precedent for all what we have seen afterwards.”²¹¹
- “People [in Santiago] were moved by what happened in Valdivia.”²¹²

Acción por los Cisnes was followed by dozens of local mobilizations nationwide, including the students' massive protests for educational rights, territorial movements in Aysén, Calama, and Tocopilla, and huge street protests in Santiago and other cities against controversial projects. These mobilizations unleashed an uneasiness that had been accumulating for decades (Mayol 2012).

Indeed, Acción por los Cisnes emerged after a decade and a half of administrations under the center-left *Concertación* coalition of parties (1990-2010), during which Chilean society was still extremely depoliticized. Long ago, the grassroots organizations that were decisive in the recovery of democracy had been displaced by the historically elitist, centralized, and

²⁰⁹ Interview conducted by the author for this research.

²¹⁰ Interview conducted by the author for this research.

²¹¹ Interview conducted by the author for this research.

²¹² Interview conducted by the author for this research.

vertically structured party politics that had dominated throughout Chile's history (Garretón 1989; Salazar and Pinto 1999). Reactivated in the democratic transition of the 1990s, these elitist politics took the form of the "*democracia de los acuerdos*" ["democracy of agreements"] (Carruthers 2001; Silva 1996). This term refers to a politics of negotiations between a handful of leaders who reached pragmatic agreements –consensus, they called it– to guarantee the "stability" of democracy (Carruthers 2001). The effect was the elimination of dissent and of social mobilization.

In 2004, when the Valdivian disaster exploded, the democracy of agreements was still the dominant mode of practicing politics in Chile. Its purpose had been to provide legitimacy to the neoliberal order inherited from Pinochet. As Edgardo Boeninger, past minister of Patricio Aylwin (1990-1994) and a key figure in Chile's democratic transition, bluntly put it, consensus was necessary to provide "legitimacy to a model of growth that carried the original sin of having been implanted by the repudiated dictatorship" (Boeninger 1997:463). Resigning to the impossibility of any substantive change to this neoliberal model, the Concertación opted for its gradual adjustment through measured doses of social "equity."

As described in Chapter 5, this elitist style of politics also was instrumental for the approval in 1994 of the country's first-ever environmental law. The exclusion of key social actors from the process that led to its approval had been justified at that time based on the assumption that Chile lacked an "internal" environmental demand (Geisse and Nelson 1995). The nascent environmental law not only included restricted spaces for the involvement of citizens (Sepulveda 2009). It allocated these limited spaces within a decision-making system designed for the assessment of individual projects, thus fragmenting the still fragile expressions of an environmentally concerned citizenry

(Sepúlveda and Villarroel 2013). Such fragmentation explains why, despite having increased since the mid 1990s (Sabatini and Sepúlveda 1997; Rojas et al. 2003), by the mid 2000s environmental conflicts remained dispersed amongst a multitude of local, single-issue and disconnected struggles (Sepúlveda and Villarroel 2012, 2013). The strong and autonomous character of the Valdivian movement confirmed that an “internal” environmental demand had finally taken form in Chile (Sepúlveda and Villarroel 2013). Consistent with Chile’s technocratic tradition²¹³ (Silva 2006), the 1994 environmental frame assigned the key role in environmental decision-making to experts. This approach was not trivial; it was deeply rooted in the political project put forward by the Concertación, as explained by Andrés Velasco, Michelle Bachelet’s past minister of finance:

“Modern democracy operates on two principles: delegation and competence. We delegate to an elite certain decisions because they are technically complex and it is efficient that experts dictate. With them in charge, the citizenry can quietly go on vacation (...). Chilean democracy is elitist, closed, technocratic, aesthetically unpresentable. But it works” (La Tercera July 19, 1997, quoted in Silva 2007:91).

These were the technocratic grounds upon which the government framed its science-laden strategy –detailed in Chapter 7– for dealing with the Río Cruces disaster. It was also on

²¹³ According to Silva (2006), Chile’s technocratic tradition can be traced back to the 1920s and has been characteristic of both conservative and progressive administrations. Basically, this tradition is characterized by the influential position within governing circles of academically credentialed experts who have been granted the power to propose technical-scientific solutions for challenging sociopolitical issues (Silva 2006). Interestingly, these technocratic forms of governing have been particularly salient under the *Concertación*’s administrations and, paradoxically, they reached what Silva (2006) describes as an historical peak during the so-called “citizen government” of Michelle Bachelet (2006-2010). Indeed, in her attempt to maintain distance from party politics, Bachelet replaced the militant cadres that had dominated the three previous democratic administrations by a whole generation of experts –most of them economists with degrees from the USA– who were appointed to core political positions (Silva 2007). Their expertise was presented as the axis of a new style of (post-political) governing. Consistently, the most pressing issues, such as the demands for educational reforms, were delegated to a series of ad-hoc expert commissions. Although social actors were occasionally invited to join these teams, their contribution was basically restricted to validating the proposals prepared by technical cadres and, therefore, ultimately framed within their “expert” realms (Silva 2007).

these technocratic grounds that Acción por los Cisnes emerged, relationally shaping its own responses to the disaster and, through them, its own identity.

First of all, citizens responded by spontaneously entangling their own fate with that of the swans and their suffering. As Chapter 9 details, the suffering of the swans constituted “the” determinant driver that “moved” actors to respond to what was occurring in the wetland far beyond Valdivia. Secondly, citizens responded to the government’s science-laden strategy that provoked their rage, fear, disappointment and sense of abandonment, producing their own knowledges about things that were not addressed by authorities or by experts. This included the health risks related to the production of dioxins by ARAUCO’s factory, the socioeconomic impacts that the disaster was causing on riverside communities, the disaster’s institutional fabrication and, above all, the death and suffering of the swans (Acción por los Cisnes 2004, 2005a, 2005b, 2005c, 2005d, 2005e, 2006).

This alternative knowledges entailed salient performative effects. On the one hand, they were decisive in connecting the Río Cruces disaster with the workings of Chile’s environmental frame. By showing how the disaster had been institutionally fabricated, the “doings” of the Valdivian movement took part in the breakdown of Chile’s environmental frame and its consecutive reform. On the other hand, the alternative knowledges produced by citizens performed a world in which close entanglements between humans, rivers, wetlands and swans are not secondary or awkward but central to peoples’ ways of life. Such non-dominant worlds circulated nationwide, attached to images of suffering swans and the testimonies of humans affected by their pain, which were continuously reproduced by the media and especially by TV stations, as Chapter 9 describes. In these non-dominant

worlds, swans are not “mere” birds or objects of scientific or economic attention but the protagonists of an ontological struggle between alternative modes of inhabiting in Valdivia.

In what follows, I review how a movement that appeared to be a local, single-issue struggle, like many others that had come about in the past two decades throughout the country, was in fact an association of citizens and swans that configured the Río Cruces disaster as an ontological struggle with the capacity to unsettle the foundations of Chile’s environmental edifice. To do so, I move away from interpretations that attribute the disaster’s saliency and sociopolitical effects to the abstract “power” of organized citizens. I follow instead the “doings” of the citizen/swan association and describe how they became involved in the ontological fractures that gradually took shape in connection with the disaster.

Such “doings” include, first of all, the production and circulation of images of swans, their suffering and their face-to-face encounters with humans, which I describe in detail in Chapter 9. They also include the preparation and dissemination of documents, presentations, brochures and other materials that carried the movement’s own knowledges: the systematic description of how, step by step, through decisions, measures, and concrete actions and omissions, the Río Cruces disaster and the massive death of the Valdivian swans had been institutionally fabricated. I review how –according to various actors, including past ministers and business representatives– by exposing the workings and failures of the country’s environmental frame, this knowledge was crucial to such frame’s cataclysmic collapse. Finally, I describe how the human/nature entanglements mobilized by the movement of the swans gave way to an ontological struggle surrounding Valdivia’s identity, one whose marks are still visible in the daily life of the city and its inhabitants.

8.2 How Chile's Environmental Frame Began to Fall Apart

A still unofficial report contracted by CONAMA to assess ARAUCO's mill operation reached the hands of the movement's spokespersons by November 2004, soon after the second assembly of citizens was held (MA&C 2004). The document contained a large list of nonfulfillments of the mill's environmental permit as well as unlawful behaviors carried out by ARAUCO during its construction and operation –detailed in Chapter 6– including untreated wastes that had been illegally dumped into the Río Cruces. The report, kept confidential by the government, deepened the feelings of rage and fear amongst citizens.

The movement's second assembly coincided with the visit to Valdivia of Paulina Saball, the National Director of CONAMA, who had come to agree upon the terms of UACH's study with its chancellor. The assembly headed to UACH's headquarters to meet her.

Frustrated by the lack of more concrete measures, people expressed their mistrust of the scientific path being followed. When asked what the government would do if the study confirmed ARAUCO's responsibility, Saball babbled an unconvincing answer (Sepúlveda 2007). Attempting a more reassuring response, she made a commitment: she would come to Valdivia to receive UACH's final report and confront its conclusions with an audience of citizens (Sepúlveda 2007). Six months later, Saball failed to honor this promise.

Those who a decade earlier had believed in another promise made by authorities who had assured that no perceptible effect would be caused by ARAUCO's factory were now unable to understand why, despite the mill's unlawful behaviors, authorities were more concerned with not violating its right to operate than with stopping the threats that the disaster represented for Valdivians. The most basic confidence that citizens still had in that the government's ability to protect them abruptly began to fall apart:

- “I was so outraged (...). I said, ‘how naive I was’ (...). It wasn’t possible to trust anymore (...), it was so disappointing (...). [Then] I still believed in institutions (...). It was too hard, too hard. A slap.”²¹⁴
- “(...) suddenly a system that came from the upper levels began to suffocate us. It was like a species of rebellion (...) perhaps this is how wars begin (...) because, oh god how much rage I felt!”²¹⁵

For the first time in the lives of many Valdivians, they were becoming aware of the severe institutional weaknesses and negligent practices that the disaster was dramatically revealing.

A massive loss of innocence was prompted within them:

- “I (...) said, ‘this cannot be true (...), they lied to me!’ (...). The entire political, economic and social system of our region was polluted (...). [It was] such a level of discredit and devaluation of public institutions!”²¹⁶
- “It changed my vision. I had always tried to be just, honest (...). It [also] changed many people who [until then] did not believe things were this [awful] way.”²¹⁷

Meanwhile, UACH’s team made public its first partial report. The distrust that citizens felt towards scientists was reinforced by these preliminary conclusions, as confirmed in the first position document prepared by Acción por los Cisnes. The document was handed to the Environmental Commission of the Chamber of Deputies, which visited Valdivia on December 17, 2004 to hold a public session sparked by the ongoing disaster. Such visit confirms the commotion that the death of the swans was provoking beyond Valdivia.

In their first public document, citizens questioned the credibility of UACH’s scientists (Acción por los Cisnes 2004). They asked how the same scientists that compliantly took part in the approval of ARAUCO’s mill could now affirm that there was a lack of knowledge

²¹⁴ Interview conducted by the author for this research.

²¹⁵ Interview conducted by the author for this research.

²¹⁶ Interview conducted by the author for this research.

²¹⁷ Interview conducted by the author for this research.

about the wetland. Were they not conscious of such limitations seven years ago, when the mill was approved and they remained silent about its potential impacts? Why didn't they recommend more rigorous studies of the risks involved instead of preparing such weak ecological baselines for the wetland?

The position document also narrated the sequence of interventions by public servants, national authorities and scientists that led to the approval of ARAUCO's mill, all of them detailed in Chapter 5. They emphasized that despite the recommendations made against it by public officials who rejected the mill due to the weaknesses of its baselines –the same ones prepared by UACH's scientists– were finally forced to approve it, subject to several conditions, after ARAUCO's investment received the backing of then President Frei. The main condition imposed was a tertiary treatment that political authorities assured would prevent any potential harm to the wetland (Acción por los Cisnes 2004).

The critical review of these events surprised the deputies. In the coming months, citizens invested great efforts in expanding this knowledge of the disaster's fabrication through a detailed review of the mill's assessment, its environmental permit and its conditions of operation (Acción por los Cisnes 2004, 2005a, 2005b, 2005c, 2005e, 2006). Although many of the deficiencies involved had been partially described in the past (Sepúlveda and Mariángel 1998; Sepúlveda and Villarroel 2010), they had never been seriously attended.

However, the primary message communicated by citizens in the document for the deputies was that, contrary to what regional authorities were then affirming, the disaster's severity was increasing. According to citizens, "the numerous swans that have fallen in the past days in full flight –some dead– within Valdivia's urban area" were proof of this (Acción

por los Cisnes 2004). Citizens also pointed to the swans' unusual behavior as an "undeniable sign of severe deterioration" (Acción por los Cisnes 2004). Finally, attempting to transmit their deepest impressions, they described that recent visits to the wetland revealed "a bleak scene: those swans that remain in the wetland find themselves increasingly malnourished due to the lack of food, and are so weak that they are unable to fly in search of a more appropriate place for subsistence" (Acción por los Cisnes 2004).

Before the end of 2004, the movement had met with the National and Regional Directors of CONAMA, the *Intendente* [Regional Governor], Valdivia's Governor, the City Council, and several other authorities and public servants. Based on the systematization of facts evidencing the disaster's fabrication, citizens had demanded from all them immediate preventive measures beginning with the temporary closure of ARAUCO's mill. Authorities, in turn, had claimed that such a measure was not legally feasible. Meanwhile, additional evidence of the disaster's severity and of ARAUCO's nonfulfillments kept growing.

In response to statements made by the Governor of Valdivia affirming that the swans were recovering and reaching "an equilibrium" (Diario Austral de Valdivia December 4, 2004), citizens decided to generate their own evidence about the disaster's progression. To do so, Eduardo Israel, a pilot, and Daniel Boroschek, a veterinarian, two of the movement's spokespersons, developed an aerial census of the swans. They flew over the wetland and took more than one thousand georeferenced pictures, concluding that the swans continued declining and had reached an historical minimum.²¹⁸ One month later, CONAF reported

²¹⁸ The study was titled "*Levantamiento Aerofotográfico del Santuario de la Naturaleza del Río Cruces*" [Aerophotographic Scoping of the Río Cruces Natural Sanctuary].

that only 289 swans remained in the wetland, the lowest number ever censused (Diario Austral de Valdivia March 4, 2005).

By January 2005, citizens were convinced of something difficult to admit: authorities were unable to propose satisfactory measures or assure that pollution would not reach Valdivia because they were, quite simply, outstripped, as citizens and politicians recount:

- “(...) nobody [in CONAMA] had the capacity to manage the situation (...) there were no prepared technicians (...) they were completely surpassed.”²¹⁹
- “Who is in charge? (...) there was no answer!”²²⁰
- “Faced with evidence of the disaster there was no institutional response.”²²¹

Hence, before the eyes of astonished citizens, the disaster was also laying bare the impoverished job of the environmental agencies in charge of overseeing the mill’s impacts once it began to function. The mill’s self-monitoring reports, which confirmed the occurrence of huge toxic discharges during its first months of operation –as Chapter 6 details– had been accumulating on the desks of CONAMA’s servants without ever being seriously reviewed. In addition, the reports of abnormal events occurring in the sanctuary recorded in the blogs of the wetland’s wardens had gone unnoticed –or perhaps were even silenced– by those in CONAF who were responsible for taking care of the protected wetland. These omissions had impeded a timely response to the sanctuary’s collapse.

Under the attentive scrutiny of mobilized Valdivians, and through the systematic recording and dissemination of relevant information in the documents and reports prepared by these citizens, the disaster was revealed as a long list of failures of the agencies charged with

²¹⁹ Interview conducted by the author for this research.

²²⁰ Interview conducted by the author for this research.

²²¹ Interview conducted by the author for this research.

protecting, monitoring and overseeing the river, the wetland and the swans. In particular, citizens focused their efforts on the changes that ARAUCO had illegally introduced to its mill against the conditions established in its environmental permit. Contrary to what authorities had asserted thus far, and based on the information generated by ARAUCO itself, Acción por los Cisnes demonstrated that the mill had been making use of unauthorized productive capacity (Sepúlveda 2007). This meant that the company had violated the law (Acción por los Cisnes 2005e, 2006). Based on the movement's claim, as detailed in Chapter 6, on January 18, 2005, COREMA ordered the first-ever preventive closure of an industrial operation of this size in Chile. However, the closure lasted less than one month, while the disaster worsened.

From this moment on, the movement's efforts focused on disseminating the evidence gathered and systematized. To do so, they implemented an intensive educational campaign in Valdivia. Hundreds of people of all ages and profiles –from physicists to teachers, students to academics, and landowners to social leaders– attended these presentations or were visited by the movement's representatives at their regular meetings. A permanent stand was installed in Valdivia's main square where brochures and posters were distributed.

These efforts were replicated nationally by taking part in seminars, advancing legal and administrative actions, sending official letters, preparing position papers and providing evidence to newspapers and interviews to TV stations, all the while meeting with authorities, international missions, Euro deputies, artists, journalists, renowned academics, experts and lawyers. As Chapter 9 describes, side-by-side these “hard” facts and arguments citizens put into circulation videos, pictures, documentaries, cartoons, posters and all sorts

of testimonies revealing the suffering of the swans and the human responses to it. The consequences of these efforts were pervasive.

The previously excluded knowledges articulated and circulated by Acción por los Cisnes allowed for the first time the construction of a detailed picture of the workings of the country's environmental institutions by illustrating, step by step, how the disaster had been fabricated. One of Chile's most influential environmental leaders reflected the following:

“(…) this systematization (…) allowed us to see the whole movie (…), how the system was really behaving (…). [It was] the perfect sequence of all that had been diagnosed since the year 1995 (…), the confirmation of each element (…). It helped to make sense of everything that had been happening [so far].”²²²

This systematic picture had destabilizing effects. Now, it was not only Valdivians who were aware of how the country's environmental frame was fully implicated in fabricating the disaster from the very first moment that the location of the pulp-mill was defined by ARAUCO. Even the most experienced authorities began to genuinely realize and acknowledge that such a frame had serious pitfalls that needed to be addressed. The disaster turned into an eye-opening event, as a past minister and a congressman put it:

- “(…) the movement (…) made evident (…) a foundational error in the way of conceiving this mill in that place.”²²³
- “It took me a while to realize the atrocity of having approved a project in a wetland like this. I said, ‘Who did this atrocity? How could something like this occur?’(…). I became aware of the enormous fragility of the regional government [in charge of environmental assessments].”²²⁴

²²² Interview conducted by the author for this research.

²²³ Interview conducted by the author for this research.

²²⁴ Interview conducted by the author for this research.

As a result, former authorities who had energetically backed the approval of the mill in the mid 1990s also began to point to the weaknesses of environmental institutions as responsible for the damage that occurred in the wetland. One of the most outstanding cases corresponds to Valdivia's past senator Gabriel Valdés, who –as Chapter 5 details– not only enthusiastically supported the approval of ARAUCO's mill, but also accused its opponents of being ignorant: “This situation demonstrates that our legislation is not sufficient and that the bodies in charge of providing [environmental] permits are comprised of many people who are not experts in these topics,” Valdés stated (Diario Austral de Valdivia April 20, 2005). Moreover, in a gesture very uncommon amongst Chile's political elite, some local authorities also demanded the accountability of those who had pressured for the approval of ARAUCO's mill in the 1990s:

“As this environmental, political and social conflict evolves there is a position that has begun to acquire more strength, and that is the questioning of those who authorized the project and did not prevent its impacts, as declared by the mayor of Valdivia, Bernardo Berger” (Diario Austral de Valdivia May 5, 2005).

In brief, as one of Chile's most renowned environmental leaders put it, the movement's “doings,” and particularly the production and circulation of a novel knowledge describing how exactly the disaster had been fabricated, provoked “*the absolute collapse of the institutional environmental frame*” becoming “the perfect opportunity” to argue for its reform.²²⁵ The enabling conditions for such reform –which had been so long resisted by business actors and postponed by the government– were now finally set.

Indeed, as a past minister fully involved in preparing said reform explains, the main driver behind it was not Chile's prospective incorporation into the OECD, as many have argued

²²⁵ Interview conducted by the author for this research.

(see Tecklin et al. 2011). According to this past minister, even though the report through which the OECD's assessed Chile's environmental frame in fact favored the critical revision of these institutions –as Chapter 6 describes–, such report lacked the capacity to trigger, by itself, the type and scale of changes ultimately introduced. Therefore, this interviewee adds, the only way of understanding the *momentum* for the reform, that is, the amount of political support it gained and the scope of the changes that it finally considered, is acknowledging the crucial role played by the Valdivian mobilization. No other event “has had the force that the case of the swans had in reforming the institutional frame,”²²⁶ this past minister adds. Thus, although the reform probably would have occurred anyway, the disaster not only accelerated it, but also, above all, enabled changes that were more substantial than expected, especially by those who had long been opposed to it.

In sum, the direct effect of the Valdivian disaster was that it turned politically unfeasible not to make the reform, as Ricardo Katz (2010), an influential environmental consultant, has affirmed. This opinion is backed by an interviewee who is a former national official involved in the reform, according to whom the disaster turned the deficiencies of Chile's environmental frame in “*undeniable ones.*”²²⁷

As this section has shown, the Río Cruces disaster, mediated by the agency of the citizens/swans association, provoked the breakdown of the country's environmental framework and opened the space for its major redesign. The depth of such a fracture was consistent with the one that the disaster also provoked in the dominant business model that

²²⁶ Interview conducted by the author for this research.

²²⁷ Interview conducted by the author for this research.

had until then prevailed in Chile, detailed in Chapter 6. Moreover, for some it also touched the democratic system as such, as a Valdivian citizen describes:

“[The disaster] provoked a huge breakdown (...) to see the fragility of our environmental frame (...) in the end what became weakened, evidencing its vulnerability, was our democracy.”²²⁸

Indeed, as one of Lagos’ past political ministers states, the disaster revealed a great, systemic fracture that extended into Chile’s overall institutional setting:

“What I began to discover (...) were great warnings of something that did not smell right in all of the institutional setting (...). Chilean institutions were in their totality questioned as result of this event.”²²⁹

Thus, beyond the institutional changes that the disaster provoked, what this extended fracture demonstrated was that the world previously tied to and sustained by the workings of Chile’s environmental frame had lost ontological density and was beginning to fall apart. Such dominant world had been shaped in connection to the technocratic knowledges upon which Chile’s system of environmental decision-making was founded. Within such technocratic grounds there was no room for things like the suffering of animals, the fears of citizens or local identities. Now, confronted with the alternative knowledges articulated around injured swans, polluted rivers and shocked citizens, the formerly dominant mode of performing Chile’s environmental institutions was weakened and forced to open the space for non-dominant worlds like those taking form in Valdivia.

²²⁸ Interview conducted by the author for this research.

²²⁹ Interview conducted by the author for this research.

The major confirmation of such ontological weakening was that political authorities and business actors finally agreed that environmental institutions were definitively surpassed and needed to be changed. As Rodrigo Pizarro (2007:3) put it:

“(…) it was not until the images of black-necked swans dying on primetime TV, and the incapacity of environmental authorities to respond to this public alarm, that the perception of political actors about environmental institutions finally changed.”

In Valdivia, this ontological confrontation was also framed around the city’s identity.

8.3 A City Built Upon Rivers and Wetlands

“Wetlands are part of Valdivian way of life,” read a press note announcing Acción por los Cisnes’ 2005 summer campaign (Diario Austral de Valdivia February 3, 2005). The same note added that Valdivia, “located in a zone of wetlands, has built its life and history around these ecosystems. Their destruction constitutes a warning for the flourishing of life, compromising the province’s integral development.”

This performance of Valdivia, defined in connection with the wetlands that surround the city, was a novel one in early 2005. Until then, wetlands were not an actor for most Valdivians. That is, not only were they not acknowledged as particularly valuable ecosystems, they also lacked the capacity to “do” things such as entangle themselves with the identity and way of life of Valdivians. Moreover, as an active member of Acción por los Cisnes notes, even the term “wetland” was unfamiliar for most Valdivians: “(…) the word wetland didn’t mean anything for the average Valdivian (…). It didn’t recall an image (…). After (…) it was: ‘Wetland, oh, of course! (…): the habitat of the poor swans!’”²³⁰

²³⁰ Interview conducted by the author for this research.

The enactment of wetlands as integrated into Valdivia's identity was not merely "invented" by the movement. It was the result of the ontological enhancement of identitarian traits that already existed locally but were then still marginal. The first of these traits has to do with conceiving Valdivia as a "beautiful" city, a place of aesthetic appeal of which its inhabitants feel proud, as noted by these interviewees who live in Valdivia:

- "There is no Valdivian that does not say that Valdivia (...) is one of Chile's most beautiful cities."²³¹
- "Even people who have not been here [in Valdivia] know that it is pretty."²³²
- "Valdivia is a city that everybody considers one of Chile's most beautiful."²³³

Strongly associated with Valdivia's beauty, a second trait expanded through the local response to the disaster was the city's closeness to its natural surroundings and, particularly, to its rivers, as Chapter 4 details. Valdivia is not only structured around two major rivers – the Río Calle-Calle and the Río Valdivia– but the daily lives of Valdivians are connected to them through the daily crossing of bridges, the walks along the riverside, the weekend visits to the fluvial market, the river navigation, and many other related activities. This connection was highlighted by interviewees, from academics to authorities and citizens:

- "We are a city that is integrated with nature."²³⁴
- "(...) the identity of this city, is that of a fluvial city, a city of water."²³⁵
- "(...) there is no one who does not adore the river, who has not sat down to contemplate it... (...). The relation of Valdivians with the water is strong."²³⁶
- "(...) the region and especially Valdivia have an identity linked to the aquatic element, to the rivers."²³⁷

²³¹ Interview conducted by the author for this research.

²³² Interview conducted by the author for this research.

²³³ Interview conducted by the author for this research.

²³⁴ Interview conducted by the author for this research.

²³⁵ Interview conducted by the author for this research.

²³⁶ Interview conducted by the author for this research.

Those who have chosen Valdivia as a place to live and who, as noted, were a key group within the local mobilization, point to the connection that Valdivians have with the city's surrounding landscape as a key force that helps explain their response to the disaster. This vision is backed by citizens, academics, regional authorities and politicians:

- "I adopted Valdivia because I fell in love with the city, with its surrounding (...). This is a city that has a human scale, full of nature and beauty."²³⁸
- "(...) the identity of this city, and the reason for which I live here (...) is the rain, the wetlands, the forest, the water. There is a symbiosis."²³⁹
- "(...) we could have chosen any other place in the world. But we came to Valdivia (...) it has to do with the river, the colors, with nature."²⁴⁰

Perhaps because of these experiences, Valdivian society is considered by observers as "more sensitive" to environmental issues. This is conveyed, for example, by the existence of a higher number of environmental organizations compared to the rest of the country. In 2004 Valdivia was, in fact, considered the Chilean city with the highest rate of environmental NGOs *per capita*. Although these perceptions are not backed by further comparable indicators, the descriptions made by public servants, national authorities, ARAUCO's officers and politicians are consistent in indicating that Valdivians have an outstanding environmental awareness. For the following business-related actors, this trait explains why Valdivians demand higher environmental standards from them than the populations of other Chilean cities:

- "(...) with or without ARAUCO [Valdivia] has (...) a special sensibility that is higher in these kinds of issues compared with other cities. Clearly (...). Two years

²³⁷ Interview conducted by the author for this research.

²³⁸ Interview conducted by the author for this research.

²³⁹ Interview conducted by the author for this research.

²⁴⁰ Interview conducted by the author for this research.

ago we tried to increase the mill's production (...). In Nueva Aldea we could (...). But in Valdivia (...) it was a scandal (...) everything is harder."²⁴¹

- "Valdivia reacted as a community also because, and this is something that I learned, it has a very high, very high, valuation of what its habitat means."²⁴²

This perception is also shared by past political and environmental officials who have been responsible for dealing with the demands of Valdivian citizens:

- "Valdivia (...) has an approach to environmental topics that is of a higher sensitivity than the country's average."²⁴³
- "Authorities know that Valdivian society (...) does not stay quiet with a simple response but needs details, technical data and a well elaborated discourse (...) there is knowledge about these topics."²⁴⁴

In sum, the strong identitarian connection with the river synthesizes what Valdivians describe as their singular mode of inhabiting in this landscape: an identity that is tied to a higher environmental sensitivity and explains why citizens are more demanding about environmental practices and react so energetically when their local habitat is threatened.

Figure 2: A Poster by Acción por los Cisnes: Summer 2006



Author: Pablo Schalscha

8.4 The Fracture and Remaking of Valdivia's Identity

The distress provoked in Valdivia by the swans' massive death cannot be understood unless we attend to the strong connection that Valdivians already had with "their" rivers.

²⁴¹ Interview conducted by the author for this research.

²⁴² Interview conducted by the author for this research.

²⁴³ Interview conducted by the author for this research.

²⁴⁴ Interview conducted by the author for this research.

As a Valdivian-born citizen explains, it was because the river was threatened by the mill's pollution that the city's entire identity was also perceived as being at risk:

“A great rage took over me [when the disaster begun] (...). I was born near the water (...), always the water. And the Río Cruces was for me like *my* river (...), then (...) the river was destroyed! (...). Anything that severely affects the river has a very powerful social impact.”²⁴⁵

This bond with Valdivia's rivers, built throughout the city's history as Chapter 4 details, constitutes the ground upon which the unprecedented response to the death of the swans was first sustained. The dying swans were seen as the main symptom of the river's pollution. It was only as the disaster unfolded that the existing bond between Valdivians and their rivers also enrolled along an emerging bond between the swans and the wetland, which –as Chapter 4 details– was until then missing. Only then could the swans become the symbolic synthesis of the network of actors organized in response to the disaster around Valdivia's reconfigured identity. This is how citizens and politicians describe the role of the swans in the remaking of the city's identity:

- “[Valdivia's identity] is well represented by the swan (...) not in abstract terms (...) but the black-necked swan ‘in’ the wetland.”²⁴⁶
- “The swan did something that has to do with our identity in Valdivia. I mean, the rain, the river, the swan (...) equals Valdivia.”²⁴⁷

As one Valdivian interviewee, a respected intellectual, put it, this nascent bond with the swans implied recognizing that an ontological mutation had affected these birds:

“The fact that the swans were transformed into the protagonists of the disaster made them shift into another category (...) before [the disaster] being close to the swans

²⁴⁵ Interview conducted by the author for this research.

²⁴⁶ Interview conducted by the author for this research.

