

Challenging Nature: understanding business perceptions and actions regarding biodiversity

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Confirmation of authorship

The candidate confirms that the work submitted is their own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

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Publications

I am the lead author for all three of the publications included with this thesis. The manuscripts originate from my PhD research and I am responsible for the research questions, methods, data collection and analysis of each one. My supervisors reviewed the manuscripts, recommending changes and edits before each submission and for any subsequent re-submissions as part of the peer review process.

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Rationale for thesis by alternative format and summary of thesis structure

This thesis combines concepts from several disciplines, including corporate sustainability, corporate responsibility and conservation science to tackle three research questions. Answering each of these questions drew on distinct literatures and resulted in conceptual contributions that are grounded within different disciplines. Answering the research questions was therefore more suited to thesis by alternative format than a traditional monograph. A discussion section draws together the three papers, identifying themes that cross-cut the papers and identifying broader contributions to the corporate sustainability and conservation science literatures.

The thesis consists of: i) a section outlining the background and rationale for the research, including a short introduction, a literature review identifying the research gaps being addressed and consequent contributions of this study, and a summary of the research strategy, case studies, data collection and analysis procedures; ii) the three papers, the first exploring corporate perceptions and actions regarding biodiversity and its conservation, the second examining the role of stakeholders in businesses learning about and controlling for their impacts on biodiversity, and the third considering the challenges that businesses face in managing impacts and dependencies on biodiversity at the organisational level; and iii) a discussion drawing together the three papers, identifying and developing underlying links between them, considering broader contributions to the different literatures relating to business and biodiversity and considering implications for future research and practice. The conclusion offers a few reflections on the results in the broader research and policy context.

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Abstract

Biodiversity loss is a major global challenge with action required from the global to the local level. Businesses are increasingly being called on to help tackle the causes of biodiversity loss by accounting for the impacts and dependencies of their activities on the landscapes in which they operate. Despite recent advances in research and practice, many uncertainties remain regarding business involvement in biodiversity conservation. This thesis tackles some of these uncertainties by seeking to understand what shapes business priorities regarding biodiversity and why some businesses are acting whilst others are not. Drawing on a review of formal corporate reporting and 70 depth interviews, this thesis uses the cases of forestry and salmon farming in Chile to explore three interrelated questions across three papers.

Firstly, there is an empirical gap regarding our understanding of how businesses perceive biodiversity and the utility of formal reporting in motivating operational reforms. What does corporate reporting tell us about business perceptions and actions regarding biodiversity? Secondly, stakeholders are acknowledged as essential in helping businesses to comprehend impacts and dependencies on biodiversity. Yet the processes and results of learning processes remain unclear. How do stakeholders help businesses understand and act on biodiversity? Thirdly, the benefits of reform to account for biodiversity are frequently emphasised, both by practitioners and scholars, but the challenges businesses face in enacting reform have received little attention. What challenges do businesses face in understanding and acting on biodiversity?

This thesis suggests that natural resource-based businesses can do more to manage their impacts on biodiversity, but their willingness and capacity to act is framed by the socio-ecological context in which they operate. Stakeholders can help businesses better understand and manage operational impacts on biodiversity, but change is unlikely without structures that support sustained debate and reform. The findings address an empirical gap regarding business interdependencies with biodiversity and the analysis provides conceptual tools to advance future research. The thesis considers how these findings intersect with current debates in corporate sustainability and conservation social science regarding business involvement in biodiversity.

Contents

Chapter 1 – Introduction	1
1.1 Bibliography.....	6
Chapter 2 – Reviewing the evidence on business and biodiversity	13
2.1 Gaps in understanding business and biodiversity	13
2.1.1 The evidence base.....	13
2.1.2 Biodiversity as a concept in corporate sustainability	16
2.1.3 Business as an actor in conservation science.....	18
2.2 Addressing gaps in understanding business and biodiversity	19
2.2.1 Research Question 1: What does corporate reporting tell us about business perceptions and actions regarding biodiversity? 19	
2.2.2 Research Question 2: How do stakeholders help businesses understand and act on biodiversity?	20
2.2.3 Research Question 3: What challenges do businesses face in understanding and acting on biodiversity?	21
2.3 Case study selection	22
2.3.1 Chile: business vs. biodiversity?	23
2.3.2 Forestry and Salmon Farming: challenges regarding biodiversity	24
2.4 Research contributions.....	30
2.4.1 Biodiversity as an issue in ONE research	30
2.4.2 Business as an actor in conservation.....	31
2.4.3 Business and biodiversity in Chile.....	32
2.5 Next steps	32
2.6 Bibliography.....	34
Chapter 3 – Case studies, materials and methods	50
3.1 Rationale for case study approach.....	50
3.2 Case selection.....	51
3.2.1 Forestry and Salmon Farming in Chile.....	52
3.2.2 Similarities and differences to other countries.....	55
3.3 Data collection, sampling and analysis.....	57
3.3.1 Methodological framework	57
3.3.2 Data collection: scoping, sampling and recruitment	59
3.3.3 Analysis.....	64
3.3.4 Positionality	68
3.3.5 Ethics	69

3.4 Bibliography.....	70
Chapter 4 – Corporate reporting and conservation realities: understanding differences in what businesses say and do regarding biodiversity	76
4.1 Introduction.....	77
4.2 Understanding corporate reporting and action on biodiversity.....	78
4.3 Case studies, materials and methods.....	80
4.3.1 Forestry and salmon farming in Chile.....	80
4.3.2 Evidence base.....	81
4.3.3 Analysis.....	84
4.4 Findings.....	85
4.4.1 Differences in perceptions and actions regarding biodiversity by sector	85
4.4.2 Differences between corporate and stakeholder accounts regarding biodiversity	89
4.5 Discussion	93
4.6 Conclusion.....	96
4.7 Bibliography.....	97
Chapter 5 – Social underpinnings of ecological knowledge: business perceptions of biodiversity as social learning.....	104
5.1 Introduction: biodiversity, business, and ecological knowledge	105
5.2 Factors in business learning about biodiversity	106
5.3 Explaining business learning about biodiversity	108
5.4 Case Studies	110
5.4.1 Forestry	111
5.4.2 Salmon Farming.....	112
5.5 Data collection and analysis	114
5.6 Findings.....	118
5.6.1 Priorities relating to biodiversity and perception of conservation role	118
5.6.2 Standards and regulations: framing the business and biodiversity relationship.....	119
5.6.3 Stakeholder interactions.....	120
5.7 Discussion	125
5.8 Conclusion.....	128
5.9 Bibliography.....	129

Chapter 6 – Corporate responsibility and the challenge of biodiversity at the organisational level.....	137
6.1 Introduction	138
6.2 Literature Review	139
6.3 Modelling challenges across levels	142
6.4 Materials and Methods	145
6.4.1 Case selection	145
6.4.2 Fieldwork.....	147
6.4.3 Analysis.....	149
6.5 Findings.....	150
6.6 Discussion.....	153
6.7 Conclusion	157
6.8 Bibliography.....	158
Chapter 7 – Discussion: Understanding biodiversity at the organisational level	165
7.1 Overview	165
7.2 Summary of findings.....	165
7.2.1 What does corporate reporting tell us about business perceptions and actions regarding biodiversity?	166
7.2.2 How do stakeholders help businesses understand and act on biodiversity?	166
7.2.3 What challenges do businesses face in understanding and acting on biodiversity?.....	167
7.3 Cross-cutting themes	167
7.3.1 Socio-ecological context, business and biodiversity	167
7.3.2 Making the business case for biodiversity	168
7.3.3 The state as essential in enabling business action on biodiversity	169
7.4 Implications of research	171
7.4.1 Biodiversity as an issue in corporate sustainability	171
7.4.2 Business as an actor in conservation.....	178
7.4.3 Conservation policy in Chilean forestry and salmon farming.....	179
7.5 Contributions to theory	180
7.5.1 ONE/ Corporate sustainability.....	180
7.5.2 Conservation science.....	182
7.6 Strengths and limitations of research	183
7.7 Bibliography.....	186

Chapter 8 – Conclusion	198
8.1 Bibliography.....	201
Chapter 9 – Appendices	203
9.1 Appendix A: Ethics Review Approval	203
9.2 Appendix B: Recruitment Materials	206
9.2.1 Recruitment e-mails with informed consent.....	206
9.2.2 Concept note.....	208
9.2.3 Curriculum Vitae.....	210
9.2.4 Sample thank you e-mail.....	211
9.3 Appendix C: Interview Guides	212
9.3.1 Forestry.....	212
9.3.2 Salmon Farming.....	215
9.4 Appendix D: Interview themes.....	220

List of tables

Table 2.1: Review of research questions.....	26
Table 2.2: Ecological interdependencies of forestry and salmon farming sectors.....	27
Table 2.3: Contrasts between the forestry and salmon farming sectors in Chile.....	28
Table 2.4: Cross-cutting themes regarding business and biodiversity	33
Table 3.1: Key dates in forestry and salmon farming in Chile	56
Table 3.2: Strengths and weaknesses of documents and interviews as sources of evidence	58
Table 3.3: Data collection sources and examples	60
Table 3.5: Data Analysis Steps	64
Table 4.1: Document Review by type and sector	82
Table 4.2: Respondents by sector and type	83
Table 4.3: Key themes regarding biodiversity across forestry and salmon farming in Chile.....	92
Table 5.1: Ecological interdependencies of forestry and salmon farming sectors.....	111
Table 5.2: Participants by sector and type	116
Table 5.3: Stakeholder engagement regarding biodiversity in Chile ..	123
Table 6.1: Respondents by sector and type	149
Table 7.1 Similarities between biodiversity and climate change as corporate sustainability issues	176

List of figures

Figure 1.1: Defining “biodiversity”, ecosystems and natural capital.....	3
Figure 3.1: Data collection and analysis stages.....	59
Figure 3.2: Stakeholder selection for the forestry and salmon farming cases.....	62
Figure 3.3: Interview content by participant type.....	64
Figure 3.4: Section of coding trees for forestry and salmon farming cases	66
Figure 5.1: Stakeholders involved in biodiversity in Forestry and Salmon Farming in Chile.....	115
Figure 5.2: Interview content by participant type.....	117
Figure 5.3: Section of coding trees for forestry and salmon farming cases	117
Figure 6.1: Priorities across different levels	144
Figure 6.2: Tensions between levels.....	144
Figure 6.3: Interview themes for managers and stakeholders.....	148
Figure 6.4: Partial adaptation strategies in forestry.	154
Figure 6.5: Avoidance strategies in salmon farming	154

List of acronyms and abbreviations

- AIFBN – Agrupación de Ingenieros Forestales por el Bosque Nativo
- ASC – Aquaculture Stewardship Council
- BAP – Best Aquaculture Practices
- CBD – Convention on Biological Diversity
- CERTFOR – El Sistema Chileno de Certificación de Manejo Forestal Sustentable
- CMPC – Compañía Manufacturera de Papeles y Cartones
- CODEFF – El Comité Pro Defensa de la Fauna y Flora
- CONAF – Corporación Nacional Forestal
- CORFO – Corporación de Fomento a la Producción
- CORMA – Corporación Chilena de la Madera
- CPF – Consejo de Política Forestal
- EIA – Environmental Impact Assessment
- FSC – Forestry Stewardship Council
- GLOBAL.G.A.P – Global Good Agricultural Practice
- GRI – Global Reporting Initiative
- GSI – Global Salmon Initiative
- HCVA – High Conservation Value Area
- IBAT – Integrated Biodiversity Assessment Tool
- INFOR – Instituto Nacional Forestal
- ISA – Infectious Salmon Anaemia
- MMA – Ministerio del Medio Ambiente (Ministry of Environment)
- NTFP – Non-Timber Forest Product
- NCC – Natural Capital Coalition
- NGO – Non-Governmental Organisation
- NGP – New Generation Plantations
- ONE – Organisations and Natural Environment
- SERNAPESCA – Servicio Nacional de Pesca y Acuicultura
- SES – Socio-Ecological System

SMA – Superintendencia del Medio Ambiente

SRS – Salmon Rickettsial Septicaemia

SUBPESCA – Subsecretaría de Pesca y Acuicultura

TEEB – The Economics of Ecosystems and Biodiversity

WWF – World Wildlife Fund

Chapter 1 – Introduction

Biodiversity supports all life on the planet (Rockström *et al.* 2009; SCBD 2010; Millennium Ecosystem Assessment 2005). Estimates on the rate of biodiversity loss vary, but multiple assessments indicate the threat posed by a failure to conserve genes, species, habitats and ecosystems (Butchart *et al.* 2010; Guerry *et al.* 2015; Johnson *et al.* 2017; Nash *et al.* 2017; Newbold *et al.* 2016; Rockström *et al.* 2009; SCBD 2010; Millennium Ecosystem Assessment 2005). Given the scale of their operations, resources and environmental impacts, businesses – particularly corporations – are seen as having a potentially significant role in helping to tackle biodiversity loss (Bishop 2012; Natural Capital Coalition 2016; PwC 2015). Efforts have grown over the last decade to encourage businesses to think about biodiversity, emphasising opportunities from acting and the risks of inaction (Bishop 2012; Cranston, Green and Tranter 2015; Evison and Knight 2010; Natural Capital Coalition 2016). The prospect of increased business involvement in biodiversity has prompted concerns amongst conservation scholars and practitioners alike (Apostolopoulou and Adams 2015; Doak *et al.* 2014; Adams 2017; Dempsey and Suarez 2016). Yet we know little of business perceptions and actions regarding biodiversity (Dempsey and Suarez 2016; Bhattacharya and Managi 2013; Bonini and Oppenheim 2010; PwC 2010).

Empirical research into business perceptions and actions regarding biodiversity remains limited. Organisations and the natural environment (ONE) research has considerably developed in recent decades, chiefly in the field of corporate sustainability (Van der Byl and Slawinski 2015; Bansal and Hoffman 2012; Bansal and Song 2017). Yet, despite many advances in ONE research, recent calls have noted the need for a more specific focus on biodiversity and the ecosystems it supports (Reade *et al.* 2015; Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). To date, few studies have specifically focussed on biodiversity: it remains an under-explored concept in corporate sustainability. Conservation has traditionally focussed on the ecological dimensions of biodiversity, overlooking the contributions of social science (Mascia *et al.* 2003; Bennett *et al.* 2017a; Bennett *et al.* 2017b; Kareiva and Marvier 2012; Sandbrook, Fisher and Vira 2013). Conservation science literature has tended to be more concerned with niche markets and tools such as Payments for Ecosystem Services (PES) and biodiversity offsetting (Adams 2017; Dempsey and Suarez 2016), but rarely focussed on businesses themselves. A few studies

have offered insights into the efficacy of corporate partnerships in conservation (MacDonald 2010; Robinson 2012), but businesses remain an unknown quantity in conservation (Kareiva 2014; Miller, Soulé and Terborgh 2014). Even accounting for surveys, reports and research papers beyond these literatures, several gaps remain in our understanding of business and biodiversity.

There are also several conceptual gaps that span both the ONE and conservation science literatures. Within the ONE literature, biodiversity has often been bracketed under the term “natural environment” or more recently with ecosystems, ecosystem services and natural capital (Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). Yet as the definitions in Figure 1.1 demonstrate, although these concepts are related they are not synonymous. An ecosystem service such as watershed protection or food provision can be respectively achieved through monoculture plantations or intensive fish-farming. By integrating thinking about biodiversity at the outset, for instance via agroforestry, mixed-species plantations, or multi-trophic aquaculture, businesses can deliver the same services but also deliver major benefits for nature (Pawson *et al.* 2013).

Moreover, conceptual developments from studies on business and climate change demonstrate that specific issues in corporate sustainability merit closer attention (Busch 2011; Kolk, Levy and Pinkse 2008; Okereke, Wittneben and Bowen 2012; Slawinski *et al.* 2017). In the case of biodiversity, whilst the desirability of conservation is not in question, what is being conserved and how best to conserve it are much debated (Adams 2017; Doak *et al.* 2014; Kareiva 2014; Marvier and Kareiva 2014; Miller, Soulé and Terborgh 2014; Sandbrook 2014; Sandbrook, Fisher and Vira 2013; Kareiva and Marvier 2012). As Mascia *et al.* (2003 p. 650) put it, conservation constitutes “a human endeavour: initiated by humans, guided by humans, designed by humans, and intended to modify human behaviour”, all focussed on preventing the loss of biodiversity. Integrating conservation science into ONE can help to address some of its conceptual shortfalls regarding biodiversity.

“Biological Diversity” means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD 1992)

“Ecosystem” means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. (CBD 1992)

“Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling.” (Millennium Ecosystem Assessment 2005)

There is no officially accepted definition of “natural capital”, although it generally encompasses biotic (living) components, such as biodiversity and ecosystems and abiotic (non-living) components, including ecosystem services. The definition adopted here is drawn from the definition used by the Natural Capital Coalition

“Natural capital is another term for the stock of renewable and non-renewable resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people. The benefits provided by natural capital include clean air, food, water, energy, shelter, medicine, and the raw materials we use in the creation of products. It also provides less obvious benefits such as flood defence, climate regulation, pollination and recreation.” (Natural Capital Coalition)

Figure 1.1: Defining “biodiversity”, ecosystems and natural capital

Conservation can benefit from conceptual and theoretical tools developed in the organisations and management literature. Conservationists have begun to realise that solely focussing on ecology risks interventions that are destined to fail because they ignore the social, political and economic context in which they are being applied (Sandbrook, Fisher and Vira 2013; Mascia *et al.* 2003). However, the continued failure of conservation interventions, even when the science is right, indicate shortcomings in fully integrating human dimensions into policy and practice (Mascia *et al.* 2003; Bennett *et al.* 2017a). That includes business as an actor in conservation. Whilst conservation social science covers a wide-ranging literature, including anthropology, ecological economics, marketing, political science, it has overlooked the potential contributions of management and organisations thinking (Bennett *et al.* 2017a; Sandbrook, Fisher and Vira 2013). The only coherent body of work that references business is the “neoliberal conservation” literature, but even this focusses more on critiquing the promotion of private sector involvement in conservation than understanding businesses themselves (Büscher *et al.* 2012; Castree 2008b; Castree 2008a; Igoe and Brockington 2007; McAfee 1999). Conservationists remain unclear on whether business in conservation is a good thing (Kareiva 2014; Marvier and Kareiva 2014; Sandbrook, Fisher and Vira 2013).

This thesis tackles three specific gaps: i) the factors driving differences in perspectives and actions regarding biodiversity across business sectors; ii) the role of stakeholders in enabling businesses to understand and act on biodiversity and; iii) the challenges that businesses face in acting on biodiversity. To address these gaps this thesis draws on the conceptual and empirical strengths of ONE, conservation science, and related literatures. Besides tackling parallel debates, combining concepts and evidence from each discipline helps address weaknesses specific to each. Concepts from corporate sustainability, corporate responsibility and corporate reporting address a lack of nuance in current understandings of business involvement in biodiversity. Beyond identifying the competing values regarding biodiversity and how it should be managed, conservation science offers insights into human-environment interactions, highlighting the importance of the “socio-ecological systems” in which businesses operate (Folke *et al.* 2007; Manfredi *et al.* 2017; Ostrom and Cox 2010; Winn and Pogutz 2013).

This thesis explores these questions through the cases of forestry and salmon farming in Chile. Natural resource based industries are heavily dependent and

have major impacts on biodiversity (Bishop 2012). Given the scale of their impacts, large firms working in sectors such as mining, oil and gas, forestry and agriculture are frequently the focus of efforts to increase business engagement in biodiversity (Bishop 2012). Deforestation is a major cause of biodiversity loss and a factor in climate change (Phelps, Webb and Adams 2012). Damage to marine environments is equally, if not more, severe (Nash *et al.* 2017). Forestry and salmon farming in Chile reflect these global challenges. Chile's remaining native temperate forest is the second largest area of its type globally, whilst its coastline is home to several endangered marine species (Miloslavich *et al.* 2011; Miranda *et al.* 2015). Both forestry and salmon farming operations have had a significant impact on biodiversity. Where forestry firms seem to have reformed, with many certifying through the Forestry Stewardship Council (FSC), salmon producers appear to have done little to control for their impacts (Salas *et al.* 2016; Cid Aguayo and Barriga 2016). Yet it remains unclear either to what extent forestry firms have reformed or why salmon producers are resistant to conservation efforts. Using a combination of document review and interviews with managers and stakeholders across the industries, this thesis seeks to understand the dynamics of biodiversity within these two sectors. It aims to use these findings to advance empirical and conceptual approaches to business and biodiversity.

The thesis is structured as follows.

Chapter 2 considers our current understanding of business and biodiversity, with a specific focus on the ONE and conservation science literature. It reviews the relative strengths and weaknesses in each discipline in terms of the concepts and evidence that they provide. It outlines the contributions to understanding business and biodiversity in general and to each of these disciplines.

Chapter 3 outlines the rationale underpinning the case study approach, choice of forestry and salmon farming in Chile and the combination of document review and interview methods.

Chapter 4 explores the factors shaping differences in perceptions and actions regarding biodiversity between the forestry and salmon farming sectors. It considers the role that corporate reporting has played in enabling reform and what else may need to change for biodiversity to be truly integrated into operations in each sector.

Chapter 5 combines social learning, the concept of boundary objects and institutional theory to understand the processes of learning about biodiversity. It reflects on the factors that mitigate against learning and substantive transformation in both sectors.

Chapter 6 integrates paradox theory and political ecology to outline the challenges that forestry firms and salmon producers face in accounting for their impacts on biodiversity.

Chapter 7 summarises the key findings from across the three papers, identifying cross-cutting themes and specific contributions to understanding biodiversity.

Chapter 8 offers overall conclusions and reflects on theoretical and practical implications of the thesis.

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Chapter 2 – Reviewing the evidence on business and biodiversity

The introduction established that whilst businesses are envisaged as playing a significant role in tackling biodiversity loss, we still know very little about how they perceive biodiversity or the actions they are taking to manage their impacts on it. This chapter considers what we do and do not know about business and biodiversity. It establishes in which ways biodiversity has been overlooked as an issue in ONE literature and how businesses remain an under-explored actor in conservation science. The chapter begins by summarising the empirical evidence regarding business and biodiversity from across these literatures, and in related work on sustainable development. It then summarises how biodiversity has been considered to date by ONE scholars, highlighting differences from other issues in corporate sustainability. It highlights how conservation science has overlooked business as an individual actor in conservation. It then identifies ways in which conservation science can address shortfalls in the ONE literature in understanding biodiversity, particularly as an issue with social and ecological dimensions. The chapter outlines three research questions that address empirical and conceptual shortfalls in both literatures. It specifies how these will be covered in the three results chapters and outlines the reasons for choosing forestry and salmon farming in Chile as the cases to apply these questions to. The chapter concludes by discussing how strengths in each literature can be used to address weaknesses in the other.

2.1 Gaps in understanding business and biodiversity

This section outlines empirical and conceptual gaps in our understanding of business perceptions and actions regarding biodiversity, beginning with an overview of the evidence base and then examining how the ONE and conservation science literatures currently conceive the relationship between business and biodiversity.

2.1.1 The evidence base

Biodiversity and ecosystems are recognised as under-researched within ONE literature (Hahn *et al.* 2017; Hoffman and Jennings 2015; Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). A few

studies highlight aspects of business involvement in biodiversity, with scholars tending to explore the business case for biodiversity and/ or benefits derived from accounting for biodiversity in strategies and operations. Several studies have identified the benefits from integrating ecological knowledge and stakeholder engagement through conservation and biodiversity management (Cardskadden and Lober 1998; Dyke *et al.* 2005; Pogutz and Winn 2016). Food producer Barilla adopted a multi-disciplinary, multi-tier approach, engaging a wide range of stakeholders to improve crop yields and achieve efficiencies, for instance (Pogutz and Winn 2016). Engaging with key stakeholders regarding biodiversity has been shown to deliver reputational gains and stronger links with local communities and conservation organisations (Cardskadden and Lober 1998; Dyke *et al.* 2005; Boiral and Heras-Saizarbitoria 2017c; Boiral and Heras-Saizarbitoria 2017b). The best means to account for biodiversity is likely vary across contexts (Bansal and Roth 2000; Reade *et al.* 2015; Westley and Vredenburg 1997), with businesses needing to adopt a nature centred approach if they are to achieve sustainability (Reade *et al.* 2015; Kearins, Collins and Tregidga 2010). For instance, Reade *et al.* (2015) demonstrated how locally responsive, place-sensitive strategies are key to delivering sustainability of the bee trade.

It appears that some businesses recognise, and are acting to realise, benefits from accounting for biodiversity. For example, the corporate accounting literature has outlined some of the motivations for acting on biodiversity (Boiral 2016; Boiral and Heras-Saizarbitoria 2017b; Rimmel and Jonäll 2013) and actions businesses are taking (Boiral and Heras-Saizarbitoria 2017c; Boiral and Heras-Saizarbitoria 2017a; Liempd and Busch 2013). These include engaging with various stakeholders to assist in building knowledge capacity, implementation and managing complexity, as well as to enhance legitimacy (Boiral and Heras-Saizarbitoria 2017c). Yet this literature also indicates that action on biodiversity remains limited (Boiral and Heras-Saizarbitoria 2017b; Boiral and Heras-Saizarbitoria 2017a; Jones and Solomon 2013; Liempd and Busch 2013; Rimmel and Jonäll 2013). The continued degradation and loss of biodiversity suggests that businesses may not be fully accounting for their impacts (Marcus, Kurucz and Colbert 2010; Hoffman and Jennings 2015). However, the poor quality of reporting means it is often difficult to understand and compare corporate performance regarding biodiversity conservation (Boiral and Henri 2017; Milne, Tregidga and Walton 2009; Jones and Solomon 2013). Studies examining managerial views of biodiversity suggest that businesses only feel partially responsible for managing their impacts on biodiversity (Sharma and Nguan 1999;

D'Amato *et al.* 2016). However, the evidence base regarding perceptions and actions remains thin.

Conservation science has rarely focussed on business as an actor in conservation (Bennett *et al.* 2017a; Bennett *et al.* 2017b; Kareiva and Marvier 2012; Sandbrook, Fisher and Vira 2013). Using corporate reports and websites, Bhattacharya and Managi (2013) find that businesses in sectors with greater exposure to or impact on biodiversity were more likely to be acting regarding biodiversity. These findings align with global surveys that identified links between business sectors at higher risk and levels of understanding and concern about biodiversity loss (Bonner *et al.* 2012; PwC 2010). Yet these findings conflict with some of the corporate accounting literature where it appeared that sectors at a lower risk from biodiversity loss appeared to be more likely to be acting (Rimmel and Jonäll 2013). Moreover, sector does not appear to be the only issue: there appears to be an association between where a business is located and the level of concern about biodiversity loss (Bonner *et al.* 2012; PwC 2010). Koellner *et al.* (2008) and Sell *et al.* (2006) identified a link between business perceptions of biodiversity and the country they operate in. However, they were unable to rule out the size and scope of the businesses as factors and they did not control for sector differences. The links between business size, sector, location and perceptions and actions regarding biodiversity remain unclear.

The neoliberal conservation literature has investigated formation and outcome of corporate partnerships with conservation NGOs (Brockington and Duffy 2010; Igoe and Brockington 2007; MacDonald 2010). However, it concentrates on the changes that have occurred within conservation NGOs rather than businesses themselves. MacDonald (2010) investigated how major corporates used Conference of Parties (COP) side events during the formation of the CBD to minimise the threat that expanded conservation practices might have on access to and acquisition of natural resources. Besides the work on partnerships and lobbying however, the benefits and drawbacks of business involvement in conservation remain unclear (Adams 2017; Doak *et al.* 2014; Kareiva 2014; Marvier and Kareiva 2014; Robinson 2011; Robinson 2012). Studies continue to focus on niche markets or sectors such as ecotourism, with limited understanding of the dynamics of more mainstream markets or differences across sectors (Dempsey and Suarez 2016). Conservationists remain more concerned with the function of and principles underlying markets in conservation than understanding businesses themselves (Adams 2017; Doak *et al.* 2014; Kareiva 2014; Marvier

and Kareiva 2014). Even advocates of new conservation concede that more evidence is required to know if partnerships and engagement with business in conservation are beneficial or not (Kareiva 2014; Marvier and Kareiva 2014).

Several studies identify barriers to increased business engagement with biodiversity. Some studies suggest that limited understanding of the risk posed by biodiversity loss, how to monitor and control for impacts on it, and uncertainty about the extent of business responsibilities for biodiversity management discourage action (van den Burg and Bogaardt 2014; Overbeek, Harms and Van den Burg 2013). Businesses also appear unwilling to invest in biodiversity conservation without supportive infrastructure such as regulations, especially given the long timescales to achieve results (Lambooy and Levashova 2011; van den Burg and Bogaardt 2014). It is unclear whether these findings apply to beyond specific locations and larger organisations with greater resources, though. Even when leaders within businesses want to be proactive regarding biodiversity, it appears that there are challenges in changing organisational cultures to think in a different way (Paoli *et al.* 2010; Overbeek, Harms and Van den Burg 2013). Other reviews suggest that many businesses perceive biodiversity as a marginal issue. Reviewing the investment policies of 50 of the world's major banks, Mulder and Koellner (2011) found just five had taken substantive action to account for risks and opportunities regarding biodiversity. Most were primarily concerned with controlling for reputational risk or being able to differentiate from competitors, rather than considering their role in degradation or loss (Mulder and Koellner 2011). Whether these findings translate to other sectors is unclear.

2.1.2 Biodiversity as a concept in corporate sustainability

In addition to the empirical gaps noted above, biodiversity also remains an underdeveloped concept in ONE. Biodiversity is recognised as part of an ecological system that places “biophysical” limits on business operations (Gladwin, Kennelly and Krause 1995; Hart 1995; Starik and Rands 1995; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). Taking biodiversity into account, businesses can help prevent the breaching of a “planetary boundary”, avoiding ecosystem collapse and the loss of vital ecosystem services (Whiteman, Walker and Perego 2013). However, insights from ecology and environmental science yet to be integrated into corporate sustainability (Hahn *et al.* 2017; Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Williams *et al.* 2017; Winn and Pogutz 2013; Linnenluecke and Griffiths 2010).

Moreover, ONE scholars have concentrated on ecosystems and ecosystem services, rather than biodiversity (e.g. Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Williams *et al.* 2017; Winn and Pogutz 2013). As the conservation science literature demonstrates, biodiversity, ecosystems and ecosystem services are related but distinct concepts (Ingram, Redford and Watson 2012; Balvanera *et al.* 2014; Harrison *et al.* 2014; Cardinale *et al.* 2012; Mace, Norris and Fitter 2012). Ecosystem services approaches can be beneficial for biodiversity but do not necessarily prevent biodiversity loss, for instance (Cardinale *et al.* 2012; Ingram, Redford and Watson 2012; Dee *et al.* 2017).