²⁴⁷ Interview conducted by the author for this research.

was an aesthetic experience. Now, if you will, it is a political experience. Thus, the swan has been transformed into something different.”²⁴⁸

Indeed, the swans became overt political agents, able of mobilizing through their suffering the defense of that part of Valdivia’s identity that had long remained hidden and subject to dominant notions of development, as these two members of Acción por los Cisnes recall:

- “(...) the black-necked swans awakened something (...) the city was in need of expressing for too long: the valuation of Valdivia’s surroundings.”²⁴⁹
- “We finally acknowledged the bond (...) and we also defended it (...) what one finally felt was, ‘What are they doing to my swans, to my city?’”²⁵⁰

Beyond its material impacts, what the disaster was really threatening, then, was what many Valdivians considered as the city’s unique “way of life.” As a Valdivian who is part of national political networks and a leader of Chile’s environmental movement recount:

- [The disaster] impacted not only the environment but the way of life of our city.”²⁵¹
- “What was at stake was an identity, a way of inhabiting that territory and of thinking oneself in that territory.”²⁵²

Therefore, the disaster sparked an ontological struggle around the city in which people ultimately “wanted to live.” Two confronting worlds emerged. On one side, there was the city tied to polluted rivers and dead swans, brought to life through ARAUCO’s mill. On the other side, there was the city that could flourish around its fluvial life and a healthy sanctuary, brought to life through the swans and their defense.

This ontological confrontation literally “took over” the city during months and years, not only through the marches of citizens and ARAUCO’s workers, but also through the debate

²⁴⁸ Interview conducted by the author for this research.

²⁴⁹ Interview conducted by the author for this research.

²⁵⁰ Interview conducted by the author for this research.

²⁵¹ Interview conducted by the author for this research.

²⁵² Interview conducted by the author for this research.

about the consequences that the disaster was having on their way of life and their prospects for the future. The local newspaper, the university's classrooms, the agendas of public agencies, the decisions of business associations, the ordinary sessions of organizations, and the dinner-time conversations of families were all captured by this struggle surrounding the city whose creation people wanted or did not want to support. As these city residents describe, this was not a calm and peaceful conversation. Rather, it was an emotionally charged and heartbreaking one that even tore apart many long established relationships:

- "(...) it was like an horrendous thing, like this could not be happening in Chile's most beautiful city (...). It wasn't intelligible."²⁵³
- "(...) that a disaster was happening here, I mean, nobody could sit back idly."²⁵⁴
- "It was super shocking (...) it was hard. I lost many friends. Almost all of them."²⁵⁵
- "I lived a complete transformation. I think it happened to many of us. I mean, a before and after. And I think the city also lived it."²⁵⁶
- "Amongst my peers [in the university] (...) everybody wanted CELCO [ARAUCO] (...) [but] in my case it was imposed (...). Many relations began to break apart."²⁵⁷

To a great extent, the intensity of this confrontation had to do with the painful deceit that Valdivians perceived in the unfulfilled promises of development –those in exchange for which they had backed ARAUCO's mill in the mid 1990s, as Chapter 5 details. This deceit, as stated, also involved their innermost trust in environmental and democratic institutions, for it had been past President Frei himself who not only pressured for the mill's approval, but also assured that no risk of damage to the wetland existed, as citizens recall:

- "Frei's (...) support for this large company (...) produced great damage to Valdivia."²⁵⁸

²⁵³ Interview conducted by the author for this research.

²⁵⁴ Interview conducted by the author for this research.

²⁵⁵ Interview conducted by the author for this research.

²⁵⁶ Interview conducted by the author for this research.

²⁵⁷ Interview conducted by the author for this research.

- “I thought that they [politicians] were trustworthy (...) but I began to feel that (...) they knew something like this could happen.”²⁵⁹

ARAUCO’s failure to fulfill its promise of development was also seen as a demonstration of a business model that –as Chapters 3 and 6 described– began to be revealed as detached from local communities and their ways of life, as a past political authority recounts:

“This company did not enjoy sympathy (...) [it] does not treat its subcontractors well, it does not generate identity (...). It is not a company that generates permanent links with society (...). It simply buys services, justifies its duty, and does it.”²⁶⁰

As the disappointment surrounding ARAUCO’s mill grew amongst Valdivians, the until then dominant notion of development that the factory represented and its connections to the city’s industrial past began to be challenged for the first time. As one interviewee who is a renowned politician puts it, this challenge was considerable enough that ARAUCO’s “development model, did not have any support.”²⁶¹ Citizens, in turn, express it as follows:

- “(...) the construction of this mill is one of our biggest errors.”²⁶²
- “(...) the company killed us, it killed many of our projects, dreams for the city.”²⁶³
- “It was an annoyance that here in Valdivia they brought us [the mill] (...) a lack of respect (...) an insult to the planet: why did they put this thing here? (...) we were so at peace with our landscapes (...). We were great!”²⁶⁴

Gradually, then, dominant modes of framing Valdivia’s development around the logic of large industrial investments such as ARAUCO’s mill, which were tied to Valdivia’s industrial past, as described in detail in Chapter 5, were questioned and confronted. In the

²⁵⁸ Interview conducted by the author for this research.

²⁵⁹ Interview conducted by the author for this research.

²⁶⁰ Interview conducted by the author for this research.

²⁶¹ Interview conducted by the author for this research.

²⁶² Interview conducted by the author for this research.

²⁶³ Interview conducted by the author for this research.

²⁶⁴ Interview conducted by the author for this research.

words of the same politician quoted above, “the havoc and gigantism of these mills (...) was concretely reflected in the death of the swans.”²⁶⁵ Opposing these dominant notions of Valdivia’s development, alternative trajectories of the city’s future, which co-existed locally but had remained marginal, began to emerge, take shape and gain strength. For the first time ever in Valdivia’s history, environmental concerns jumped to the core of the city’s and the region’s visions of development, involving public and private agendas:

- “One of the movement’s achievements (...) is that it finally raised environmental issues in the city.”²⁶⁶
- “(...) many people realized that we had an opportunity we were losing.”²⁶⁷
- “This was a transcendental change (...) a conversation that did not exist before (...) behind the issue of the swans, there was always the issue of the river and of tourism, of the region’s sustainability.”²⁶⁸

These new visions unsettled the assumptions upon which such trajectory had been founded so far, and this was particularly true of Valdivia’s “Agreed Agenda” [*Agenda Pactada*]. This was a formal agreement reached in the early 1990s by the region’s political and economic elites –which Lagos replicated nationally under his administration– that had been the navigation chart for the most strategic decisions involving Valdivia’s path of development. As one of the movement’s spokespersons details:

“Before, there was an attitude of an Agenda Pactada that was like, ‘Sorry, businessmen and great powers have already agreed on the city’s project (...) we already resolved it (...)’. Now (...), what we wanted wasn’t so clear. Then, ok, let’s put the Agenda Pactada away and allow new things come.”²⁶⁹

²⁶⁵ Interview conducted by the author for this research.

²⁶⁶ Interview conducted by the author for this research.

²⁶⁷ Interview conducted by the author for this research.

²⁶⁸ Interview conducted by the author for this research.

²⁶⁹ Interview conducted by the author for this research.

The intensity of this confrontation was such that by April 2005, after the mill was causally linked to the disaster by UACH's scientific report –as described in Chapter 7– many in Valdivia began to speak about what only a few months earlier was simply unthinkable: the mill should be closed and ARAUCO should leave Valdivia. Not only for what it had done to the wetland, but also for what it was doing to Valdivia's future.

Accordingly, when in May 2005 UACH's past Chancellor and winner of Alternative Nobel Prize in Economy, Manfred Max-Neef, was interviewed by the local newspaper, he made his stance clear regarding the benefits of the mill's closure. He argued that ARAUCO not only represented a certain type of development and the sort of jobs associated with it, but further, that to choose the path of the pulp-wood business for Valdivia implied –as the disaster had shown– literally destroying the possibility of a very different development model and of very different jobs connected to Valdivia's rivers, wetlands and swans:

“CELCO [ARAUCO] not only does not create jobs, but destroys them for others (...). The sanctuary's catastrophe has caused serious economic repercussions (...); it is immoral to try to blame the defenders of the sanctuary for the jobless people that the mill's closure will leave behind” (Diario Austral de Valdivia May 11, 2005).

Therefore, Max-Neef argued, the economic cost of the pulp-mill's closure –highlighted by those who opposed such a drastic measure– should be analyzed considering all the benefit that it would generate in the long-run through the flourishing of the alternative path of development that ARAUCO was now killing:

“(...) the benefit, present and long-term, that the mill's closure will bring will be much greater than the harm that will result if it continues to operate under the current conditions (...). If only in six months of contamination damage of such a magnitude was generated, what can we expect in two or three more years? Simply, that toxins will end up (...) inside the human body” (Diario Austral de Valdivia May 11, 2005).

It became evident that a significant number of Valdivians found their identities and ways of life to be closer to such non-dominant views and priorities than to the vision and decisions put forward by those who, in the mid 1990s, had strongly backed the mill's approval, as Chapter 5 details. As a Valdivian politician describes it:

“An eruption of questionings of (...) the model of development was generated. Yes. Absolutely (...). Absolutely.”²⁷⁰

The ontological struggle unfolding around Valdivia's identity was so intense that it reached the presidential campaign during 2005. In April 2005, during a televised presidential debate between the candidates of the governing *Concertación*, Soledad Alvear, former minister of justice and member of the coalition most conservative party—the *Democracia Cristiana* [Christian Democracy]—declared that if ARAUCO's mill had violated the law it should be sanctioned and closed (La Tercera April 27, 2005). In turn, Joaquín Lavín, a right-wing candidate, declared through the press, “I don't want a development with dead swans” (La Tercera April 24, 2005). Only a few months earlier, such declarations were simply impossible to make for any of these mainstream politicians.

8.5 Tracing the Marks of Emerging Worlds

As non-dominant modes of relating to nature gained space and materiality within Valdivian society, the ongoing ontological struggle was also intensified within the movement, where different modes of relating to the sanctuary and the swans had taken shape. Additionally, in the context of the heated atmosphere created by the 2005 presidential campaign, some citizens questioned what they considered a subordination of the disaster's effects on humans to the swans and their suffering. This debate gave way to the movement's reframed

²⁷⁰ Interview conducted by the author for this research.

campaign, now centered on the risks that the dioxins and furans produced by pulp-mills could represent for humans. Such reframing was largely due to the fears raised by “*la mancha*” [the slick], the brownish mass of polluted water that was bringing the wetland’s pollution to downtown Valdivia, as described in Chapters 4 and 7. However, rather than moving the suffering of the swans to a secondary position, this reconfiguring affirmed the connection between humans and swans. By showing that the pollutants accumulated in the sanctuary were also reaching the city, “*la mancha*” also revealed that Valdivians and swans were both inhabitants of *the same wetland*, as represented in this postcard (see Figure 3).

Valdivia’s identity was now fully entangled to wetlands. The invisible place occupied by these ecosystems until 2004 had now come to light, as citizens and authorities describe:

- “(...) the movement of the swans allowed many people to have a view of the city from above (...). That is what we tried to reflect on the postcard of the wetland-city: trying to understand where we finally lived.”²⁷¹
- “(...) few cities in the world are built on a wetland (...): Valdivia is on top of a wetland.”²⁷²
- “(...) anyway, this is a ‘wetland-city’!”²⁷³

Figure 3: Postcard: “Valdivia, The Wetland-City”



Author: Bruno Bettati

The ecological collapse of the sanctuary served to enact the wetland –and the whole system of wetlands in the midst of which the city is founded– as constitutive of a “mode of life” distinguished by the particular way in which Valdivians relate

²⁷¹ Interview conducted by the author for this research.

²⁷² Interview conducted by the author for this research.

²⁷³ Interview conducted by the author for this research.

to nature. The wetland, therefore, became a vital part of the city's identity. Valdivia was now seen as *being within the Río Cruces wetland*. It was a “wetland-city.”

Today, the marks of these emerging worlds, in which humans, rivers, wetlands and swans are considered actors connected to the city's project of development, are everywhere. To begin with, middle- and working-class associations, such as those that comprise the city's Union of Neighborhood Associations [*Unión Comunal de Juntas de Vecinos*], have for the first time ever begun to centrally focus on environmental issues. As one of its historic leaders explains, persuading these organizations to attend to the movement's message was not easy. However, they not only officially supported Acción por los Cisnes but also incorporated the movement's demands into their own. As this same leader recounts:

“(…) it was super difficult to convince the rest of the leaders that the movement was right and the company was wrong, because they were awaiting progress and development for Valdivia [coming from ARAUCO's mill] (…). As time went by, the support from local leaders increased (…). Today there is environmental awareness in the union, and that did not exist before.”²⁷⁴

Simultaneously, a new wave of environmental organizations emerged in Valdivia, which many consider to have been an effect of the movement in defense of the swans:

- “(…) many associations are people from the movement who came together.”²⁷⁵
- “[The movement] permeated many other things that happened later in Valdivia (…) for example barter [*trueque*] emerged from there.”²⁷⁶
- ““These groups, where did they come from, finally?” And one sees that they were born from the movement of the swans!”²⁷⁷
- “It sounds strange, but [the movement] was like a cultivation field.”²⁷⁸

²⁷⁴ Interview conducted by the author for this research.

²⁷⁵ Interview conducted by the author for this research.

²⁷⁶ Interview conducted by the author for this research.

²⁷⁷ Interview conducted by the author for this research.

The movement has also inspired projects for the protection of wetlands in working-class neighborhoods, the most notable being the *Catrico Environmental Park and Wetland*. This is a 40 hectare urban park of previously abandoned urban lots, promoted since 2006 by local associations of neighbors that represent about 20,000 inhabitants. Its objective is to transform one of “the largest clandestine rubbish dumps in southern Chile into a park of wetlands and sports, enclosed in working-class neighborhoods [*poblaciones*].”²⁷⁹ The way in which the Valdivian movement brought together such a diversity of citizens and offered them all a space is seen by leaders of the Catrico wetland-park and spokespersons of Acción por los Cisnes as determinant in the emergence of this type of initiative:

- “(...) this project [the Catrico park] also is born, I think, from the environmental awareness created by Acción por los Cisnes.”²⁸⁰
- “[Acción por los Cisnes fostered] the convergence between a more professionalized world and the world of the working-class neighborhoods.”²⁸¹

The Río Cruces disaster also left lasting marks on the vision of development of the *Región de Los Ríos* [The Rivers Region] –of which Valdivia is the capital– which was created in 2007 after decades of mobilization. The corresponding Regional Development Plan approved in 2009 (Gobierno de Chile 2009) includes for the first time the protection and conservation of wetlands as a priority. In addition, one of its seven prospective scenarios, titled “*The return of the swans*,” highlights the central place that the region’s natural assets –such as protected areas, hydraulic resources or bioenergy– may have in its future development (Gobierno de Chile 2009). As one of the movement’s spokespersons explains:

²⁷⁸ Interview conducted by the author for this research.

²⁷⁹ “Discurso Asamblea de Nacimiento de la Corporación Catrico”. No date. Valdivia.

²⁸⁰ Interview conducted by the author for this research.

²⁸¹ Interview conducted by the author for this research.

- “(...) the lines of development that are a priority today are very different from [those that] existed until 2004 (...). It was a change in the debate about where the region is now headed.”²⁸²
- “[Valdivia’s] first ever regional development strategy was taken over by environmental themes.”²⁸³

Similarly, since 2011, in the context of the revision of the city’s land-use plan led by Valdivia’s municipality, an unusually intense debate around the destruction of urban wetlands has emerged. The controversy led to the gradual articulation of a network of environmentally concerned organizations that, by April 2015, and with the support of social leaders and academics, has voiced the need for new mechanisms for the legal protection of urban wetlands in the future law of protected areas and biodiversity that is currently being debated in the Congress. If this initiative succeeds, new marks of the Valdivian mobilization in defense of wetlands may be found in national laws.

Finally, the imprint of the Río Cruces disaster also can be traced to the vision of development promoted by private investors who have begun to concern themselves with Valdivia’s identity and, in particular, with its connection to rivers. One such initiative is “Sustainable Valdivia” [*Valdivia Sustentable*], an alliance of government agencies, municipalities, universities, productive associations, private companies, NGOs and social organizations which, in April 2012, defined a common agenda for advancing towards sustainable urban development. One of the members of this agreement is Vision Valdivia [*Visión Valdivia*], an association of business-related actors founded in February 2010 with the purpose of “transforming the city and region of Valdivia into the nautical capital of the

²⁸² Interview conducted by the author for this research.

²⁸³ Interview conducted by the author for this research.

South Pacific” (Visión Valdivia 2014). The organization, of which ARAUCO is a member, promotes the productive use of Valdivia’s rivers, lakes, and maritime coast in order to “generate a virtuous development circle” through emblematic initiatives such as a fluvial master plan for Valdivia and a system of fluvial transportation (Visión Valdivia 2014). For one of the movement’s spokespersons, the origin of these initiatives cannot be understood disconnected from the ontological struggle unleashed by the defense of the swans:

“(…) projects and investments around the river (…) focused, finally, on (…) its importance for the development of the city and the region… It was the movement of the swans what generated them.”²⁸⁴

Indeed, what these recent trends and “doings” by such a diverse group of actors demonstrate is that the ontological struggle sparked by the Río Cruces disaster has left permanent marks on Valdivian society. They are clearly visible in those performances of the city’s development that strongly resonate with the non-dominant worlds mobilized through the Río Cruces struggle. For the first time, these initiatives have positioned the connection between Valdivians, its rivers, the surrounding wetlands and the swans that inhabit them as crucial to the local notion of development. None of them can be understood without considering the way in which the ontological struggle resulting from the disaster made room for the surfacing and enhancement of previously non-dominant modes of relating to these “natural” entities as co-fellows in the projects of future that Valdivians want to build around their city.

²⁸⁴ Interview conducted by the author for this research.

8.6 Conclusions

In this chapter I have provided an account that attempts to make sense of how a local and single-issue struggle, like the one that emerged in Valdivia, can be able of provoking such drastic effects, including the breakdown and reform of the Chile's environmental frame.

Rather than focusing on any abstract notion of "power," my narrative closely follows the actual "doings" of the actors. In doing so, I recognize that citizens did not simply respond to the Río Cruces disaster by mobilizing demands, claims, or technical arguments. *Overall, what Valdivians mobilized were worlds.* These were worlds in which the connection between humans and rivers and, above all, the response of humans to the death and suffering of the swans were enacted as constitutive of a *unique mode of inhabiting Valdivia, one involving close entanglements with these nonhuman entities.*

What the Valdivian movement materially "did" was, in the first place, to closely entangle itself with the existence, suffering and "doings" of the sanctuary's swans and other nonhumans, such as the river and the wetland. Through its 'doings' citizens enrolled wetlands and swans into the already existing tight connections between Valdivians and their rivers. As a result, wetlands were seen for the first time as valuable places that deserved to be protected while Valdivia became a "wetland-city," recognizing itself as being part of the Río Cruces wetland. In turn, the black-necked swans, who had come to live in Valdivia's wetland during the mid 1970s and until the mid 2000s had a "weak" existence were ontologically reconfigured through the disaster. Acting as the bridge that helped Valdivians articulate and defend their particular mode of inhabiting this territory and relating to its nonhuman residents, the swans became overt political agents.

As the disaster evolved and these non-dominant human/nonhuman entanglements gained ontological density, a fierce ontological struggle took shape. The until then dominant modes of framing Valdivia's identity, in close relation to ARAUCO's mill and its promise of development, began to be openly questioned as never before. Such dominant world was unable to provide the most basic assurances to the astonished citizens who could not make sense of the deep loss they were experiencing. It was the loss not only of the sanctuary and the swans, but also of the confidence they had placed in experts, scientists, authorities and businessmen who had promised them a decade earlier that ARAUCO's mill would cause no harm to the wetland and, moreover, would bring benefits and progress to Valdivians.

What was at stake was not just that the environmental law had shown to be insufficient for preventing any damage to the wetland. Or that local scientists had been unable to generate the knowledge required to seriously assess the potential impacts that could affect the sanctuary. Nor was it that political pressures had been so strong that they forced the approval of ARAUCO's mill even against recommendations made by competent services. Nor that the public entities in charge of overseeing the mill's impacts were technically incompetent and failed to detect the numerous signs of abrupt ecological collapse affecting the sanctuary in a timely manner. Nor even that the company had repeatedly violated the mill's environmental permit by illegally discharging toxic wastes to the river without any concern for the problems that this could cause.

The most pressing consequence of this systemic failure was that it made evident that the Río Cruces disaster was not an accident. It was, rather, an institutionally fabricated event. This meant that for the disaster to occur it had required the sustained efforts and workings involved in the environmental approval of private investments in Chile. Though such

efforts might appear, in light of the disaster, as deficiency, hesitation, unlawfulness and omission, they were constitutive of a specific and dominant way of performing the relation of Valdivia with its natural surroundings. In this dominant mode, rivers were mere receptacles of industrial pollutants, swans did not deserve any special effort to be protected, and wetlands and estuaries did not even exist; furthermore, none of these entities were capable of establishing meaningful bonds with humans.

By setting in motion the systematic revision of the approval and functioning of ARAUCO's mill, and revealing step by step, how the disaster had been fabricated, the Valdivian human/nonhuman association opened the black boxes of Chile's environmental frame. Doing so, the connections of such frame with the country's then dominant business model, of which ARAUCO was one of the preeminent representatives, was also exposed.

As many interviewees noted, it was the knowledge produced by citizens and describing the systematic, detailed and technically refined exposure of how the disaster had been fabricated by the same legal frame and procedures responsible for the wetland's protection, that provoked the largest and deepest fracture in the history of Chile's environmental frame. This fracture, thus, required sustained efforts, not only from citizens but also from nonhumans, including the continued death and decrease of the number of swans and "the slick" that inundated Valdivia's downtown with its polluted waters.

Consequently, an *ontological opening* occurred. That is, a state of suspended reality resulting from the systemic failure of environmental laws and their techno-scientific assurances. Not only the environmental frame and its technocratic assurances had failed. The world performed through it, in which the pollution coming from ARAUCO's mill was

compatible with a wetland and a colony of swans that lacked any significant value or bond with Valdivians, had lost ontological primacy. Therefore, the space for non-dominant worlds and identities, such as those taking form around Valdivia's identity, was opened. As demonstrated here, the marks of this ontological struggle are still traceable in Valdivia.

Chapter 9: Two Dead Swans and Thousands of Humans: On the Agency of Animal Suffering

“The animal looks at us, and we are naked before it. Thinking perhaps begins there” (Jacques Derrida 2002:397).

“The swan died. Its neck fell under the water” (past minister, interviewed for this research).

9.1 Two Dead Swans

From his office in *La Moneda*, Chile’s presidential palace, a picture of two black-necked swans found in Valdivia, 850 km to the south, caught the attention of one of then President Lagos’ political ministers.²⁸⁵ The image was published on October 23, 2004 as part of an article in the local newspaper *Diario Austral de Valdivia*. It showed two swans being held by a couple of policemen who found them in the Río Cruces Sanctuary. The first swan was dead. His right wing hung down while one policeman held his neck and feet. His colleague embraced the second swan, unusually thin, that was then in agony. The image was accompanied by the text: “These dead swans were found in the Río Cruces” (*Diario Austral de Valdivia* October 23, 2004).

Photograph 5: Two Policemen Holding Dead Swans



The picture was part of a daily press dossier prepared by a female journalist. The inclusion of the image disconcerted the minister. His first thought was that these swans were not worthy of his attention on that busy morning. He considered asking the journalist to modify her selection criteria. However, after a second look at the image, the minister realized that it had left him deeply moved. The mere idea that the swans of the Río Cruces wetland could

²⁸⁵ The account of this episode is based on the testimonies of various interviewees.

be threatened and dying produced a strong impression on him; he felt a mixture of sorrow and betrayal for the danger that could be affecting such precious birds in the Valdivian sanctuary. Furthermore, the image provoked what the minister later described as an “aesthetic shock”: the sense that the death of the Río Cruces’ swans was simply “too horrible” to be happening. As this feeling grew in intensity, the minister feared that the threatened swans could “do” much more than just move his feelings.

Indeed, a chilling idea crossed the minister’s mind: the possibility that the death of the swans could be connected to the operation of ARAUCO’s recently inaugurated pulp-mill upstream of Valdivia. He realized that whatever was damaging the swans, if the notion of such a connection acquired momentum their death could spark a multitude of economic and political issues. These potential effects, which could quickly grow in magnitude, certainly deserved the minister’s attention. Without further analysis, he put the picture aside, along with other high priority topics he had selected that morning. Anticipating that the case could evolve into a complex conflict, the minister ordered its monitoring. He was correct: the injured swans of the Río Cruces had the capacity to “do” much more than simply stir the emotions of sensitive humans.

The press note that captured the minister’s attention reported a trip taken to the sanctuary by public officers and scientists from the local university, *Universidad Austral de Chile* (UACh), to inspect the situation. Their mission was to determine the severity of the damages in the wetland. Although these actors already knew that ecological changes were occurring, the note describes that they were surprised by the discovery of dead swans:

“There is worry about the unexplained deaths of swans in the Río Cruces Natural Sanctuary (...). In a tour through the wetland (...) five dead swans were found, one in

a state of agony. The scientists of the Universidad Austral de Chile say the situation is abnormal” (Diario Austral de Valdivia October 23, 2004).

The newspaper’s conclusions were alarming. They affirmed that “this natural heritage, that is of course, humanity’s” –pointing to the wetland’s protected status under the Ramsar Convention– was “at risk of disappearing” (Diario Austral de Valdivia October 23, 2004).

A second report was published on October 24, 2004 by *El Mercurio*, Chile’s influential, conservative newspaper. It was also accompanied by a photograph, this time on its front page. It showed UACH’s zoologist Roberto Schlatter standing in a boat in the midst of the wetland. By his side, one of the wetland’s wardens held a dead swan by its foot. The fact that Schlatter was featured in *El Mercurio*’s article was not accidental. As described in Chapter 4, after studying the swans in decades past, he had sponsored the declaration of the wetland as a protected area. He was emotionally affected by the findings of dead swans:

Photograph 6: Schlatter and a Warden in the Wetland Holding a Dead Swan



Author: Daniel Boroschek

“VALDIVIA- The presence of black-necked swans in the Río Cruces is one of the main attractions of the Carlos (...). A team of experts, directed by the Head of UACH’s Institute of Zoology, Roberto Schlatter, toured the sanctuary (...). [T]hey discovered, with surprise and worry, that swans were disoriented and quite thin. A bad surprise. And not only that: they found five dead

swans. Not yet recovered from the shock, they put them on the boat’s cover and took them to a laboratory” (El Mercurio October 24, 2004)

Following both press reports, concerns grew about the fate of the Valdivian swans. On October 26, the *Diario Austral de Valdivia* reported the results of the last monthly census conducted by CONAF: swans had dropped from an historic average of 6,000 to less than

3,000 in a few months. Valdivia's Governor declared that the situation was "almost a catastrophe" because "it has to do with Valdivia, its surroundings, with the ecology, it is an attraction for tourism (...). This is urgent, because the damage caused is irreversible, and will continue to grow" (Diario Austral de Valdivia October 26, 2004). The article reported that the issue had reached the desk of then President Ricardo Lagos, who had declared the need for "establishing the origin" in order to "adopt the appropriate measures" (Diario Austral de Valdivia October 26, 2004).

The Valdivian movement was not yet born²⁸⁶, nor had citizens taken to the streets. Nonetheless, the threatened swans from the Río Cruces were already displaying their agency by urging ministers, Valdivian scientists, local authorities and the President himself to act *because* of what was happening to them. As one of President Lagos' past ministers asserts: "They [the swans] had (...) a national impact (...). Everyone knew that the swans were dying."²⁸⁷ Indeed, before citizens could do anything in their defense, diverse networks of actors had already entangled themselves with the fate of the swans. Even ARAUCO, whose directors had arrogantly denied any responsibility in the wetland's pollution, declared the company's willingness "to support all the studies needed to scientifically analyze the situation of the swan population" (El Mercurio October 29, 2004).

To make matters worse, swans began to fall over the city as they tried to abandon the polluted wetland. It was these images, exhibited on national TV, that sparked an unprecedented mobilization in Valdivia. Two citizens recall:

²⁸⁶ The first assembly of citizens from which Acción por los Cisnes originated occurred on November 2, 2004.

²⁸⁷ Interview conducted by the author for this research.

- “One day Claudia told me, ‘(...) there is a mess with the mill and the swans are dying. They are falling down.’ I had no idea (...). It was like a shock (...). [T]hat day, in the evening, I went to the first assembly.”²⁸⁸
- “The pictures of the swans falling down generated a commotion, such an awful social shock, lets say, that caused people to get involved at once. In one week the assemblies began.”²⁸⁹

What these events show is that the bodily presence of the Valdivian swans and their concrete “doings” were from the onset the fundamental object of concern in relation to the disaster and its effects. As a past-minister put it, “from the point of view of the relevance and triggering factors (...) the swans is what takes over the scene.”²⁹⁰ Another past national authority, who handled the legal effects of the disaster, declares:

“(...) swans dying had never been seen before on the news shows (...) at 10 pm at night, on television (...). [T]he case (...) had all the ingredients, everyone, everyone, absolutely all, to become an emblematic one (...) [with a] charismatic species –the swans– as protagonist.”²⁹¹

Even President Lagos, under whose administration the disaster exploded, knew that the fate of the swans was the fundamental issue to be addressed. According to one of his past ministers, Lagos “felt that the crucial point of all this was not the mill (...). It was that the *swans could return to inhabit the wetland.*”²⁹² This was also, precisely, the way in which Valdivians framed their demand. Therefore, the attention given to the swans surpassed by far that given to any related event, such as the river’s pollution, the threat that it could represent for humans, or the harm caused to other species.

²⁸⁸ Interview conducted by the author for this research.

²⁸⁹ Interview conducted by the author for this research.

²⁹⁰ Interview conducted by the author for this research.

²⁹¹ Interview conducted by the author for this research.

²⁹² Interview conducted by the author for this research.

Before the disaster occurred, however, the political agency of the swans –that is, their capacity to mobilize other actors to do things such as challenge dominant business practices or inflect the country’s environmental frame– was not at all obvious. Rather, the swans were virtually invisible actors. Even in Valdivia, where they had been established since the mid 1970s, no meaningful connection existed between the swans and the identity of Valdivians by the mid 2000s. Additionally, as described in Chapter 4, in the early 1980s the Río Cruces’ swans were cruelly killed for their meat and their eggs sold in Valdivia’s fluvial market. And in the mid 1990s, during the assessment of ARAUCO’s pulp-mill, no special concern for the impacts that could affect the swans was articulated by public agencies or environmental NGOs. The presence of swans was also negligible in Valdivian literature, music and art. Similarly, no clear relation existed between Valdivians and the Río Cruces wetland. Although visitors to the sanctuary had been growing²⁹³, and in 2008, after the disaster, 79% of Valdivians declared to have visited the wetland at least once (Laboratorio de Modelación Ecológica 2008), no traces of a visible “bond” between Valdivians, the sanctuary and its swans are found until 2004, when the disaster exploded. In contrast to this invisibility, the prominent public resonance of the Río Cruces disaster and its sociopolitical effects –including the “power” attributed to the Valdivian mobilization– cannot be understood unless we acknowledge the central role played by the Río Cruces’ swans. If by 2004, prior to the disaster, the swans had not yet become relevant actors and no meaningful bond existed between them and Valdivians, how can their striking agency emerged after the disaster be explained? Where was it founded?