There has been a tendency to focus on ecological or social factors, overlooking interconnections between social and ecological systems (Hoffman and Jennings 2015; Williams *et al.* 2017). Early ONE literature acknowledged the importance of accounting for social dimensions in ecological sustainability (Gladwin, Kennelly and Krause 1995; Jennings and Zandbergen 1995; Starik and Rands 1995; Williams *et al.* 2017; Winn and Pogutz 2013; Hoffman and Jennings 2015), what Gladwin, Kennelly and Krause (1995: p. 878) described as moving “beyond ecological efficiency to also include social sufficiency”. Understanding these interconnections – i.e. understanding “socio-ecological systems” (SES) – is central to much thinking in conservation science (Ban *et al.* 2013; Cox 2014; Cumming 2018; Folke *et al.* 2007; Holling 2001; Ostrom 2007; Ostrom and Cox 2010; Reed 2008). The concept of SES recognises that biophysical factors shape the landscapes communities are embedded in, but that community management practices can also shape landscapes (Folke *et al.* 2007; Holling 2001; Chapin *et al.* 2009). Work on SES recognises that social systems operate within and to some extent are limited by ecological ones, but emphasises that social mechanisms are as important to understand as ecological ones (Folke *et al.* 2007; Olsson, Folke and Berkes 2004). Although SES has sometimes been referenced in ONE literature, scholars have tended to focus on biophysical rather than social aspects (Boons 2013; Winn and Pogutz 2013).

Successful conservation means considering and integrating different values, as well as forms of knowledge (Cárcamo *et al.* 2014; Manfredo *et al.* 2017; Mathevet, Bousquet and Raymond 2018; Reed 2008; Sturm 2014). The Half-Earth debate (e.g. Büscher *et al.* 2017; Kopnina 2016; The WILD Foundation 2017) demonstrates how different values can result in conservationists advocating radically different solutions. At a local level, competing perceptions and priorities are as much a factor in determining outcomes for biodiversity and conservation

as knowledge (Cárcamo *et al.* 2014; Reed *et al.* 2017; Reed 2008). Early ONE literature acknowledged that ecology is not a fully objective, value-free science (Purser, Park and Montuori 1995), but even work on traditional ecological knowledge has tended to focus on instrumental aspects of “knowledge” rather than the values such knowledge is bound with (Whiteman 2004; Whiteman and Cooper 2000; Whiteman and Cooper 2011). Even where traditional and scientific forms of knowledge align (Whiteman and Cooper 2000), the process of integrating different values and priorities may remain contentious and complex (Gladwin, Kennelly and Krause 1995; Starik and Rands 1995). Learning about biodiversity is as much about understanding and integrating different values as it is forms of knowledge (e.g. Rist *et al.* 2016; Cárcamo *et al.* 2014; Kearins, Collins and Tregidga 2010).

It is unclear to what extent findings from other issues in corporate sustainability offer insights into to understanding biodiversity as an issue. For instance, climate change challenges businesses to implement policies to deliver long term, often uncertain benefits at the expense of short term priorities (Slawinski *et al.* 2017). Research into the dynamics of multi-stakeholder initiatives (MSIs) to tackle climate change might also translate across to conservation initiatives, for instance (Pinkse and Kolk 2012). However, biodiversity loss and climate change are interdependent yet qualitatively different issues, sometimes requiring divergent solutions (Gullison *et al.* 2007; Jackson *et al.* 2005; Mawdsley, O’Malley and Ojima 2009; Reside, VanDerWal and Moran 2017; Lindenmayer *et al.* 2012). As found with climate change, stakeholder engagement and strategies may be specific to the issue and even sector in question, resulting in outcomes distinct to other issues in corporate sustainability (Linnenluecke, Griffiths and Winn 2013; Okereke, Wittneben and Bowen 2012; Kolk and Pinkse 2005). Moreover, accounting for biodiversity means thinking back as well as forward, understanding how past actions have modified and/ or damaged landscapes, habitats and species populations (Folke *et al.* 2007; Ostrom 2007; Ostrom 2009).

2.1.3 Business as an actor in conservation science

Business remains an under explored actor in biodiversity, with conservation social scientists deploying a limited analytical toolkit. Within the neoliberal conservation literature businesses are characterised as wanting to exercise full control over their operations, maximise profits and meet shareholder expectations (Büscher *et al.* 2012; MacDonald 2010). However, little distinction is made between business intentions and actions across sectors, levels or scales

(e.g. Bracking 2012; MacDonald and Corson 2012; Roth and Dressler 2012). Studies have generally used outcomes and discourse analysis to explain intentions and interpret actions (Bracking 2012; MacDonald 2010; MacDonald and Corson 2012; Münster and Münster 2012). Relying on outcomes to predict intentions ignores the context-dependent nature of business strategies and actions. Relying on discourse ignores the multi-faceted means by which organisations can be analysed and understood, including resource-based, stakeholder and institutional views (Barney 1991; Hart 1995; Oliver 1997; Donaldson and Preston 1995; Freeman 1984; Hoffman and Jennings 2015; Hörisch, Freeman and Schaltegger 2014; Mitchell, Agle and Wood 1997) to the individual or micro-foundational level (Aguinis and Glavas 2012; D'Amato *et al.* 2016; Hahn *et al.* 2014).

2.2 Addressing gaps in understanding business and biodiversity

There are several research gaps regarding business and biodiversity. This section outlines three research questions designed to address these gaps and the contributions that they make to the ONE and conservation science literatures. These are summarised in Table 2.1 below. The next section provides an overview of the general contributions to each literature. The results chapters cover the specific contributions to each literature in further detail.

2.2.1 Research Question 1: What does corporate reporting tell us about business perceptions and actions regarding biodiversity?

There is a clear evidence gap regarding how businesses perceive biodiversity and what action they are taking. Some studies suggest businesses are motivated by risk but others that they see benefits from acting. More empirical work is required to uncover perceptions of risk and opportunity regarding biodiversity. There is a link between factors related to the firm, particularly sector, and differences in perceptions and actions regarding biodiversity. Yet the social and ecological context a business operates in also appears to be significant. Identifying the relative significance of firm-specific and context-specific factors would be a first step in resolving uncertainty regarding the drivers of business involvement in biodiversity. Moreover, many studies have relied on formal corporate reporting such as websites and sustainability reports to understand

business perspectives and actions regarding biodiversity. A few studies have used either surveys or interviews of managers or relied on investigating outcomes, but none have integrated different perspectives. Integrating corporate and stakeholder accounts can build a more comprehensive understanding of how businesses perceive biodiversity and what action they are taking.

Research question 1 addresses uncertainties in the corporate accounting literature regarding what businesses do and do not report (Boiral 2016; Boiral and Heras-Saizarbitoria 2017c; Ehrnström-Fuentes and Kröger 2017; Russell, Milne and Dey 2017). Exploring the shortfalls in corporate reporting on biodiversity compared to other issues in corporate sustainability builds understanding of to what extent biodiversity is different to other issues within corporate sustainability. For the conservation science literature, highlighting the factors shaping business perceptions and actions on biodiversity addresses the limited differentiation between different sectors. Moreover, reporting is seen as a significant tool in motivating businesses to think about and act on controlling impacts on biodiversity (Bishop 2012; Jones and Solomon 2013; Natural Capital Coalition 2016). Examining the strengths and limitations of formal reporting contributes to understanding what other changes (e.g. regulatory) might be necessary to aid reforms regarding biodiversity (van den Burg and Bogaardt 2014).

2.2.2 Research Question 2: How do stakeholders help businesses understand and act on biodiversity?

There are also gaps in our understanding of how businesses gain ecological knowledge. We know that stakeholders can assist businesses learning about and reforming operations to account for biodiversity (Boiral and Heras-Saizarbitoria 2017c; Pogutz and Winn 2016). We also know that successful biodiversity management requires participants to be prepared to embrace learning and experimentation (Folke *et al.* 2007; Holling 2001; Moon *et al.* 2014). We do not understand what factors help – or hinder – knowledge transfer regarding biodiversity. This chapter uses social learning to understand processes of ecological knowledge transfer between businesses and stakeholders, particularly the importance of organisations that help to bridge divides between different actors. Whilst it is clear that stakeholders can facilitate reform and the regulatory context may influence the likelihood of learning occurring, how and why is unclear. This chapter uses institutional theory to explain why learning may not occur in some cases. Finally, stakeholder engagement in learning processes is

often conceived as leading to positive outcomes: the concept of boundary objects is used to explore how learning processes might break-down over time.

Research question 2 addresses calls in corporate sustainability for greater understanding of how businesses engage with different stakeholders regarding biodiversity (Boiral and Heras-Saizarbitoria 2017c). Combining social learning, institutional theory and boundary objects explains how businesses can learn from stakeholders but also why there may be limits to learning, resulting in operational reforms that are more symbolic than substantive. Using social learning shows how theories from conservation social science can be integrated into corporate sustainability. Applying institutional theory and the concept of boundary objects demonstrates that established organisation and management theory can be extended into understanding business and biodiversity. For conservation science, this chapter offers insights into business perspectives on stakeholder engagement regarding biodiversity. Institutional theory contributes to furthering understanding of the diverse ways in which businesses may respond to pressures for reform. Finally, it also covers the limitations of social learning, addressing some of the ways in which institutional contexts may inhibit reform and highlighting how systemic reform may be necessary to achieve reform at the organisational level.

2.2.3 Research Question 3: What challenges do businesses face in understanding and acting on biodiversity?

The benefits of accounting for biodiversity are consistently emphasised and widely acknowledged (Bishop 2012; Natural Capital Coalition ; Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013; Bonini and Oppenheim 2010; Cranston, Green and Tranter 2015; Evison and Knight 2010). Yet biodiversity conservation is challenging, spanning multiple levels and scales and often demanding an interdisciplinary, collaborative approach to achieve successful outcomes (Boiral and Heras-Saizarbitoria 2017c; Jones and Solomon 2013; Ostrom 2007; Bennett *et al.* 2017a; Bennett *et al.* 2017b). Little is known about either the capacity of businesses to integrate these challenges or how they perceive their capabilities to act. Combining paradox theory (Hahn *et al.* 2014; Lewis 2000; Smith and Lewis 2011; Van der Byl and Slawinski 2015) with the political ecology of the firm (Caprotti 2012; Neumann 2009; Orssatto and Clegg 1999; Turner 2009) advances our understanding of the challenges businesses face in accounting for biodiversity and how they seek to

tackle them. Paradox theory provides insights regarding tensions at the organisational level and political ecology of systemic tensions between markets, nature and society.

Research question 3 advances understanding of tensions in corporate sustainability in several respects. Business and biodiversity has not previously been explored through paradox theory. The results highlight the significance of temporal and value dimensions regarding biodiversity, particularly the impact of historic decisions in shaping current decision-making (Hahn *et al.* 2010; Hahn *et al.* 2015; Van der Byl and Slawinski 2015). Applying paradox theory to explore biodiversity and business contributes to our understanding of similarities and differences between biodiversity and other issues in corporate sustainability. Political ecology underlines the need to analyse tensions between social and ecological systems to understand the challenges business face in accounting for their impacts on biodiversity. Using political ecology answers calls to integrate theory from beyond management and organisations into ONE research. Within conservation science, businesses are perceived to be a powerful actor that can wield significant influence (Adams 2017; MacDonald 2010; Marvier and Kareiva 2014) but there is limited evidence of whether power at global levels translates to local contexts or how businesses perceive their capabilities. Trade-offs and tensions are widely debated in conservation, but often focus on tensions between humans and nature or competing conservation priorities (McShane *et al.* 2011; de Groot *et al.* 2010; Fletcher 2012; Hirsch *et al.* 2011; Reed *et al.* 2017). Paradox theory – not previously applied in conservation science – offers insights into how businesses handle tensions at the organisational level. Exploring strategies to manage challenges provides a clearer picture of business capabilities and limitations in being able to enact conservation.

2.3 Case study selection

As the review in section 2.1 demonstrates, findings for business and biodiversity vary across contexts, creating a challenge in making comparisons and applying findings beyond the study in question. Location and sector choice are likely to have a strong bearing on the findings to the research questions and applicability to other contexts. This study focussed on the cases of forestry and salmon farming in Chile. This section outlines the reasons why Chile provides a suitable context for answering these questions and why forestry and salmon farming are appropriate sectors to centre on.

2.3.1 Chile: business vs. biodiversity?

These research questions could be applied to a wide variety of countries. At first sight, Chile may appear to be an esoteric choice: besides its geographical remoteness, with its small population occupying a small strip separating the Andes from the Pacific Ocean, the legacy of the Pinochet era mean that findings here may be difficult to apply to other contexts. Furthermore, where many of its South American neighbours experience a tropical climate, Chile is characterised by multiple biomes and climates, from the World's driest desert the Atacama in the north to Patagonia and the tip of the Antarctic in the south (Miranda *et al.* 2015). Yet like many of its Latin American neighbours, not to mention many middle-income and developing countries worldwide, Chile also faces the challenge of achieving economic growth whilst also conserving biodiversity. Chile is highly biodiverse but has predicated economic growth on the exploitation of its natural resources, notably copper, timber and fisheries (Latta and Aguayo 2012; Heilmayr *et al.* 2016; Tecklin, Bauer and Prieto 2011; Barton and Fløysand 2010). The pressures of globalisation, deforestation and habitat degradation and associated social conflicts seen in Chile have parallels to other countries in Latin America and beyond (e.g. Deutsch *et al.* 2007; Marin-Burgos, Clancy and Lovett 2015; Ehrnström-Fuentes and Kröger 2017; Ospina Peralta *et al.* 2015). There are also parallels across the region in terms of the policies designed conserve and restore biodiversity, from certification to offsets (e.g. Balvanera *et al.* 2012; Cabbage *et al.* 2010b; Villarroja, Barros and Kiesecker 2014; McKenney and Kiesecker 2010; Duchelle, Kainer and Wadt 2013; Murcia *et al.* 2016)

Chile is also a significant actor in Latin America: a middle-income country whose development is leading others in the region (World Bank n.d.-b). Accordingly, focussing on Chile may provide insight regarding the potential future relationship between business and biodiversity in other countries in the near future. Furthermore, Chile offers a good context in which to consider the latitude of businesses to act regarding biodiversity. There are wide array of potential sectors to focus on, including agriculture, ecotourism, mining and viticulture (World Bank n.d.-b). Limited environmental regulation also means the onus to act responsibly regarding the environment and conserve biodiversity largely rests with businesses. Finally, the findings may be relevant for conservation and development policies for Chile itself. For all of these reasons, Chile was felt to provide a good context to explore the research questions.

2.3.2 Forestry and Salmon Farming: challenges regarding biodiversity

As with location, the research questions could be applied to almost any business sector. The reasons for focussing on forestry and salmon farming, related both to the characteristics of each sector and the potential for comparisons between them, are outlined below.

There were multiple reasons for deciding to focus on the forestry industry. Firstly, forestry reflects bigger debates regarding the pressure for economic growth versus environmental degradation. Forestry activities – of which industrial plantations form a significant component – underpin many economies and livelihoods worldwide: yet these activities are also responsible for widespread biodiversity loss (World Bank n.d.-a). Although many studies suggest that negative impacts on biodiversity can be managed, fierce debate remains as to whether plantations contribute to deforestation and biodiversity loss, or help to save it (e.g. Bremer and Farley 2010; Pawson *et al.* 2013; Gibson *et al.* 2011; Warman 2014). Secondly, whilst a much researched sector, many aspects – including forestry firm perceptions and actions regarding biodiversity – remain under-explored. The wealth of existing research on the forestry sector more generally also helps inform the focus of this study. For instance, empirical work on corporate reporting in forestry can be used to inform research question 1. Similarly, the evidence regarding economic, political and social dimensions of measures such as certification, as well as stakeholder engagement in other contexts (e.g. Cashore 2002; Cabbage *et al.* 2010a; Overdevest and Rickenbach 2006; Moog, Spicer and Böhm 2015; Rametsteiner and Simula 2003; Tricallotis, Gunningham and Kanowski 2018) can be used to inform research question 2. The general challenges noted above help inform research question 3.