²⁹³ Andrés Muñoz-Pedrerros (2004) reports that in the years previous to the disaster, visitors to the sanctuary grew from 2,922 in 2000, to 7,534 in 2001 and 16,220 in 2002. These numbers mostly correspond to the navigation of tourists during summer and do not necessarily reflect the trend amongst Valdivians.

Attending to *how* the various actors responded to the disaster through “doings” such as commissioning scientific reports, taking to the streets or mounting a campaign to deny their responsibility, we find that the images of dead or agonizing swans, the reports evidencing a declining number of swans in the wetland, and the direct encounters with injured swans constitute key triggering events. All have in common *the experience of witnessing the suffering of the swans*. As a past environmental authority with a key role in finding a solution for the disaster described it, “the issue of the swans (...) had the connotation of a disaster from the very first day (...) the dying of swans, the images of the swans (...) it was a thing really Dantesque!”²⁹⁴ As also suggested by the minister’s “aesthetic shock” that I describe at the beginning of this chapter, I propose that the experience of a close encounter with the suffering of the swans is found at the origin of the responses to the disaster put forward by all manner of actors, including the Valdivian movement. Moreover, as I will argue in the concluding chapter, *recognizing the agency involved in the suffering of the swans allows the conception of the Valdivian struggle as a properly political event*. That is, it can be seen as an event with the capacity to disrupt and displace the configuration of the prevailing sociopolitical order –and more precisely, its ontology– through the emergence of actors and “doings” that had remained hitherto invisible or excluded.

In order to contribute to an understanding of what is involved in the agency of the Río Cruces’ swans and their suffering, in what follows I review the encounters that Valdivians, authorities and other actors had with this triggering event. In doing so, I detail what Valdivian swans “did,” how these “doings” were circulated through different images, and what these images in turn “did” to those that witnessed them.

²⁹⁴ Interview conducted by the author for this research.

To acknowledge the unsettling power of the swans' suffering is not an easy task, for it leads to the complex and unstable territory of animal suffering and of the human/nonhuman distinction. Despite the issue's complexities, in what follows I review how posthumanist philosophies have addressed the issue of animal suffering. In so doing I explain why the "question of the animal" and the core issue of animal suffering are so central to the challenge of building a truly posthumanist understanding. I also build on these arguments for the political ontological interpretation of the disaster that I offer in the final conclusions.

9.2 The Swans are Falling, the Swans are Drowning

As stated, the direct encounter with the Río Cruces' swans entailed an enormous agentic force. Materially, such agency took form and was amplified by a cascade of images that overflowed in the media, the Internet and the daily lives of Chileans. That first press report that "moved" the minister was followed by an avalanche of articles, pictures, videos, documentaries, animations, and, of course, texts.

During the first three years of the struggle, between November 2004 and November 2007, more than 3,000 articles about the disaster were published in the national press. They were mostly focused on the state of the swans (Halpern 2007). It is no wonder that swans were chosen as the "character of the year 2004" by the *Diario Austral de Valdivia* (January 2, 2005). As one of the movement's spokespersons explains, journalists from Santiago were more interested in the swans than in citizens: "TV channels were in search, not so much of our opinion, but of the swan that had fallen (...) the image of a dead or agonizing swan was multiplied this way... uff [sound of explosion]." ²⁹⁵

²⁹⁵ Interview conducted by the author for this research.

These images not only made it evident that swans were threatened and dying –above all, they made it visible that swans were suffering. Images of injured, agonizing or dead swans circulated nationwide and abroad. They were slowly starving and emaciated, their bodies devoured by parasites and their organs full of metals. They made involuntary movements due to neurological damage, and they were too weak to fly away or to resist the spring storms. These usually strong birds began to fall from the sky, some dead, or to simply drown, unable to escape from the polluted trap the wetland had become. The once radiant white plumage of the black-necked swans had turned into a grubby, brownish coat. Their charismatic beauty had been snatched away along with their vitality and lively dignity.

The suffering of the swans could not be easily ignored. It was not just occurring “out there” in the wetland –32 km upstream of Valdivia– but also in the midst of the city. The

Photograph 7: Woman Holding an Injured Swan, January 2005



Author: Daniel Boroschek

journalist Soledad Ojeda, from the *Diario Austral de Valdivia*, was the only reporter to join the inspection of the wetland described at the beginning of this chapter. In fact, she wrote the report whose picture had astonished the minister. From then on, Ojeda followed the swans and their encounters with Valdivians. Most of these encounters

happened after a swan had fallen over people’s houses or yards, mostly in working-class neighborhoods. The testimonies gathered by Ojeda confirm that ordinary citizens were not

only aware that the swans were escaping from the polluted wetland, but also deeply moved by their suffering:

- “With sorrow and astonishment, the neighbors of the Pablo Neruda neighborhood confirmed that (...) two of these aquatic birds collapsed (...). ‘I feel very sad to see that these birds are falling because of pollution’, Gloria said, who encountered the swans when she arrived home.” (Diario Austral de Valdivia November 19, 2004).
- “They are dying because the water is polluted. That’s why they came here”, said Sebastián, a 9 year old boy, commenting on the 10 swans that chose a rainfall pond (...) as their temporary home (Diario Austral de Valdivia December 4, 2004).
- “Irma Cárcamo (...) never thought that she would encounter one of these birds in her yard (...). ‘This is very sad, that they are falling anywhere (...) many more may be suffering’” (Diario Austral de Valdivia December 9, 2004).
- “Ten swans grouped on the city’s waterfront began eating grass along with their cygnets (...). The image provoked great shock because these birds are not accustomed to grazing” (Diario Austral de Valdivia May 19, 2005).

By reproducing these encounters, Ojeda’s writing helped sustain a collective response to what was happening to the swans. Some of these responses are overwhelming, such as those from policemen and university guards:

- “A policeman from the Oscar Cristi Gallo Police Station reported that (...) on Saturday night (...) a swan collapsed in the surrounding area, without energy to resume its flight (...). Last Thursday another two swans were ‘hosted’ (...) in the same Police Station” (Diario Austral de Valdivia November 22, 2004).
- “A swan was rescued by guards near the Nahmías pavilion in UACH’s campus. One of the guards commented, ‘It was extremely thin and has wounds on its feet’ due to walking on the pavement (Diario Austral de Valdivia May 27, 2005).

These and dozens of other face-to-face encounters with injured or agonizing swans multiplied the witnesses of their suffering in Valdivia and beyond. In particular, a poignant

two-minute video captured early on by the veterinarian Daniel Boroschek, who soon became one of the Valdivian movement's spokespersons, went viral.

Boroschek captured the images during a patrolling trip to the wetland at the end of September 2004, a month before the disaster was exposed. He organized the visit in order to show the changes occurring in the sanctuary to journalists from the local cable channel. During their return, having almost reached the city, they encountered a dramatic scene: a swan that had lost control of its long black neck was desperately trying to hold it up while its head made disordered circles and kept falling once and again into the river. The bird appeared to be drowning, evidently in pain. Boroschek gave the journalists a copy of the video, who showed it on local TV. From there, the images jumped to *Chilevisión*, a nationwide TV channel, and did not stop being screened for months and even years.

Boroschek and Eduardo Israel, a physician and air pilot who also became a spokesperson of the Valdivian movement, also included the scene in the first documentary of the case, "*La Tragedia del Río Cruces*" ["The Río Cruces Tragedy"]. The sixteen-minute video was the most screened on Valdivia's waterfront during the following summer.

At a time when Facebook and other social networks did not yet exist, the video of the drowning swan traveled long distances, including beyond Chile's borders.²⁹⁶ It was continuously screened on the country's major TV channels and transformed into what a business analyst called an "indelible image" (La Tercera September 18, 2011). Nobody had imagined what this drowning swan would be able to "do." As one of the movement's

²⁹⁶ The drowning swan became part of a campaign against a pulp-mill to be located in front of the Argentinean town of Gualaguaychú, in the northeast of the country, just across the Uruguay River. This video presented the agony of the Valdivian swan as a warning of the impacts that could also happen in the Uruguay River. See Emilio Cartoy (2006), "Historia de las dos orillas", documentary on the conflict caused by a European pulp-mill on the Uruguay River. Retrieved: September 25, 2013 (http://www.youtube.com/watch?v=faX8_MQbqZg; <http://www.youtube.com/watch?v=kXKxBVL8H-Q>).

spokespersons accounts: “The images of mistreatment, of the swans that are drowning, that cannot breathe (...) were shocking for me (...). I think they showed them on TV because they were so shocking, never imagining the effect they would have.”²⁹⁷

The drowning swan is the single most iconic image of the Río Cruces disaster. Perhaps due to its capacity to “do” things such as provoke its airing by TV stations, travel beyond Chile’s borders or cause feelings of shock in authorities and businessmen, the image multiplied its presence in such a way that made it impossible to avoid being exposed to the suffering it showed. As a businessman linked to ARAUCO describes:

“(…) it was too strong, I think, for the Valdivian community and, afterwards, for the country, that image, repeated one and a thousand times by the television, all day long, of this swan that was falling down [into the water] (...). You have to be totally numb to not react to that (...). And the country reacted in the same way (...) it helped enormously to create that reaction, this image (...) the entire country saw it.”²⁹⁸

By acquiring a “life of its own,” the drowning swan exerted an agency that was independent of the Valdivian movement. Such has been the “power” granted to this image that the effects of the disaster in Chile’s business sector were attributed to it exclusively by the following text of a course for business managers:

“The overwhelming scenes of a black-necked swan, writhing in a desperate and inevitable agony, shook the public. Although environmental groups and other organizations had been calling attention to this issue, it was these images that triggered one of the biggest and most complex industrial crises in Chile” (La Tercera September 18, 2011).

²⁹⁷ Interview conducted by the author for this research.

²⁹⁸ Interview conducted by the author for this research.

It should not come as a surprise then that the authorities in charge of solving the disaster had a difficult time dealing with the vast resonances of these images, as a past environmental authority describes: “I had a granddaughter (...) she then was three years old (...). I was invited to a TV program on Channel 13, in the morning. After I came out, I was already very affected by the case, she asked me (...) why are you killing the swans?”²⁹⁹

Even ARAUCO’s executives experienced unease when confronted to the images of suffering swans: “What do you feel (...) when you see the images and pictures of a noble bird, such as a swan, dead or agonizing?,” was the opening question of a journalist interviewing Alberto Etcheagaray, then president of ARAUCO’s Board (La Segunda May 3, 2005). “Wow, that’s a tough question, very tough...”, Etcheagaray muttered. “It touches me. I cannot stop feeling moved,” he answered (La Segunda May 3, 2005).

Indeed, what these images finally “did,” as Etcheagaray acknowledges, was to “move” actors –authorities, scientists, citizens and businesses– to act in response. As a member of the Valdivian movement describes:

“Felipe Cubillos –a businessman and leader of social welfare campaigns– told me that his daughters ran crying when they saw these images on the TV. It was in that moment that he decided to become involved [in the case].”³⁰⁰

Given the agency of these images, it was not by chance that the Valdivian movement opted for the video and the screen –as opposed to ARAUCO, which chose the newspaper. This option was key in facilitating the job of TV channels that, despite the controversial meaning of the dying swans, were willing to show it. According to members of the movement:

²⁹⁹ Interview conducted by the author for this research.

³⁰⁰ Interview conducted by the author for this research.

- “You could have seen pictures (...) and said, oh, some swans died... (...). But the videos... all the videos that there are! Especially that image of the guy with the [dead] swan ... That image is super tough.”³⁰¹
- “(...) while the movement chose the audio-visual signifier the mill chose the (...) written one (...). This also explains in part why the TV was so uninhibited (...) the world of the TV is a visual one (...) an army of audiovisualists were inclined to give us [Acción por los Cisnes] at least the space.”³⁰²

Indeed, the constant display of the suffering swans on the TV screens did not occur spontaneously. It required the collaboration of directors and editors. This was not easy since –as Chapter 3 recounts– ARAUCO’s mill was not only owned by the country’s largest forest company, but also in hands of Chile’s by then wealthiest businessman and one of the *Concertación*’s financiers.³⁰³ To reinforce suspicions about the responsibility of Angelini’s industry was a politically complicated thing to do for TV channels and newspapers in 2004, especially considering the boorish campaign the company had launched threatening to sue anyone who dared to make such “unfounded” accusations (El Mercurio October 29, 2004).

The act of circulating images of injured swans was indeed dangerous. Boroschek knew it well. He had received anonymous calls about his televised denunciations. As late as July 2007, Boroschek was notified that he would be sued if a new video of a swan showing the same involuntary movements as the drowning one –which had gone viral– was not

³⁰¹ Interview conducted by the author for this research. The interviewee refers to a one-minute video prepared by Acción por los Cisnes that shows a man jumping into the river and swimming towards a dead, floating swan. The man reaches the dead bird and embraces it, deeply moved.

³⁰² Interview conducted by the author for this research.

³⁰³ Given the lack of a law obligating transparency in any political donation, by 2004 the donations that Angelini made to political parties and candidates linked to the governing Concertación were only a rumor. However, this practice has been recently confirmed in the midst of one of the major political scandals ever to have occurred in the country, revealing the systematic financing of politicians by major corporations, including ARAUCO and others owned by Angelini.

removed from his YouTube account (La Tercera July 8, 2007). Boroschek deleted it. The video was republished by Acción por los Cisnes and still generates unpredictable effects.³⁰⁴

Not only denouncing agonizing swans become a risky action. Helping these animals also turned into a clandestine activity for some, as a member of the movement describes:

“People who I think were in favor of the company brought me [injured] swans and said, ‘I bring you this, but don’t tell anybody. I don’t want to get involved. Do not take any pictures’ (...). There was fear (...). Like something hidden.”³⁰⁵

Nevertheless, as a past national environmental authority who played a key role in the case put it, the circulation of images of the disaster by national TV channels and newspapers became “unavoidable,” as it was simply “impossible to silence.”³⁰⁶ This did not occur because the media was against ARAUCO, but rather because, despite ARAUCO’s pressure to avoid the exhibition of such images, “it was impossible to skip the story!”³⁰⁷

In sum, despite the political complexities involved, the images of the Valdivian swans and their suffering managed to circulate broadly and continuously through the media. Different actors –from citizens to businessmen, and from authorities to scientists– recognize in such images the fundamental driver that “moved” them to respond to the disaster.

9.3 Uneasy Feelings

In attempting to make sense of the capacity that the swans had to move such a range of actors in response to their suffering, different interviewees –members of the movement as

³⁰⁴ The 2007 video can be retrieved from: <https://www.youtube.com/watch?v=Cg6hX0ADd3M>. In 2014, Boroschek was still receiving calls from people who had seen the video and wanted to know about the swans.

³⁰⁵ Interview conducted by the author for this research.

³⁰⁶ Interview conducted by the author for this research.

³⁰⁷ Interview conducted by the author for this research.

well as past national authorities– point to their “symbolic power,” that is, to what makes them special creatures charged with unique meanings:

- “(...) the swan pertains to that group of harmless, fantastic, mythical (...) animals that from a very early age represent something for you, like purity, ingenuity, romance (...) an archetypal relation, that doesn’t exist with other species.”³⁰⁸
- “The swan is not just another feathery creature. In the collective imagination it represents something meaningful, from the point of view of aesthetic values.”³⁰⁹
- “(...) the affected species was extraordinarily emblematic (...) that has a beautiful image, that has a beautiful history, with the monogamy of the couple, the raising of cygnets on the father’s or the mother’s back.”
- “That the swan dies is not irrelevant (...). It immediately generates a severe alarm (...). [It is] the most important animal, the most symbolic, the most fragile, the one with which you have more connection. So, we need to do something!
- “The swan is a sacred animal.”³¹⁰

These meanings and values attached to the swans are attributed by the actors to what they define as “universal” sources, such as European fairytales and eastern religions. Despite being considered “real” in terms of their connection to the Valdivian swans, these “universal” knowledges and traditions are described only vaguely in terms of how exactly such a connection is expressed. However, it is in relation to such “symbolic power” that different actors –from citizens to environmental leaders and past ministers– explain the capacity that the swans had of providing Valdivians with a unifying basis for the unusually broad movement that emerged in response to the disaster:

- “(...) from an almost literary point of view [the swans] had an evocation that brought people together.”³¹¹

³⁰⁸ Interview conducted by the author for this research.

³⁰⁹ Interview conducted by the author for this research.

³¹⁰ Interview conducted by the author for this research.

³¹¹ Interview conducted by the author for this research.

- “[The swan] is what is at the base of the movement and what made such diverse people become connected in such a brief time (...) the figure of the swan is that catalyzing element.”³¹²
- “The swan has that capacity (...) that appeals to everyone (...). [I]t can gather people around (...). It can equally summon people of the socialist party (...), of Valdivia’s tourism chamber, and even of the company.”³¹³

In contrast to a majority of interviewees pointing to the swan’s “symbolic power,” when it comes to recounting their direct experience in the face of ill, agonizing or dead swans, something different happens. Only a few are capable of putting such experience into words, remembering feelings of sorrow and compassion and the sensation of discomfort and shock that comes from something that is deeply wrong:

- “It was shocking. You wanted to (...) shout to everybody how the swans were falling over the houses, how they were dying in the river.”³¹⁴
- “(...) did you ever see a swan, like, really bad [*‘pa’ la cagá’*]? (...) I did. And it was something terrible.”³¹⁵
- “Desperate, [the swans] were dying, falling over, collapsing (...). The sensation was of compassion. I think they awakened many feelings (...) sensitive fibers were touched in everyone who saw these agonizing birds.”³¹⁶

In contrast to these descriptions, while attempting to explain their emotions in front of the swans, most interviewees found themselves at a dead end: they doubled back to what they describe as the universal and abstract “symbolic power” attached to the swans. This difficulty speaks to the lack of a more direct source on which to ground such feelings given the absence of a previously visible bond between the swans and their own identities. Where

³¹² Interview conducted by the author for this research.

³¹³ Interview conducted by the author for this research.

³¹⁴ Interview conducted by the author for this research.

³¹⁵ Interview conducted by the author for this research.

³¹⁶ Interview conducted by the author for this research.

did the deep emotions sparked by the swans –deep enough to provoke the sociopolitical effects already described in the previous chapters– come from? Where were they grounded?

This impossibility of conceptualizing the experience of being “deeply moved” by the suffering of a swan does not only come from the inexistence of a previous bond with these birds. It also comes from dominantly humanist frames of thought according to which humans and animals are separated by an abyssal divide that makes it not only unlikely but also awkward to experience such an emotional response. However, it was on the grounds of these unexplainable and hitherto unknown reactions to the suffering of nonhumans that the response to the Río Cruces disaster was grounded. I argue that *only when we accept the sociopolitical potency that is contained in this response to the suffering swans might we begin to fully understand how it was that a local, single-issue movement expanded into such ontologically disruptive event.*

Despite its unsettling character, the difficulty of speaking about it and its overt awkwardness, citizens dared to make room for this emerging “bond” alongside their technical and political arguments. Indeed, after entangling the sense of their mobilization to the fate of the swans by naming themselves *Acción por los Cisnes* [Action for the Swans], the movement’s main efforts were focused on denouncing what the swans were suffering, on censusing how many swans were left, and on investigating what was causing their massive death. They also performed the suffering of the swans in front of authorities and the media. As a member of the movement recalls:

“(…) all those artistic expressions (…) that tended to humanize the swans (…) [by converting them to] costumes and even the body of a funeral, they are nothing but the reaction to the *feeling that the swan is calling upon you, that is a species that is (...)*

talking to you, that is telling you: Help! Do something. Tell the others (...). This was incarnated as a message and the human artistic reaction was to personify [the swan] (...). [I]t made a deep impression and was part of the movement's communication."³¹⁷

As this testimony recounts, citizens enacted this emerging bond with the swans through spiritually charged demonstrations. These included the funeral noted above as well as other ceremonies such as a procession into the sanctuary that was conducted as the closing event of a citizen convention organized by Acción por los Cisnes in November 2005. A dozen boats gathered around a central ship from which the Capuchin priest Elmar Boos blessed the sanctuary, followed by the lyric performance of the famous Valdivian soprano, Gabriela Lehman. It was an eclectic representation of the sanctuary's "sacredness."

In carrying out these activities, citizens made room for non-dominant modes of human/nature relationings quite different from those displayed through the technocratic knowledges that had led to the approval of ARAUCO's mill. Such previously dominant ways of conceiving what a swan is, how it is (or is not) related to humans, and what it can "do" to us, our institutions and laws, were fractured to the core by the alternative human/nature entanglements that the disaster made plainly visible through the spontaneous, overwhelming response to the suffering of these animals. What is most notable about this fracture is that, as stated, it began to occur before Valdivians organized their movement, illustrating the capacity that the swans themselves had to "move" the emotions of authorities, scientists and businessmen, forcing them to act in their defense.

³¹⁷ Interview conducted by the author for this research.

In order to explore the sociopolitical potency involved in the experience of animal suffering, in what follows I explore the answers provided by posthumanist philosophies.

9.4 Taking Animals Seriously

The massive unsettling provoked by the suffering of the swans demands to be taken seriously. This is not an easy task. As Cary Wolfe acknowledged when interviewed by Dana Medero and Alison Calder (2003), although animals, their suffering and our response to it are everywhere –especially in the inundation mass-audience TV shows– the academy has remained far behind, resisting the conceptualization of what this overpowering presence means. According to Wolfe, the reason is clear: dominant “academic discourses [have] remained within an essentially humanist framework or logic, including the conceptual developments focused on the issue of animal rights” (Medero and Calder 2003:43).

The difficulties involved in the study of animals are, however, not just a matter of theoretical lagging. As Wolfe claims, “this is a very difficult problem to theorize –it is a real minefield” (Medero and Calder 2003:43). The fundamental challenge of taking our relation with animals seriously is that “it discloses how the human is not and never has been human –in the ways that we now think about it and in the ways that the traditionalists thought about it” (Medero and Calder 2003:43). What Wolfe implies is that to think seriously about what distinguishes humans from animals inevitably leads one to question the validity of what we have hitherto considered as uniquely human traits. Indeed, the “question of the animal,” as Cora Diamond labeled it, may lead us to dismantle basic assumptions through which the humanist tradition has defined “what it means to be human,” hence its potentially dangerous consequences.

Humanist philosophies and disciplines from Descartes to Heidegger have defined humans through a particular subjectivity elsewhere defined as the “metaphysics of presence” (Derrida 1995, 2002). Its most distinctive condition is the capacity that humans have of “being-present.” That is, of being capable of full consciousness, self-introspection, intentionality and freedom in relation to themselves and the world. In classical philosophy, the main marker of this human subjectivity is verbal language. Associated with speech is the ability of reason, which is for many the definitive marker of humanness. These demarcations have situated the human subject in radical opposition to nonhuman animals, which are conceived as lacking any subjectivity.

In the past three decades, the conceptual tools needed to “even begin thinking through” the “question of the animal” have begun to become available (Wolfe 2009). In great part, the need to reconceptualize our relation with animals has come from uneasiness in the face of animal suffering. For Derrida (2002:394), the unprecedented extension and scale of animal abuse and suffering is today *the* fundamental problem that any study of animals needs to address. This “can be called violence in the most morally neutral sense of the term,” he claims (Derrida 2002:391). It is a violence that “men do all they can in order to dissimulate (...) in order to organize on a global scale the forgetting or misunderstanding of (...) [what] some would compare to the worst case of genocide (...) [for] it is occurring through the organization and exploitation of an artificial, infernal, virtually interminable survival, in conditions that previous generations would have judged monstrous, outside of every supposed norm of a life proper to animals”³¹⁸ (Derrida 2002:394).

³¹⁸ As Giorgio Agamben (2003) has argued, this contemporary violence against animals is inseparable from the violence exerted on humans, particularly racially marked instances. Wolfe (2009:567) has also explained

For Wolfe, the paradigmatic shift that may result from placing the “question of the animal” at the center of debate is comparable to those of the 1970s and 1980s, when race and gender began to be taken seriously, or the 1990s, when the same happened with sexual difference:

“animal studies is only the latest permutation of a socially and ethically responsive cultural studies working to stay abreast of new social movements (...) which is itself an academic expression of a larger democratic impulse toward greater inclusiveness of every gender, or race, or sexual orientation, or –now– species” (Wolfe 2009:568).

If this question has not yet gained enough force, it is because that would require “the sacrifice of the ‘animal’ and the animalistic” that maintains “that fantasy figure called ‘the human’” (Wolfe 2003:6, quoted by Castricano 2008:186). This fantasy has survived, Wolfe (2009) adds, because critical theory “remains humanist to the core,” reproducing essentialist notions of “the human” and hierarchies involved in subjugating animals.

Thus, we can only begin to seriously address the “question of the animal” if we position ourselves at the margins of dominant humanist philosophies and accept the risk of exploring that abyssal space between us and nonhumans where the grounds of thought are elusive. In doing so, Diamond (1978) argues, the first challenge is thinking through the events in which animals jump to the center of our experience and prompt pressing questions that, though lacking answers, demand our reflection.

Thus, I ask: What did the massive death and suffering of the Río Cruces’ black-necked swans provoke in Valdivia and beyond? How can such responses and their effects be considered beyond the humanist frame that the actors involved use to describe them?

that violence against humans often operates through “a double movement that animalizes them for the purposes of domination, oppression, or even genocide –a manoeuvre that is effective because we take for granted the prior assumption that violence against the animal is ethically permissible.”

9.5 Being Moved by the Suffering of Animals

As described, the testimonies of my interviewees confirm the striking limitations of our frames of thought in the face of animal suffering. The experience of a “response” to the harm caused to the swans was there, acting as the driving force that led Valdivians to gather and act, but questions remain about the nature of that response. How did the witnesses of such animal suffering experience it? What fractures occurred in their subjectivities?

Consistent with the example of the deep reaction prompted by the suffering of the Río Cruces’ swans, it is fitting that the debate about animals as ethical subjects has been centrally framed around the issue of animal suffering. Moreover, according to Wolfe (2008, 2010), *the way in which the problem of animal suffering has been conceptually and ethically addressed is what distinguishes those approaches to the “question of the animal” that remain within a humanist framework from those that are truly posthumanist.*

Wolfe situates both the works of Peter Singer³¹⁹ (1975), on animal rights, and of Martha Nussbaum (2006), on the shared ontological markers of humans and nonhuman animals, as located within a humanist frame. Both are focused on what has been called the “capabilities approach,” which acknowledges animals as subjects of ethical consideration *because* they hold specific capabilities that are also present in humans. Although this approach questions the neglect of a moral status to animals –as proposed by philosophers such as Descartes, Kant, Heidegger or Lévinas– it fails to interrogate the category of “the human” and its markers, proposing, rather, to extend human capacities or rights to nonhuman animals.

³¹⁹ Singer is the most influential representative of the capabilities approach and was the first to put animal suffering at the core of debate.

Building upon the “capabilities approach” and rejecting –like Singer³²⁰– the ontologically and ethically demarcating role attributed to reason, Nussbaum (2006) argues that both sides of the dualism rationality/animality are “thoroughly unified.” Hence animality, she affirms, should be reconsidered not as contrary to but as inherent to “the human” (Wolfe 2008:11). Furthermore, instead of founding human dignity on rationality and consciousness, Nussbaum reinscribes it as residing in the *materialness of an animal body that is shared with all sentient animals*. If human dignity resides in animality, it follows that animals should also enjoy the possibility of what Nussbaum (2006:351) calls “a flourishing life,” that is, “a life with the type of dignity” relevant to each kind of species.

Singer and Nussbaum redraw the dividing line between humans and nonhuman animals by founding it, not on rationality, but on the animality of the human body where dignity and the capacity to suffer and enjoy reside. However, by extending to animals the dignity to which humans are entitled, both remain within the grounds of humanism.

On the other hand, Wolfe (2008, 2010) situates properly posthumanist authors as those that, first of all, acknowledge the limitations of human thought to even grasp the experience of being confronted by the suffering of nonhuman animals (2008, 2010). These authors mainly include Cora Diamond (1978, 2003) and Jacques Derrida (1995, 2002).

A foundational piece is Diamond’s classic *Eating Meat and Eating People* (1978), which introduces the influential notion of “fellow creatures.” Diamond argues that what stops us from eating our dead is not founded on any biologically given capacity that is shared with

³²⁰ Based on Jeremy Bentham’s reflection about the human/animal divide, Singer (1975) reframes the ethical debate on animals by bringing to the fore the *capacity for suffering*. Singer sees the ability to suffer –and to enjoy– as qualitatively different from those related to reason or language and as a prerequisite for having interests. His utilitarian argument goes: if animals –as humans– can feel pain and pleasure, they should also be entitled to the rights that have historically protected human interests based on these same capacities.

animals, such as suffering or enjoyment. Even if they are already dead, she says, there is *something* that holds us back from eating other humans. It is something that is missing in the case of dead animals. To ignore this “force” is, Diamond (1978:471) affirms, “not to give a defence of animals; it is to attack the significance in human life.”

Proposing a way out, Diamond elaborates the concept of “fellow creatures.” This notion is not biology-laden, but rather, “it means a being in a certain boat, as it were, of whom it makes sense (...) [to] be sought as *company*” (Diamond 1978:474, emphasis in the original). In Diamond’s view, what humans and animals share cannot be reduced to markers or capacities but has to do with *less tangible features that move us to respect and protect the “dignity of human life”*: “the response to animals as our fellows in mortality, in life on this earth (...) depends upon a conception of *human life*” (Diamond 1978:474).

Thus, without denying that humans are entitled to a special status founded on the value of human life, through the notion of “fellow creature” Diamond opens the possibility of *beginning to think of nonhuman animals in terms of the dignity of their own life*. Doing so, she moves beyond the frontiers of humanism and dares to accept that there are ethical grounds also in the dignity of animal life *per se*. This resonates with the testimonies of Valdivians exposed to the experience of suffering swans, who account that swans had “lost their dignity” by being exposed to undeserved pain: “[The swans were] harmed (...) [their] habitat taken away (...) [they] drowned, suffered, died, and there was nothing that [they] did to you. Something totally unjust.”³²¹

³²¹ Interview conducted by the author for this research.