Like forestry, there were several reasons for selecting the salmon farming sector. Firstly, although a newer and smaller sector compared to forestry, the economic significance of aquaculture in general, and salmon farming in particular, is growing (Iizuka and Katz 2015). Findings regarding salmon farming could be relevant in terms of understanding how best to reform and expand current operations. Secondly, although less clear-cut than in forestry, evidence suggests that salmon farming can have major adverse impacts on biodiversity (see Table 2.x for a summary). The perceptions and actions of salmon farmers regarding biodiversity and to what degree they feel responsible for managing impacts on it remain unclear. Thirdly, several studies indicate that, like forestry, aquaculture

has been associated with social conflict (Barton and Fløysand 2010; Ospina Peralta *et al.* 2015). Research on stakeholder engagement regarding biodiversity and its conservation regarding salmon farming is limited, let alone contrasts to other natural resource-based sectors.

Fourthly, whilst there are parallels between forestry and salmon farming, there are also several points of contrast and which help in exploring the research questions. The major difference between the two sectors is that they operate in contrasting ecological contexts: where forestry is a terrestrial activity, salmon farming is predominantly marine (see Table 2.x below). The two sectors also have differential impacts across social, economic and geographic scales, providing further points of contrast (see Table 2.y below). Overall, whilst there are several crossovers between salmon farming and forestry, the significance of the sector in its own right and the points of difference make it a suitable focus for this study. Although there is a thinner research base to refer to, existing studies regarding salmon farming can also help inform answers to the three research questions.

The justifications for choosing forestry and salmon farming also translate across to the Chilean context. Many of the issues mentioned above are replicated forestry and salmon farming in Chile (Cubbage *et al.* 2010a; Echeverria *et al.* 2006; Heilmayr *et al.* 2016; Heilmayr and Lambin 2016; Tricallotis, Gunningham and Kanowski 2018). In terms of forestry for example, concerns regarding deforestation due to destruction of native forest and the expansion of plantations are widespread. Social conflict associated with commercial forestry activities is also evident. Salmon farming in Chile also reflects issues seen elsewhere, including concerns about the impacts of antibiotics, escapes and eutrophication. Social conflict is also evident in the areas in Chile where salmon farming operate. Both forestry and salmon farming are significant sectors, both in terms of their contributions to Chilean export income as well as in terms of their global market share (Salas *et al.* 2016; Iizuka and Katz 2015). Finally, there are multiple contrasts between the forestry and salmon farming sectors in Chile and which further contribute to answering the research questions (see Table 2.z).

The suitability of forestry and salmon farming as cases is covered in greater detail in Section 3.2.

Table 2.1: Review of research questions

Research question	Evidence gaps addressing	Relevant literature	Concepts applied	Contributions
<p>1</p> <p>What does corporate reporting tell us about business perceptions and actions regarding biodiversity?</p>	<ul style="list-style-type: none"> • Factors driving different business perceptions & actions regarding biodiversity • Differences between biodiversity & other forms of sustainability reporting 	<ul style="list-style-type: none"> • Corporate accounting 	<ul style="list-style-type: none"> • Perception management 	<p>Empirical</p> <ul style="list-style-type: none"> • Using counter accounts to understand business perceptions and actions regarding biodiversity • Potential of formal reporting mechanisms to leverage operational reform regarding biodiversity
<p>2</p> <p>How do stakeholders help businesses understand and act on biodiversity?</p>	<ul style="list-style-type: none"> • Ecological knowledge transfer • Business perceptions of stakeholders involved in biodiversity conservation 	<ul style="list-style-type: none"> • Management & organisations • Environmental management 	<ul style="list-style-type: none"> • Boundary objects • Institutionalism • Social learning 	<p>Empirical</p> <ul style="list-style-type: none"> • Potential of certification as a tool for corporate biodiversity management <p>Conceptual</p> <ul style="list-style-type: none"> • Extension of social learning into corporate sustainability • Extension of boundary objects and institutional isomorphism into conservation science
<p>3</p> <p>What challenges do businesses face in understanding and acting on biodiversity?</p>	<ul style="list-style-type: none"> • Trade-offs regarding biodiversity • Limitations of corporate capabilities regarding biodiversity conservation 	<ul style="list-style-type: none"> • Management & organisations • Corporate sustainability • Political ecology 	<ul style="list-style-type: none"> • Paradox theory • Political ecology • Co-evolution theory 	<p>Empirical</p> <ul style="list-style-type: none"> • Limits to organisational capabilities in biodiversity management <p>Conceptual</p> <ul style="list-style-type: none"> • Extending understandings of socio-ecological systems into corporate sustainability • Strengthening organisational perspectives in conservation science

Table 2.2: Ecological interdependencies of forestry and salmon farming sectors¹

Potential Impacts	Forestry	Salmon Farming
Operations on biodiversity	Damaging/ Reducing Biodiversity	
	<ul style="list-style-type: none"> • Deforestation and degradation of native forest leading to reduction/ loss of habitat and species • Land conversion, e.g. loss of space for agriculture and food production • Reduction of non-timber resources for foraging species • Pesticide use leaching into water supply • Reduction in ecosystem services, e.g. water retention and soil nutrients 	<ul style="list-style-type: none"> • Antibiotics and/ or hormones entering wildlife stocks • Disease and/ or parasite transfer to marine fauna • Effluent and eutrophication reducing water fauna • Escapes introduce non-native species and predation of marine fauna • Land conversion (where inland) • Stress on wild fish stocks due to conversion to salmon fish meal
	Protecting/ Increasing Biodiversity	
	<ul style="list-style-type: none"> • Plantations on degraded soil reduce stress on native forest and can prevent further soil erosion 	<ul style="list-style-type: none"> • Reduced stress on wild fish stocks • Reduction in land conversion for other protein sources, e.g. beef
Biodiversity on operations	<ul style="list-style-type: none"> • Diseases spread more easily in monocultures, e.g. if all pine • Growth cycles determine species choice for plantations (~10 to >80 years) 	<ul style="list-style-type: none"> • Damage to cages, e.g. by seals • Harvesting dependent upon hatching and growth rates (~2 to 3 years) • Microbes and sea lice kill salmon • Predation, e.g. by seabirds and seals

¹ Drawn from PAWSON, S. M., A. BRIN, E. G. BROCKERHOFF, D. LAMB, T. W. PAYN, A. PAQUETTE and J. A. PARROTTA. 2013. Plantation forests, climate change and biodiversity. *Biodiversity and Conservation*, **22**(5), pp.1203-1227. and DIANA, J. S. 2009. Aquaculture production and biodiversity conservation. *BioScience*, **59**(1), pp.27-38.

Table 2.3: Contrasts between the forestry and salmon farming sectors in Chile

Variable group	Variable	Forestry	Salmon Farming	Crossover
Stakeholders	Business/ State Relationship	<ul style="list-style-type: none"> • Interactions with government agencies including CONAF, INFO, CORFO 	<ul style="list-style-type: none"> • Interactions with government agencies including Subpesca, Sernapesca and ProChile 	Medium
	Business/ NGO Relationship	<ul style="list-style-type: none"> • Partnerships and cooperation with various conservation NGOs promoted on websites 	<ul style="list-style-type: none"> • No formal partnerships with conservation NGOs promoted on websites 	Low
	Business/ Local Community Relationship	<ul style="list-style-type: none"> • Evidence of local community cooperation, e.g. regarding non-timber forest products (NTFPs) 	<ul style="list-style-type: none"> • Localised community-based initiatives advertised by SalmonChile 	Low
	Workforce	<ul style="list-style-type: none"> • High trade union membership • Representation on FSC and PEFC boards 	<ul style="list-style-type: none"> • Labour disputes common; weak trade union representation 	Low
Firm/ Sector specific	Age	<ul style="list-style-type: none"> • Old, well established sector • Mixture of old and new firms (older firms date back to 1970s and before) 	<ul style="list-style-type: none"> • Relatively new sector, established in 1980s 	Low
	Legal Structure	<ul style="list-style-type: none"> • All large firms are PLCs with exception of a single B-Corp; many small private and/ or family-owned firms 	<ul style="list-style-type: none"> • Mixture of firm types 	Low
	Ownership	<ul style="list-style-type: none"> • Predominantly Chilean (post consolidation of sector since mid-1990s) 	<ul style="list-style-type: none"> • Mixture of foreign owned, Chilean and family owned 	Low
	Size	<ul style="list-style-type: none"> • Sector dominated by two MNCs, with around 30 other large companies involved in export 	<ul style="list-style-type: none"> • Some MNCs, some large firms and some medium sized; a few small scale, single site operations 	Low
	Stage of Development	<ul style="list-style-type: none"> • Most firms are well established • Most large firms have CSR and sustainability programmes 	<ul style="list-style-type: none"> • Some firms well established (with CSR programmes) 	Low

Variable group	Variable	Forestry	Salmon Farming	Crossover
Sector specific	Relationship with Biodiversity	<ul style="list-style-type: none"> • Monoculture plantations susceptible to disease • Responsible for introduction of non-native species and destruction of native forest • See Table 2.2 for other impacts 	<ul style="list-style-type: none"> • Introduced non-native Atlantic salmon to marine environment • See Table 2.2 for impacts 	Medium
	Supply Chain	<ul style="list-style-type: none"> • Beginning of supply chain 	<ul style="list-style-type: none"> • Early part of supply chain: production in part dependent on pharmaceutical companies and feed suppliers 	Medium
	Visibility of activity	<ul style="list-style-type: none"> • Highly visible 	<ul style="list-style-type: none"> • Not always highly visible but activities widely documented 	Medium
Context	Information Provision	<ul style="list-style-type: none"> • Scientific input via INFOR and conservation biologists • Partnerships with conservation NGOs 	<ul style="list-style-type: none"> • Scientific input via INTESAL and INCAR 	Medium
	Location	<ul style="list-style-type: none"> • Main sites of operation in Bio Bio, Araucania, Los Ríos and Los Lagos regions 	<ul style="list-style-type: none"> • Concentrated in Los Lagos; some sites in Aysén, Magallanes, Coquimbo and Valparaiso 	Medium
	Market Structure	<ul style="list-style-type: none"> • Wide range of markets (South America key, but Europe also critical) 	<ul style="list-style-type: none"> • Main markets are USA, Japan and Brazil 	Low
	Regulations	<ul style="list-style-type: none"> • Some activities regulated • Generally resistant to regulation 	<ul style="list-style-type: none"> • Heavily regulated • History of resistance to regulation 	Medium
	Standards and Tools	<ul style="list-style-type: none"> • Certification widespread • FSC and/ or PEFC applied by majority of companies 	<ul style="list-style-type: none"> • Multiple certifications (e.g. ASC, BAP, GlobalGAP) but not all firms certified 	Low
	Strategic importance	<ul style="list-style-type: none"> • Key export for Chile 	<ul style="list-style-type: none"> • Key export for Chile 	High

2.4 Research contributions

Section 2.2 outlined the specific contributions that the three research questions make to advancing ONE and conservation science research (see summary in Table 2.1). This section outlines the broader contributions this thesis makes to the ONE and conservation science literatures, arising from connections between the three research questions. Table 2.2 summarises three themes that cross-cut the research questions and how they advance understanding of business and biodiversity within each discipline.

2.4.1 Biodiversity as an issue in ONE research

Although ONE scholars recognise that “ecologically embedded” businesses will engage with multiple stakeholders, embracing diverse cultures, outlooks and forms of knowledge (Gladwin, Kennelly and Krause 1995; King 1995; Starik and Rands 1995; Whiteman and Cooper 2000), there has been limited follow-up of what that might look like in practice. Exploring how businesses learn about, communicate and engage with competing social and ecological priorities advances understanding of what it means for businesses to be “socially-ecologically embedded” and of interconnections between social and ecological systems at the organisational level (Hoffman and Jennings 2015; Williams *et al.* 2017). Crucially, studies on the temporal dimensions of sustainability have tended focus on the future impact of present decisions and actions (Bansal and DesJardine 2014; Slawinski and Bansal 2015; Slawinski *et al.* 2017). Yet biodiversity conservation means taking a “long view” of time (Purser, Park and Montuori 1995), accounting for how past actions have modified and/ or damaged landscapes, habitats and species populations (Folke *et al.* 2007; Ostrom 2007; Ostrom 2009). The success of restoration initiatives is based on performance against a historical baseline, rather than controlling for future impacts, for instance (Bull *et al.* 2013; Bull *et al.* 2014). Examining how businesses integrate considerations about past impacts into reporting, reform and strategies regarding biodiversity advances understanding of specific challenges that biodiversity presents regarding temporal dimensions of corporate sustainability (Slawinski and Bansal 2015; Hahn *et al.* 2015).

This thesis also advances understanding of the intersections between corporate sustainability and responsibility (Bansal and Song 2017; Montiel 2008; Schaltegger and Burritt 2018). Bansal and Song (2017) have criticised the dangers of blurring responsibility – understanding how businesses manage moral

responsibilities to society – and sustainability, focussed on understanding how businesses manage connections to the ecological systems in which they operate. Yet as the preceding discussion demonstrates, biodiversity conservation is a social and an ecological issue, demanding that scientific and value considerations are integrated from the outset. Early ONE literature recognised that to become ecologically sustainable organisations might need to rethink their roles in society (Shrivastava 1995). However, whilst corporations can lobby for regulatory reform and influence consumer behaviour, achieving change may be beyond the capabilities of a single firm or sector (Jennings and Zandbergen 1995; Starik and Rands 1995). Identifying limits to business capabilities does not absolve them of proactively pursuing reform regarding biodiversity. However, we know the state can play a significant role in shaping corporate sustainability strategies (Marcus, Aragon-Correa and Pinkse 2011) and there are indications that it may be a significant actor regarding biodiversity. A clearer conception of the role the state can play in facilitating pro-sustainability reform has direct implications for how corporate responsibilities to act on biodiversity are articulated.

2.4.2 Business as an actor in conservation

The three research questions and cross-cutting themes contribute to a more nuanced understanding of business as an actor in conservation. Integrating theories and methodologies from ONE provides a much richer account of how businesses perceive and act on calls to manage impacts on biodiversity than through current research. Specifically, acknowledging businesses as individual actors helps explain differences in approaches to biodiversity management currently unaccounted for by existing theory (e.g. Büscher *et al.* 2012; MacDonald 2010). It also helps understand the contingency of business strategies and actions on the social and ecological context in which they are based. This thesis also contributes to understanding the possibilities and limitations of business as a partner in conservation (Brockington and Duffy 2010; Igoe and Brockington 2007; Kareiva and Marvier 2012; MacDonald 2010; Robinson 2011). Most debate regarding the desirability of business involvement is based on concerns about profits and shareholder priorities overriding those of other stakeholders (e.g. Bennett *et al.* 2017a; Kareiva and Marvier 2012; MacDonald 2010). Management and organisations theory, as well as evidence from ONE scholarship indicate that integrating a wider range of considerations – including concerns about the environment – is not simply desirable but essential if businesses wish to achieve sustainability (e.g. Bansal and Song 2017; Hahn *et al.* 2015; Whiteman, Walker

and Perego 2013; Winn and Pogutz 2013). Businesses may still seek to – and successfully negate – these pressures and manipulate partnerships. However, an improved knowledge of the strategies businesses deploy enables conservationists to better understand what actions to take to prevent sub-optimal outcomes for both biodiversity and the communities embedded in the landscapes shaped by it.