How can this “non-biological notion” of a dignity that pertains to nonhumans be conceptualized? In attempting an answer, Diamond follows Simone Weil’s 1986 work on rights and justice. As Diamond (2001:121) explains, Weil argues that when injustice is framed “in the language of rights,” it falters because the entitlement to rights is concerned “with how much he or she gets compared to other participants.” Therefore, it trivializes “genuine issues of justice and injustice,” which have to do with evil and other unjust treatments (Diamond 2001:120). Thus, for Diamond (2001:121, emphasis added) our capacity to respond to injustice does not depend on determining what is “fair” (or just), but on the capacity “really to see, really to take in, what it is for a human being to be harmed.” *This capacity requires recognizing our own vulnerability*, she adds.

What does it mean to build our response to suffering upon our own vulnerability? Diamond answers, quoting Weil (1986:51, quoted in Diamond 2001:130, emphasis added), that:

“[In] the heart of every human (...) there is something that goes indomitably expecting, in the teeth of all experience of crimes committed, suffered, and witnessed, that good and not evil will be done to him (...). [T]his profound and childlike expectation of good (...) is the source of the cry of outraged hurt when injustice is done to one.”

Moreover, Weil’s notion of justice is based, not only on an unreasoned expectation of good, but also and fundamentally on the possibility in us of “being brought up short by that expectation, of being touched by it, of finding ourselves reluctant to go ahead with harm that can elicit from that place in the heart of the other person the cry, ‘Why am I being hurt?’” (Diamond 2001:131, emphasis added). Diamond’s view of justice does not need to reside in any underlying metaphysical assumption about an intrinsic good in humans (or animals). Instead, it demands redrawing what she claims (Diamond 2001:131-32) is a

contemporary notion of justice –one that “pushes apart justice, on the one hand, and compassion, love, pity, tenderness, on the other”– by proposing that *what really impedes us from doing harm* is our “awareness of the other being” in a way that we may experience a “loving attention to another being, a possible victim of injustice, [that] is essential to any understanding of the evil of injustice.” Extended to animals, this notion of injustice involves responding to them aware of “a sense of their life” that allows us to experience “a pain and revulsion felt as akin to that at the exercise of power without curb over vulnerable human beings” (Diamond 2001:139).

This sense of injustice in front of nonhuman animals can only occur, Diamond (2001:140) proposes, once we acknowledge our condition of “fellow creatures.” This implies a sense of belonging “with” what is “unlike us.” A recognition that demands our awareness of animals as “others” and bewilderment for “their strange unknown lives,” but also acceptance of the striking fact that they are “inhabitants with us of this earth” and linked with us to the “planetary phenomenon of life” (Diamond 2001:140).

Diamond is not simplistically calling for a morally overarching principle that converts nonhuman animals into our equals. She acknowledges that the notion of “fellow creature” “normally, or very often, goes with the idea (...) that we do eat them. But (...) that they must be hunted fairly or raised without usage”³²² (Diamond 1978:475). In sum, Diamond stresses that *despite our inability to even conceive of the sense of a “dignity of life” that animals share with us, we cannot deny its existence.* Moreover, confronted with injustices

³²² Based on Diamond, Derrida (1995:282) adds that the “eating” involved in the notion of “fellow creature” is not a question of good or bad –“[O]ne eats him regardless and lets oneself be eaten by him”– but involves all sorts of forms of partaking animals, and not only their meat. If “*one must* eat in any case,” the question then becomes: “*how* for goodness’ sake should one *eat well* (...)?” (Derrida 1995:282, emphasis in the original). To eat well, Derrida (1995:282-3) concludes, is a matter of “offering infinite hospitality” and the “sublime refinement” involved in the respect for others.

committed against animals, we need to make room for something like a “sense of human life and loss” and a “grasp of the situations in which one human being can appeal for pity to another.” Since such experience resists being conceptualized, Diamond (1978:478) argues, we must at least begin to accept it, just like when we “imaginatively read into animals something like an appeal to our pity.”

Different members of the Valdivian movement described having felt “a call for help” from the swans that resonates with the expectation of “not being hurt” that Diamond describes. It was not only that the swans were dying and trying to escape, but also that through their concrete “doings” they seemed to be calling upon humans (as fellow creatures):

- “It was like if they were saying to us: danger! danger! danger! They are killing us. They are killing us.”³²³
- “We never put in words the idea that ‘the swan species was calling for help.’ We didn’t verbalize it this way in a written discourse of the movement. But it was part of the movement’s identity. Something totally shared and, moreover, it was what also united people who had little in common. Absolutely! (...). The dramatic way in which the swans communicated (...) the way in which they, literally, fell down was somehow a cry for help, right? Because the death could have been slower and more invisible, but instead it gained all the imaginable traits of visibility (...). Everything had the flavor of a cry for help.”³²⁴

9.6 Redrawing the Divide

For Wolfe (2008), Diamond’s main philosophical contribution is making visible that, faced with animal suffering, there is not only the unspeakability of not being able to talk about it in a context that does everything to hide it, but also a second unspeakability that is even more overpowering: it comes from “the limits of our own thinking in confronting such a

³²³ Interview conducted by the author for this research.

³²⁴ Interview conducted by the author for this research.

reality” (Wolfe 2008:14). It is a “finitude,” a “*not-being-able*” in Derrida’s terms, that the modern human subject of humanism shares with animals: the finitude that comes from the common subjection to a language that is, in Wolfe’s (2010) terms, “prosthetic.” That is, a language that, for both humans and animals, is always anterior and radically “a-human.”

Therefore, from being considered a “precondition for our subjectivity, for what makes us human” (Wolfe 2008:571), language –the capacity to communicate through a semiotic system of spoken signs³²⁵ (Derrida 1995; Wolfe 2008)– becomes something radically exterior to the innermost subjectivity of humans. Something that “in an important sense is not ours at all” (Wolfe 2008:571) and that only erratically and partially accounts for the impossibly fully present subject that is described in “the ‘auto-biography’ that humanism gives to itself” (Wolfe 2008:571).

If language is no longer a marker that differentiates us humans from nonhumans, both of which share the subjection to an external semiotic system, the dividing line between humans and animals may begin to be redrawn. According to Wolfe, this is the most crucial task of “an animal studies taken seriously” (2008:571). In approaching it, Wolfe (2009:570) “invokes” Derrida’s (2002) essay *The Animal That Therefore I Am (More to Follow)*, which is for him “the single most important event in the brief history of animal studies.”

From “Aristotle to Lacan, and including Descartes, Kant, Heidegger and Lévinas,” Derrida explains, all philosophers “say the same thing: the animal is without a language. Or more precisely *unable to respond* (...) with a response that could be precisely and rigorously distinguished from reaction” (Derrida 2002:400, emphasis added).

³²⁵ Language should be “[U]nderstood in the broadest sense as a semiotic system through which creatures ‘respond’ to each other” (Wolfe 2008:571).

In his attempt to understand what responding may mean for animals, Derrida brings back the question proposed two centuries earlier by Jeremy Bentham³²⁶: not whether they can talk or reason, but whether they can *suffer*. This is a question that “changes everything,” Derrida (2002:396) claims. It not only leaves behind the issue of capabilities, it disturbs it through “a certain *passivity* (...) a passion, a not-being-able” (2002:396, emphasis in the original). To ask, “*can* they suffer?” is to ask of inability and vulnerability: “Being able to suffer is no longer a power, it is a possibility without power (...). What is this nonpower at the heart of power? (...) What right should be accorded to it?” (Derrida 2002:396). It is not “a matter of ‘giving speech back’ to animals,” but of conceiving of the absence of language “as something other than a privation,” he adds (2002:416).³²⁷ And concludes that “[T]he said question of the said animal in its entirety comes down to knowing not whether the animal speaks but whether one can know what *to respond* means. And how to distinguish a response from a reaction” (Derrida 2002:377, emphasis in the original).

9.7 Border Crossing

To accept the “prosthetic” nature of language (Wolfe 2010) also means acknowledging that we are caught within a mode of thought that inevitably obscures the experiences we face “at the border” of what it means “to be human.” These are experiences that concern “the

³²⁶ In a note on page 4 of *Animal Liberation* (1975), his foundational work on animal rights, rescued in 2001 by Paola Cavalieri (2001), Singer includes a quotation from Jeremy Bentham’s *An Introduction to the Principles of Morals and Legislation* (1789, 1948). The same quotation inspired Derrida’s work on animals. Bentham’s text reads: “What else is it that should trace the insuperable line? Is it the faculty of reason, or, perhaps, the faculty of discourse? But a full-grown horse or dog is beyond comparison a more rational, as well as a more conversable animal, than an infant of a day, or a week, or even a month, old. But suppose the case were otherwise, what would it avail? The question is not, Can they *reason*? nor, Can they *talk*?, but Can they *suffer*?” (Bentham 1948:4, quoted in Cavalieri 2001:61, emphasis in the original). Bentham’s work was first published in 1789 (Internet Encyclopaedia of Philosophy, Retrieved: May 9, 2014). <http://www.iep.utm.edu/bentham/>.

³²⁷ “No one has ever denied the animal this capacity to track itself, to trace itself or retrace a path of itself. Indeed the most difficult problem lies in the fact that it has been refused the power to transform those traces into verbal language” (Derrida 2002:417).

confines of man” and that lead to the “‘crossing of borders’ between man and animal” (Derrida 2002:372), such as those of being “moved” by the suffering of the swans. The radical nudity that Derrida experiences, to the point of describing his thought “at the border of the human,” results from the encounter with his cat’s gaze. A gaze that is “uninterpretable, unreadable, undecidable, abyssal and secret. Wholly other” (Derrida 2002:381). “What does this bottomless gaze offer to my sight?” he asks (Derrida 2002:381, emphasis in the original). And answers, shaking every inch of our humanness: “*the gaze called animal offers to my sight the abyssal limit of the human*” (Derrida 2002:381, emphasis added).

The gaze that Derrida encounters is a gaze that “sees” him, that catches him naked. It interpellates his humanness in its vulnerable finitude and incapacity to capture through his thought what this nonhuman other is and sees. It is a gaze that, when it meets with human eyes, reveals the impossibility, the complete failure of our conceptual existence to grasp what is there, on the other side of the abyss. To accept this radical otherness that reveals itself through the gaze of the animal is, as Weil (1986) has said, “*to lose ourselves.*”

The testimonies I gathered reveal that the encounters with the swans’ suffering was experienced as something like “losing one’s thought.” An unthinkable and impossible impulse to “cross the abyss,” as one of the Valdivian movement’s spokespersons accounts:

“When you reach that point where an animal talks to you, when you feel interpellated by an animal, the experience is (...) paradigm-breaking. Because in the Jewish-Christian tradition animals are there to be of use for us [para servirse de ellos]. They are not there to dialogue with you, and even less to have a language (...). [A] strange thing happens. Something like you don’t know if you are on the side of your own

human species or on the side of that other species that is calling for help. *A bifurcation occurs.*”³²⁸

One may not have directly seen the suffering swans. One may not have embraced them, as many did, or heard their dramatic call of a being in pain. However, one was still “touched” by such suffering through the hundreds of images presented to the public, making it almost impossible not to respond. As this same witness accounts:

“One of the scenes that shocks me most of ‘*Ciudad de Papel*’ is when Boroschek picks up a swan that is in a yard and puts it in a cage. Inside the car, the swan begins to cry. It is a cry like an agonic moan. Something like ‘aaaahhhh...’. Impressive (...). Many people who watch that scene feel something physical. Like a nausea.”³²⁹

Derrida (2002:373, emphasis added) dares to describe his own “losing of himself” in front of the deeply unsettling power of the encounter with the gaze of his female cat:

“[S]omething happens there that shouldn’t take place (...). It is as if, at that instant, I had said or were going to say the forbidden, *something that shouldn’t be said. As if I were to admit what cannot be admitted.*” He adds, “in these moments of nakedness, *under the gaze of the animal, everything can happen to me*” (Derrida 2002:381, emphasis added). Derrida concludes (2002:379, emphasis added):, “I no longer know who I am (following) or who I am chasing”, he adds; “*I no longer know how to respond.*”

By making room for this experience, Derrida reminds us that the radical encounter with the gaze or call of an animal, forgotten and perhaps even censored, leads to unexplored terrains that are beyond dominant humanist philosophies. To truly encounter such a gaze and such a call one needs to recognize that the animal “can allow itself to be looked at, no doubt, but

³²⁸ Interview conducted by the author for this research.

³²⁹ Interview conducted by the author for this research.

also –something that philosophy perhaps forgets, perhaps being this calculated forgetting itself– *it can look at me*. It has its point of view regarding me. *The point of view of the absolute other*” (Derrida 2002:380, emphasis added).

For Derrida (2002), there is a transformative power in the encounter with the gaze of an animal. Such experience also differentiates humans. Those who have undergone it are the poets and prophets. Those who have not, are the philosophers. Philosophers, he affirms (2002:382-83, emphasis in the original), are those who “have no doubt seen, observed, analyzed, reflected on the animal, but who have never been *seen seen* by the animal.”

To accept being exposed is, then, to accept that our finitude and vulnerability is “capable of panicking us” and “wounding us,” but also, and above all, is capable of “*unseat[ing] our reason,*” especially if we experience this shared vulnerability “with other animals, *in the presence of what we do to them*” (Diamond 2003:21, emphasis added). We have no other choice, Diamond claims, than accepting the responsibility of “making the best” of this relation and accepting that it is something into which we must let ourselves be “taken up” and “surrender to,” as Derrida puts it, like generations of humans have done before us.

Confronted with the unbearable experience of multitudinous animal suffering, Derrida (2002:397, emphasis added) makes a call to respond:

“it is not only a duty, a responsibility, an obligation, it is also a necessity, a constraint that (...) everyone is held to (...) because I believe it concerns what we call ‘thinking.’ *The animal looks at us, and we are naked before it. Thinking perhaps begins there.*”

Can philosophy provide an answer? According to Diamond (2003:13), philosophy “does not know how to inhabit a body.” Thus, she adds, we have no other choice than to appeal to poetry –as Derrida does. Poetry is also for Diamond (2003:9) the only way of “having the

capacity to return us to such a sense of what animal life is.” Poetry gives us the power of a “sympathetic imagining” of the lives of animals and allows us to begin to perceive them as potentially real subjects of justice (Nussbaum 2006:355, quoted by Wolfe 2008:21). This is perhaps why the only traces of a bond between black-necked swans and humans are found in the work of Chilean poets, as detailed in Chapter 4.

As the population of swans inhabiting the wetland continued to decline, their presence had never been so extended in Valdivia, where they colonized the most diverse sites: the local newspaper and the TV cable channel, the city’s walls, T-shirts, windows of cars and houses, posters, flyers and songs were full of them. Wooden swans appeared in the artisans’ market, and art exhibitions presented pictures and drawings of swans. New businesses used them in their logos while kids dressed up in swan-costumes. People made swan-umbrellas, swan-tricycles and swan masks. Through this large-scale performances, involving the entire city, the “(corpo)reality” or ontological density of the swans also was enhanced as never before. As a leader of a working-class neighborhood declared: “(...) in the movement *Acción por los Cisnes* all of us became swans. All of us turned into marching swans.”³³⁰

Along with their ubiquitous and quotidian presence, the swans also revealed their multiplicity, that is, the different layers constitutive of their mutating identity. Amongst other mutations, the image of suffering swans turned into a politically charged weapon. Many in the Valdivian movement who felt discomfort with the cartoonish, pristine white figure coming from fairytales that dominated the media, began to depict the swans as rebellious entities, capable of confronting all sorts of injustices.

³³⁰ Interview conducted by the author for this research.

Rebel swans transformed the image of unpolluted birds into a dangerous actor whose free and far-reaching circulation was potentially subversive. It was precisely in this sense that the image of the swans was used to intervene in an advertising campaign promoting Chile as a destination of superb landscapes launched by the government in 2007. The campaign’s slogan –“*Chile: nature that moves*” [“*Chile: naturaleza que conmueve*”]– was put alongside the image of a run-over and bleeding swan dramatically changing its meaning.

Since 2010, Valdivia’s walls have begun to be populated by these rebellious swans through the drawings of the street artist Felipe Smides.³³¹ Whether denouncing the destruction, pollution or privatization of nature, or accompanying more recent struggles, such as the demand for free public education, swans have become symbols of political resistance and subversive subject/victims ready to condemn wrongs and “move” people to right them.

Photograph 8: More Rebel Swans by Felipe Smides



Over the years, as the ecological struggle has cooled down, swans have stopped inundating

the national press or the TV. However, their presence has continued to appear in the headlines once in a while, reminding us of their vital force. One example is an interview with Michael Hantke, president of the recently created Third Environmental Court that began to operate on December 2013 in Valdivia (Diario Austral de Valdivia January 12, 2014). Hantke highlighted the relevance of the sanctuary’s disaster in the creation of the country’s new environmental frame and, therefore, of the environmental court over which

³³¹ <https://www.flickr.com/photos/felipesmides>

he presides and whose location in Valdivia is no accident. Hantke is depicted through a caricature. He sits on top of a tower of books, and behind them a swan leans out, reminding the lawyer that his work is being attentively observed by potentially rebellious actors.

9.8 Conclusions

The suffering of the swans, spread through the circulation of images, provoked unsettling emotions in authorities, scientists, citizens and businessmen. It was on the grounds of such emotions that many of these actors articulated their response to the disaster. Therefore, the agency entailed in the suffering of the swans needs to be considered on its own, independently of that involved in the Valdivian mobilization.

As seen, to conceptualize the agency involved in the human experience of being moved by the suffering of an animal entails unsettling consequences for dominantly humanist frames of thought. I suggest that this may also be the source of the sociopolitical power arising from the encounters with the suffering swans. Indeed, I argue that it is in the unsettling power provoked by the suffering of the swans that the origins of the massive response to and far-reaching effects of the Río Cruces disaster must be searched for. I also propose that the uneasiness provoked by the experience of being confronted by the suffering of the Valdivian swans and the sociopolitical effects that it gave rise to confirm the existence of non-dominant ontologies or worlds in which the Río Cruces swans are –or can be– fully entangled with us, humans, our institutions, laws and, more broadly, “our” society.

Chapter 10: Conclusions: What Does it Mean to Politically Disrupt the World? The *Río Cruces* Disaster as a Properly Political Event

“Politics is now and many” (Simon Critchley 2007: 131).

“We no longer have to choose between interpreting the world and transforming it” (Michel Callon 2006: 53).

10.1 Overview

In the previous chapters I develop a posthumanist account of the *Río Cruces* disaster. That is, an account which, in conceiving the event as an *ontological opening* or interruption in the “normal state of affairs,” describes the fractures it provoked at different sites, while evidencing the traces of non-dominant performances and making room for the full-blown agency of nonhumans. In particular, I pay attention to the ontological struggles between competing worlds that occurred once dominant business practices, prevailing environmental regulations, or deep-rooted notions of development were confronted by alternative ways of “doing” business, relating to nature or performing local identities. Alternative realities that had so far remained hidden or marginalized under the appearance of a dominant, singular world and its corresponding “ontological consensus.”

Rather than insisting on the conclusions already detailed, here I want to provide a broader picture of the account so far presented. Overall, what I wish to show is that the world’s performance may be seen as an unending struggle between competing ontological programs that are continuously gaining or losing “(corpo)reality” through the concrete “doings” of situated actors. When applied to long-term processes –such as the making and unsettling of Chile’s “forest model,” the establishment and collapse of the country’s environmental frame, or the historic shaping and re-enactment of Valdivia’s identity– this approach helps to evidence the existence of otherwise hidden or excluded worlds through the traces of their gradual and sedimented configuration in events apparently disconnected

in time and space. Seen this way, reality –that is, the actual shape the world has taken– may begin to be understood as a much more fluid endeavor, the result of the constant workings of a multitude of actors, some struggling to sustain certain “states of affairs” while others taking part in their interruption, fissuring, or exposure. In such fluid processes through which the world is constantly coming into existence, there is plenty of room for unexpected agencies and surprising events which, as we know, never come alone but are always connected to broader networks of “doings” involved in one or other mode of performing what reality turns to be.

Applied to the Río Cruces disaster this political ontological approach has allowed me to better account for *how* it was that this local, single-issue mobilization could have fractured things such as ARAUCO’s business model and Chile’s environmental laws, forcing their change, while also transforming the relation of Valdivians with their surrounding landscape and incorporating it as never before into a renewed notion of local development. The capacity of the Río Cruces disaster to provoke such long-lasting and far-reaching effects largely transcends the actual “doings” of Valdivian citizens and even of the citizens/swans association. As the events described suggest this capacity involves the historically sedimented density through which alternative worlds had been silently unfolding.

This is the case, for example, of alternative notions of forest development mobilized through the defense of native forests threatened by the expansion of exotic plantations since the 1980s, which had already challenged dominant ways of doing the forest business in Chile. It also is the case of the alternative understandings of local development that emerged in resistance to ARAUCO’s pulp-mill during the mid-1990s in Valdivia and Mehuín. Such resisting worlds, as the descriptions of the actors confirm, were determinant

in the fast and intense response that the Río Cruces disaster generated amongst Valdivian citizens a decade after. And of course, it is also the case of the worlds mobilized through the close, material entanglement of Valdivians with their rivers.

These nondominant worlds enrolled into the ontological struggle unleashed by the Valdivian disaster not only expanded their own ontological density, as it happened in the case of Valdivia's connection with its rivers. They also contributed to "(corpo)realize" those new worlds that took form along the struggle, such as the bond between Valdivians and the swans. Constituted as key actors of the struggle, Valdivian rivers acted as the bridges that enrolled wetlands and swans into an expanded Valdivian identity. Therefore, the capacity of the disaster to become such a breakpoint event may be understood only when its connections to competing ontologies, that were already taking shape, are traced.

As well, the capacity of the Río Cruces disaster to expose and fracture dominant worlds and, doing so, to make room for nondominant ontologies, required a series of particular ingredients. Amongst them were already weakened practices and knowledges, such as those involved in the country's largely questioned system of environmental impact assessment. Similarly, an already fissured "forest model" and ARAUCO's socially-disentangled investments provided fertile grounds for the fissures derived from the Valdivian struggle. An additional ingredient was the presence of strong territorial identities associated with particularly dense human/nature entanglements such as those existing between Mehuín and its ocean, or between Valdivia and its rivers. In connection to the disaster, these territorial identities nurtured reconfigured understandings of development closely tied to nonhumans and in particular to wetlands and swans.

This research also and centrally reveals the existence of non-dominant nature/human relationalities that emerged unexpectedly and surprisingly, and about which there was no previous register. This was the case with the impressive agentic capacity demonstrated by the Valdivian black-necked swans and their suffering. Notably, the Sanctuary's swans began to act and "do" things even before the Valdivian movement emerged, which speaks of their capacity to unsettle dominant ontological configurations. Indeed, the swans may be said to have "moved" actors to "do" unprecedented things such as to order –in the case of the government– the preventive closure of a mega-factory for the first time ever in Chile. Or to renounce –in the case of ARAUCO– to its right of appealing to a condemnatory sentence also for the first time ever within a legal suit pursued by the State Defense Council.

Of course none of these "doings" may be attributed exclusively to the agency of the swans. As with every other agency accounted for, Valdivian swans were entangled in networks of actors that enabled them to put their capacities "to work." However, multiplied by TV screens and digital images, their suffering was in itself the most powerful of all the agencies mobilized through the Valdivian struggle. Even more notable, the agency mobilized by the suffering of the swans speaks to the strength and density that nondominant human/nature relationalities already have in the actual performance of our world. The magnitude of the *ontological opening* provoked by the Río Cruces disaster and its resulting fractures cannot be understood unless we also include these alternative worlds, the multitude of agencies they involve, and their confrontations with dominant ones.

Finally, as I argue in the introduction, posthumanist approaches allow me to expand conventional understandings of what is at stake in local struggles by interpreting them in political ontological terms. It is doing so that I want to account for the transformative

political potential of these struggles and the ontological confrontations they unleash. As I show through this work, the Valdivian struggle provoked multiple fractures at a diversity of sites –such as environmental laws, business practices, and local identities– generating effects whose marks may be traced to the present. These fractures, in turn, allowed the manifestation of the nondominant worlds already described. But, what about the more aggregated effects the Valdivian struggle generated over the actual configuration of the political community? Put in other words, how can we account for the more enduring mutations derived from the Río Cruces disaster in terms of who and what counts as a political actor of Chile’s environmental politics?

In order to attempt an answer to such questions and, at the same time, enhance posthumanist understandings of the political potential of local struggles, I bring them into conversation with broader theoretical traditions. In particular, I put Jacques Rancière’s notion of the “properly political” in dialogue with a political ontological perspective. The questions I want to address include: *Can the Río Cruces disaster be said to have politically disrupted the world?* If so, *how* can the disruptive potential of a local, situated struggle be conceptualized? And, further, can nonhumans be included as full-blown actors of such disruptive potential? Throughout this reflection, I also dialogue with radical thinkers that have applied Rancière’s post-political notions, although with a different interpretation, as well as with contemporary political philosophers whose work will help me expand my own ontological interpretation of Rancière’s political thought.

10.2 What Does it Mean to “Politically Disrupt” the World?

Post-political authors contest the common understanding that “everything is political.” For Paul Ricouer (1965:255, quoted in Marchant 2007), for example, the “properly political”

takes shape only “in great moments, in ‘crisis’, in the climatic and turning points of history.” Rancière (1999:139-40), one of the most influential philosophers amongst post-political thinkers, argues that, although political events are rare, “always local and occasional,” they may emerge anywhere and anytime that prevailing modes of social ordering are unsettled by the singularization of specific wrongs that embody “a case of universality.”

Indeed, according to Rancière a genuine politics takes shape when particular demands “stand-in for the Universal,” as Slavoj Žižek (2000) has put it. That is, when a particular protest “is no longer actually just about that demand, but about the universal dimension that resonates” through it (Žižek 2000:204). Thus, for Rancière any particular struggle can be considered as genuinely political only when it represents wrongs that are universal, in that they affect the entire political community and, doing so, mobilize a demand for transforming the sociopolitical order as such. In other words, particular demands stand-in for universal ones when they can function “as the metaphoric condensation of the global restructuring of the entire social space” (Žižek 2000:208).

To fully understand Rancière’s notion of the “properly political” it must be noted that it is founded on an “aesthetic metaphor” of the social order, which he describes as *the partition of the sensible*. In brief, the partition of the sensible corresponds to the self-evident facts upon which the very existence of a political community is based and delimited by determining “who and what is visible and audible as well as what can be said, thought, made, or done” (Rancière 2011:85). Such distribution of places and doings constitutes “a totalizing account of the population” (Rancière 2011:14). For Rancière, this totalizing account corresponds to *the police order*. This is not an order for the disciplining of bodies but an “order of bodies” in itself that defines “the allocation of ways of doing, ways of

being, and ways of saying, and sees that those bodies are assigned by name to a particular place and task; (...) sees that a particular activity is visible and another is not, that this speech is understood as discourse and another as noise” (Rancière 1999:29). Therefore, the “police order” and its particular *partition of the sensible* is mainly about governing the spatial and temporal allocation and configuration of bodies and “doings.” In sum, it is the pattern of inclusion and exclusion that determines “who have a part in the community of citizens” (Rancière 2011:13).

Based on this aesthetic approach Rancière argues that what is proper to politics are not the mechanisms, organizations and activities that we usually describe as part of a “political system,” including laws, political parties, elections and the like. Neither the conflicts nor the power relations that are commonly conceived as “political,” such as those involving confrontations between groups organized around certain interests, values or ideologies, is what distinguishes the political. Instead, Rancière proposes that “politics proper” emerges whenever *the police order* and its specific modes of *partitioning the sensible* are disrupted by those who remain “*uncounted and unnamed.*” “The political,” then, is “what disturbs this order by introducing either a supplement or a lack (...). It is a gap in the sensible” that revolves around “what is seen and what might be said, on the question of who is qualified to see or say what is given” (Rancière interviewed by Panagia 2000:124). Thus, the ‘properly political’ is “whatever shifts a body from the place assigned to it (...) makes visible what had no business being seen, and makes heard a discourse where once there was only place for noise” (Rancière 1999:30). In sum, “[s]pectacular or otherwise, political activity is always a mode of expression that undoes the perceptible divisions of the police order” (Rancière 1999:30).

This definition of politics also centrally involves Rancière's concept of "the demos." For him, the demos is "an excessive part –the whole of those who are nothing, who do not have specific properties allowing them to exercise power," but that simultaneously hold "the paradoxical power of those who do not count: the count of 'the unaccounted for'" (Rancière 2000:124). The "properly political," then, has little to do with already existent constituencies or conflicts. It has little to do either with the role of the state or any already known actor. Instead, "politics proper" emerges always in the form of "specific subjects that are outnumbered with respect to the count of the objective whole of the population" (Rancière interviewed by Panagia 2000:124). That is, it necessarily involves the expression of "the demos," the unaccounted, in the form of a "dividing force" that interrupts and confronts the prevalent "police order," demanding to be counted in. Understood this way, the practice of demo-crazy is not a political regime, a culture of pluralism or a form of life. It is, instead, "the symbolic institution of the political in the form of the power of those who are not entitled to exercise power –a rupture in the order of legitimacy and domination" (Rancière interviewed by Panagia 2000:124).

The question that emerges is: what allows those who are excluded from "the whole" of the political community to disrupt prevalent orderings? For Rancière, such power resides in the principle of "equality." That is, in the presupposition that everyone is equal to each other and that anyone may occupy "the political" as a place. Moreover, Rancière (2011:86) considers that "the only universal in politics" is that "we are all equal." Materially, however, equality is never assured but must be continuously enacted. For equality to occur, dissent and rupture are needed in the form of "the voicing speech that claims a place in the order of things" (Rancière 2001:86). In other words, it is the presupposition that every body and

every speech is equal to every other, that is, the presupposition of an universal equality, that enables the actual “police order” and its *partition of the sensible* to be questioned as a naturalized order and, thus, forced to change. In sum, “politics proper” may exist only because there are equals, and it is from such universal “egalitarian contingency” that hitherto excluded political subjectivities may have the power to exert dissensus, provoking a change in the prevailing order.

Therefore, dissensus is, for Rancière (2000:124), “the essence of the political.” It is always through particular, intermittent acts of dissensus that the political subjectivities of the demos –of those that lack a place and a speech– take shape and evidence the contingency of any sociopolitical order. Dissensus, then, is not a quarrel or argument. It is the act of making perceptible in the order of the police a “surplus of subjects” who can create “a common polemical scene” by contending “the objective status of what is ‘given’” while imposing the examination of “things that were not ‘visible,’ that were not accounted for previously” (Rancière interviewed by Panagia 2000:125). In other terms, dissensus is the creation of a *fracture*, “a fissure in the sensible order,” one that separates and divides the political community from within itself (Rancière interviewed by Panagia 2000:85).