2.4.3 Business and biodiversity in Chile

Chilean politics and biodiversity have subject to extensive research. However, there is limited research regarding corporate sustainability practices in Chile and none focussing on business perceptions of biodiversity. Moreover, there is very little research that has sought to understand stakeholder engagement by businesses regarding biodiversity in Chile. There is also little detail on the challenges facing businesses in realising reform regarding impacts on biodiversity.

2.5 Next steps

There's a consensus that we need to understand more about business involvement in biodiversity amongst both conservation and corporate sustainability researchers and practitioners. The next chapter addresses how these research questions will be tackled through the cases of forestry and salmon farming, and outlines the methods used to explore these two cases.

Table 2.4: Cross-cutting themes regarding business and biodiversity

Theme	Aspect covered through research question (results chapter)			Contribution to understanding (Discipline)
	RQ1 (Chapter 4)	RQ 2 (Chapter 5)	RQ 3 (Chapter 6)	
Understanding business as “socially-ecologically” embedded	Role of local social and ecological context in shaping different responses to biodiversity	Role of social and ecological context in shaping learning processes regarding biodiversity	Challenges posed by social and ecological factors in managing impacts on biodiversity	<ul style="list-style-type: none"> • Social dimensions of ecological embeddedness (ONE) • How local context shapes business actions regarding biodiversity (CS)
Understanding corporate perceptions of the business case for biodiversity	How businesses perceive and report on the business case	How businesses engage with stakeholders regarding biodiversity	Corporate perceptions of their capability to react to the business case	<ul style="list-style-type: none"> • Business responses to accepting responsibility for managing impacts on biodiversity (ONE) • Which aspects of the business case for biodiversity motivate action (CS)
The role of the state and statutory regulation in aiding reform	Influence of regulatory reform alongside reporting	Role of state and regulations in aiding (or hindering) learning processes regarding biodiversity	Need for state and statutory regulations to enable change relative to voluntary approaches	<ul style="list-style-type: none"> • Need for statutory regulation in addition to/ in place of voluntary standards in biodiversity (ONE) • Need for the state in facilitating reform regarding biodiversity (CS)

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Chapter 3 – Case studies, materials and methods

This chapter outlines the methodological approach underpinning the research. It outlines the reasons for a case study approach and choice of cases. It summarises the data collection and analysis procedures and concludes with a statement on positionality and ethics. Further details on the case histories, sampling, data collection and analysis in chapters 4 and 5 are indicated below.

3.1 Rationale for case study approach

There were several reasons for adopting a case study approach for this research. Firstly, we know that business involvement in biodiversity may be affected by a wide range of variables related both to businesses and the socio-ecological context that they operate in. Yet we are uncertain about how different factors interact, for instance understanding processes of ecological knowledge transfer. Qualitative approaches, including case studies, are suited to exploratory research of this nature (Cresswell 2008; Yin 2014). Secondly, Chapter 2 highlighted that it was difficult to understand how these factors translate across different contexts. Case studies are suited to researching phenomena in the context in which they occur (Yin 2014). Thirdly, Chapter 2 identified several conceptual shortfalls in the ONE and conservation science literatures regarding business and biodiversity. Case studies are often used in theory development, not only in management research but across the social sciences (Eisenhardt 1989; Yin 2014).

The strengths of a qualitative, case study method were also weighed against those of taking a quantitative approach. Quantitative methods such as surveys provide statistically significant findings that can be generalizable to a population/universe (Cresswell 2008). As noted in Chapter 2, there may be issues that are highly context specific, resulting in relationships being identified that are entirely unique to the case in question (Eisenhardt 1989; Yin 2014). However, whilst case studies are context-specific and lack generalisability to a population, theories can be developed and examined in other contexts (Yin 2014). Case studies also provide a rich data source that can inform further qualitative and/ or quantitative research (Yin 2014). Relationships established in one qualitative study can be statistically tested across multiple contexts at a later stage, for instance. Moreover, many of the studies covered in Chapter 2 used qualitative methods to build the existing knowledge base regarding business and biodiversity.

Systematically applied qualitative and case study methods can also be replicated in other contexts. Consequently, case studies can contribute to addressing evidence gaps regarding business and biodiversity, providing data and informing future research, both qualitative and quantitative.

A final consideration was that previous quantitative work into business and biodiversity has suffered from low response rates, especially when targeting managers and senior executives, creating difficulties in drawing reliable conclusions from the data gathered (Koellner, Sell and Navarro 2010). Other studies indicate that a relatively small proportion of respondents are sufficiently knowledgeable regarding more technical aspects of this research, for example of certification and measurement tools (Boiral and Heras-Saizarbitoria 2017b). Without reliable sample, it is difficult to target the right people through survey methods and to ensure a response rate sufficient to deliver statistically significant results. Furthermore, some stakeholders, e.g. community organisations, are difficult to reach via survey methods. Given time and resource constraints in terms of creating sample, achieving a response rate sufficient for statistical analysis and of reaching the right people via survey, it was felt that qualitative research might be more appropriate for this study.

3.2 Case selection

This research used a comparative case study approach. Although a single case can be explored in greater depth, analysing two or more cases can strengthen theory-building by enabling comparisons and identifying similarities and differences across cases (Yin 2014). The ability to compare and contrast can therefore potentially further understanding of the relationships between different factors (Eisenhardt and Graebner 2007; Yin 2014). Chapter 2 noted that several studies have highlighted a link between business sector and involvement in biodiversity. This study focussed on forestry and salmon farming. Due to their impacts and/ or dependence on biodiversity, natural resource based sectors have featured prominently in research to date (e.g. Boiral and Heras-Saizarbitoria 2017b; Boiral and Heras-Saizarbitoria 2017a; D'Amato *et al.* 2016; Lähtinen *et al.* 2016). Forestry has featured in some research but is rarely contrasted with other sectors (e.g.Boiral and Heras-Saizarbitoria 2017a), and no studies have focussed on marine-based industries such as salmon farming.

Various contrasts between forestry and salmon farming suggested that that they might fit with a “polar type” approach (Eisenhardt and Graebner 2007). For instance, forestry firms operate in terrestrial ecosystems and salmon producers in marine environments. Forestry impacts on biodiversity tend to be on the immediate site of operation, whereas salmon farming has impacts further down the supply chain through fish caught for fish feed (Diana 2009). Table 5.1 in Chapter 5 provides a detailed breakdown of contrasts in ecological factors relevant to the two sectors. Although polar type approaches do not address issues of representativeness, explicitly choosing contrasting cases can facilitate theory development. (Eisenhardt and Graebner 2007; Eisenhardt 1989). For example, it is easier to identify differences, as well as potential similarities between cases (Eisenhardt 1989). The cases of forestry and salmon farming in Chile add to the polar type approach because they have taken seemingly divergent approaches to biodiversity during the last decade or so. These contrasts are outlined in section 3.2.1 below.

3.2.1 Forestry and Salmon Farming in Chile

Chile is highly biodiverse, with a third of the world’s remaining native temperate forest making it a designated biodiversity hotspot (Miranda *et al.* 2015). Its 4,500km plus coastline features numerous marine species, several endemic to the region (Miloslavich *et al.* 2011). Chile’s economic growth has been export-led, based on its natural resource wealth, including copper mining, forestry and salmon farming (Latta and Aguayo 2012). Although environmental regulation has developed since the 1990s, conservation policy remains limited, with the onus for action relying on voluntary efforts by business (Latta and Aguayo 2012; Tecklin, Bauer and Prieto 2011; Villarroya, Barros and Kiesecker 2014). In some ways Chile is ecologically, economically, socially and politically unique, complicating comparisons with other contexts. In contrast to much of the rest of Latin America for instance, Chile has begun to reverse deforestation (Heilmayr *et al.* 2016) and its economic, environmental, and social policy still reflects the legacy of the Pinochet regime (Latta and Aguayo 2012; Tecklin, Bauer and Prieto 2011). Yet the challenge of balancing economic growth with biodiversity conservation is far from unique to Chile and other countries in Latin American and beyond have adopted versions of Chile’s growth model (Ospina Peralta *et al.* 2015). Countries such as China have also managed to reforest whilst also developing (Heilmayr *et al.* 2016). Accordingly, even accounting for certain differences, there are points of comparison between Chile and other countries (e.g. Ehrnström-Fuentes and Kröger 2017; Ospina Peralta *et al.* 2015; Villarroya, Barros and Kiesecker 2014).

Forestry and salmon farming have received significant support from the state as part of Chile's export-led growth strategy (Latta and Aguayo 2012; Heilmayr *et al.* 2016; Barton and Fløysand 2010). Chile is a significant player in global pulp and paper production and the second largest producer of farmed salmon after Norway (Bustos-Gallardo 2017; Salas *et al.* 2016). Biodiversity conservation does not appear to be high on the agendas of forestry firms or salmon producers in Chile. The expansion of both sectors has been predicated on monocultures of non-native species: in forestry through plantations of *Pinus radiata* (radiata pine) and *Eucalyptus* (*Eucalyptus globulus*, *Eucalyptus nitens*) and in salmon farming via concessions of coho, Atlantic and chinook salmon (Salas *et al.* 2016; Soto, Jara and Moreno 2001). Both sectors are characterised by limited regulation and oversight regarding biodiversity (Latta and Aguayo 2012; Salas *et al.* 2016; Little *et al.* 2015). Yet as Table 3.1 demonstrates, there are marked differences in the histories of each sector.

The big change in forestry regarding biodiversity appears to be the pursuit of Forestry Stewardship Council (FSC) certification following the Río Cruces crisis (Sepúlveda and Villarroel 2012). Until 2009 Masisa, the third largest forestry firm operating in Chile, was the only major forestry firm signed-up to the FSC. Following pressure on Arauco and CMPC (the two biggest forestry firms operating in Chile), almost all major producers pursued FSC certification (Tricallotis, Gunningham and Kanowski 2018). The big three producers engage more directly and consistently with stakeholders, for instance via the forestry dialogue, through the World Wildlife Fund's (WWF's) New Generation Plantations (NGP) initiative and in committing to the state-led forestry policy council (CPF), drafting a blueprint for a vision of a sustainable forestry sector (CONAF 2016; Diálogo Forestal (n.d.); New Generation Plantations (n.d.)). Yet, there appear to be limits to the extent of reform regarding biodiversity and tensions persist. Forestry firms resist pressure to end clear-cutting of plantations and disputes with local communities regarding plantations and water usage remain (Miranda *et al.* 2015; Tricallotis, Gunningham and Kanowski 2018). The debate regarding the cause of widespread forest fires in 2017 indicates that biodiversity and plantation practices remain contentious (Torres Cuadros 2017). Conflict related to land claims by indigenous Mapuche people is also growing, further complicating dialogue regarding native forest and plantation management (Salas *et al.* 2016).

Where the story of forestry in Chile appears to be one of at least partial reform regarding biodiversity, little appears to have changed in salmon farming. Following rapid expansion, salmon farming in Chile has been beset by ecological crises (see Table 3.1 and Bustos-Gallardo 2013; Little *et al.* 2015). An Infectious Salmon Anaemia virus (ISAv) outbreak almost destroyed the industry. Strict sanitary and environmental regulations designed to improve biosecurity and reduce impacts on the seabed have failed to address fundamental issues in the industry (Bustos-Gallardo 2017; Cid Aguayo and Barriga 2016; Buschmann *et al.* 2009). A recent algal bloom and red tide in 2016 had a serious, albeit less devastating effect in ecological, economic and social terms (Paz Infante Heymann 2016). Table 3.1 indicates some reforms, with the biggest producers joining the Global Salmon Initiative (GSI) and committing to achieve Aquaculture Stewardship Council (ASC) standards by 2020 (WWF 2016). Yet none of these changes have gone as far as the FSC in social or environmental protection (Cid Aguayo and Barriga 2016). Many producers resist pressure to even publish data on antibiotic use – seen to be damaging by some conservationists – let alone reduce its use (Esposito 2016).

Neither case makes for an ideal type comparison of business perceptions and actions regarding biodiversity. However, the partial reform in forestry compared to the relative adherence to the status quo in salmon farming merits further exploration. Are differences between the sectors a reflection of broader sector dynamics? Are the contrasting socio-ecological contexts each sector operates in significant? For instance, the relatively greater ecological threats that salmon producers must manage compared to forestry firms. The role of FSC certification in encouraging reform regarding biodiversity in forestry, in contrast to impact of strict regulations on salmon producer actions is unclear. To what extent have forestry firm perceptions of biodiversity changed through adopting certification and greater stakeholder engagement? Other than the state, salmon producers do not appear to have engaged anywhere near as much with external stakeholders. Yet their reasons for resisting engagement regarding conservation issues are unexplored. It remains uncertain to what extent either sector feels responsible – or capable – of managing impacts on biodiversity. A clearer understanding of views in each sector on their role in biodiversity conservation could inform future research and policy on these sectors in Chile.

3.2.2 Similarities and differences to other countries

In certain respects, industrial forestry in Chile is distinct. The sector is dominated by three multinational firms, with around 30 other firms accounting for a large proportion of the remaining land ownership and export share (Salas *et al.* 2016). Where in Chile the displaced Mapuche are seeking to reclaim land (González-Hidalgo and Zografos 2017), in Brazil conflicts between indigenous people and foresters frequently involve defending existing land rights. However, the story of certification in Chile can be contrasted with that of other countries with temperate forest (e.g. Finland or Sweden) and/ or where major multinational forestry firms operate (e.g. Brazil or the USA) (Araujo, Kant and Couto 2009; Dyke *et al.* 2005). The perceptions and actions of big forestry firms in Chile regarding biodiversity could also be contrasted with those operating in temperate, tropical, developed and developing countries to identify similarities and differences across ecological and institutional contexts (e.g. by voluntary and statutory regulation). Understanding more about the role FSC certification has had in shaping impacts on biodiversity in Chile can also be compared to experiences observed elsewhere, such as regarding engagement with local and indigenous communities (Araujo, Kant and Couto 2009; Dyke *et al.* 2005; Ebeling and Yasue 2009; Rätty *et al.* 2016; Dennis *et al.* 2008).

Salmon farming in Chile is unique in some respects. Some ecological challenges that producers face, such as combatting Salmon Rickettsial Septicaemia (SRS), are more acute than elsewhere (Esposito 2016). The concessions system, tightly concentrated in and around Puerto Montt and Chiloe, differs from the regulatory setup of other major farmed salmon producers (Barton and Fløysand 2010). However, the biggest ecological and social challenges that Chilean salmon producers face – sea lice, eutrophication and minimising impacts on wild fish populations – are the same as those elsewhere (Barton and Fløysand 2010; Diana 2009). Certification systems are proliferating across contexts and many of the producers operating in Chile are also owned by and/ or operate in other countries (Vince and Haward 2017; Vormedal 2017). Analysing practices in Chile could have implications for understanding activities elsewhere. The scale and importance of salmon farming both in Chile and globally, as well as economically and ecologically, also make it worthy of further research. Overall, salmon farming in Chile is worthwhile examining based on its own merits and as a contrasting case to forestry.