In contrast to democracy, the “*police order*” is governed by what Rancière calls “the principle of saturation.” That is, “a mode of the partition of the sensible that recognizes neither lack nor supplement” (Rancière interviewed by Panagia 2000:24). Rancière attributes this principle to Plato’s founding narrative of the three races as a self-contained order where each member of the political community is entitled to specific functions, hierarchically and spatially delimited in relation to the whole. Such community is completely realized, expressing a natural distribution, a saturation of space and time. A

community “with nothing left over” (Rancière 1999:65-7). For Rancière, in Plato’s community the “properly political” is foreclosed: a “nonpolitical city (...) no city at all” (Rancière 1999:71). However, such self-contained community can only exist by eliminating “the disturbing elements of political subjectification (...) the capability of permutability, of changing places of those who have no part” (Rancière 1999:66-71). In sum, it can only exist by the annulment of politics.

Rancière has argued that what underlies the present post-political condition is the logic of consensus that negates democracy and annuls the possibility of dissensus and surplus identities. Indeed, democracy, as said, can only exist through the constant reconfiguring of “the relations of the visible and the sayable, that create new subjects and supplementary objects” (Rancière interviewed by Panagia 2000:125). However, in the world of consensus every individual is grouped as part of already known interests: everyone becomes a stakeholder, announcing a common world where the sum of these given actors constitutes the “whole” that “is called humanity” (Rancière 1999: 24). Thus, the consensus order erases the marks left behind by the partition through which such a “whole” was configured as the inside of the political community. This way, the political community is “cleansed of surplus identities, peopled by real bodies endowed with properties expressed by their name” (Rancière 1999:124). In such an order there is no space for exposing the contingency of social configurations, and the only admissible debate turns out to be “over the technologies of management, the arrangements of policing and the configuration of those who already have a stake, whose voice is already recognized as legitimate” (Swyngedouw 2009:610). Thus, the consensus order annuls dissensus. In brief, it is “*the end of politics*” (Rancière, 2001:32, emphasis added).

Based on Rancière, radical authors such as Erik Swyngedouw (2009, 2010) and Slavoj Žižek (2000, 2002) have highlighted how the contemporary expression of the foreclosure of “the political” is expressed in the reigning managerial, techno-scientific consensus that characterizes what has been called the present post-political order. According to these radical views, in the post-political order the potential of the “properly political,” expressed in the metaphoric universalization of particular demands, is being systematically counter-posed by “the vast apparatus of experts, social workers and so on” that reduces “the overall demand (complaint) of a particular group to just this demand, with its particular content” (Žižek 2000:204). Such managerial mode of governing treats social differences as irrelevant, reducing them to a technical matter in the hands of experts who are in charge of solving the concrete needs and demands of people. Conflict, in turn, is replaced by “the collaboration of enlightened technocrats (economists, public opinion specialists, etc.) and liberal multiculturalists; via the process of negotiation of interests, a compromise is reached in the guise of a more or less universal consensus” (Žižek 2000:198). The post-political order is, then, about addressing specific, fragmented problems and seeking technically appropriate solutions that “remain of course fully within the realm of the possible, of existing socio-ecological relations” (Swyngedouw 2010:193).

10.3 An Ontological Reading of Rancière’s Politics

Here I want to argue that Rancière’s aesthetic notion of politics may be read in ontological terms. As noted, for Rancière the properly political emerges through events that *interrupt*, *displace* and provoke *fissures* in pre-given or dominant social orderings. That is, that disrupt the places and roles already assigned to “bodies,” “doings,” and “sayings” in the “whole” of the political community, determining who and what counts as a political actors.

Such political disruptions are distinct from all conflicts of interest between constituted parties “for it is a conflict over the very count of those parties” that occurs whenever groups contend by their very existence the ‘regime of the all visible and counted’ (Rancière 1999:100). The ground for political action, then, is a “polemical scene” –to use Rancière’s terms–, or, from my perspective, a *fracture in the ontology of the political community*, where the coming in to existence of certain subjects and objects embody in itself the contestation of the given order by imposing the “examination and discussion of those things that were not “visible,” that were not accounted for previously” or “which did not have a name” (Rancière 2000:124-5). In other terms, *properly political events are those that provoke ontological disruptions by introducing “surplus” subjects and objects that force a revision of the configuration of the prevalent social order.*

This ontological interpretation of Rancière’s political philosophy is also consistent with the fact that his aesthetic view remains fully open to any potentially political event and, even more important, to any potentially political actor. Indeed, for Rancière ‘the political’ as disruption lacks a specific place (or body). Rather, its specific place is the “*police order*” itself, exposed to any mode of interruption or displacement. Thus, whenever the prevailing order is rephrased or restaged, whenever the dominant –spatial or otherwise– distribution of “bodies,” “doings” and “sayings” is exposed, challenged and reconfigured, it may be said that “politics” has emerged. This view not only rejects the naturalization of the “properly political,” but also acknowledges that “the political sequence is unusual, eventual, not predictable and, above all, disruptive,” thus it “cannot be foretold on the basis of the social or ecological analysis,” but rather “can only retroactively be identified as an eventual political moment” (Swyngedouw 2009:608). In other terms, it is only based on the

disruptive effects that a particular event has already produced that it may be considered as “properly political.” It is a matter of *post-hoc* reflection rather than of previous classifications and exclusions.

Indeed, Rancière’s understanding of the “properly political” has the virtue of placing politics at the center of exclusions. It is in the very act of demonstrating such exclusion by those who had remained “uncounted and unnamed” that, according to Rancière, politics may happen. Therefore, politics is overall the challenge of the ontological configuration of any prevailing political order, through demonstrating its arbitrary partition of whose “bodies,” “sayings” and “doings” count: “[P]olitics exists wherever the count of the parts and the parties of society is disturbed by the inscription of a part of those who have no part” and “ceases wherever this gap no longer has any place, wherever the whole of the community is reduced to the sum of its parts with nothing left over” (Rancière 1999:123). Therefore, the political community that emerges from Rancière’s understanding is not a closed and already given “consensual community of interests”, but rather a “community of interruptions, fractures, irregular and local” (Rancière 1999:137-8). A community that already acknowledges the fractures and fissures in existent identities and that is constantly being divided and confronted from within, challenged to draw and re-draw new lines in its “*partition of the sensible*.” Only in so doing may the political community make room for emerging identities, their “bodies” and “sayings.”

In principle, then, the reconfiguration of any political community could –as Rancière argues– be redrawn to make room for nonhumans as political agents as long as their “bodies,” that is, their existence, could serve as the demonstration of previous exclusions. However, as long as for Rancière such demonstration also needs to be based on the

universal principle of equality, nonhumans are *de facto* excluded for, ontologically speaking, they are not and cannot be equals within the contours of the prevalent Euro-modern “ontological consensus” and its corresponding *partition of the sensible*. As we will see, Simon Critchley’s reading of Rancière provides us a way out of such impasse.

I want to insist here on the thoroughly ontological notion of “the political” implied in Rancière’s philosophy. In fact, for him political disruptions splinter reality by introducing into it contentious objects and subjects that lack “the consistency of coherent social groups” and rather “exist entirely within the act” of resistance (Rancière 2000:124-5). From such ontological approach *the most elementary form of resistance consists, precisely, in existing*: “Democratization consists in the manifestation of dissensus, in demonstration as demonstration, manifesting the presence of those who do not count” (Critchley 2007: 130).

This is why the identification of a political sequence requires an attentive eye, capable of tracing “[W]herever the part of those who have no part is inscribed, however fragile and fleeting these inscriptions may be” (Rancière 1999:87). For, political disruptions may take unexpected and nuanced shapes, just a mere “sphere of appearance of the demos” (Rancière 1999:87). Therefore, Rancière (1999:89) warns, there is no case for predetermining who the people are and through what doings they may disrupt the prevalent order. In politics, he explains, “subjects do not have consistent bodies; they are fluctuating performers who have (...) the peculiar role of inventing arguments and demonstrations-in the double, logical and aesthetic, senses of the terms.”

Radical authors have highlighted Rancière’s notion of politics for it re-interprets and expands what resistance means through acknowledging the aesthetic dimension that is

inherent to any radical emancipatory politics (Žižek 2013). By multiplying the events that may allow the properly political to emerge, such expansion has led Žižek (2013: 75) to argue that Rancière's thought remains "one of the few consistent conceptualizations of how we are to continue to resist" under the present, post-industrial global society.

Nonetheless, these same radical perspectives have entirely dismissed the transformative potential of local, situated struggles and movements for they are considered beforehand to be micro-politics or placebo-politicalness as Marchant (2007:47) has called them. That is, dispersed resistances, *a priori* failed, and whose more radical forms only aspire to "destabilize, displace, and so on, the power structure, without ever being able to undermine it effectively" (Žižek 2002:101). Moreover, radical authors see local protests as "not truly political" because of "the restricted nature of the constituency" they involve (Marchant 2007:47). Single-issue mobilizations, such as most environmental struggles, are viewed as "a proliferation of identitarian, multiple and ultimately fragmented communities" whose protests are "framed fully within the existing practices [of the] police order" (Swyngedouw 2009:615). This "postmodern 'identity politics'" is conceived as the opposite of the universalization of wrongs that is inherent to the "properly political," for it is concerned with "the assertion of one's particular (...) place within the social structure" while nurturing a "depoliticized notion of society in which every particular group is 'accounted for'" through "the preferential treatment which should compensate for the wrong this group has suffered" (Žižek 2000:208-209). In sum, post-political authors see most local, situated struggles "as such, doomed to failure" in their political potency (Swyngedouw 2009:616). Therefore, although radical thinkers may subscribe to Rancière's philosophy –especially, its depiction of the foreclosure of the political under the present techno-scientific consensus–,

in my view, their aprioristic dismissal of the political potential of local struggles contradicts Rancière's notion of the "properly political." It does so, in the first place by denying that the political, as Rancière conceives it, may arise anytime and anywhere and is only identifiable by *post-hoc* tracings of its disturbing effects. Secondly, radical interpretations establish beforehand that certain events are politically futile contradicting Rancière's ontological understanding that "the political" can only take shape through particular, contingent events that expose the exclusionary constitution of a political community. Thus, by insisting on the irrelevance of local struggles, radical approaches fail to make room for, precisely, the unexpected, fleeting, albeit disruptive forms that political events have acquired. In particular, by doing so such approaches dismiss the central place of ontological struggles –such as those described by Mario Blaser (2009, 2010)– in the present global conjuncture and which are the focus of this work.

Indeed, I argue, Rancière's ontological notion of politics, so influential amongst critical authors, may be expanded in conversation with posthumanist understandings. In doing so, I want to contribute to showing *how*, exactly, can local struggles unsettle prevalent orderings and the corresponding "ontological consensus." Building on Critchley's reading of Rancière, in what follows, I propose a political ontological perspective that makes room for all sorts of bodies as potential members of the political community, including nonhumans.

10.4 The "Properly Political" as an Ethical Response

In order to interpret Rancière's understanding of the properly political in thoroughly ontological terms, the core relation between particular demands and their "universalization" that is presupposed in his philosophy needs to be reframed. As said, according to Rancière the inherently political potential of any situated protest is unleashed only when its

connection to the universal may be demonstrated. This implies the capacity of particular struggles to evidence wrongs that affect the “whole” of the political community and that, doing so, expose the contingency of prevailing orderings. The key question becomes: in what specific ways can particular struggles evidence wrongs that are universal?

An important distinction needs to be made. For a particular struggle to expose a universal wrong it does not need to mobilize broader political projects of social transformation, as radical authors such as Erik Swyngedouw (2010), for example, have argued. Indeed, after describing Rancière’s approach, Swyngedouw concludes that the truly political only emerges through the “construction of great new fictions” that are “mobilised for realization,” constituting “the decisive material and symbolic space” from which “different socio-environmental futures can be imagined, fought over and constructed” (Swyngedouw 2010:204). This view assumes that the properly political revolves around radically oppositional spaces structured upon competing political projects. Such an antagonistic notion of politics, however, denies the actual contestation of the present post-political order by local, single-issue struggles that are not concerned with mobilizing broad programs of social transformation but that, nonetheless, may still have the capacity to fracture prevalent orders and force them to change. Thus, if we insist on assessing the political potential of situated struggles through conventional radical lens we will also miss the possibility of observing and tracing their transformative effects through a political ontological perspective. In what follows I bring Critchley’s political philosophy in conversation with Rancière’s to shed light on the question of how local demands may stand-in for universal ones when observed through ontological lenses.

Basically, Critchley disagrees with Rancière in that the fundamental force that moves actors to prompt a “properly political” sequence is the principle of equality. He argues that Rancière’s universal egalitarian principle is an abstract, disincarnated force that only makes sense with reference to an original political community. Such foundational notions of politics, Critchley (2007:128) notes, characterize traditional political philosophy, and are expressed in its obsession with the state: “the problem with much traditional thinking about politics is that it is *archic*: it is obsessed with the moment of foundation, origination, declaration, or institution that is linked to the act of government, of sovereignty, of establishing a state.”

Therefore, Critchley sees local struggles and practices of situated contestation as expressing an “interstitial distance” from prevalent structures and modes of governing in the attempt to build alternative relationalities and forms of social living that he defines as the cultivation of “spaces of autonomy.” Accordingly, gatherings, associations and spontaneous local struggles, articulated in the sharing of a common experience of contestation, albeit fragmented and fleeting, can still embody the dissensual resistance that constitutes the properly political with no need of being massive or permanent. Indeed, as Critchley notes, the political force of these local struggles lies, not in the impulse towards the realization of certain alternative configuration of the present order, but in its inflection and explicit “deformation” from beneath. As he insists, politics proper does not aim for any “fixed form of society” or pre-determined political program. Rather it aims for “the deformation of society from itself through the act of material political manifestation” (Critchley 2007:129). That is, politics aims for the continuous deformation of the prevalent ontology of the ‘police order’ towards the cultivation of a truly multiple world.

In sum, then, Critchley agrees with Rancière in that the archic view founded on Plato's *Republic* has permeated political philosophy, resulting in essentially anti-political notions: "In Hannah Arendt's terms it consists in the reduction of the political to the social, or in Jacques Rancière's terms it is the reduction of politics (*la politique*) to the order of the police (*la police*)" (Critchley 2007:128). However, on the other hand, Critchley criticizes Rancière's universal principle of equality for –even though it is not pre-given and essential but locally enacted through the demands of situated actors– it is yet anchored in a narrative of a foundational political arrangement that mobilizes an *archic* notion of politics. Doing so, Critchley contends, Rancière's equality prompts an anti-political sensibility that annuls, instead of opening, "the political" as an event.

To replace Rancière's principle of equality, Critchley (2007:114-19) proposes that what ultimately "motivates the subject into the political action" is an "ethical demand of infinite responsibility" in front of the claims raised by autonomous others, and which lies "at the heart of a radical politics." In Critchley's terms, such ethical demand consists in a moment of "hetero-affectivity" experienced as an "intimate disturbance" that results from witnessing the suffering of 'an other', and which precedes any political claim. As Critchley (2007:131-2) explains, "ethics is the experience of an infinite demand at the heart of my subjectivity, a demand that undoes me and requires me to do more, not in the name of some sovereign authority, but in the namelessness of a powerless exposure, a vulnerability, a responsive responsibility, a humorous self-division." This ethical demand is what, in the face of a "political disappointment," such as "an experience of injustice and the feeling of anger (...) produces motion, the mood that moves the subject" (Critchley 2007: 130). Moreover, it is a demand experienced as a "splitting in the heart of the self, a constitutive

undoing and dispossessing of the self (...) close to what Judith Butler has recently written about affect undoing us, in particular the affect of grief (...) ‘In grief, we are held in *thrall* by the other’,” Critchley (2007:119) quotes.³³² Such experience, Critchley adds (2007:119-120), “shows our essential interconnectedness and vulnerability to the other’s demand” while providing us “the motivational force to enter into a political sequence (...) facing and facing down a wrong or confronting a situation of injustice (...) through an ethical responsiveness to the sheer precariousness of the other’s face, of their injurability and our own.” For Critchley, then, what lies in the origin of any political event and holds any political community together is not the abstract concept of a theoretical doctrine, such as Rancière’s universal principle of equality. It is, rather, an ethical impulse originating in a concrete, bodily experience of exposure to a shared vulnerability in front of a wrong that makes an “other” suffer. It is this intimate, splintering and affective undoing that, for Critchley, moves a subject to take part in practices of dissent including local struggles.

Read through political ontological lenses Critchley’s main contribution lies in having identified and left behind the residual traces of a radical thinking that forecloses the political potential of particular struggles for failing to undermine the prevalent order through the antagonistic mobilization of universal demands. On the contrary, I argue, *the capacity of local struggles to unsettle the prevalent order is not a question of material or symbolic antagonism but of ontological accountancy: it is the “existence” of previously excluded “bodies,” “doings” and “sayings,” hitherto uncounted and unnamed, that is evidenced by local struggles which, in so doing, expose to revision not only the contingency of dominant social orders, but also their specific ontology.* This ontological politicization

³³² Critchley quotes here Judith Butler’s “Precarious Life” (2006).

needs not to be framed in antagonistic terms. It involves, rather, the concrete disturbance of the places and roles assigned to sociopolitical actors, without the necessity of mobilizing any broader restructuring program. Thus, properly political events become fully grounded in the practices –that is, the actual “doings” and “sayings”– of situated actors. It is our challenge to identify the manifold ways in which such practices may disturb prevailing orders, leaving marks that can be traced beyond their fragmented or temporal appearance.

10.5 The Space for Nonhumans in the “Properly Political”

Once the political potential of local struggles has been rooted in the situated practices of ethical resistance proposed by Critchley, rather than on disembodied and universal principles, I can return to my attempt to interpret Rancière’s work in fully ontological terms.

Critchley’s notion of the properly political meets with Rancière’s philosophy in that it reinforces the ontological perspective that I here want to highlight: the situated, always contingent deformations of the prevalent order are finally and foremost ontological disruptions. That is, expressions of dissent that revolve around the existence of those who are a given part of the political community, and of the places already assigned to their “bodies,” “doings” and “sayings.”

Politics may be seen, then, as the intermittent enactment of fragmented, always situated events that make visible and unsettle the ontological contingency of existent social orderings, while making room for the ontological multiplicity of the world. That is, for the acknowledgement that there is no such thing as a foundational political community and that, moreover, the world is not singular but ontologically open and constantly being performed through the “doings” and “sayings” of actors that are not given either, and whose very

existence constitutes a site of ontological inflection. Thus, it is the coordinates of the political community itself, its borders and allocations, the definition of who or what is a legitimate actor or speech, and, furthermore, of what are the affinities and drivers of political resistance, what becomes confronted and unsettled through situated struggles.

I want to close this reflection on Critchley's ontological expansion of what constitutes a "properly political" event by opening the space for nonhumans as political actors. As Critchley notes, the politically constitutive moment of ethical call in response to which the "properly political" emerges is defined by an hetero-affective encounter on the face of an "other." Since it is the "call" for ethical demand in itself what defines this political moment—rather than any pre-given capacity of any of the actors involved—, the place of this "other" may be occupied by—as Critchley himself puts it— multiple "forms of life" and "possible worlds." In my view, these forms of life and possible worlds include nonhumans as well as nondominant modes of human/nonhuman relationings. In fact, as detailed in Chapter 8, something like the ethical demand conceptualized by Critchley was described by many of my interviewees to describe what they experienced in the face of the Río Cruces' swans' suffering. Moreover, some of them said they even "heard" a call for help from the swans, an experience they depicted as a "paradigm-breaking" one.

The key point I want to make is that Critchley's interpretation allows us to bring the encounter between humans and Valdivian swans to the very core of the constitutive moment that enabled the Río Cruces disaster to become a "properly political" event. Therefore, despite its unexpected character, there is no need for treating such an encounter as something that is strange to politics. On the contrary, it may begin to be treated—as many

of the actors themselves describe it— as “*the*” fundamental driver of the political potency unleashed by this ecological struggle.

At this point I return to Rancière in order to add an element that expands his ontological notion of the political and of the political community. For Rancière (2011), the political subject who brings “politics proper” into existence is not a human individual seeking adequate representation or recognition of his interests. It is, as he calls it, ‘an empty operator’ that challenges the established order of classification and distribution.

Furthermore, in this aesthetic conception of political subjects, Rancière (2011) makes room for what he calls “silent speech,” which he describes as the possibility that “things” —that is, nonhuman entities— may become political subjects as long as they have immanent, latent meanings that emerge and acquire political power. As the Valdivian case notably shows, the political disturbance that resulted from the encounter of humans with suffering swans exposes, precisely, how speechless actors may become full-blown political agents, mobilizing along sedimented meanings, identities, and territorial projects of development.

Indeed, regardless of our capacity to elaborate this experience and its effects, the Río Cruces disaster mutated the ontology, not only of the Valdivian swans, which are now completely different creatures, able “do” things that were impossible to even conceive a decade ago. The disaster also mutated the configuration of the Valdivian —and perhaps also of the Chilean— political community. In other words, it provoked an ontological expansion of the actors that currently take part in the city’s becoming, which include the swans as well as the wetlands and, more than ever before, the rivers that are tied to both. Their “speechlessness” does not impede these entities from being fundamental actors in contingent debates and decisions that involve highly controversial issues, such as

Valdivia's urban expansion or the approval of new investments located in the proximities of the Sanctuary or other wetlands. Moreover, in 2015, Valdivia is considered the place where citizens and regional authorities are more concerned about wetlands, to the extent that the possibility of a regional policy for their protection –the first of its type in the country– is beginning to be discussed. In sum, a decade after the Río Cruces disaster exploded its marks can be traced, not only in the fractures provoked at different sites, but also in the constitution of nonhumans as political agents that, since then, have continued to expand their capacities, their “doings,” and their entanglements to humans, as full members of a now broadened political community.

10.6 Final Words

Here I have proposed that Rancière's aesthetic understanding of “the political” is consistent with the political ontological perspective developed by posthumanist theories. Both allow me to attend to the fissures in the prevalent “ontological consensus” by showing how new “bodies,” “doings” and “sayings” –previously unaccounted– disturb such an order by the very demonstration of their existence. However, Rancière's post-political perspective does not explicitly include nonhumans amongst those unaccounted subjects. Therefore, I take from Critchley's conversation with Rancière's political philosophy the notion of an ethical demand that stands as the core motive of political action, and which may well emerge in response to the suffering of a nonhuman “other” that in that same act turns into a political actor. That is, an actor able to make others “do” things in response to what affects him.

As said, the encounters with Valdivians swans was experienced by all sorts of actors as “*the*” crucial factor that forced them to respond and act, converting the Río Cruces disaster into a politically generative event. Consistently, the most relevant effect of the disaster was the

full irruption of new political actors previously ignored, such as swans and wetlands, and of the worlds that came along with them. In particular, the recognition of the legitimate existence of a bond that gradually emerged and tied together Valdivians, the sanctuary and its swans sharply inflected the mode in which environmental decisions had been so far made in Chile. In one phrase, the ontologically laden displacements that resulted from the Valdivian struggle changed the country's environmental frame, its scientific foundations, and its political justifications.

Such a deep displacement of the political community also unsettled the dominant Euro-modern "ontological consensus." For, whenever humans allow themselves to be "moved" and respond to the suffering of nonhumans –such as Valdivian swans– and, moreover, experience their demand as something like a "call" for help, they act in contradiction to the Euro-modern ontology. Just as critical, such "doings" confront Euro-modern notions of what it means to be "human." That is, they confront that we humans are safely disconnected by our rationality from what Critchley describes as an hetero-affective impulse that emerges in response to the shared vulnerability we experience when faced in front of the suffering of our nonhuman fellows.

The ontological way of framing the political agency of local struggles has several implications. The most important being the revaluation of the type of changes that local struggles may generate. Despite all the criticisms that local, single-issue mobilizations have received for failing to provoke the transformation of hegemonic structures, the case of the Valdivian struggle shows that these mobilizations can nonetheless be considered as overtly political in the terms proposed by Rancière's philosophy and its expanded ontological reading that I enact here. Indeed, through demonstrating the existence of "bodies," "doings"

and “sayings” not previously considered, this local struggle fractured and simultaneously expanded *the constitution of the political community itself*.

In sum, the *Río Cruces* ontological struggle reveals that, in the here and now, inside this same modernity that is supposedly immune to overcoming the greatest of all divides, disturbingly unsettling experiences where humans are moved to cross or at least stare into the depths of the abyss separating them from nonhumans, are happening. Moreover, they are able to become the core driving forces of broad sociopolitical transformations. By far the most important conclusion of this research is to highlight the political potency that lies within ecological struggles once we begin to observe them through posthumanist and performative lenses that unveil the ontological struggles they unfold. Apparently local and single-issue ecological struggles, such as the one triggered in Valdivia, may have the capacity to unsettle the ontological configuration of the political community by revealing the hidden, forgotten –although fully alive– political agency of nonhuman animals.

References

- Abalos, José. 1985. "Crecimiento Regional versus la Comunidad. Chiloé: un Caso de Autoconfianza Colectiva Regional." *EURE* 34/35: 9-34.
- Acción por los Cisnes. 2005a. "Fundamentos de la Agrupación Ciudadana Acción por los Cisnes en Relación al Desastre Ecológico en el Santuario de la Naturaleza del Río Cruces." Valdivia, Chile: Acción por los Cisnes.
- Acción por los Cisnes. 2005b. "Historia de las Infracciones de CELCO a las Leyes de Chile y su Responsabilidad en el Daño Ambiental del Santuario del Río Cruces." Valdivia, Chile: Acción por los Cisnes. Retrieved May 15 2011 (http://www.accionporloscisnes.org/documentos/documentos_apc/historia_infracciones_celco.pdf).
- Acción por los Cisnes. 2005c. "Posición Crítica de Acción por los Cisnes ante el Informe Final del Consultor Zaror." April 7. Valdivia, Chile: Acción por los Cisnes. Retrieved April 8 2010 (http://www.accionporloscisnes.org/documentos/documentos_apc/posicion_informe_zaror.pdf).
- Acción por los Cisnes. 2005d. "Carta Abierta de Acción por los Cisnes a los Profesionales, Técnicos y Funcionarios de la Comisión Nacional del Medio Ambiente." May 30. Valdivia, Chile: Acción por los Cisnes. Retrieved October 30 2013 (http://www.accionporloscisnes.org/documentos/documentos_apc/carta_abierta_funcionarios_conama.pdf).
- Acción por los Cisnes. 2005e. "Recurso Jerárquico en Contra de la Resolución Exenta 377/05 de la COREMA X." Valdivia, Chile: Acción por los Cisnes. Retrieved June 21 2014 (http://www.accionporloscisnes.org/index.php?option=com_content&task=view&id=83&Itemid=31).
- Acción por los Cisnes. 2006. "Condiciones Ambientales de la Autorización de la Planta de Celulosa Valdivia de CELCO-ARAUCO, Impactos Ambientales Derivados de sus Incumplimientos e Ilegalidad de la Autorización Administrativa con que COREMA X Permitió la Continuidad de su Operación." Valdivia, Chile: Acción por los Cisnes.
- Acción por los Cisnes. 2004. Letter to the Environmental Commission of the Chamber of Deputies. December 17th 2004. Signed on behalf of Action for the Swans by Vladimir Riesco, José Araya, Claudia Sepúlveda, Ximena Rosales and Juan Pablo Lazo. Valdivia, Chile: Acción por los Cisnes.
- Acción por los Ríos. May 1996. No Title. Letter to the Neighbors of Valdivia. Valdivia, Chile: Acción por los Ríos.
- Agamben, Giorgio. 2003. *The Open: Man and Animal*. Stanford, CA: Stanford University Press.

- Aillapán, Lorenzo. 2005. *Veinte Poemas Alados de los Bosques Nativos de Chile*. Concepción, Chile: Durandal.
- Albert, Federico. 1900. *Las Dunas, o sean las Arenas Volantes, Voladeros, Arenas Muertas, Invasión de las Arenas, Playas i Médanos del Centro de Chile: Comprendiendo el Litoral Desde el Límite Norte de la Provincia de Aconcagua Hasta el Límite Sur de la de Arauco*. Santiago: Imprenta Cervantes.
- Aldunate, Carlos. 2001. *El Factor Ecológico: Las Mil Caras del Pensamiento Verde*. Santiago: LOM Ediciones.
- Álvarez, Carlos. 1993. "La Corporación de Fomento de la Producción y la Transformación de la Industria Manufacturera Chilena." Pp. 63-148 in *La Transformación de la Producción en Chile: Cuatro Ensayos de Interpretación*. Estudios e Informes de la CEPAL. LC/G. 1674-P. ECLAC Collection 84. Santiago: ECLAC.
- Álvarez, Enrique. 1956. "La Elaboración de Maderas Prensadas en Chile." *Chile Maderero* VI, N° 5.
- Anderson, Steve. 2004. "Forestry Companies Bend to Environmental Pressure: Native Forests Continue to be Endangered." *The Santiago Times*, April 5. Retrieved August 10 2014 (<http://santiagotimes.cl/forestry-companies-bend-to-environmental-pressure/>).
- Apablaza Cheuquepán, Carol, Carla Hormaechea Mena and Jocelyn Villanueva Villa. 2008. "Caso Celco: Competencia de los Tribunales Superiores de Justicia, para Pronunciarse, en Virtud de un Recurso de Protección Ambiental, sobre Materias Técnicas, que Competen a la Institucionalidad Ambiental Respectiva". *Revista de Derecho* 9(9): 117-138.
- ARAUCO. June 8 1995. "Gerencia General, Arauco VAL-213." Letter from Alejandro Pérez, ARAUCO's CEO, to Rabindranath Quinteros, Regional Governor of the Lakes District [Región de los Lagos]. Puerto Montt: ARAUCO.
- ARAUCO. June 9 2005. Press release. Santiago, Chile: ARAUCO. Retrieved June 16 2009 (<http://arauco.cl/noticias.asp?idq=2636&tipo=2&parent=0>).
- ARAUCO. 2005. *Memoria Anual 2004*. Santiago: ARAUCO.
- ARAUCO. 2007. *Memoria Anual y Reporte Ambiental 2006*. Santiago: ARAUCO.
- ARAUCO. 2010. "Gerencia Planta Valdivia, Arauco GPV 2010." Letter from ARAUCO to the First Civil Court of Valdivia. Valdivia: ARAUCO.
- ARAUCO. 2011. "Foro Temático: Contribución de Empresas Arauco al Desarrollo Local. Documento de Propuestas." Elaborated as part of ARAUCO's application to the Forest Stewardship Council. April 2011. Santiago: ARAUCO. Retrieved May 14 2014 (<http://www.foroabierto.cl/desarrollo-local/discusiones-desarrollo-laboral/>).

- ARAUCO. 2012. "Plan de Gestión Social." Santiago: ARAUCO.
- ARAUCO. February 12, 2016. "Presenta Descargos." Expediente Sancionatorio, Superintendencia del Medio Ambiente (SMA), N° D-001-2016. Santiago.
- Archivo Histórico Casa Museo Eduardo Frei Montalva. Carpeta 72. Retrieved July 31 2014 (<http://www.casamuseoeduardofrei.cl/site/2014/06/objeto-del-mes-el-plan-forestal-de-eduardo-frei-montalva/>).
- Armesto, Juan, Carolina Villagrán and Claudio Donoso. 1994. "Desde la Era Glacial a la Industrial: La Historia del Bosque Templado Chileno." *Ambiente y Desarrollo* 10 (1): 66-72.
- Armesto, Juan. 1992. "Editorial: Mitos y Realidades del Bosque Nativo Chileno." *Revista Chilena de Historia Natural* 65: 173-176.
- Asesorías para el Desarrollo. 2009. "Evaluación del Programa Fondo de Financiamiento de Centros de Excelencia en Investigación FONDAP. Informe Final." Febrero de 2009. Santiago: Subsecretaría de Economía Fomento y Reconstrucción, Ministerio de Economía, Gobierno de Chile.
- Barad, Karen. 2003. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs* 28 (3): 801-831.
- Barandarian, Javiera. 2013. "Regulatory Science in a Developing State: Environmental Politics in Chile". PhD Dissertation in Environmental Science, Policy and Management, University of California, Berkeley. Retrieved April 21 2014 (<http://www.escholarship.org/uc/item/8kr0t37g>).
- Barbosa Lima-Toivanen, Maria. 2012. "The South American Pulp and Paper Industry: The Cases of Brazil, Chile, and Uruguay." *World Forests* 17: 243-283.
- Barnes, Trevor. 2002. "Performing Economic Geography: Two Men, Two Books, and a Cast of Thousands." *Environment and Planning A* 34(3): 487-512.
- Barnes, Trevor. 2008. "Making Space for the Market: Live Performances, Dead Objects, and Economic Geography." *Geography Compass* 2/5: 1432-1448.
- Barry, Andrew and Don Slater. 2002. "Technology, Politics and the Market: an Interview with Michel Callon." *Economy and Society* 31(2): 285-306.
- Bentham, Jeremy. 1948. *An Introduction to the Principles of Morals and Legislation*. New York: Hafner Press.
- Bernarth, Ernesto. 1940. *El Cultivo del Pino, el Alamo y el Eucalypto*. Santiago, Chile: Editorial Zig-Zag.
- Bernedo Pinto, Patricio. 1999. "Los Industriales Alemanes de Valdivia, 19850-1914." *Historia* 32: 5-42.

- Biblioteca del Congreso Nacional de Chile. 2010. "Historia de la Ley N° 20.417. Crea el Ministerio, el Servicio de Evaluación Ambiental y la Superintendencia de Medio Ambiente." Diario Oficial, 26 de Enero. Valparaíso: Biblioteca del Congreso Nacional de Chile.
- Blake, Emmet R. 1977. *Manual of Neotropical Birds*. Volume I, Sphenicidae (Penguins) to Laridae (Gulls and Allies). Chicago and London: The University of Chicago Press.
- Blaser, Mario. 2009. "Political Ontology: Cultural Studies Without 'Culture'?" *Cultural Studies* 23(5-6): 873-896.
- Blaser, Mario. 2010. *Storytelling Globalization from the Chaco and Beyond*. Durham, NC: Duke University Press.
- Blaser, Mario. 2014. "Ontology and Indigeneity: on the Political Ontology of Heterogeneous Assemblages." *Cultural Geographies* 21(1): 49-58.
- Bluth Solari, Alejandra. 2013. *El Aporte de la Ingeniería Forestal al Desarrollo del País: Una Reseña Histórica de la Profesión Forestal en Chile*. Santiago: Colegio de Ingenieros Forestales de Chile A.G.
- Boeninger, Edgardo. 1997. *Democracia en Chile, Lecciones para la Gobernabilidad*. Santiago: Editorial Andrés Bello.
- Boettcher, Claudio. 2007. "Variación Comparativa de Biomasa Estacional en Dos Macrófitos de la Región de Valdivia, Chile." *Ciencia y Trabajo* 9: 191-199.
- Boisier, Sergio. 2000. "Chile: la Vocación Regionalista del Gobierno Militar." *EURE* 26 (77): 81-107.
- Bougainville, Louis. 1771. *Voyage Autour du Monde par la Frégate du roi 'la Boudeuse' et la Flûte 'l'Étoile'; en 1766, 1767, 1768 & 1769*. Paris, France: Saillant & Nyon, libraires, rue S. Jean-de-Beauvais.
- Bradley, Ruth. 2008. "Reforma Ambiental: ¿Mejoría o Perjuicio?" *bUSINESS-CHILE* 256, August. Retrieved July 28 2014 (<http://www.businesschile.cl/portada.php?w=contenido&lan=es&id=2>).
- Callon, Michel, ed. 1998. *The Laws of the Market*. Oxford, UK; Malden, MA: Blackwell Publishers.
- Callon, Michel, Pierre Lascoumes and Yannick Barthe. 2009. *Acting in an Uncertain World. An Essay on Technical Democracy*. Cambridge, MA; London: The MIT University Press.
- Callon, Michel. 1986. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay". Pp.196-223 in *Power, action and belief: a new sociology of knowledge?*, edited by John Law. London: Routledge.

- Callon, Michel. 2006. "What Does it Mean to Say that Economics is Performative?" (Papiers de Recherche du CSI -CSI Working Papers Series ed.). Paris: Centre de Sociologie de L'Innovation, Ecole des Mines de Paris.
- Callon, Michel. 2009. "Elaborating the Notion of Performativity." *Le Libellio d'Aegis* 5 (1): 18-29. Retrieved May 10 2010 (<https://hal-mines-paristech.archives-ouvertes.fr/hal-00460877/document>).
- Cámara de Diputados. 2009. "Informe del Primer Trámite Constitucional del Proyecto de Ley que Crea el Ministerio de Medio Ambiente, la Superintendencia de Medio Ambiente y el Servicio de Evaluación Ambiental". Oficio 8080. Sent by the Chamber of Deputies to the President of the Senate on May 6. Valparaíso: Cámara de Diputados, Congreso de Chile.
- Campos, Hugo, Elys Bucarey and José Arenas. 1974. "Estudios Limnológicos del Lago Riñihue y Río Valdivia (Chile)." *Boletín de la Sociedad de Biología de Concepción* 47: 47-67.
- Campos, Hugo. 1973. "Migration of *Galaxias maculatus* (Jenys) (Galaxiidae, Pisces) in Valdivia Estuary, Chile." *Hidrobiología* 43 (3-4): 301-312.
- Campos, Hugo. 1995. "Estudio de Impacto Ambiental Proyecto Valdivia. Investigaciones sobre la Calidad de Agua del Río Cruces y Estudios Limnológicos". Celulosa Arauco y Constitución S.A. Responsible Researcher: Hugo Campos C. Institute of Zoology, UACH. Prepared for Geotécnica Consultancy Limited. October 1995. Valdivia: Universidad Austral de Chile.
- Camus, Pablo and Ernst Hajek. 1998. *Historia Ambiental de Chile*. Santiago: Ediciones Pontificia Universidad Católica de Chile.
- Camus, Pablo. 2003. *Los Bosques y la Gestión Forestal en Chile*. Santiago: Ediciones Pontificia Universidad Católica de Chile.
- Camus, Pablo. 2006. *Ambiente, Bosques y Gestión Forestal en Chile. 1541-2005*. Santiago: Ediciones LOM.
- Cardoso, Fernando Henrique and Enzo Faletto. 1969. *Dependencia y Desarrollo en América Latina*. Ciudad de México: Siglo XXI.
- Carriere, Ricardo and Lawrence Lohmann. 1996. *Pulping the South: Industrial Tree Plantations and the World Paper Economy*. London and New Jersey: Zed Books Ltd.
- Carruthers, David. 2001. "Environmental Politics in Chile: Legacies of Dictatorship and Democracy." *Third World Quarterly* 22 (3): 343-58.
- Casati, Paula, María V. Lara and Carlos Andreo. 2000 "Induction of a C4-like Mechanism of CO2 Fixation in *Egeria densa*, a Submersed Aquatic Species." *Plant Physiology* 123: 1611-1621.

- CASEB (Center for Advanced Studies in Ecology and Biodiversity). April 25th 2005
 “Comentarios sobre el Informe Final de la Universidad Austral de Chile para la Dirección Regional de CONAMA X Región de Los Lagos, ‘Estudio sobre Origen de Mortalidades y Disminución Poblacional de Aves Acuáticas en el Santuario de la Naturaleza Carlos Anwandter, en la Provincia de Valdivia’.” Santiago: CASEB.
- Cassals, Vicente. 1999. “La Política Forestal en Chile: una Perspectiva Histórica.” *Scripta Nova Revista Electrónica de Geografía y Ciencias Sociales* 45: 16. Retrieved August 25 2008 (<http://www.ub.edu/geocrit/sn-45-16.htm>).
- Castillo, Luis and Jorge Dey. 1908. *Jeografía Vegetal del Río Valdivia i sus Inmediaciones*. Second Edition. Santiago: Imprenta Cervantes.
- Castillo, Marcelo, ed. 2000. “Estudio de la Reforma de la Ley N° 19.300 Sobre Bases Generales del Medio Ambiente. Informe Final.” Santiago: CONAMA.
- Castricano, Jodey, ed. 2008. *Animal Subjects: An Ethical Reader in a Posthuman World*. Ontario, Canada: Wilfrid Laurier University Press.
- Cavalieri, Paola. 2001. *The Animal Question: Why Nonhuman Animals Deserve Human Rights*. Oxford: Oxford University Press.
- Celulosa Arauco y Constitución S.A. 1995. “Proyecto Planta Celulosa Valdivia, X Región Chile. Proposición de Términos de Referencia para el Estudio de Impacto Ambiental”. Valdivia: ARAUCO.
- Chong, Eliana. 1995. “Los 25 Años de una Proeza: la Loca Idea de Reforestar Chile.” *Chile Forestal* 227: 6-13.
- Christopher D.K. Cook and Katharina Urmi-König (1984) “A Revision of the Genus *Egeria* (hydrocharitaceae).” *Aquatic Botany* 19 (1-2): 73–96.
- Clapp, Roger Alex. 1998. “Waiting for the Forest Law: Resource-Led Development and Environmental Politics in Chile.” *Latin American Research Review* 33 (2): 3-36.
- CODEFF (Comité Pro-Defensa de la Flora y Fauna). 1983. *La Destrucción de Bosque Nativo para ser Reemplazado por Plantaciones de Pino Insigne*. Santiago: CODEFF.
- CODEFF (Comité Pro-Defensa de la Flora y Fauna). 1992. “El Futuro del Bosque Nativo Chileno, un Desafío de Hoy.” Serie Documentos CODEFF. Santiago: CODEFF.
- CODEFF-Valdivia (Comité Pro-Defensa de la Flora y Fauna). 1996 “Declaración Pública. ¡No a la Instalación de una Planta de Celulosa en el Santuario de Río Cruces!” Enero de 1996. Valdivia.
- Coetzee, J.M. 1999. *The Lives of Animals*. Princeton, NJ: Princeton University Press.

- Comisión Científica Independiente Proyecto Río Cóndor-Chile. 1995. "Recomendaciones Ecológicas para el Proyecto Forestal Río Cóndor: Resumen del Informe de la Comisión Científica Independiente." *Ambiente y Desarrollo* 11(4): 75-83.
- Comité de Defensa de Mehuín. 1996a. "Boletín Informativo No 1." No date. Mehuín.
- Comité de Defensa de Mehuín. 1996b. "Boletín Informativo No 3." No date. Mehuín.
- Comité de Defensa de Mehuín. 1997. "Boletín Informativo No. 3." No date. Mehuín.
- Comité Técnico COREMA X (Comisión Regional del Medio Ambiente de la Décima Región de Los Lagos). 1996. "Informe Técnico de Calificación preparado por el Comité Técnico de la Comisión Regional del Medio Ambiente de la Décima Región de Los Lagos. Proyecto 'Planta Valdivia' Celulosa Arauco y Constitución S.A.". January 31st. Puerto Montt: COREMA X.
- CONAF (Corporación Nacional Forestal). 1978. *Laguna Torca: Hábitat del Cisne de Cuello Negro*. Santiago: Chile Forestal.
- CONAF (Corporación Nacional Forestal). 1988. *Libro Rojo de los Vertebrados Terrestres de Chile*. Santiago: CONAF.
- CONAF (Corporación Nacional Forestal). 1999. *Catastro y Evaluación de los Recursos Vegetacionales Nativos de Chile. Monitoreo*. Santiago: CONAF.
- CONAF-Valdivia (Corporación Nacional Forestal). March 2004. "Patrullaje y Observaciones." Photocopies of handwritten notes prepared by the Sanctuary's wildlife keepers, presented as evidence by the State Defense Council in the trial for environmental damage against ARAUCO. Presented to the First Civil Court of Valdivia. Valdivia: Consejo de Defensa del Estado.
- CONAF-Valdivia (Corporación Nacional Forestal). July 2004. "Patrullaje y Observaciones." Photocopies of handwritten notes prepared by the Sanctuary's wildlife keepers, presented as evidence by the State Defense Council in the trial for environmental damage against ARAUCO. Presented to the First Civil Court of Valdivia. Valdivia: Consejo de Defensa del Estado.
- CONAF-Valdivia (Corporación Nacional Forestal). August 2004. "Patrullaje y Observaciones." Photocopies of handwritten notes prepared by the Sanctuary's wildlife keepers, presented as evidence by the State Defense Council in the trial for environmental damage against ARAUCO. Presented to the First Civil Court of Valdivia. Valdivia: Consejo de Defensa del Estado.
- CONAF-Valdivia (Corporación Nacional Forestal). October 2004. "Patrullaje y Observaciones." Photocopies of handwritten notes prepared by the Sanctuary's wildlife keepers, presented as evidence by the State Defense Council in the trial for environmental damage against ARAUCO. Presented to the First Civil Court of Valdivia. Valdivia: Consejo de Defensa del Estado.

CONAF-Valdivia (Corporación Nacional Forestal). November 2004. “Patrullaje y Observaciones.” Photocopies of handwritten notes prepared by the Sanctuary’s wildlife keepers, presented as evidence by the State Defense Council in the trial for environmental damage against ARAUCO. Presented to the First Civil Court of Valdivia. Valdivia: Consejo de Defensa del Estado.

CONAF-Valdivia (Corporación Nacional Forestal). March 2005. “Patrullaje y Observaciones.” Photocopies of handwritten notes prepared by the Sanctuary’s wildlife keepers, presented as evidence by the State Defense Council in the trial for environmental damage against ARAUCO. Presented to the First Civil Court of Valdivia. Valdivia: Consejo de Defensa del Estado.

CONAF-Valdivia (Corporación Nacional Forestal). April 2012. “Santuario de la Naturaleza Carlos Anwandter Humedal del Río Cruces.” Oficina Provincial Valdivia, Región de Los Ríos: CONAF.

CONAF (Corporación Nacional Forestal). August 18th 1995. Letter from Carlos Ritter, Regional Director of CONAF, to Raúl Arteaga, Regional Director of CONAMA X. Ordinario 959. Puerto Montt: CONAF.

CONAF (Corporación Nacional Forestal). July 21st 1995. Letter from Carlos Ritter, Regional Director of CONAF, to Raúl Arteaga, Regional Director of CONAMA X. Ordinario 871. Puerto Montt: CONAF.

CONAMA (Comisión Nacional de Medio Ambiente). 1995. “Informe de Observaciones. Estudio de Impacto Ambiental. Proyecto Celulosa Valdivia.” Unidad de Evaluación de Impacto Ambiental. Santiago: CONAMA.

CONAMA (Comisión Nacional de Medio Ambiente). 1998. *Una Política Ambiental para el Desarrollo Sustentable*. Santiago: CONAMA.

CONAMA (Comisión Nacional del Medio Ambiente). 1999. Resolución Exenta 009. Dirección Ejecutiva. Santiago: CONAMA.

CONAMA X (Comisión Nacional de Medio Ambiente de la Décima Región de Los Lagos). 1995a. “Observaciones al Estudio de Impacto Ambiental –Planta Valdivia – Celulosa Arauco y Constitución S.A.” Puerto Montt: CONAMA X.

CONAMA X (Comisión Nacional del Medio Ambiente de la Décima Región de Los Lagos). 1995b. Letter from Pío Infante, from CONAMA Valdivia, to Jorge Frites, Jefe de Gabinete del Intendente Rabindranath Quinteros. Ordinario # 180. Valdivia: CONAMA X.

CONAMA X (Comisión Nacional del Medio Ambiente de la Décima Región de Los Lagos). June 9th 1995. Letter from Raúl Arteaga to Silvia Hormazábal. Ordinario 113. Puerto Montt: CONAMA X.

- CONAMA X (Comisión Nacional del Medio Ambiente de la Décima Región de Los Lagos). September 4th 1995. Letter from Pío Infante, from CONAMA Valdivia, to María Isabel Manzur, CODEFF's Director. Valdivia: CONAMA X.
- CONAMA X (Comisión Nacional del Medio Ambiente de la Décima Región de Los Lagos). 2004. Ordinario N° 1077. Puerto Montt: CONAMA X.
- Concejo Municipal de Mariquina. June 26th 1996. "Pronunciamiento sobre Efluentes Planta Celulosa". San José de la Mariquina: Concejo Municipal.
- Consejo de Defensa del Estado (CDE). July 30th 2012. "En lo Principal: Se Tengan Presente Observaciones de Prueba Rendidas en Autos. Otrosí: Se Certifique Vencimiento del Término Probatorio". Presented to the First Civil Court of Valdivia. Valdivia: Consejo de Defensa del Estado.
- Cordero Vega, Luis. 2010. "Proyecto de Ley que Rediseña la Institucionalidad Ambiental. Contenido y Desafíos de Implementación." Presentation to the Seminar "La Nueva Institucionalidad Ambiental y sus Desafíos." January 7th 2010. Santiago: Centro de Estudios Públicos.
- COREMA X (Comisión Regional del Medio Ambiente de la Décima Región de Los Lagos). May 30th 1996. Resolución Exenta 001. Puerto Montt: COREMA X.
- COREMA X (Comisión Regional del Medio Ambiente de la Décima Región de Los Lagos). October 30th 1998. Resolución Exenta 279. Puerto Montt: COREMA X.
- COREMA X (Comisión Regional del Medio Ambiente de la Décima Región de Los Lagos). June 6th 2005. Resolución Exenta 377. Puerto Montt: COREMA X.
- Contreras, René. 1998. "Determinación y Dinámica de Metales Pesados en Sedimentos del Sistema Estuarial Valdivia." Tesis para Optar al Título de Biólogo Marino. Facultad de Ciencias. Universidad Austral de Chile. Valdivia.
- COREMA X (Comisión Regional del Medio Ambiente de la Décima Región de Los Lagos). January 18th 2005. Resolución Exenta 18. Puerto Montt: COREMA X.
- COREMA X (Comisión Regional del Medio Ambiente de la Décima Región de Los Lagos). June 6th 2005. Resolución Exenta 377. Puerto Montt: COREMA X.
- CORFO (Corporación de Fomento de la Producción). 1978. "Antecedentes y Alcances Generales sobre el Proyecto para Establecer una Planta de Astillas de Madera en la Isla Grande de Chiloé." Boletín de Divulgación. Santiago: CORFO.
- Corte de Apelaciones de Valdivia. April 18 2005. Resolución 4237, Recurso 33/2005, "Vladimir Riesco y otros contra Celulosa Arauco S.A." Valdivia: Corte de Apelaciones.
- Corte Suprema de Chile. May 30 2005. Fallo Causa Rol N° 1.853-2005. "Vladimir Riesco y otros contra Celulosa Arauco S.A." Santiago: Corte Suprema.

- Cortés, Hernán. 1990. "Manejo del Bosque Nativo y Exportación de Astillas". Pp. 133-145 in *Sector Forestal, Acción Ambiental: ¿Obstáculo o impulso al desarrollo?*. Santiago: CIPMA.
- Corti, Paulo and Roberto Pablo Schlatter. 2002. "Feeding Ecology of the Black-necked Swan *Cygnus melancoryphus* in Two Wetlands of Southern Chile." *Studies on Neotropical Fauna and Environment* 37 (1): 9-14
- Corti, Paulo. 1996. "Conducta de Alimentación y Capacidad de Forrajeo del Cisne de Cuello Negro (*Cygnus melanocorypha*. MOLINA, 1782) en Humedales de Valdivia." Tesis para optar al grado de Licenciado en Ciencias Veterinarias. Instituto de Zoología. Universidad Austral de Chile. Valdivia.
- Cruz, María Elena and Rigoberto Rivera. 1983. "La Realidad Forestal Chilena." Serie Resultados de Investigación, No 15. Santiago: Grupo de Investigaciones Agrarias.
- De Rosales, Diego. 1877. *Historia General del Reino de Chile*. Tomo I (1425-1553). Valparaíso: Flandes Indiano.
- Defensores del Bosque Chileno. 1999. *La Tragedia del Bosque Chileno*. Santiago: Ocho Libros Editores.
- Delamaza, Gonzalo. 2010. "Construcción Democrática, Participación Ciudadana y Políticas Públicas en Chile." Doctoral Thesis. Department of Languages and Cultures of Latin America, Faculty of Humanities, Leiden University. Retrieved August 24 2012. (<https://openaccess.leidenuniv.nl/handle/1887/15360>).
- Delamaza, Gonzalo. 2012. "Responsabilidad Social Empresarial, Política e Internacionalización. El Caso del 'Conflicto de los Cisnes' en Valdivia, Chile." *Centro de Investigación de la Universidad del Pacífico* 39 (70): 167-201.
- Delmastro, Roberto. 1990. "Experiencia de Forestal Valdivia S.A. en Conservación Ambiental." Pp. 95-204 in *Sector Forestal 'Acción Ambiental: ¿Obstáculo o impulso al desarrollo?*. Santiago: CIPMA.
- Derrida, Jacques. 1995. "'Eating Well', or the Calculation of the Subject." Pp. 255-287 in *Points... Interviews 1974-1994*. Stanford, California: Stanford University Press.
- Derrida, Jacques. 2002. "The Animal That Therefore I Am (More to Follow)." *Critical Inquiry* 28 (2): 369-418.
- Descola, Philippe. 2005. *Par-delà Nature et Culture*. Paris: Gallimard.
- Diamond, Cora. 1978. "Eating Meat and Eating People." *Philosophy* 53 (206): 465-479.
- Diamond, Cora. 2003. "The Difficulty of Reality and the Difficulty of Philosophy." *Partial Answers* 1(2): 1-26.
- Diario Austral de Valdivia n.d. 1996. No title. Interview to members of Acción por los Ríos.

Diario Austral de Valdivia. June 21 1996. "Mehuín Rechaza Colector de Celulosa."

Diario Austral de Valdivia. November 23 1996. "Es muy Delicado Oponerse por Oponerse."

Diario Austral de Valdivia. March 12 1997. "Firme Apoyo al Proyecto Celulosa Valdivia: Concejo Municipal Emitió Declaración Pública Anoche."

Diario Austral de Valdivia. April 3 1997. "Gremios Dispuestos a Defender con Todo al Proyecto de Celulosa: Entregaron 'Manifiesto de Valdivia'."

Diario Austral de Valdivia. April 25 1997. "Proyecto de Celulosa Aplazado Hasta 2001."

Diario Austral de Valdivia. November 25 1997. "Presidente Frei Reafirmó Apoyo a Planta de Celulosa."

Diario Austral de Valdivia. January 17 1998. "Diputado Electo Roberto Delmastro: Si Estuviera en Puerto Montt la Planta Ya Estaría Funcionando."

Diario Austral de Valdivia. November 16 2003. "Peligra Conservación del Santuario de la Naturaleza." Retrieved September 24 2012 (<http://www.australvaldivia.cl/site/edic/20031116012540/pags/20031116013012.html>).

Diario Austral de Valdivia. October 23 2004. "Alerta por Muerte de Cisnes."

Diario Austral de Valdivia. October 26 2004. "Gobernador: Esto es Urgente."

Diario Austral de Valdivia. November 15 2004. "¡Vida a los Cisnes!"

Diario Austral de Valdivia. November 19 2004. "Cayeron Dos Cisnes en Patio de una Casa."

Diario Austral de Valdivia. November 22 2004. "Cisne Cayó en el Sector Angachilla."

Diario Austral de Valdivia. November 27 2004. "No Matamos a los Cisnes."

Diario Austral de Valdivia. December 4 2004. "Llega una Decena de Cisnes a Vivir a la Pablo Neruda."

Diario Austral de Valdivia. December 9 2004. "Cisne Muerto Cayó en Patio de una Casa."

Diario Austral de Valdivia. January 2 2005. "Escogen a 'Valdivianos del Año.'"

Diario Austral de Valdivia. January 8 2005. "Juntas de Vecinos Piden Solución para el Santuario."

Diario Austral de Valdivia. February 3 2005. "Comienza Campaña de Difusión Veraniega."

Diario Austral de Valdivia. March 4 2005. "Quedan Sólo 289 Cisnes."

Diario Austral de Valdivia. April 20 2005. "Valdés Lamentó Daño del Santuario."

Diario Austral de Valdivia. May 5 2005. "Preparan Manifestaciones."

- Diario Austral de Valdivia. May 11 2005. “Max-Neef: Cierre de la Planta de Celulosa será Beneficioso para la Comunidad.”
- Diario Austral de Valdivia. May 11 of 2005. “Conama Tiene una Responsabilidad muy Grande.”
- Diario Austral de Valdivia. May 19 2005. “Cisnes Comen Pasto.”
- Diario Austral de Valdivia. May 20 2005. “Muerte de Cisnes Continúa...”
- Diario Austral de Valdivia. May 27 2005. “Austral-Rescataron un Cisne.”
- Diario Austral de Valdivia. January 12 2014. “El País se Pone al Día con Temas que en Otras Partes están Resueltos. Michael Hantke, Presidente del Tercer Tribunal Ambiental.”
- Diario Financiero. May 12 2005. “Presidente de Corma Cree Necesaria Discusión con Todos los Actores en Conflicto.”
- Di Marzio, Walter and Rob McInnes. 2005. “Informe de Misión Santuario Carlos Anwandter (Río Cruces, Chile). Misión Consultiva Ramsar. Chile.” March 29 to April 4 of 2005. CONAMA: Valdivia.
- Didyk, Borys. 2011. “Informe de Observaciones Periciales del Perito Adjunto Estado-Fisco de Chile.” Estado-Fisco de Chile con Celulosa Arauco y Constitución S.A. ROL N° 746-2005 Primer Juzgado Civil de Valdivia. Viña del Mar.
- Dinerstein, E., D.M. Olson, D.J. Graham, A.L. Webster, S.A. Primm, M.P. Bookbinder, and G. Ledec. 1995. *A Conservation Assessment of the Terrestrial Ecoregions of the Latin America and the Caribbean*. Washington: World Bank/World Wildlife Fund.
- Dirección General de Aguas (DGA). December 29 2004. Ordinario N° 770. Puerto Montt: DGA.
- Dirección General de Aguas. July 19 1995. Letter from Mario Cornejo, DGA’s Regional Director, to Raúl Arteaga, Regional Director of CONAMA. Ordinario 264. Puerto Montt: CONAMA X.
- Drouilly, Patricio 1976. “Primer Censo Nacional del Cisne de Cuello Negro *Cygnus melancoryphus* (Molina, 1782) en Chile.” *Medio Ambiente* 2(1):57-63.
- Dürschmidt, Monika. 1980. “Some Ecological Observations on Environmental Parameters, Planktonic Seasonal Succession and Biomass in Rio Cruces (Prov. Valdivia), South Chile.” *Archiv fur Hydrobiologie* 88 (3): 345-363.
- Dürschmidt, Monika. 1980. “Studies on the Chrysophyceae from Rio Cruces, Prov. Valdivia, South Chile by Scanning and Transmission Microscopy.” *Nova Hedwigia* 33: 353-388.

- Dürschmidt, Monika. 1982. "*Mallomonas parvula* sp. nov. and *Mallomonas retifera* sp. nov. (Chrysophyceae, Synuraceae) from South Chile." *Canadian Journal of Botany* 60 (5): 651-656.
- Dürschmidt, Monika and Lore Steubing. 1983. "Estudios Limnológicos en Dos Ríos del Sur de Chile (río Calle-Calle y río Cruces), Valdivia, Chile." *Medio Ambiente* 6 (2): 58-71.
- Dussel, Enrique. 2000. "Europa, Modernidad y Eurocentrismo". Pp. 41-53 in *La Colonialidad del Saber: Eurocentrismo y Ciencias Sociales*, edited by Edgardo Lander. Buenos Aires: CLACSO.
- Elizalde, Rafael. 1958. *La Sobrevivencia de Chile: la Conservación de sus Recursos Naturales Renovables*. Dirección General de Producción Agraria y Pesquera. Santiago: Ministerio de Agricultura.
- El Mercurio. November 8 1995. "Ministro Ortega Fustigó Estudio de Banco Central sobre Bosque Nativo."
- El Mercurio. August 6 2001. "La Gala de Angelini."
- El Mercurio. October 24 2004. "Río Cruces: Investigan Muerte de Cisnes en Santuario de la Naturaleza."
- El Mercurio. October 29 2004. Inserción. Declaración Pública. "Celulosa Arauco ante la Situación del Río Cruces, Valdivia."
- El Mercurio. January 26 2005. "Países Industrializados Exigen Mayor Fiscalización Ambiental."
- El Mercurio. May 1 2005. "El Abogado que Tiene a Celco de Rodillas."
- El Mercurio. March 16 2005. "Cambios: Los Porqués Tras el Alejamiento de Lamarca de la Presidencia de Copec."
- El Mercurio. May 10 2005. "Celulosa Arauco: El Impacto Económico del Cierre de Valdivia."
- El Mercurio. May 23 2005. "Conflicto Ambiental: La Muerte de los Cisnes de Cuello Negro en el Río Cruces. Los Cambios en la Estrategia de Arauco."
- El Mercurio. May 23 2005. "Cierre de Planta Valdivia: Trabajadores de Celco Presionan al Gobierno."
- El Mercurio. June 4 2005. "Desastre en el Río Cruces de Valdivia. Gobierno: Celco Dañó Imagen del País."
- El Mercurio. June 4 2005. "Gobierno Expresa Molestia a Empresa Celco por Caso Informe."