Table 3.1: Key dates in forestry and salmon farming in Chile

Forestry	Salmon farming
<ul style="list-style-type: none"> • 1974: Forestry law “Ley 701” created, subsidising expansion of non-native species plantations • 2002: Chilean forestry standard CERTFOR created; fails to match FSC environmental standards • 2003: Arauco and CMPC, Chile’s two biggest forestry firms, agree to no longer harvest native forest following campaign by US-NGO Forest Ethics • 2007: Arauco pulp mill spill into Río Cruces wetlands kills thousands of black-necked swans, resulting in widespread protests in the Valdivian region • 2009: Arauco and CMPC agree to pursue FSC Certification, leading to operational reforms and new commitments, e.g. native forest restoration • 2009: Chilean Forest Dialogue bringing together forestry firms, community and conservation NGOs to discuss plantation and native forest policies • 2009: Arauco, CMPC and Masisa (third largest forestry firm operating in Chile) join discussions about future plantation policies through the WWF’s New Generation Plantations initiative • 2012 Arauco and CMPC achieve FSC certification • 2015: Forestry Policy Council (CPF) formed to discuss a vision for a sustainable industry strategy up to 2030, forestry representatives include industry association CORMA • 2017: Forest fires destroy more than 500,000 ha of plantation and native forest. Widespread criticism of forestry firm plantation practices which some critics claim contributed to the spread of the fires 	<ul style="list-style-type: none"> • 1980s & 1990s Rapid expansion of salmon farming in Chile • 1991: General Law of Fishing and Aquaculture • 1997: Environmental Impact Assessments introduced, requiring producers to control for the impact of new concessions • 2001: “RESA” and “RAMA” Regulations raising level of sanitary and environmental controls • 2007-2009 Infectious Salmon Anaemia Virus (ISAv) outbreak exposes poor practice and inadequacy of regulations. Production collapses, prompting major redundancies, followed by rioting and an arson attack on industry association SalmonChile’s regional headquarters in Puerto Montt • 2009: “Salmon Roundtable” comprising salmon producers, suppliers, and main public agencies together to discuss regulatory reforms to control and prevent further outbreaks • Sanitary and Environmental regulations revised to include increased oversight and enforcement powers by state • 2012: Commitment by six largest salmon producers to achieve Aquaculture Stewardship Council (ASC) certification by 2020 • 2013: Strategic Salmon Plan Founded, comprising salmon producers, suppliers, main public agencies, academic researchers (e.g. veterinarians, marine biologists) and the WWF to discuss how to achieve sustainable aquaculture • 2015: “Blue Whale Clean Production Accord” (APL) sees producers agree to monitor blue whale and other large crustacean populations around their sites of operation • 2015-2016: Algae Bloom and Red Tide lead to large-scale losses of salmon and indefinite closure of concessions. Protests against government and salmon farmers by fishermen and local communities in response to dumping of dead fish in sea

3.3 Data collection, sampling and analysis

3.3.1 Methodological framework

This thesis integrated two forms of data collection: document review and qualitative interviews (Cresswell 2008). The design drew on Rydin and Falleth's (2006) institutional analysis of networks and institutions in natural resource management. There were several reasons for adopting Rydin and Falleth's approach. Firstly, it has been applied to analyse and understand a range of natural resource contexts, indicating that it could be suitable for the two cases being analysed here (Rydin and Falleth 2006). Secondly, the approach is flexible and can be adapted to integrate multiple theories, suggesting it would be appropriate given the research objectives of this thesis (Rydin and Falleth 2006). Thirdly, as Chapter 2 demonstrated, institutional theory has been successfully applied in both ONE and conservation science research. Accordingly, it was felt that Rydin and Falleth's approach would fit with methods and analytical practices common to both disciplines.

Rydin and Falleth examine how actors' competing priorities regarding natural resources are mediated through institutions, both formal (e.g. rules and regulations) and informal (e.g. interactions between actors). Chapter 2 noted that various studies have emphasised the potentially significant role of institutional arrangements in shaping business perceptions and actions regarding biodiversity. Rydin and Falleth integrate document review and interviews, recognising the strengths and weaknesses of each. Documents establish context and outline core issues and activities; detail relevant rules and regulations; and identify key actors, their stated priorities and the language they use (Rydin and Falleth 2006). However, documents are often insufficient for understanding the values that inform actor priorities (Rydin and Falleth 2006). Formal corporate reporting has been noted for failing to capture difficulties firms encounter, different views on stakeholder engagement and motivations behind communications, for instance (Boiral and Heras-Saizarbitoria 2017b; Rimmel and Jonäll 2013). Interviews can be used to investigate informal institutions (e.g. interactions between actors) that are often not documented, such as unrecorded dialogue with stakeholders (Rydin and Falleth 2006). Table 3.2 summarises how these forms of evidence complement each other.

Table 3.2: Strengths and weaknesses of documents and interviews as sources of evidence²

	Documentation	Interviews
Strengths	<p><i>Context</i></p> <ul style="list-style-type: none"> • Detailed view of developments over time • Identification of key actors • Identification of formal mechanisms and details on workings • Identification of major issues within sector • Detail of language used • Corroboration of claims made by individual actors 	<p><i>Depth</i></p> <ul style="list-style-type: none"> • Potential to question actor priorities and motivations, their interactions with other actors and involvement in key processes • Understanding of less formal interactions • Identify differences between recorded accounts and lived experience, e.g. contrasts between formal reports and manager and stakeholder opinions • Access to individual groups with limited/ no accessible documents
Weaknesses	<p><i>Incomplete record</i></p> <ul style="list-style-type: none"> • Reliance on what authors are willing and/or able to disclose regarding motivations for actions. • Some controversial events or criticisms may be excluded • Often do not cover informal mechanisms 	<p><i>Reliability and accuracy</i></p> <ul style="list-style-type: none"> • Recall of details is often poor • No guarantees that interviewees will be prepared to disclose or discuss certain matters, even if they are a matter of public record • Data quality dependent upon quality of interview

² Developed from RYDIN, Y. and E. FALLETH. eds. 2006. *Networks and institutions in natural resource management*. Northampton, MA, USA; Cheltenham, UK: E. Elgar.

3.3.2 Data collection: scoping, sampling and recruitment

This section summarises the data collection stages and preparation of materials for analysis. Figure 3.1 outlines the main steps for each stage and Table 3.3 the main sources for data collection plus some examples. See section 3.3.3 below for details on analysis.

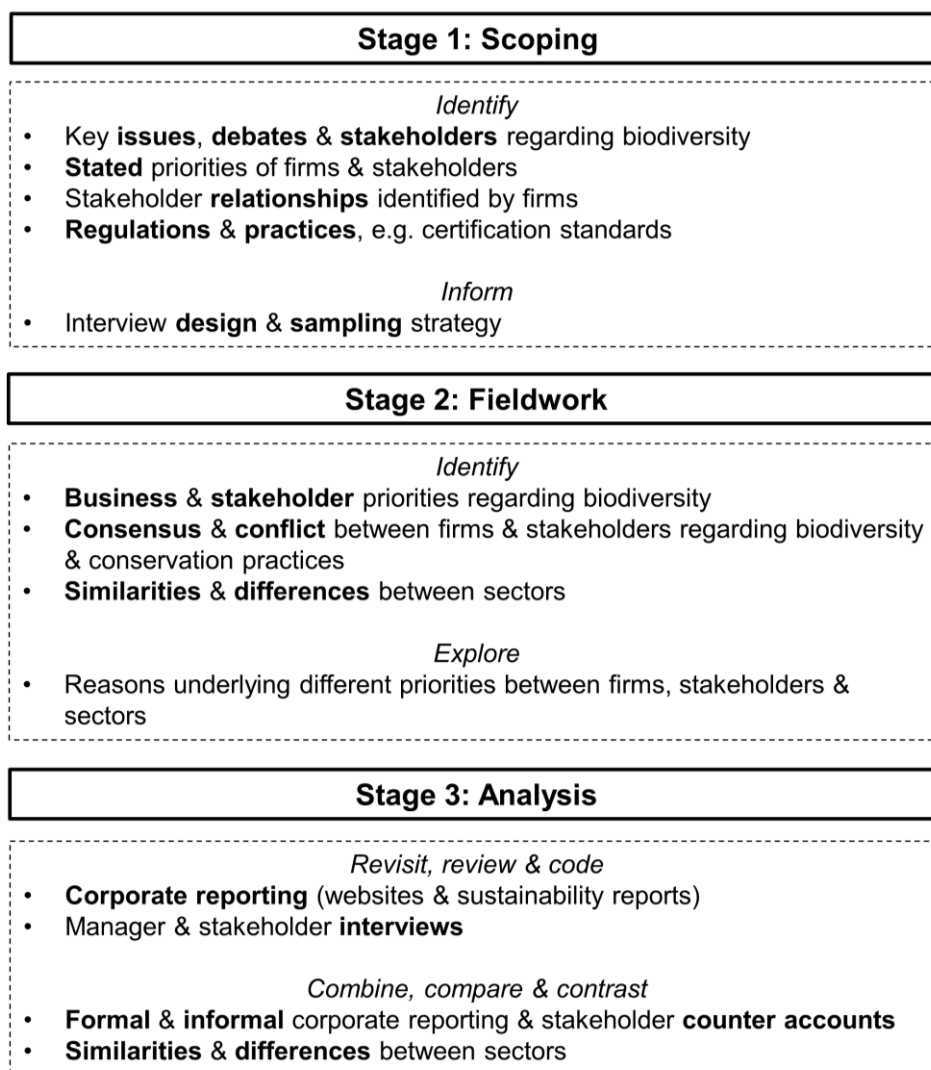


Figure 3.1: Data collection and analysis stages

Table 3.3: Data collection sources and examples

Stage	Source types and examples ³	Forestry	Salmon Farming
1	Business and industry		
	Businesses	Arauco, CMPC, Hancock, Masisa, etc.	Aquachile, Blumar, Cermaq, Marine Harvest, etc.
	Industry associations	CORMA, ASMAD	SalmonChile, Intesal
	Stakeholders		
	Certification bodies	FSC, CERTFOR	ASC, BAP, GlobalGAP, ISO
	Chilean state ministries & agencies	Ministerio del Medio Ambiente (MMA), CONAF, CORFO, Fundación Chile, INFOR	MMA, ProChile, Sernapesca, SubPesca, Superintendencia del Medio Ambiente (SMA)
	Conservation & Community NGOs	CODEFF, Greenpeace, Taller de Acción, TNC, WWF	Oceana, WWF
	University institutes	Universidad de Chile, Universidad de la Concepción	Universidad Austral de Chile, Universidad de Talca
	Others (e.g. professional associations)	Colegio de Ingenieros Forestales, Confederación de Trabajadores Forestales (CTF)	Global Salmon Initiative (GSI)
2	Interviews	Forestry firms and individuals from the group types above plus environmental consultants	Salmon producers and individuals from the group types above plus representatives from the supply chain and environmental consultants
	Document review	Forestry firm websites, sustainability/ integrated reports and certification documentation	Salmon producer websites, sustainability/ integrated reports

³ Website pages for all except for Businesses (annual and/ or sustainability reports) and Certification bodies (online databases)

Stage 1 (scoping) Used websites, online documents and studies from both sectors to identify key themes, initiatives and stakeholders; the design and content of interviews; and inform sampling (see Table 3.3 above).

Stage 2 (fieldwork): consisted of interviews with managers and stakeholders and a subsequent review of corporate reporting.

Sampling was initially based on a consideration of the case histories of Chilean forestry and salmon farming. Supplementing Boiral and Heras-Saizarbitoria's (2017b) approach using corporate reports and websites, industry association, certification and Chilean government websites were also used to identify stakeholders. In forestry, FSC Chile board membership and participants involved in the Diálogo Forestal (forestry dialogue) and NGP processes in Chile were included. In salmon farming, environmental consultants working on EIAs and websites of organisations involved in environmental and social campaigns. Conservation scientists, NGOs, local communities, and the state are recognised as key stakeholders regarding biodiversity management (Boiral and Heras-Saizarbitoria 2017b; Pogutz and Winn 2016). The initial sample list was revised following discussions with researchers, former managers and industry observers based in Chile. Consequently, representatives of industry associations, and community-based NGOs were added to the sample for both sectors. Environmental consultants were added to the forestry sample, and senior managers and directors of oceanography firms, laboratories and feed suppliers to the salmon farming sample (see Figure 3.2 below).

The principal interview targets were managers engaged with operations. Business development and corporate relations managers in the largest firms were approached if their role included some engagement with biodiversity. Stakeholder relevance regarding biodiversity varies depending on local context (Boiral and Heras-Saizarbitoria 2017b; Reade *et al.* 2015). Some stakeholders were not included in this study (see Figure 3.2). Trades unions had limited involvement in biodiversity policy; certification bodies were also more peripheral stakeholders in Chilean salmon farming regarding biodiversity. The main retailers in both cases are based outside of Chile, but managers, NGOs working with retailers, and state representatives provided sufficient information to be able to understand retailer priorities regarding biodiversity management. It proved difficult to identify specific shareholders and/ or corporate investors to approach.

Instead, the testimony of current and former managers was used to account for investor priorities.

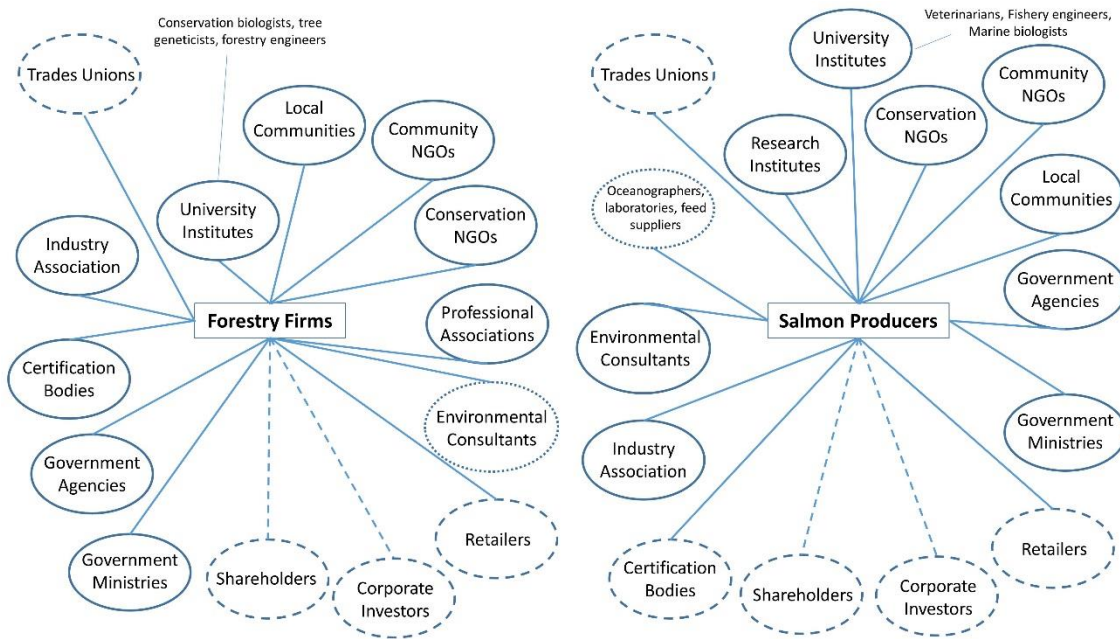


Figure 3.2: Stakeholder selection for the forestry and salmon farming cases

Recruitment was primarily via e-mail and included sending a concept note (see Appendix B) with a follow-up call to clarify any questions and confirm date, time and location for interview. Some recruitment was participant-driven, based on cross-referencing recommendations during fieldwork. Several participants worked across or had experience of both sectors and were asked about both. Recruitment continued until a point of saturation, i.e. at the point where further interviews added no new insights regarding the cases (Bauer and Arts 2000). In this study, saturation was judged to be when key stakeholders had been covered and similar stories emerged regarding the main themes (Bauer and Arts 2000). Interviews were supplemented by informal discussions with academics and industry insiders, visits to forestry operations, a private protected area, and a forestry industry conference. See Table 3.4 for a breakdown of participants by sector and type.