- El Mercurio. June 7 2005. "Lagos Afirma que Celco Pone en Juego la Credibilidad del País: El Jefe de Estado se Refirió a la Entrega de un Informe Irregular a la Corte Suprema."
- El Mercurio. June 8 2005. "Pugna Gobierno Celco Causa Salida de los Abogados: Profesionales Denuncian una Campaña Difamatoria en su Contra, Mientras el Ejecutivo Dio por Superado el Conflicto."
- El Mercurio. June 9 2005. "Crisis por Cierre de Planta de Valdivia: Gobierno y Celco Juegan sus Cartas."
- El Mercurio. June 10 2005. "Rigor Medioambiental: Privados Temen Escalada de Búsqueda de Nuevos Celcazos."
- El Mercurio. June 15 2005. "Los Errores que ha Cometido Celco no son Fácilmente Perdonables."
- El Mercurio. June 19 2005. "Entretelones."
- El Mercurio. June 26 2005. "Nicolás Eyzaguirre. El Ministro de Hacienda Enfrenta la Coyuntura Política y Económica: La Gente de Celco Estaba Desubicada."
- El Mercurio. August 14 2005. "La Segunda Oportunidad."
- El Mercurio. August 26 2005. "Lecciones del Caso Celco: Dura Crítica a Falta de Claridad en Materia Medioambiental." By Juan Meriches and Daniel Carrillo.
- El Mercurio. October 18 2005. "Debate Científico: Celco Sacó Humo en Pucón."
- El Mercurio. October 30 2005. "Bruno Philippi: Su Particular Liderazgo en la Sofía: La Comezón del Séptimo Mes."
- El Mercurio. August 29 2007. "El Futuro del Conglomerado: Roberto Angelini Encabeza la Sucesión que Liderará las Empresas del Grupo."
- El Mercurio. June 23 2008. "Proyecto de Ley Sobre Nueva Institucionalidad en el Congreso."
- El Mercurio. August 12 2013. "Fernando Flores, Presidente del Consejo Nacional de Innovación para la Competitividad: Para los Chilenos, el Cambio más Urgente es de Orden Cultural."
- El Mostrador. October 15 2013. "Chile Tiene un Problema Serio de Falta de Transparencia en el Financiamiento de la Política."
- Encyclopedia Britannica. 1911. "Swan." By Sir Joseph Wilson. Volume 26. Retrieved March 22 2014 (http://en.wikisource.org/wiki/1911_Encyclopædia_Britannica/Swan).
- Escobar, Arturo. 1999. "After Nature: Steps to an Antiessentialist Political Ecology." *Current Anthropology* 40(1):1-30.

- Escobar, Arturo. 2007. "The 'Ontological Turn' in Social Theory: A Commentary on 'Human Geography without Scale' by Sallie Marston, John Paul Jones II and Keith Woodward." *Transactions of the Institute of British Geographers* 32(1): 106-11.
- Escobar, Arturo. 2012. "Cultura y Diferencia: la Ontología Política del Campo de Cultura y Desarrollo." *Walekeru* 2: 7-16.
- Estades, Cristián. 1994. "Impacto de la Sustitución del Bosque Natural por Plantaciones de *Pinus radiata* sobre una Comunidad de Aves en la Octava Región de Chile." *Boletín Chileno de Ornitología* 1: 8-14.
- Estades, Cristián. 2001. "Informe sobre Validación Técnica del Proyecto 'Validación de Procedimientos Técnico-Administrativos para Listar Especies en Categorías de Conservación'." Santiago: CONAMA.
- Etcheverry, María. 1993. "Índices del Boletín Ornitológico (Chile) (1969-1979)." *Revista Chilena de Historia Natural* 66: 211-213.
- FAO (Food and Agriculture Organization). 1992. "Programa de Acción Forestal-Chile". Roma-Santiago: FAO.
- FAO (Food and Agriculture Organization). 2005. "Pulp and Paper Capacities." Survey 2004-2009. Rome: FAO.
- Fazio, Hugo. 2004. "Mapeo Empresarial de Chile. Santiago: CENDA.
- Figueroa-Fábrega, Luis, José Luis Galaz and Carolina Merino. 2006 "Conocimiento y Conservación del Cisne de Cuello Negro *Cygnus melancoryphus* (Molina, 1782) en el Humedal del Río Cruces, Valdivia, Chile." *Gestión Ambiental* 12: 77-89.
- Firmani, Carla. April 4 2008. "El Bosque Nativo Tiene Ley." Biblioteca del Congreso Nacional de Chile. Retrieved September 26 2014 (http://www.bcn.cl/carpeta_temas_profundidad/ley-bosque-nativo).
- Fjeldsa, Jon. 1985. "Origin, Evolution, and Status of the Avifauna of the Andean Wetlands." *Ornithological Monographs* 36: 85-112.
- Forbes. February 26 2004. "The World's Richest People." Retrieved July 13 2013 (<http://www.forbes.com/2004/02/25/bill04land.html>).
- Foucault, Michel. 1994. *The Order of Things. An Archeology of the Human Sciences*. New York: Vintage Books.
- Frei Montalva, Eduardo. 1966. "Mensaje Presidencial." Santiago: Presidencia de Chile.
- Frene, Cristián and Mariela Núñez. 2010. "Hacia un nuevo Modelo Forestal en Chile." *Revista Bosque Nativo* 47: 25-35.

- Fuentes, Eduardo. 2005. Intervention in the panel “La Ciencia del Santuario y el Santuario de la Ciencia” held on November 16 2005 at the San Francisco Convent, Valdivia, during the Citizen Convention “Agua, Ciudadanía y Territorio: Ideando Nuevas Regiones Sin Contaminación,” organized by Action for the Swans between November 14 and 19 of 2005.
- Garretón, Manuel A. 1989. *The Chilean Political Process*. Boston: Allen and Unwin.
- Garrido, Jorge. 2005. Trailer of the documentary “Ciudad de Papel” (2007). Valdivia: Jirafa Films.
- Gay, Claudio. 1847. *Historia Física y Política de Chile*. Zoología. Tomo Primero. Paris: casa del autor. Chile: Museo de Historia Natural de Santiago.
- Geisse, Guillermo and Michael Nelson. 1995. “De la Reacción a la Iniciativa: Política Ambiental Chilena.” *Ambiente y Desarrollo* 11 (2): 7-11.
- Glade, Alfonso (ed). 1993. *Libro Rojo de los Vertebrados Terrestres de Chile*. Santiago: Corporación Nacional Forestal.
- Gobierno de Chile. 1995. “Mensaje de S.E. el Presidente de la República con el que Inicia un Proyecto de Ley que Modifica el Decreto Ley N° 701, de 1974, sobre Fomento Forestal.” Mensaje Presidencial N° 642-330. April 25 1995. Santiago: Gobierno de Chile.
- Gobierno de Chile. 2008. “Mensaje de S.E. la Presidenta de la República con el que Inicia un Proyecto de Ley que Crea el Ministerio de Medio Ambiente, el Servicio de Evaluación Ambiental y la Superintendencia del Medio Ambiente.” Mensaje Presidencial N° 352-356, June 5 2008. Santiago: Gobierno de Chile.
- Gobierno de Chile. 2009. *Estrategia Regional de Desarrollo. Región de Los Ríos*. Valdivia: Gobierno de Chile.
- Gobierno de Chile. 2012. “Indicadores de Pobreza. CASEN 2011. Encuesta de Caracterización Socioeconómica Nacional.” Santiago: Ministerio de Desarrollo Social. Retrieved October 31 2014 (http://observatorio.ministeriodesarrollosocial.gob.cl/layout/doc/casen/publicaciones/2011/pobreza_casen_2011.pdf).
- González, Gustavo. July 25 2002. “Ambiente-Chile: Isabel Allende en Polémica Campaña por Bosques.” Inter Press Services (IPS). Santiago.
- González, Yanko. 2013. “Memoria y Universidad.” Inaugural Speech in the Panel “Construyendo Futuro desde la Historia,” Held in Commemoration of the 1973 Coup d’Etat. September 11 2013. Retrieved June 27 2014 (<http://humanidades.uach.cl/2013/09/11/memoria-y-universidad/>).

- Grass, Antonio and Fernando Raga. 1991. "Análisis Económico del D.L. 701." Documento presentado al Segundo Simposio de Economía Forestal en Chile. Departamento de Ingeniería Industrial. Concepción: Universidad del Bío-Bío.
- Grossberg, Lawrence. 2006. "Does Cultural Studies have Future? Should it? (Or What's the Matter with New York?)." *Cultural Studies* 20 (1): 1-32.
- Guarda, Fernando. 1953. *Historia de Valdivia 1552-1952*. Santiago: Imprenta Cultura.
- Guarda, Gabriel. 1965. *Un Río y una Ciudad de Plata*. Valdivia: Editorial Universidad Austral de Chile.
- Guarda, Gabriel. 1978. *Historia Urbana del Reino de Chile*. Santiago: Editorial Andrés Bello.
- Guarda, Gabriel. 2001. *Nueva historia de Valdivia*. Santiago: Ediciones Universidad Católica.
- Guarda, Gabriel. 2009. *Cuatro Siglos de Evolución Urbana. Valdivia 1552-1910*. Valdivia: Universidad Austral de Chile.
- Guerra, Debbie and Juan Carlos Skewes. 2008. "¿Vernacularización, Hibridación, Enajenación o Patrimonialización? Disyuntivas Locales en la Construcción del Paisaje." *Conserva* 12: 5-37.
- Halpern, Daniel. 2007. "Los Puntos que no Mide el Rating." *Cuadernos de Información* 20: 78-86.
- Hauenstein, Enrique. 1981. "Distribución y Ecología de *Egeria densa* (Planch) en la Cuenca del Río Valdivia." Tesis para optar al grado de Magíster en Ecología. Valdivia: Universidad Austral de Chile.
- Hauenstein, Enrique and Carlos Ramírez. 1986. "The Influence of Salinity on the Distribution of *Egeria densa* in the Valdivia River Basin, Chile." *Archivos Hydrobiologicos* 107 (4): 511-519.
- Hauenstein, Enrique. 2004. "Antecedentes sobre *Egeria densa* (luchecillo), Hidrófita Importante en la Alimentación del Cisne de Cuello Negro." *Gestión Ambiental* 10: 89-95.
- Inter Press Service, January 28 2005. "Ambiente-Chile: La Hora de la Verdad Ante la OCDE." Gustavo González. Santiago.
- Haig, Irving T. 1944. "La Riqueza Forestal de Chile Como Base para una Expansión Industrial." Informe. Santiago: CORFO.
- Hansen, Henry. 1973. "Trumpeter Swan Management." *Wildfowl* 24: 27-32.
- Haraway, Donna. 1989. *Primate Visions: Gender, Race, and Nature in the World of Modern Science*. New York and London: Routledge.

- Haraway, Donna. 1991. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspectives." *Feminist Studies* 14(3): 575-599.
- Haraway, Donna. 1997. *Modest.Witness@Second.Millennium.Femaleman.Meets.Oncomouse: Feminism and Technoscience*. New York: Routledge.
- Hartwig, Fernando. 1991. *Chile: Desarrollo Forestal Sustentable*. Santiago: Editorial Los Andes.
- Hartwig, Fernando. 1994. *La Tierra que Recuperamos*. Santiago: Editorial Los Andes.
- Hellmayr, Charles E. and Boardman Conover. 1948. *Catalogue of Birds of the Americas*. Zoological Series. Field Museum of Natural History. Volume XIII, Part I, Number 2. August 18th of 1948. Publication 615. Field Museum Press.
- Hervé, Dominique and Raimundo Pérez L. (Coordinators). 2011. *Derecho Ambiental y Políticas Públicas*. Cuadernos de Análisis Jurídico. Colección de Derecho Ambiental. Santiago: Universidad Diego Portales.
- INFOR (Instituto Forestal). 1999. *Estadísticas Forestales*. Santiago: Ministerio de Agricultura.
- Irvine T. Haig, L.V. Teesdale, Philip A. Briegleb, Burnett H. Payne, and Martin H. Haertel. 1946. "Forest Resources of Chile, as a Basic of Industrial Expansion." December 1946. US Forest Service.
- Israel, Eduardo and Claudia Sepúlveda. October 16 2006. Letter to Catalina Bau, National Director of CONAF.
- Izquierdo, Francisco. 2002. "Los Determinantes en los Mecanismos de la Organización Industrial en el Sector Forestal Chileno." Tesis para optar al grado de Magister en Economía Agraria. Facultad de Agronomía e Ingeniería Forestal. Santiago: Pontificia Universidad Católica de Chile.
- Jadresic, Alejandro (Ed). 1998. "Modernización de la Institucionalidad Reguladora del Estado. Informe Final. Protección del Medio Ambiente. Explotación de Recursos Naturales." Prepared for the Comisión Presidencial de Modernización de la Institucionalidad Reguladora del Estado. Non edited document.
- Jaksic, Fabián. June 5 2009. "Estado Fisco de Chile Contra ARAUCO. Causa Rol 152-2008." Legal Testimony during the trial for environmental damage pursued by the State Defense Council against ARAUCO. Folio 64, fojas 572. Santiago: 13° Juzgado Civil.
- Jaksic, Fabián. June 9 2009. "Estado Fisco de Chile Contra ARAUCO. Causa Rol 152-2008." Legal Testimony during the trial for environmental damage pursued by the State Defense Council against ARAUCO. Legal Testimony during the trial for environmental damage pursued by the State Defense Council against ARAUCO. Folio 69, fojas 587. Santiago: 13° Juzgado Civil.

- Jasanoff, Sheila (Ed.). 2004. *States of Knowledge: The Co-production of Science and Social Order*. London, UK: Routledge.
- Jasanoff, Sheila. 2005. *Designs on Nature: Science and Democracy in Europe and the United States*. Princeton, NJ: Princeton University Press.
- Johnson, Goodall. 1965. *The Birds of the Chile and Adjacent Regions of Argentina, Bolivia and Peru*- Vol. 1. Buenos Aires: Platt Establecimientos Gráficos.
- Katz, Jorge, Giovanni Stumpo and Felipe Varela. 1999. "El Complejo Forestal Chileno." Project CEPAL/IDRC "Industrial restructuring, innovation and international competitiveness in Latin America (Phase II)." Santiago: ECLAC/IDRC.
- Katz, Ricardo. 2010. Presentation in the Seminar "La Nueva Institucionalidad Ambiental y sus Desafíos." January 7 2010. Santiago: Centro de Estudios Públicos.
- Keller, Carlos. 1956. *Revolución en la Agricultura Chilena*. Santiago: Editorial Zig-Zag.
- Kennedy, Claudette. 1976. Guía de las aves comunes de los pantanos de Valdivia. Boletín de Vida Silvestre 1.
- Klubock, Thomas Miller. 2006. "The Politics of Forests and Forestry on Chile's Southern Frontier, 1880s-1940s." *Hispanic American Historical Review* 86 (3): 535-570.
- Kosek, Jake. 2006. *Understories: The Political Life of Forests in Northern New Mexico*. Durham, NC, and London: Duke University Press.
- Laboratorio de Modelación Ecológica (LME). 2008. "Estudio de Opinión y Percepción sobre el Problema del Humedal de Río Cruces." Proyecto "Elaboración de un Modelo Conceptual del Ecosistemas del Humedal de Río Cruces." Facultad de Ciencias, Programa PULSO, Facultad de Ciencias Sociales, Universidad de Chile, Santiago. Retrieved March 18 2010 (<http://ecosistemas.uchile.cl/cruces/documentos/modelo/files/Encuesta1.pdf>).
- Lagos, Nelson A., Pedro Paolini, Eduardo Jaramillo, Charlotte Lovengreen, Cristian Duarte, and Heraldo Contreras. 2008. "Environmental Processes, Water Quality Degradation, and Decline of Waterbird Populations in the Rio Cruces Wetland, Chile." *Wetlands* 28 (4): 938-950.
- Lagos, Nelson. 2008. "Variabilidad de Eventos de Mortalidad y Reproductivos del Cisne de Cuello Negro en el Santuario de la Naturaleza Carlos Andwandter (Río Cruces, Valdivia) Durante el Periodo 2003 a 2005." Prepared for the trial for environmental damage pursued by the State Defense Council against ARAUCO. ROL N° 746-2005, Primer Juzgado Civil de Valdivia. November 2008. Santiago: 13° Juzgado Civil.
- Lara, Antonio and Thomas Veblen. 1993. "Forest Plantations in Chile: a Successful Model?" Pp. 117-138 in *Afforestation: Policies, Planning and Progress*, edited by Alexander Mather. Florida, USA: Belhaven Press.

- Lara, Antonio Victor Sandoval, Carlos Prado, G. Cruz, I. Martínez and P. Añazco. 1995. "Determinación de stocks de bosque nativo." Proyecto Banco Central-Universidad Austral de Chile. Santiago: Banco Central.
- Lara, Antonio, Marco Cortés and Cristián Echeverría. 2000. "Situación del Medio Ambiente y del Patrimonio Natural, Bosques." Pp. 131-173 in *Informe País Estado del Medio Ambiente en Chile 1999*. Santiago: Centro de Análisis de Políticas Públicas, Universidad de Chile.
- Lara, Antonio. 2004. "Conservación de los Ecosistemas Boscosos: Algunas Lecciones de los Últimos 20 años." *Ambiente y Desarrollo* 20(2): 111-115.
- Lara, Antonio, René Reyes and R. Urrutia. 2010. "Bosques Nativos." Pp. 107-138 in *Informe País: Estado del Medio Ambiente en Chile 2008*. Instituto de Asuntos Públicos, Universidad de Chile. Santiago: LOM Ediciones.
- La Nación. September 30 1996. "No Cometeremos Tropelías: Celulosa Arauco no está Dispuesta a Comprar el Sí con Regalos Sociales." Interview to the engineering and construction manager of the future Valdivia pulp-mill, Mario Urrutia.
- La Nación. June 12 2005. "El Hombre Transversal."
- La Nación. September 24 2007. "Estudio de la PUC Demuestra que Actuales Riles de CELCO no Tienen Impacto en Luchecillo."
- Larraín, Sara. 2006. "Desafíos Ambientales del Desarrollo Bacional: Evaluación Desempeño 1997–2006 y Propuesta Institucional." Serie en Foco 92. Santiago: Expansiva.
- La Segunda. October 16 1996. "Valdivia Declara la Guerra a Mehuín por Millonario Proyecto de Celulosa."
- La Segunda. March 19 1997. "Planta de Celulosa en Valdivia Significa una Verdadera Explosión de Desarrollo. Entrevista a Gabriel Valdés."
- La Segunda. May 3 2005. "Arauco Planteó al Presidente Lagos que la Solución Definitiva es una Salida al Mar."
- La Tercera. November 27 2004. "Celulosa Arauco Afirma que Asumirá Responsabilidad Si Hay Contaminación."
- La Tercera. March 7 2005. "Gobierno: Mayor Celo Ambiental Atenuó Crítica de la Oede."
- La Tercera. April 21 2005. "Celco Anuncia Cambios Tras Duro Informe por Muerte de Cisnes."
- La Tercera. April 24 2005. "Las Sorpresas del Debate Medioambiental." Reportajes.
- La Tercera. April 27 2005. "Las Mejores Frases del Encuentro."

- La Tercera. June 3 2005. "Gobierno Critica a Celco por Atribuir a Universidad un Estudio Propio."
- La Tercera. June 12 2005. "La Embestida Final de La Moneda Contra Celco."
- La Tercera. June 15 2005. "Lamarca Desliza Críticas a Celulosa Arauco."
- La Tercera. June 19 2005. "El Último Diálogo de Lagos y Angelini."
- La Tercera. August 8 2005. "Gobierno Confirma Diálogo con Celco y Empresa Alista Reapertura de Planta."
- La Tercera. March 5 2006. "Interview to Ricardo Lagos".
- La Tercera. July 8 2007. "Celco Anuncia Querrela por Falsas Acusaciones sobre Daño Neurológico en Cisne Hallado en Río Cruces."
- La Tercera. September 18 2011. "Course: Ethic in Business, Case: 'La Imagen Imborrable del Cisne de Cuello Negro.'"
- La Tercera, December 13 2012. "Lagos y Críticas por Agrosuper."
- Latour , Bruno. 2001. *La Esperanza de Pandora*. Primera Edición en Español. Barcelona: Gedisa.
- Latour, Bruno. 2005. *Reassembling the Social. An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Latour, Bruno and Steve Woolgar. 1986. *Laboratory Life: the Construction of Scientific Facts*. Second Edition. Princeton, NJ: Princeton University Press.
- Latour, Bruno. 1992. *Ciencia en Acción*. First Spanish Edition. Barcelona: Labor.
- Law, John and Annemarie Mol. 2008. "The Actor-Enacted: Cumbrian Sheep in 2001." Pp. 57-77 in *Material Agency: Towards a Non-Anthropocentric Approach* edited by Carl Knappett and Lambros Malafouris. New York: Springer-Verlag. DOI: 10.1007/978-0-387-74711-8_4
- Law, John. 2004. *After Method: Mess in Social Science Research*. London and New York: Routledge.
- Law, John. 2008. "On Sociology and STS." *The Sociological Review* 56 (4): 623-649.
- Lawton, John and Moshe Shachak. 1994. "Organisms as Ecosystem Engineers." *Oikos* 69: 373-386. Reprinted in Clive G. Jones, John H. Lawton, Moshe Shachak. 1996. "Organisms as Ecosystem Engineers." In *Ecosystem Management Selected Readings* edited by Fred B. Samson and Fritz L. Knopf. New York: Springer-Verlag.
- Lawton, John H. 1994. "What Do Species Do in Ecosystems?" *Oikos* 71 (3): 367-374.

- Lazo, I. and J. Yáñez. 1989. "First Record of Black-Necked *Cygnus melancoryphus* in South Shetland and Antarctica." *Polar Record Journal* 25(155): 354.
- Leal, Felipe and Miguel Negrón. 2012. "Tensiones Ambientales y Rol de los Medios de Comunicación en la Formación de Debate Público: Dos Casos Emblemáticos para la Institucionalidad Ambiental Chilena (Celco y Barrancones)." *Revista Austral de Ciencias Sociales* 22: 25-42.
- Leslie, A.J. 1992. "Copper Herbicide Use-patterns in Florida Waters." Florida Department of Natural Resources. Tallahassee, Florida, USA.
- Fundación Chile. 2009. "Enero-Abril de 2009. Crisis: el Peso de las Cifras." *Lignum* 18 (113): 57-59.
- Lignum. February 23 2016. "Arauco Presenta Descargos ante SMA por Proceso Sancionatorio Abierto en contra de Planta Valdivia." Retrieved: February 24, 2016 (<http://www.lignum.cl/2016/02/23/arauco-presenta-descargos-ante-sma-por-proceso-sancionatorio-abierto-en-contra-de-planta-de-valdivia/>).
- Lilies, Jürgen Henning. 1970. *Geología de los Alrededores de Valdivia y Volcanismo y Tectónica en Márgenes del Pacífico en Chile Meridional*. Valdivia: Universidad Austral de Chile.
- Lohmann, Larry. 2008. "Carbon Trading, Climate Justice and the Production of Ignorance: Ten examples." *Development* 51: 359-365. Doi:10.1057/dev.2008.27
- Lopetegui, Eduardo Jaramillo, Roberto Schlatter Vollman, Heraldo Cifuentes Contreras, Cristian Duarte Valenzuela, Nelson Lagos Suarez, Enrique Paredes Herbach, Jorge Ulloa Huepe, Gastón Valenzuela Jaramillo, Bruno Peruzzo Leischner, and Ricardo Silva Riveros. 2007. "Emigration and Mortality of Black-necked Swans (*Cygnus melancoryphus*) and Disappearance of the Macrophyte *Egeria densa* in a Ramsar Wetland Site of Southern Chile." *Ambio* 36 (7): 607-610.
- Luraschi, Marco. 2007. "Análisis de la Cadena Productiva de la Celulosa y el Papel a la Luz de los Objetivos de Desarrollo Sostenible: Estudio del Caso de Chile." Documento de proyecto. Santiago: ECLAC, United Nations.
- MA&C Consultora. 2004. "Apoyo al Seguimiento Ambiental del Proyecto Celulosa Planta Valdivia-Celulosa Arauco y Constitución S.A." Final Report N°3, Version 2. August 24, 2004. Santiago.
- Madge, Steven and Hilary Burn. 1988. *Waterfowl: an Identification Guide to the Ducks, Geese and Swans of the World*. Boston: Houghton Mifflin Company.
- Marchant, Oliver. 2007. *Post-Foundational Political Thought. Political Difference in Nancy, Lefort, Badiou and Laclau*. Edinburgh: Edinburgh University Press.

- Mardones, Alvaro and Carlos Leal. 1995. "Informe Técnico Análisis de Estudio de Impacto Ambiental Proyecto Planta Celulosa Valdivia." November 1995. Valdivia: CODEFF.
- Marin, M. January 5 1998. Memorandum #12600. From the General Director of the Maritime Territory and Maritime Government of Valdivia to the Regional Secretary of the National Environmental Commission (CONAMA). Valdivia: Chilean Navy.
- Marín, Víctor., Antonio Tironi, Luisa E. Delgado, Manuel Contreras, Fernando Novoa, Marcela Torres-Gómez, René Garreaud, Irma Vila and Italo Serey. 2009. "On the Sudden Disappearance of *Egeria densa* from a Ramsar Wetland site of Southern Chile: A Climatic Event Trigger Model." *Ecological Modelling* 220: 1752-1763.
- Markham, Brent. 1971. "Censo Invernal de Cisnes y Flamencos en Magallanes." *Anales del Instituto de la Patagonia* 2 (2): 146-157.
- Marquet Pablo, Sebastián Abades and Iván Barria. 2012. "Distribución y Conservación de Humedales Costeros: una Perspectiva Geográfica." Pp. 2-19 in *Humedales Costeros de Chile. Aportes Científicos a su Gestión Sustentable*, edited by José Miguel Fariña and Andrés Camaño. Santiago: Ediciones Universidad Católica de Chile.
- Martinez, Mariano, Carlos Darrieu and Guillermo Soave. 1997. "The Avifauna of Laguna Llanquanelo (Mendoza, Argentina), a South American Wetland of International Importance." *Freshwater Forum* 9: 35-45.
- Matte, Eliodoro. 1994. "Prólogo." Pp. 13-20 in *La Tierra que Recuperamos*, Fernando Hartwig. Santiago: Editorial Los Andes.
- Matthei, Oscar. 1995. *Manual de las Malezas que Crecen en Chile*. Santiago: Alfabetá Impresores.
- Mayol, Alberto. 2012. *El Derrumbe del Modelo: La Crisis de la Economía de Mercado en el Chile Contemporáneo*. Santiago: LOM Ediciones.
- Medero, Dana and Alison Calder. 2003. "Ethics, Activism, and the Rise of Interdisciplinary Animal Studies: An Interview with Cary Wolfe." *Topia: Canadian Journal of Cultural Studies* 10: 39-52.
- Medina, R. 1988. "Flora y Fitosociología del Santuario de la Naturaleza Río Cruces (Valdivia, Chile)." Tesis para optar al grado de Licenciado en Ciencias Forestales. Valdivia: Facultad de Ciencias Forestales, Universidad Austral de Chile, Valdivia.
- Mentis, M. T. 1988. "Hypothetico-Deductive and Inductive Approaches in Ecology." *Functional Ecology* 2 (1): 5-14.

- Mignolo, Walter. 2007. "Introduction: Coloniality of Power and Decolonial Thinking." *Cultural Studies* 21 (2-3): 155-167.
- Ministerio de Agricultura. 2005. "Evaluación de Impacto Programa de Bonificación Forestal DL 701. Informe Final." Santiago: Ministerio de Agricultura.
- Ministerio de Educación Pública. 1981. "Declara Santuario de la Naturaleza la Zona Humeda de los Alrededores de Valdivia." Decreto N° 2734. June 3 1981. Santiago: Gobierno de Chile.
- Ministerio de Industrias. 1908. "Anuales Agronómicos." Sección de Aguas y Bosques. Santiago: Gobierno de Chile.
- Ministerio de Medio Ambiente and Centro de Ecología Aplicada. 2011. "Diseño del Inventario Nacional de Humedales y el Seguimiento Ambiental." Santiago, Chile: Gobierno de Chile.
- Ministerio Secretaría General de la Presidencia. 1993. "Pauta para la Evaluación del Impacto Ambiental de Proyectos de Inversión." Santiago: Gobierno de Chile.
- Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice*. Durham and London: Duke University Press.
- Mol, Annmarie. 1999. "Ontological Politics: A Word and Some Questions." *The Sociological Review* 47 (1): 74-89.
- Molina, Juan Ignacio. 1782. *Saggio sulla Storia Naturale del Chili*. Bologna: Tipografia S. Tomasso d'Aquino.
- Montes, Leonidas. May 15 2005. "Celulosa Arauco: Cisnes con el Cuello en Alto." El Mercurio, Reportajes.
- Moreno, Carlos. February 27 1997. "Declaración Pública." Diario Austral de Valdivia.
- Mouchard, Alex. 2013. "El Cisne de Cuello Negro y el Abate." Blog *Historias Zoológicas*. Entry July 7 2013. Retrieved October 24 2014 (<http://historiaszoológicas.blogspot.com/2013/07/el-cisne-de-cuello-negro-y-el-abate.html>).
- Muñoz-Pedreros, Andrés, Cecilia Godoy, Luis Olivares and Patricia Möller. 1993. "Santuario de la Naturaleza del Río Cruces (X Región de Chile). Proposiciones para un Prospectus." *Comunicaciones Museo Historial Natural de Concepción* 7: 33-47.
- Muñoz-Pedreros, Andrés. 2004. "Los Humedales del Río Cruces y la Convención de Ramsar: un Intento de Protección Fallido." *Gestión Ambiental* 10: 11-26.
- Naciones Unidas. 1957. "Informe del Grupo Asesor en Papel y Celulosa para América Latina." La Paz: CEPAL.

- Nazer Ahumada, Ricardo. 2009. "Historia de la Corporación de Fomento de la Producción, CORFO: 1939-2009. Santiago: Patrimonio Consultores. Retrieved February 14 2015 (<http://repositoriodigital.corfo.cl/bitstream/handle/11373/7229/HISTORIA%20CORFO%20FINAL.pdf?sequence=1>).
- Mario Pino, 2005. Intervention in the panel "La Ciencia del Santuario y el Santuario de la Ciencia" held on November 16 2005 at the San Francisco Convent, Valdivia, during the Citizen Convention "Agua, Ciudadanía y Territorio: Ideando Nuevas Regiones Sin Contaminación," organized by Action for the Swans between November 14 and 19 of 2005.
- Nazif, Iván. 2014. "Plantaciones y Pobreza en Comunas Forestales. Forestación y Estilo de Desarrollo." Gerencia Forestal. Santiago: CONAF.
- Nelson, Paola. 1996. "Concentración de Metales Pesados en el Complejo Estuarial Valdiviano." Tesis para optar al Título de Biólogo Marino. Facultad de Ciencias. Valdivia: Universidad Austral de Chile.
- Nempu, Pedro, Cristina Padovani, C. García and R. Jaramillo. 1993. "La Biodiversidad Vegetacional del Santuario de la Naturaleza Río Cruces (Valdivia, Chile)." *Acta Botánica Malacitana* 18: 259-279.
- Neruda, Pablo. 1966. *Arte de Pájaros*. Santiago: Editorial Lord Cochrane.
- Neruda, Pablo. 1997. *Antología Fundamental*. Santiago: Editorial Andrés Bello.
- Neruda, Pablo. 2004. *Confieso que he Vivido*. Santiago: Pehuén Editores.
- Norambuena, María Cecilia and Francisco Bozinovic. 2009. "Mineral Metabolism in a Black-necked Swan (*Cygnus melanocoryphus*) Population from Southern Chile." *Journal of Zoo and Wildlife Medicine* 40 (4): 617-623.
- Nussbaum, Martha. 2006. *Frontiers of Justice: Disability, Nationality, Species Membership*. Cambridge, MA: Harvard University Press.
- Ogilvie, Malcolm A. 1972. "Distribution, Numbers and Migration". Pp. 29-56 in *The Swans*, edited by Peter Scott and the Wildfowl Trust. London: Michael Joseph Ltd.
- Ojeda, Patricio. 2006. *Responsabilidad Social Empresarial. Una Visión Alternativa del Caso de la Planta de Celulosa Valdivia*. Concepción: Ediciones Universidad del Bío Bío.
- Organización para la Cooperación y el Desarrollo Económico (OCDE). 2005. "Evaluaciones del Desempeño Ambiental Chile." Santiago/Paris: OCDE/CEPAL.
- Organization for Economic Cooperation and Development (OECD) and the World Bank. 2009. "Reviews of National Policies for Education. Tertiary Education in Chile." Santiago/Paris: OECD/World Bank/ Ministry of Education of Chile.

- Orgeira, José Luis and Oscar Fogliatto. 1991. "The Black-Necked Swan *Cygnus melanocoryphus* in Antarctica." *Marine Ornithology* 19:140-143.
- Osorio, Cristóbal. 2009. "Impacto del Crecimiento Urbano en el Medio Ambiente del Humedal de Valdivia 1992-2007." Tesis para optar al grado de Magíster en Asentamientos Humanos y Medio Ambiente. Instituto de Estudios Urbanos y Territoriales. Santiago: Pontificia Universidad Católica de Chile.
- Otero, Luis and Tomas Monfil. 1994. "Potencialidad de los Bosques Nativos en el Desarrollo de la Región de Los Lagos." *Ambiente y Desarrollo* 10 (2):13-18.
- Palma, Alvaro, Marcelo Silva, Carlos Muñoz, Carolina Cartes and Fabián Jaksic. 2008. "Effect of Prolonged Exposition to Pulp Mill Effluents on the Invasive Aquatic Plant *Egeria densa* and Other Primary Producers: A Mesocosm Approach." *Environmental Toxicology and Chemistry* 27 (2): 387-396.
- Parmelee, David and William Fraser. 1989. "Multiple Sightings of Black-Necked Swans in Antarctica." *American Birds* 43: 1231-1232.
- Parra, Nicanor. 1983. *Poesía Política*. Santiago: Bruguera.
- Pino Navarro, Jimena. 2005. "Aprendizajes y Olvidos de una Construcción Política y Patrimonial de la Naturaleza: Memoria Colectiva del Conflicto por la Bahía de Maiquillahue en las Nuevas Generaciones de la Comunidad de Mehuín". Tesis para optar al Título de Antropóloga y al grado de Licenciada en Antropología. Instituto de Ciencias Sociales. Valdivia: Universidad Austral de Chile.
- Pino, Mario and N. Fuentes. 2001. "Determinación de Origen, Niveles Naturales y Posibles Aportes Antrópicos en los Contenidos de Metales Traza en los Estuarios de Valdivia, X Región." Oficina Técnica de Puerto Varas. SERNAGEOMIN. Valdivia: Servicio Nacional de Geología y Minería/Universidad Austral de Chile.
- Pino, Mario Gerardo Perillo and Pablo Santamarina. 1994. "Residual Fluxes in a Cross Section in the Valdivia River Estuary, Chile." *Estuarine, Coastal and Shelf Sciences* 38: 491-505.
- Pinto, Aníbal. 1962. *Chile: Un Caso de Desarrollo Frustrado*. Santiago: Editorial Universitaria.
- Pizarro, Rodrigo. 2007. "La Reforma Ambiental en Chile." *Journal of Technology, Management and Innovation* 2 (2): 3-6.
- Pontificia Universidad Católica de Chile. 2005. "Antecedentes Sobre el Convenio entre la Pontificia Universidad Católica de Chile y Celulosa Arauco y Constitución S.A." Retrieved July 21 2013 (http://www.bio.puc.cl/caseb/adjuntos/Antec_conv_PUC-Arauco.pdf).

- Primer Juzgado Civil de Valdivia. July 27 2013. "Estado-Fisco de Chile con Celulosa Arauco y Constitución S.A." Causa Rol746-2005. Valdivia: Primer Juzgado Civil de Valdivia.
- Prochelle, Oscar and Hugo Campos. 1985. "The Biology of Introduced Carp *Cyprinus carpio* L., in the River Cayumapu, Valdivia, Chile." *Studies on Neotropical Fauna and Environment* 20: 65-82.
- Quijano, Aníbal. 2000. "Coloniality of Power, Eurocentrism, and Latin America." *Nepantla: Views from the South* 1 (3): 533-580.
- Radio Bío-Bío. December 19 2011. "Denuncian la Caza de Cisnes de Cuello Negro en Corral." Retrieved March 22 2014 (<http://www.biobiochile.cl/2011/12/19/denuncian-la-caza-de-cisnes-de-cuello-negro-en-corral.shtml>).
- Raga, Fernando and Lionel Sierralta. 1995. "Un Marco Conceptual para una Política Forestal Sustentable." *Ambiente y Desarrollo* 11 (4): 28-35
- Raga, Fernando. 1991. "Ecología y Desinformación en el Sector Forestal." *Ambiente y Desarrollo* 7 (2): 22-26.
- Ramírez, Carlos, Cristina San Martín, Ricardo Medina y Domingo Contreras. 1991. "Estudio de la Flora Hidrófila del Santuario de la Naturaleza Río Cruces (Valdivia, Chile)." *Gayana Botánica* 48 (1-4): 67-80.
- Ramírez, Carlos, Domingo Contreras y Javiera San Martín. 1986. "Distribución Geográfica y Formas de Vida en Hidrófitos Chilenos." *Actas VIII Congreso Nacional de Geografía. Instituto Geográfico Militar de Chile (IGM)* 1: 103-110.
- Ramírez, Carlos, Erwin Carrasco, Silvana Mariani and Nicolás Palacios. 2006. "La Desaparición del Luchecillo (*Egeria densa*) del Santuario del Río Cruces (Valdivia, Chile): Una Hipótesis Plausible." *Ciencia & Trabajo* 8 (20): 79-86.
- Ramírez, Carlos, R. Godoy, Domingo Contreras and E. Stegmaier. 1982. *Guía de Plantas Acuáticas y Palustres Valdivianas*. Valdivia: Universidad Austral de Chile.
- Ramírez, Carlos. 1995. "Flora y Vegetación Acuática del Río Cruces y Santuario de la Naturaleza." Descripción Línea Base Proyecto Valdivia. Informe Final. Valdivia: Forestal Arauco/Geotécnica.
- Ramírez, Carlos. 1996. "Flora y Vegetación Acuática del Río Cruces y Santuario de la Naturaleza (Campaña de Verano)." Descripción Línea Base Proyecto Valdivia. Informe Final. Valdivia: Forestal Arauco/Geotécnica.
- Rancière, Jacques. 1999. *Disagreement: Politics and Philosophy*. Minneapolis: University of Minnesota Press.
- Panagia, Davide. 2000. "Dissenting Words: A Conversation with Jacques Rancière." *Diacritics* 30 (2): 113-26.

- Rancière, Jacques. 2003. "Comment and Responses." *Theory & Event* 6 (4): n.p.
- Rancière, Jacques. 2011. *The Politics of Aesthetics. The Distribution of the Sensible*. London, New York: Continuum.
- Rau, Jaime. 1980. "Fluctuación Estacional de *Cynus melancoryphus* (Molina) en Puerto Natales (Última Esperanza, XII Región de Magallanes) (Anseriformes, Anatidae)." *Noticiero Mensual Museo Nacional de Historia Natural* 24: 279-280.
- Reinhardt, Eduard G., Robert B. Nairn, and Gloria López. 2010. "Recovery Estimates for the Rio Cruces After the May 1960 Chilean Earthquake." *Marine Geology* 269 (1): 18-33.
- Revista Análisis. May 13 1979. "Chiloé Cielos Cubiertos."
- Revista Capital. February 1997. "Mehuín: El Otro Maremoto."
- Revista Chile Forestal. August 1978. "Proyecto Astillas Abre las Puertas del Desarrollo en Chiloé." Santiago: CONAF.
- Revista Hoy. November 1977. "Los Dólares de la Erosión."
- Revista Hoy. October 1978. "Tiempo de Denuncia, Iglesia –con Respaldo del Episcopado Nacional– Rechazó el Proyecto Astillas-Chiloé de CORFO y los Japoneses."
- Revista Qué Pasa. June 17 2008. "Lagos Fue Más Allá de lo que le Correspondía a su Investidura."
- Reyes, René, Claudia Sepúlveda and Luis Astorga. 2014. "Gobernanza del Sector Forestal Chileno. Tensiones y Conflictos entre las Fuerzas de Mercado y las Demandas de la Ciudadanía." Pp. 693-720 in *Ecología Forestal. Bases para el Manejo Sustentable y Conservación de los Bosques Nativos de Chile* edited by Claudio Donoso, Mauro González and Antonio Lara. Valdivia: Universidad Austral de Chile.
- Ritter, Carlos. November 13 1995. Letter to Raul Arteaga, Regional Director of CONAMA, from the Regional Director of CONAF. Ordinario 1398. Dirección Regional Corporación Nacional Forestal. Puerto Montt: CONAF.
- Rodríguez, Laura. 2014. "La Ciudad como Fuente Icónica de Sentido: Aproximaciones Desde la Cultura Geográfica en Valdivia." *Revista Austral de Ciencias Sociales* 14: 15-18.
- Rojas, Alejandro, Francisco Sabatini, and Claudia Sepúlveda. 2003. "Conflictos Ambientales en Chile: Aprendizajes y Desafíos." *Ambiente y Desarrollo* 19 (2): 22-30.
- Pérez Rosales, Vicente. 1957. *Recuerdos del Pasado. 1814-1860*. Santiago: Carlos de Vidts Editores.

- Rosas, Roberto. April 2 2009. "Estado Fisco de Chile con Celulosa Arauco y Constitución S.A. Causa Rol 152-2008." Legal Testimony during the trial for environmental damage pursued by the State Defense Council against ARAUCO. Folio 426, point 4. Valdivia: Primer Juzgado Civil de Valdivia.
- Rottmann, Jurgen and María Victoria Callejas. 1992. "Estrategia Nacional de Conservación de Aves." Serie Técnica del Servicio Agrícola y Ganadero, DIPROREN 1 (1). Santiago: Unión de Ornitólogos de Chile/DIPROREN.
- Rykiel, Edward J. 1996. "Testing Ecological Models: The Meaning of Validation." *Ecological Modelling* 90: 229-244.
- Sabatini, Francisco and Claudia Sepúlveda (eds.). 1997. *Conflictos Ambientales: Entre la Globalización y la Sociedad Civil*. Santiago: CIPMA.
- Salazar, Gabriel and Julio Pinto. 1999. *Historia Contemporánea de Chile I: Estado, Legitimidad, Ciudadanía*. Santiago: LOM Ediciones.
- Salazar, Juan. 1988. "Censo Poblacional del Cisne de Cuello Negro (*Cygnus melancoryphus*) en Valdivia." *Medio Ambiente* 9 (1): 78-87.
- Salazar, Juan. 1989. "El Santuario de la Naturaleza Río Cruces." *Chile Forestal* 160: 16-17.
- San Martín, Cristina, Ricardo Medina, Pedro Ojeda and Carlos Ramírez. 1993. "La Biodiversidad Vegetacional del Santuario de la Naturaleza Río Cruces (Valdivia, Chile)." *Acta Botánica Malacitana* 18: 259-279.
- San Martín, Cristina, Yessica Pérez, Drina Montenegro and Miguel Álvarez. 2011. "Diversidad, Hábito y Hábitat de Macrófitos Acuáticos en la Patagonia Occidental (Región de Aisén, Chile)." *Anales Instituto Patagonia* 39 (1): 23-41.
- Sánchez, Juan Enrique. 2011. "Informe Pericial. Estado de Chile con Celulosa Arauco y Constitución S.A. Rol 746-2005. January 27, 2011. Valdivia: Primer Juzgado Civil de Valdivia.
- Sand-Jensen, Kaj and Ole Pedersen. 1999. "Velocity Gradients and Turbulence Around Macrophyte Stands in Streams." *Freshwater Biology* 42: 315-328.
- Sarewitz, Daniel. 2004. "How Science Makes Environmental Controversies Worse." *Environmental Science & Policy* 7: 385-403.
- Schlatter, Roberto, Jorge Ruiz, J. Ordonez, and J. Herreros. 1992. "Nidificación del Cuervo del Pantano en el Río Cruces, Valdivia." *Boletín informativo de la Unión de Ornitólogos de Chile* 13: 12-13.
- Schlatter, Roberto, Juan Salazar, Alex Villa and Javiera Meza. 1991a. "Demography of Black-Necked Swans, *Cygnus melancoryphus* in Three Chilean Wetland Areas." *Wildfowl Supplement* 1: 88-94.

- Schlatter, Roberto, Juan Salazar, Alex Villa and Javiera Meza. 1991b. "Reproductive Biology of Black-necked Swans at Three Chilean Wetland Areas and Feeding Ecology at Río Cruces." *Wildfowl Supplement* 1: 268-271.
- Schlatter, Roberto, René Navarro and Paulo Corti. 2002. "Effects of El Niño Southern Oscillation on Numbers of Black-Necked Swans at Río Cruces Sanctuary, Chile." *Waterbirds* 25 (1): 114-122.
- Schlatter, Roberto. 1998. "El Cisne de Cuello Negro (*Cygnus melanocoryphus*) en Chile." Pp. 121-131 in *La Conservación de la Fauna de Chile, Logros y Perspectivas* edited by Víctor Valverde. Santiago: CONAF.
- Schmidt, Harald. 1990. "Manejo del Bosque Nativo y Exportación de Astillas." Pp. 147-153 in *Sector Forestal 'Acción Ambiental: ¿Obstáculo o impulso al desarrollo?'* Santiago: CIPMA.
- Scott, John and Gordon Marshall. 2005. "Ontology". Pp. 28-45 in *A Dictionary of Sociology*. Oxford: Oxford University Press.
- Sepúlveda, Claudia. 1999. "¿Cómo Fortalecer la Prevención de Conflictos en el SEIA?: Recomendaciones a Partir de la Percepción Ciudadana." *Ambiente y Desarrollo* 15 (4): 11-23.
- Sepúlveda, Claudia. 2007. *Ciudad de Papel*. Valdivia, Chile: Jirafa Films.
- Sepúlveda, Claudia. May 16 2012. "Swans, Ecological Risks And Ontological Struggles: A Posthumanist and Performative Account of the Río Cruces Disaster in Valdivia, Chile." PhD Research Proposal. First Draft. University of British Columbia.
- Sepúlveda, Claudia and Paula Mariángel. 1998. "La Legitimidad del Sistema de Evaluación de Impacto Ambiental Puesta en Juego: el Caso de la Planta de Celulosa Valdivia." *Ambiente y Desarrollo* 14 (2): 6-17.
- Sepúlveda, Claudia and Bruno Betatti. 2005. "El Desastre Ecológico del Santuario del Río Cruces: Trizadura Institucional y Retroceso Democrático." *Ambiente y Desarrollo* 20-21 (3-1): 62-68.
- Sepúlveda, Claudia and Alejandro Rojas. 2010. "Conflictos Ambientales y Reforma Ambiental en Chile: Una Oportunidad Desaprovechada de Aprendizaje Institucional Sobre Participación Ciudadana." *Ambiente y Desarrollo* 24 (2): 15-23.
- Sepúlveda, Claudia and Pablo Villarroel. 2010. "El Desastre Ecológico del Santuario del Río Cruces en Valdivia: Trizadura Institucional y Retroceso Democrático". Pp. 318-348 *Conflictos por el Agua en Chile: Entre los Derechos Humanos y las Reglas del Mercado* edited by Sara Larraín and Ximena Poo. Santiago: Fundación Chile Sustentable.

- Sepúlveda, Claudia and Pablo Villarroel. 2012. "Swans, Conflicts and Resonance: The Role of Local Movements in the Reform of Chilean Environmental Institutions." *Latin American Perspectives* 39 (4): 181-200.
- Sepúlveda, Claudia and Pablo Villarroel. 2013. "From a Scientifically Oriented Environmentalism to a Grassroots Call for Democracy". Pp. 21-48 in *Environmental Movements around the World* edited by Timothy Doyle and Sherilyn MacGregor. Santa Barbara, CA: Praeger.
- Sepúlveda, Claudia and Juanita Sundberg. 2015. "Aperturas Ontológicas, Multiplicidad y Performación: Ampliando la Agenda de una Ecología Política Posthumanista a Partir de Reflexiones Sobre el Desastre del Río Cruces, en Valdivia". Pp. 167-191 in *Ecología Política en Chile: Poder, Naturaleza, Conocimiento* edited by Beatriz Bustos, Manuel Prieto and Jonathan Barton. Santiago: Editorial Universitaria.
- Senado de Chile. 2009. "Segundo Informe, Recaído en el Proyecto de Ley, en Segundo Trámite Constitucional, que Crea el Ministerio de Medio Ambiente, el Servicio de Evaluación Medio Ambiental y la Superintendencia de Medio Ambiente." Boletín N° 5947-12. Comisión de Medio Ambiente y Bienes Nacionales. Valparaíso: Congreso Nacional de Chile.
- Silva, Eduardo. 1996. "Democracy, Market Economy and Environment Policy in Chile." *Journal of Interamerican Studies and World Affairs* 38 (4): 1-33.
- Silva, Patricio. 2006. "Los Tecnócratas y la Política en Chile: Pasado y Presente." *Revista de Ciencia Política* 26 (2): 175-190.
- Silva, Patricio. 2007. "Estilos Políticos y Orientación Tecnocrática Bajo los Gobiernos de Lagos y Bachelet." *Revista de Sociología* 21: 79-105.
- Singer, Peter. 1975. *Animal Liberation*. New York: Avon Books.
- Skewes, Juan Carlos. 2004. "Conocimiento Científico y Conocimiento Local. Lo que las Universidades no Saben Acerca de lo que los Actores Locales Saben." *Cinta de Moebio* 19: 22-37.
- Skewes, Juan Carlos and Debbie Guerra. 2004. "The Defense of Maiquillahue Bay: Knowledge, Faith, and Identity in an Environmental Conflict." *Ethnology* 43 (3): 217-231.
- Sladen, William J.L., W.W. Gunn and W.W. Cochran. 1970. "Studies on the Migrations of the Whistling Swan." Pp. 231-44 in "Proceedings of the World Conference on Bird Hazards to Aircraft, 1969." Kingston, Ontario. Canada.
- Sladen, William J.L. 1973. "A Continental Study of Whistling Swans Using Neck Collars." *Wildfowl* 24: 8-14.
- SMA (Superintendencia del Medio Ambiente). January 8 2016. "Formula Cargos que Indica a Celulosa Arauco y Constitución S.A., Planta Valdivia." Resolución

Exenta N°1/ROL D-001-2016. Carolina Silva Santelices. Fiscal Instructora. División de Sanción y Cumplimiento. Santiago.

SMA (Superintendencia del Medio Ambiente). January 11 2016. "SMA Inicia Proceso de Sanción Contra Celulosa Arauco por Incumplimientos en su Planta Valdivia." Retrieved: February 22, 2016.

(<http://www.sma.gob.cl/index.php/noticias/comunicados/641-sma-inicia-proceso-de-sancion-contr-celulosa-arauco-por-incumplimientos-en-su-planta-valdivia>).

Sociedad Chilena de Botánica. 2001. "Declaración Pública sobre Campaña Bosques para Chile." Octubre. Retrieved July 29 2014 (<http://www.udec.cl/~botanica/>).

SOFOFA (Sociedad de Fomento Fabril). 1890. "Movimiento Económico en 1889." *Boletín de la Sociedad de Fomento Fabril* (BSFF) 7: 98-99.

SOFOFA (Sociedad de Fomento Fabril). 2005. *Informe Anual 2004-2005*. Santiago: SOFOFA.

SOFOFA (Sociedad de Fomento Fabril). 2006. *Memoria Anual 2005/2006*. Santiago: SOFOFA.

Soper, Kate. 1996. "Nature/'nature'." Pp. 22-34 in *FutureNatural* edited by George Robertson. London: Routledge.

Steubing, Lore, Carlos Ramirez and M. Alberdi. 1980. "Energy Content of Water-and-Bog Plant Associations in the Region of Valdivia (Chile)." *Vegetatio* 43: 153-161.

Stuardo, José. 2007. "Trascendencia del Primer Saggio Sulla Storia Naturale del Chili de J.I. Molina, su Traducción, el Compendio Anónimo y el Bicentenario." *Atenea* 495 (I): 83-107.

Swyngedouw, Erik. 2009. "The Antinomies of the Postpolitical City: In Search of a Democratic Politics of Environmental Production." *International Journal of Urban and Regional Research* 33 (3): 601-20.

Swyngedouw, Erik. 2010. "Impossible Sustainability and the Post-political Condition." Pp. 185-205 in *Making Strategies in Spatial Planning* edited by María Cerreta, Grazia Concilio and Valeria Monno. Netherlands: Springer. DOI 10.1007/978-90-481-3106-8_11

Tanner, Chris, John Clayton, and Rohand Wells. 1993. "Effects of Suspended Solids on the Establishment and Growth of *Egeria densa*." *Aquatic Botany* 45: 299-310.

Tecklin, David, Carl Bauer and Manuel Prieto. 2011. "Making Environmental Law for the Market: The Emergence, Character, and Implications of Chile's Environmental Regime." *Environmental Politics* 20: 879-98.

- The Baltimore Sun. December 6 1992. "Pair of Swans May Herald Return of Trumpeters Related Breed Studied at Lake Elkhorn." Retrieved May 14 2013 (http://articles.baltimoresun.com/1992-12-06/news/1992341048_1_swans-sladden-trumpeter).
- Tironi, Antonio. 2012. "Propuesta Teórica para el Análisis Topológico de Redes Ecológicas: en la Búsqueda de la Resiliencia Ecosistémica." Tesis para optar al grado de Doctor en Ciencias con mención en Ecología y Biología Evolutiva. Facultad de Ciencias. Santiago: Universidad de Chile. Retrieved July 8 2012 (ftp://ecosistemas.uchile.cl/pub/publicaciones/2012/Tesis_Doctoral_A_Tironi.pdf).
- Tironi, Eugenio. 2011. *Abierta. Gestión de Controversias y Justificaciones*. Santiago: Uqbar.
- Törey, Sofía. 1994. "Adriana Hoffman, Coordinadora de 'Defensores del Bosque Chileno': 'No Pretendemos Ponerle Candado al Bosque Pero Sí que Nos Detengamos a Reflexionar Sobre Qué Haremos con Él'." *Ambiente y Desarrollo* 10 (3): 28-32.
- UACH (Universidad Austral de Chile). 2004. "Estudio Sobre Origen de Mortalidades y Disminución Poblacional de Aves Acuáticas en el Santuario de la Naturaleza Carlos Anwandter, en la Provincia de Valdivia." Primer Informe de Avance. Convenio Complementario Específico No 1210-1203/2004-12-14 entre la Dirección Regional CONAMA Xa Región de los Lagos y la Universidad Austral de Chile. December 15 2004. Valdivia: Universidad Austral de Chile.
- UACH (Universidad Austral de Chile). 2005a. "Estudio Sobre Origen de Mortalidades y Disminución Poblacional de Aves Acuáticas en el Santuario de la Naturaleza Carlos Anwandter, en la Provincia de Valdivia." Segundo Informe de Avance. Convenio Complementario Específico No 1210-1203/2004-12-14 entre la Dirección Regional CONAMA Xa Región de los Lagos y la Universidad Austral de Chile. February 11 2005. Valdivia: Universidad Austral de Chile.
- UACH (Universidad Austral de Chile). 2005b. "Estudio Sobre Origen de Mortalidades y Disminución Poblacional de Aves Acuáticas en el Santuario de la Naturaleza Carlos Anwandter, en la Provincia de Valdivia." Informe Final. Convenio Complementario Específico No 1210-1203/2004-12-14 entre la Dirección Regional CONAMA Xa Región de los Lagos y la Universidad Austral de Chile. April 18 2005. Valdivia: Universidad Austral de Chile.
- UACH (Universidad Austral de Chile). 2005c. "Informe de Respuestas y Comentarios a las Observaciones Realizadas por Diferentes Servicios Públicos al Estudio de la UACH." Valdivia: Universidad Austral de Chile.
- Universidad de Concepción. 2009. "Análisis de la Cadena de Producción y Comercialización del Sector Forestal Chileno: Estructura, Agentes y Prácticas." Informe Final. Departamento de Economía. Concepción: Universidad de Concepción.

- Urrutia, Roberto, Koen Sabbe, Fabiola Cruces, Karla Pozo, José Becerra, Alberto Araneda, Wim Vuverman and Oscar Parra. 2000. "Estudio Paleolimnológico de Laguna Chica de San Pedro (VIII Región): Diatomeas, Hidrocarburos y Ácidos Grasos." *Revista Chilena de Historia Natural* 73: 717-728.
- Valdebenito, Gerardo. 2005. "Evaluación de Efectividad del Fomento Forestal en Chile, Periodo 1996-2003." Tesis para optar al grado de Magíster en Gestión y Políticas Públicas. Facultad de Ciencias Físicas y Matemáticas. Santiago: Universidad de Chile.
- Venegas, Claudio. 1994. *Aves de Magallanes*. Punta Arenas: Ediciones Universidad de Magallanes.
- Claudio Zaror (2005b) "Apoyo al análisis de fuentes de emisión de gran magnitud y su influencia sobre los ecosistemas de la subcuenca del Río Cruces". Informe Final. March 2005.
- Vergara, Carlos. 2012. "Plantaciones Forestales a Gran Escala y Desarrollo Territorial: Temas Críticos, Propuestas de Gestión Empresarial y Política Pública para la Región de Los Ríos." Documento N°1. Centro Regional de Estudios Ciudadanos. Agrupación Eco-Región Agenda Local 21. Valdivia: Iniciativa Nueva Región Cómo Vamos.
- Vial, Gonzalo. 1990. *Historia de Chile 1891-1973*. Santiago: Editorial Hachette.
- Vidal, Edwin, Delicia Jaramillo, Carlos Fisher and Ricardo Mendoza. 2008. *Valdivia: un Patrimonio Pictórico. 1983-2007*. Valdivia: Corporación Cultural de la Ilustre Municipalidad de Valdivia.
- Villa, Alex. 1988. "Laguna Torca, Refugio de las Aves." *Chile Forestal* 151:16-17. Visión Valdivia. 2014. "Our Vision." Retrieved November 21 2014 (http://www.visionvaldivia.cl/index.php?option=com_content&view=article&id=1&Itemid=3&lang=es).
- Vuilleumier, Francois. 1997. "A Large Autumn Concentration of Swans (*Cygnus melancoryphus* and *Coscoroba coscoroba*) and Other Aaterbirds at Puerto Natales, Magallanes, Chilean Patagonia, and its Significance for Swan and Waterfowl Conservation." *Ornitología Neotropical* 8: 1-5.
- Weil, Simone. 1986. "Human Personality". Pp. 50-78 in *Simon Weil: An Anthology* edited by Siân Miles. New York: Weidenfeld and Nicolson.
- Whatmore, Sarah. 2009. "Mapping Knowledge Controversies: Science, Democracy and the Redistribution of Expertise." *Progress in Human Geography* 33 (5): 587-598.
- Winter, Augusto. 1927. "La Fuga de los Cisnes". In *Poesías*. Temuco: Editorial Ceres.
- Wolfe, Cary. 2008. "Flesh and Finitude: Thinking Animals in (Post)Humanist Philosophy." *SubStance* 37 (3): 8-36.

- Wolfe, Cary. 2009. "Human, All Too Human: 'Animal Studies' and the Humanities." *PMLA* 124 (2): 564-575.
- Wolfe, Cary. 2010. *What is Posthumanism?* Minneapolis: University of Minnesota Press.
- World Bank. 1986. "Chile: Forest Industry and Subsector Study." Report No. 6380-CH. Santiago: World Bank.
- World Wildlife Fund for Nature-Chile. 2005. "Informe de Observaciones y Recomendaciones, Misión Internacional de Evaluación de WWF ante la Controversia del Santuario de la Naturaleza y Sitio Ramsar Carlos Anwandter y la Planta de Celulosa Valdivia de CELCO." November 2005. Valdivia: WWF.
- Yarrow, Matthew, Víctor Marín, Max Finlayson, Antonio Tironi, Luisa Delgado and Fernanda Fischer. 2009. "The Ecology of *Egeria densa* Planchon (Liliopsida: Alismatales): A Wetland Ecosystem Engineer?" *Revista Chilena de Historia Natural* 82: 299-313.
- Zaror, Claudio. 2005a. "Apoyo al Análisis de Fuentes de Emisión de Gran Magnitud y su Influencia sobre los Ecosistemas de la Subcuenca del Río Cruces." Informe Parcial. February 2005. Puerto Montt: CONAMA X.
- Zhang, Yijing, Anne Toppinen and Jussi Uusivuori. 2014. "Internationalization of the Forest Products Industry: A Synthesis of Literature and Implications for Future Research." *Forest Policy and Economics* 38: 8-6.
- Žižek, Slavoj. 2000. *The Ticklish Subject. The Absent Centre of Political Ontology*. Second Edition. London: Verso.
- Žižek, Slavoj. 2002. *Revolution at the Gates -Žižek on Lenin- the 1917 Writings*. Verso, London.
- Žižek, Slavoj. 2013. "The Lesson of Rancière." Pp. 65-75 in *The Politics of Aesthetics. The Distribution of the Sensible* by Jacques Rancière. London: Bloomsbury.