Table 3.4: Participants by sector and type

Respondent Type	Forestry	Salmon Farming	Multiple sectors	Total
Key informants/ Industry Experts				
Former managers; industry observers; researchers	2	2	1	5
Business Managers and Senior Managers, Directors				
Business Development/ Corporate Relations	5	2	-	7
Operations/ Environment	6	8	-	14
Stakeholders				
Conservation biologists (University)	2	2	1	5
Environmental Consultants	2	-	3	5
FSC Board Members	2	N/A	N/A	2
Industry Association representative	2	2	-	4
NGO representative	3	2	7	12
Professional Association representative	1	-	-	1
State representative	3	3	4	10
Supply chain (Breeding & Eggs, Diagnostics, Fish Feed, Genetics, Oceanography)	-	5	-	5
Total	28	26	16	70

3.3.2.1 Interview content

Interviews were conducted as “guided conversations”, structured around a set of core themes and questions (Cresswell 2008) and adapted to suit the knowledge and experience of each participant. Figure 3.3 offers an overview of what was covered in interview. The Interview guides in Appendix C provide more detail on the topics covered. All interviews were recorded and most were face-to-face, generally in the participant’s workplace although sometimes in a café or home if easier for the participant. Three interviews were conducted via Skype whilst in Chile to accommodate time and travel constraints for the researcher and/ or participant. All interviews were in Spanish apart from four in English.

Business Managers	Stakeholders and Key Informants
<ul style="list-style-type: none"> Participant's role and expertise within firm: engagement with operations and understanding of biodiversity 	<ul style="list-style-type: none"> Individual/ Organisation's role and aims regarding biodiversity/ conservation; reforms that stakeholder wants to see/ is campaigning for
<ul style="list-style-type: none"> Main challenges facing firm regarding biodiversity 	<ul style="list-style-type: none"> Conservation challenges in Chile (if focal organisation, focus on challenges in region)
<ul style="list-style-type: none"> Use of tools/ standards, e.g. FSC, ASC, to manage impacts on biodiversity Optional follow-up questions <ul style="list-style-type: none"> How tools and/ or standards help firms to manage impacts Challenges of implementing these tools/ standards 	<ul style="list-style-type: none"> Perceptions/ experiences of forestry firm and/ or salmon producer regarding <ul style="list-style-type: none"> Understanding of biodiversity Efforts regarding biodiversity management/ conservation
<ul style="list-style-type: none"> Challenges firm has faced/ is currently facing in implementing biodiversity practices 	
<ul style="list-style-type: none"> Impact of state regulations on corporate biodiversity strategy (e.g. Environmental Impact Assessments (EIAs), sector-specific laws) 	<ul style="list-style-type: none"> Perception/ experience of certification and/ or regulations in moderating forestry firm and/ or salmon producer actions regarding biodiversity
<ul style="list-style-type: none"> Stakeholder involvement in decision-making regarding biodiversity management Optional follow-up questions <ul style="list-style-type: none"> How decisions are communicated Stakeholders who make decision-making more problematic Sources of disagreements How manage disagreements 	<ul style="list-style-type: none"> Level and forms of engagement with forestry firms and/ or salmon producers Optional follow-up questions <ul style="list-style-type: none"> Involvement in decision-making/ consultation Areas of agreement/ disagreement
<ul style="list-style-type: none"> Views on main challenges and opportunities for firm regarding biodiversity in the next 5 to 10 years 	<ul style="list-style-type: none"> Views on main challenges and opportunities for forestry and/ or salmon farming regarding biodiversity in the next 5 to 10 years

Figure 3.3: Interview content by participant type

Stage 3 (analysis): included transcription and coding of interviews and coding of the corporate reports. The four English interviews were transcribed by the researcher, the remainder by a native Spanish speaker. All were double checked and (if necessary) corrected before being finalised. Section 3.3.3 details how these materials were analysed.

3.3.3 Analysis

This section outlines the process for analysing the interviews and the corporate reports. The overall process is summarised in Table 3.5.

Table 3.5: Data Analysis Steps

Step	Purpose	Form(s) of analysis
1: Snapshot	<ul style="list-style-type: none"> Identify emergent themes Provide framework for coding 	Within case
2: Initial coding	<ul style="list-style-type: none"> Individual and group coding Revise themes generated at Step 1 	Within case
3. Final coding	<ul style="list-style-type: none"> Review individual and group codes: check if any codes need to be added or combined Framework analysis to enable within case and cross case analysis 	Within case Cross case
4. Summary	<ul style="list-style-type: none"> Review case-level themes to identify similarities and differences across cases 	Cross case

3.3.3.1 Interview analysis

The interview analysis process was modelled on the general inductive approach.

Step 1 consisted of reading through each transcript, noting both the key issues covered and initial reflections on the key themes and messages arising from the interview. These were logged in an Excel spreadsheet and grouped by participant type (e.g. Forestry Firm, Salmon Producer, NGO representative, etc.). The initial themes are listed in Appendix D.

Steps 2 and 3 were the coding stages. NVIVO 10 was used for several reasons. Firstly, it is designed to accommodate multiple forms of qualitative analysis (Bazeley and Jackson 2013). Secondly, it provided a single repository for all the data being analysed: the spreadsheet capturing website details, sustainability and integrated annual reports and interview transcripts. Thirdly, time-stamps on notes and codes sped-up the coding process and makes it easier for other researchers to follow thought processes and replicate the analysis conducted here (Bazeley and Jackson 2013).

Step 2 involved re-reading the interviews and generating individual codes from the text. The individual codes were then combined into group codes. These group codes were compared with the themes arising from Step 1 to see what (if any) additional themes arose.

Step 3 involved a further iteration of coding, revisiting the interviews to see if any further codes were generated and new themes arose. Analysis was both “within-case,” to build-up picture of each sector (Eisenhardt 1989 pp: 539-540) and “cross-case” to look for patterns and differences between each sector (Eisenhardt 1989 pp: 540-541). An initial focus on within-case data helps in identifying patterns and factors unique to each case (Eisenhardt 1989). Cross-case analysis is necessarily more detailed, requiring the researcher to revisit codes and patterns and potentially generating new categories that span both cases (Eisenhardt 1989). This research focussed on identifying similarities and differences across the cases. The coding outputs in NVIVO enabled comparisons between the two cases. Figure 3.4 below offers a snapshot of the coding at Steps 2 and 3 and the codes and themes generated.

Step 4 involved looking at the codes and associated quotes to identify similarities and differences within-case between managers and their stakeholders as well as similarities and differences between different stakeholder types (e.g. between conservation biologists and conservation NGOs in forestry and supply chain and state representatives in Salmon farming). Cross-case analysis included comparisons between managers in the forestry and salmon farming sectors and between stakeholders in each sector (e.g. conservation NGOs representatives working solely in forestry compared to those in salmon farming).

Steps 1 and 2 formed the basis for the analysis of all three results chapters. Steps 3 and 4 were repeated for each results chapter.

	1. Individual coding	2. Group codes	3. Theme codes (x = group code)
Forestry	Change in attitude forestry firms Change in forestry more than certification Change in profile biodiversity Clear-cut practices endure Examples of cultural change Innovations with respect to biodiversity Masisa as a leader	Change in Chilean forestry over time (a)	Change in Forestry and biodiversity (a) Forestry Firm Interactions with Stakeholders Forestry Firm Perceptions of Biodiversity
	Positive contribution plantations Important economic role plantations Plantations efficient Plantations save native forest Support for extension Ley 701	Positive contribution plantations (b)	Institutional Impacts Plantations (b)
Salmon Farming	Algae Bloom unpredictable Climate change as major challenge Conditions are different in Chile Seals attacking nets SRS a major priority Trade-offs with feed Trade-offs with location	Environmental challenges (c)	Challenges (c) Change on the way Impact ISA
	EIA structures measuring of impact Environment Department established after new regulations introduced Focus on monitoring Laws frequently change Legal focus on below surface Present aim to meet regulatory requirements Use of regulations to structure efforts to measure impacts	Activities defined by legal framework (d)	Impact of regulations (d) Salmon farmer perceptions of industry Stakeholder interactions

Figure 3.4: Section of coding trees for forestry and salmon farming cases

3.3.3.2 Document analysis

The document review process followed the same principles as for the interview analysis but was adapted to suit the document materials. The document analysis also focussed solely on forestry firm and salmon producer websites sustainability and/ or integrated reports and other background materials relevant to sustainability such as certification reports. Whilst content analysis is commonly applied to reviewing corporate reports, given the limited amount of text and documents, most forms of content analysis (e.g. word frequency counts, word associations, etc.) were likely to offer limited insight. Consequently, analysis focussed on a close reading of the text. Joutsenvirta (2009) used a similar method to analyse forestry reporting. See Table 3.6 for a breakdown of documents reviewed.

Step 1 involved a review of every website to assess website sections relating to sustainability, natural environment, CSR, certification and biodiversity and documents relating to and referencing these themes. If available, sustainability reports and/ or annual reports with a sustainability section were downloaded. A note was made of the most recent and oldest available reports to understand the time span over which changes could be reviewed. Other documentation that looked potentially relevant, such as Forestry Management Plans and specific booklets were also downloaded but were used as background information rather than forming part of the coding process. Press releases, company magazines and financial reports were not included in the review in order to be able to concentrate on material most explicitly focussed on biodiversity. The key features from each website (terminology, relevant pages and documents were logged in an Excel document for reference. A quick review of the most recently available sustainability report for each company established the form and quantity of information available regarding biodiversity, with a note made of activities, stakeholders and terminology.

For Steps 2 and 3 all webpages and reports (if available) were loaded into NVIVO. Coding involved re-reading each webpage and the relevant sections of reports in depth and following the within and cross-case analysis outlined above.

Step 4 included a final review to identify case-level themes arising from the reports. The within case analysis focussed on similarities and differences between formal corporate reporting and manager accounts in each sector. It also compared the themes arising from the reports in each sector to stakeholder accounts. Cross-case analysis focussed on differences between the two sectors in terms of the accounts arising from formal reporting.

Table 3.6: Document Review by type and sector

Document Type	Forestry	Salmon Farming
Company websites	22	20
Sustainability, Integrated or Annual Report		
2004	3	0
2006	3	3
2008	3	4
2010	3	8
2012	3	8
2014	3	10
2015	3	10
2016	3	7
Total	24	51
Other		
<ul style="list-style-type: none"> • Forest Management Plans • Forest Survey Reports • Forestry Operational Documents • Environmental/ CSR Policy Declarations 	68	13

3.3.4 Positionality

Any study involving human subjects requires the researcher to reflect on their positionality. There were several aspects to this research that could present barriers to effective research and indirectly influence the outcome of the interviews. Cultural considerations included that the research was being conducted by a British national in Chile, predominantly in Spanish and mostly with Chilean nationals⁴ (Dwyer and Buckle 2009; Herod 1999). These cultural and linguistic differences heighten the risk of misunderstandings or confusion during research. Identity differences included the fact that many of the participants were in positions of power relative to both the researcher and other members of the population (Schoenberger 1991). Interviewing “elites” presents issues of access, not simply in establishing contact but also in convincing individuals in positions of responsibility to sacrifice time for an interview with a foreign national (Herod 1999). “Non-elite” respondents, such as those working in small community-based NGOs can also be time-poor since they have fewer resources to manage their workload and hence an interview represents a significant sacrifice. Being an “outsider” with no connections to forestry or salmon farming in Chile had the potential to make recruitment more difficult (Schoenberger 1991). Consequently, there was a risk that interviews would not

⁴ A few participants were from other countries in South America but had been based in Chile for a long time

move beyond superficial discussion to explore topics that cannot be covered by another means, e.g. through document review or previous research.

Various steps were taken to manage the potential impacts of these issues on the study. Measures were taken to reassure participants regarding the veracity of the research being conducted. A concept note and e-mail explained the research aims and reasons for wanting to interview the individual in question. Follow-up calls enabled an initial link to be made and – if necessary – to reassure the participant about the research aims and use of data. Interviews always began with an explanation of the researcher's background; role at the University of Leeds; interest in the topic area; reasons for choosing Chile; and for wanting to talk to that person specifically. Before starting the interview, participants were asked if they were unclear about anything or had any questions, and reassurances were given regarding efforts to ensure their anonymity. A follow-up e-mail thanking the respondent and re-supplying research contact details also reminded them of how they could follow-up if necessary. These steps also helped establish trust with the participants, who were more visibly at ease once the research objectives, interest in their organisation and reasons for wanting to talk to them was outlined. Emphasising personal credentials such as knowledge and experience in conservation and commercial fields also boosted their confidence in the stated aims of the research. Finally, demonstrating a clear interest in Chile and being able to talk Spanish further built rapport.

3.3.5 Ethics

Ethical approval for interviewing was granted by the University of Leeds Ethics Review committee (AREA 15-038). The main concerns were regarding guarantees of participant anonymity, ensuring informed consent and length of data storage. See Appendix A for the decision letter. Risk assessment was granted by the University of Leeds. Data will be stored for at least five years from the end of fieldwork (i.e. until June 2021).

The forestry and salmon farming sectors in Chile are relatively small in terms of personnel. Consequently, it was impossible to guarantee complete anonymity. However, to minimise the risk of any individuals being identified all quotes are referenced using a unique ID and a broad categorisation (e.g. I4, Manager, Forestry Firm; I20, Conservation NGO). This form of referencing was mentioned to participants when discussing use of quotes. Participants were always

contacted on an individual rather than group basis, and to an e-mail address in their name, rather than generic or group e-mail address.

Verbal consent was obtained at the beginning of the interview. Participants were sent full details of the purposes of the research and an outline of the interview content in the recruitment e-mail (with concept note and CV attached). Any questions before the interview were dealt with either over the phone or via e-mail. Participants were always asked if they were happy to be recorded before the interview began. The thank you e-mail sent after the interview provided contact details should participants have any questions or concerns. See Appendix B for copies of the concept note, CV and an example thank you e-mail.

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Frame A: Vista of the Valdivian forest. Image: Thomas Smith (2016)

This image is from a viewing platform at Arauco's Parque Oncol, a protected area operated by the firm and open to the public.



Frame B: Puerto Montt at sunset. Image: Thomas Smith (2016)

SalmonChile's regional headquarters in Puerto Montt are situated in the building at the centre of the picture

Chapter 4 – Corporate reporting and conservation realities: understanding differences in what businesses say and do regarding biodiversity

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Abstract

Businesses are increasingly called on to participate in tackling biodiversity loss but the extent of corporate commitments to act are unclear. We have a limited understanding of differences in perceptions and actions regarding biodiversity across business sectors. Doubts also remain concerning the reliability of corporate reporting as a window into business involvement in biodiversity. This paper tackles these uncertainties by using formal corporate reporting and interviews with managers and stakeholders about actions regarding biodiversity as the evidence base. Taking the cases of forestry and salmon farming in Chile, it finds sectoral differences are influenced by distinct regulatory settings and forms of stakeholder engagement. Whilst reporting serves as a partial window into each sector, manager interviews and stakeholder accounts indicate firms in both sectors perceive biodiversity primarily as a reputational risk, rather than a core responsibility. In both cases businesses have used formal corporate reporting to mask negative impacts and it has failed to leverage fundamental reform. The findings indicate that formal reporting can only ever play a partial role in understanding and motivating business action on biodiversity. Stakeholder views and the particularities of local contexts must be more clearly articulated to ensure businesses undertake substantive rather than symbolic action on their impacts. The paper concludes by reflecting on implications for Natural Capital reporting and identifies limitations and avenues for future research.

4.1 Introduction

Businesses are increasingly called on to recognise their role in tackling biodiversity loss (Jones and Solomon 2013; Natural Capital Coalition 2016). Sustainability reports and surveys offer insights into business perceptions and actions regarding biodiversity but gaps remain in our understanding of how and why businesses are responding (Boiral and Heras-Saizarbitoria 2017a; Jones and Solomon 2013; Liempd and Busch 2013; Rimmel and Jonäll 2013). We know that perceptions and actions vary by sector but the underlying causes of these differences are unclear. Intervening factors relating to the contexts businesses are operating in, such as regulations and stakeholder relations, appear to be significant (Boiral and Heras-Saizarbitoria 2017b; Mulder and Koellner 2011). Business motivations to act are also framed as both realising opportunities (e.g. product differentiation) and reducing risks (e.g. reputational damage through negative impacts on biodiversity). Yet it is uncertain whether many businesses accept the “business case” for biodiversity, including ethical responsibilities to manage their impacts (Jones and Solomon 2013; Liempd and Busch 2013). This paper examines the factors influencing business perceptions and actions on biodiversity by contrasting the cases of the forestry and salmon farming sectors in Chile. The paper demonstrates that differences are strongly influenced by the contexts businesses operate in. It establishes that despite differences in approach, businesses in both sectors perceive biodiversity as a reputational risk rather than a core responsibility.

This paper advances our understanding of business perceptions and actions regarding biodiversity in several ways. The relationship between business sector and biodiversity is unclear, with some studies suggesting an association but others the influence of other, unrelated factors. This paper demonstrates that multiple factors related to the local contexts in which businesses operate influence approaches to biodiversity. It also tackles uncertainties regarding corporate motivations to act regarding biodiversity. Many studies have focussed on corporate accounts, as formal reporting and/ or manager interviews, offering only partial explanations. Combining corporate and stakeholder accounts enables a deeper understanding of business perceptions and actions regarding biodiversity by demonstrating what businesses highlight and underplay in their reporting (Boiral 2013). Consequently, the paper addresses an empirical gap regarding the capacity of formal reporting to increase business accountability for managing biodiversity (Jones and Solomon 2013). The paper highlights similarities and differences between biodiversity and other issues in corporate

sustainability, reflecting on implications for Natural Capital reporting. It concludes by identifying limitations and avenues for future research.

4.2 Understanding corporate reporting and action on biodiversity

This section considers the insights corporate reporting provides into business perceptions and actions regarding biodiversity. It highlights evidence gaps addressed by this paper.

Multiple factors appear to influence business perceptions and actions regarding biodiversity. Although there is an association between business sector and action, the nature of the association is uncertain (Bonini and Oppenheim 2010; Bhattacharya and Managi 2013; Boiral and Heras-Saizarbitoria 2017a; Rimmel and Jonäll 2013). Some studies suggest that firms with the greatest exposure to biodiversity (e.g. utilities) and/ or impact on it (e.g. mining) have the most explicit policies towards biodiversity (Bhattacharya and Managi 2013). Other studies have identified the opposite, with those firms at lowest risk providing more information (Rimmel and Jonäll 2013).

Besides sector, factors related to the context a business is operating in appear to influence approaches to biodiversity. Concern about and priorities regarding biodiversity vary across regions (Bonini and Oppenheim 2010; PwC 2010; Sell *et al.* 2006). Regulatory contexts may shape conservation activities and investments, for instance (Lambooy and Levashova 2011; Mulder and Koellner 2011). Who is communicating knowledge about biodiversity and how effectively that knowledge is communicated can influence business commitments to conservation (Ebeling and Yasue 2009; Lambooy and Levashova 2011; Overbeek, Harms and Van den Burg 2013; Pogutz and Winn 2016; Ruckelshaus *et al.* 2015; van den Burg and Bogaardt 2014; McNab *et al.* 2015). For example, stakeholders such as the state and conservation NGOs can help businesses understand their responsibilities to act (van den Burg and Bogaardt 2014; D'Amato *et al.* 2016; McNab *et al.* 2015; Overbeek, Harms and Van den Burg 2013; Sell *et al.* 2006).

Motivations within businesses to engage in biodiversity conservation remain unclear. The business case for engaging in biodiversity conservation is founded

on operational, regulatory, financial, reputational, societal, and ethical grounds (Natural Capital Coalition 2016; Jones and Solomon 2013). These are often split into opportunities from acting and risks of inaction (Natural Capital Coalition 2016). Corporate motivations for involvement in biodiversity initiatives identified through reporting include improving corporate image and legitimacy, gaining new knowledge, innovating, and better understanding stakeholder expectations regarding conservation. Some studies suggest that ethical considerations are a factor in corporate action on biodiversity (Boiral and Heras-Saizarbitoria 2017a) but others have found limited or no evidence that ethics are significant in corporate perceptions and actions regarding biodiversity (D'Amato *et al.* 2016; Liempd and Busch 2013). It is uncertain whether opportunity or risk is a greater incentive for action (Boiral and Heras-Saizarbitoria 2017b; Boiral and Heras-Saizarbitoria 2017a; Bhattacharya and Managi 2013).

A further issue with much of this work is the reliance on corporate accounts, acknowledged by the studies themselves (Bhattacharya and Managi 2013; Boiral 2016; Boiral and Heras-Saizarbitoria 2017b; Boiral and Heras-Saizarbitoria 2017a; Liempd and Busch 2013; Rimmel and Jonäll 2013). Limited reporting requirements regarding biodiversity (e.g. the Global Reporting Initiative (GRI) and Integrated Reporting) mean outputs are often minimal and low quality (Jones and Solomon 2013). Interviews and surveys of managers and employees provide greater insight into thought processes and activities, but can suffer from social desirability bias and adherence to the official corporate line (D'Amato *et al.* 2016; Rimmel and Jonäll 2013; Mulder and Koellner 2011; Lambooy and Levashova 2011).

Corporate sustainability reporting can be used to construct “façades” to neutralise competing (and potentially contradictory) stakeholder demands (Cho *et al.* 2015; Boiral 2016). Consequently, businesses can use reporting to avoid rather than tackle issues (Milne and Gray 2013). Several studies have demonstrated how businesses can manipulate perceptions of their attitudes and actions regarding biodiversity, presenting what is seen as desirable and legitimate rather than necessarily what they really believe (Boiral 2016). Since multiple values and perspectives are relevant in constructing conservation priorities, perception management regarding biodiversity is a potentially serious issue (Boiral and Heras-Saizarbitoria 2017b). Reporting practices regarding biodiversity are under-explored.

The review above indicates several gaps in our understanding of business approaches to biodiversity. Firstly, considering actions in context can build a more comprehensive understanding of the interplay between sector and non-sector related factors, overlooked in previous work. Secondly, examining motivations to act in context can address issues with the level of detail offered by managers and formal reports. Integrating stakeholder “counter accounts” can provide information of activities on the ground (Boiral 2013; Ehrnström-Fuentes and Kröger 2017) and expose issues and disputes not disclosed by businesses in reports or surveys (Boiral 2016; Cho *et al.* 2015; Lähtinen *et al.* 2016). Contrasting corporate perspectives with stakeholder opinions and experiences can build a more comprehensive understanding of corporate perceptions and drivers to act regarding biodiversity. Thirdly, identifying both what business highlight and what they downplay or fail to report can help understand the capacity of formal reporting to change corporate perceptions and actions regarding biodiversity (Boiral 2016; Jones and Solomon 2013). Recent developments in such as the Natural Capital Protocol (NCP) (Natural Capital Coalition 2016) might address these failings, but a clearer understanding of how reporting is being used at the moment can identify what else might need to be reformed to leverage change in business approaches to biodiversity.

4.3 Case studies, materials and methods

4.3.1 Forestry and salmon farming in Chile

This study contrasted perceptions and actions regarding biodiversity in the forestry and salmon farming sectors in Chile, with biodiversity historically a low priority in both industries (Heilmayr *et al.* 2016; Latta and Aguayo 2012; Barton and Fløysand 2010). Sector differences need further exploration and case studies enable detailed investigation of multiple variables, aiding understanding of phenomena in their context (Cresswell 2008; Yin 2014). Focussing at a sector rather than organisational level increased participant anonymity, enabling them to be more open in their views.

Biodiversity appears to have risen up the agenda in forestry in Chile since the early 2000s, with the largest firms adopting Forestry Stewardship Council (FSC) certification and increasing investment in native forest conservation (Cubbage *et al.* 2010; Heilmayr and Lambin 2016). Firms have entered a Forestry Dialogue with community and conservation NGOs and participated in a state-led Forest Policy Council to discuss reforms to industry practice. The three largest firms

have joined the New Generations Plantation Initiative (NGP) to consider new approaches to plantation management, including introducing wildlife corridors (New Generation Plantations (n.d.)). Yet recent widespread forest fires have revived criticism of forestry plantation practices (AIFBN 2017) and conflicts with indigenous Mapuche people regarding land ownership, and with local communities over water and plantation management persist (González-Hidalgo and Zografos 2017; Ehrnström-Fuentes and Kröger 2017; Salas *et al.* 2016). The extent of reform and reasons underlying changes to date remain unclear.

Salmon farming's rapid expansion in Chile – with production second only to Norway globally – appears to have come at a high environmental cost and with limited regard for biodiversity (Cid Aguayo and Barriga 2016). Environmental Impact Assessments (EIAs) were introduced in the late 1990s (Barton and Fløysand 2010) but the inadequacy of regulations were exposed by an Infectious Salmon Anaemia (ISA) outbreak that almost wiped out the industry and regulatory reforms concentrated on sanitation and biosecurity rather than biodiversity (Bustos-Gallardo 2015). The largest firms operating in Chile have joined the Global Salmon Initiative (GSI), committing to meeting Aquaculture Stewardship Council (ASC) standards by 2020 (ASC 2017), but reforms remain limited (Bustos-Gallardo 2015). Salmon producer practices are widely criticised and conflict with local communities and conservation NGOs persists (Salgado *et al.* 2015; Bustos-Gallardo 2015; Latta and Aguayo 2012). An algae bloom prompted fresh protests in 2016 (AQUA 2016), and salmon producers have resisted calls to release data on antibiotic use (Esposito 2016). The extent to which salmon producers understand their impacts on biodiversity is uncertain.

4.3.2 Evidence base

The study combined formal corporate reporting using company websites, sustainability reports and online documentation, manager and stakeholder interviews.

Qualitative approaches can extract rich data from a small evidence base (Cho *et al.* 2015; Joutsenvirta 2009; Boiral 2016). This study adapted Joutsenvirta's (2009) approach to examine changes in formal reporting over time. Chilean forestry and salmon farming industry association membership lists and government records on forest plantation and salmon farm concession ownership were used to identify relevant firms in each sector. Arauco, CMPC and Masisa

are the only firms to produce sustainability reports. Due to minimal changes in formal report content year on year, the study examined alternate years between 2003/2004 (the earliest available reports) and 2014. Firms with websites were analysed, along with any documentation regarding FSC standards. Subsidiaries of larger organisations were included in the analysis where they have distinct operations with separate reports. Firms without an online presence were excluded because they had no documentary material. Source types are summarised in Table 4.1.

Table 4.1: Document Review by type and sector

Document Type	Forestry	Salmon Farming
Company websites	22	20
Sustainability, Integrated or Annual Report		
2004	3	0
2006	3	3
2008	3	4
2010	3	8
2012	3	8
2014	3	10
2015	3	10
2016	3	7
Total	24	51
Other		
• Forest Management Plans	68	13
• Forest Survey Reports		
• Forestry Operational Documents		
• Environmental/ CSR Policy Declarations		

Interviews with 21 senior and middle managers and four industry association representatives across both sectors supplemented the document review (Rydin and Falleth 2006). Interviews explored strategic and operational decisions, internal and stakeholder relationships, and the development of ongoing projects. See Table 2 for a summary.

Business interviews were complemented by 49 stakeholder interviews to: a) understand the demands placed on businesses in each sector regarding biodiversity, and b) avoid risking a partial understanding of business perceptions and actions regarding biodiversity due to “retrospective sense-making” in corporate accounts (Eisenhardt and Graebner 2007: 28). Boiral and Heras-

Saizarbitoria (2017b) recommend using more diverse and detailed sources of information, including stakeholders involved in biodiversity actions, to triangulate corporate reporting and to understand stakeholder priorities regarding biodiversity. Stakeholders were identified through existing literature and discussions with experts working within and / or studying one of or both sectors in Chile. The range of participants is summarised in Table 4.2.

Table 4.2: Respondents by sector and type

Respondent Type	Forestry	Salmon Farming	Multiple sectors	Total
Key informants/ Industry Experts				
Academic researchers; former managers; industry observers	2	2	1	5
Corporate Representatives				
Business Development/ Corporate Relations	5	2	-	7
Operations/ Environment	6	8	-	14
Industry Association representative	2	2	-	4
Stakeholders				
Conservation biologist (University)	2	2	1	5
Environmental Consultant	2	-	3	5
FSC Board Member	2	N/A	N/A	2
NGO representative	3	2	7	12
Professional Association representative	1	-	-	1
State agency and ministry representative	3	3	4	10
Supply chain (Breeding & Eggs, Diagnostics, Fish Feed, Genetics, Oceanography)	-	5	-	5
Total	28	26	16	70

Material was gathered over several stages, including fieldwork in Chile.

Scoping (September to October 2015): involved a review of corporate reports and websites, and the websites of relevant stakeholders to generate a) themes for interview and b) a sample of organisations and target participants. The sample included secondary and some tertiary targets if the primary target was unavailable or unwilling to participate. Targets were cross-referenced with recommendations from each participant to check if any individuals or organisations should be added.

Interviews (November 2015 and May 2016): covered the Metropolitan, Bio, Araucania and Los Lagos Regions of Chile. 67 face to face interviews, three via Skype; 66 conducted in Spanish and four in English. Participants were recruited via e-mail and telephone, sometimes after recommendation by other participants. Fieldwork continued until the point of saturation, i.e. until similar themes continually reappeared and new interviews yielded few or no insights (Bauer and Arts 2000).

Document review (January to March 2017): involved downloading all relevant documentation and capturing content from corporate websites.

4.3.3 Analysis

Data were analysed inductively using NVIVO 10. Formal reports were reviewed in their original form, with text from websites and summaries of other documents collated in an Excel spreadsheet. Interviews were transcribed by a native Spanish speaker and checked against original recordings; the interviews in English were transcribed by the lead author. There were several phases of analysis: 1) Reading and coding formal corporate reporting, grouping individual codes into themes, repeating this process for interviews with managers and industry association representatives. 2) Reviewing codes to identify additional details from manager interviews and any disparities between the interviews and formal reports. 3) Repeating the reading and coding process for stakeholder interviews. 4) "Within-case" analysis (Eisenhardt 1989: 539-540) to understand similarities and differences between corporate and stakeholder accounts in each sector. 5) "Cross-case" analysis (Eisenhardt 1989: 540-541), combining corporate and

stakeholder accounts for forestry and separately for salmon farming to identify similarities and differences between sectors.

4.4 Findings

In this section we highlight differences in perceptions and actions regarding biodiversity in forestry and salmon farming in Chile, both across sectors and between corporate and stakeholder accounts. We explore the reasons for these differences in the discussion.

4.4.1 Differences in perceptions and actions regarding biodiversity by sector

4.4.1.1 Forestry

Forestry firms focus on native forest when discussing biodiversity: “ARAUCO is committed to the protection of the native forests on its land, understanding that the sustainability of its production processes is closely tied to the biodiversity and ecosystem services of the territory it inhabits. Monitoring enables the Company to identify changes and implement prevention and restoration actions” (ARAUCO 2017: p. 84). Firms highlight restoration and monitoring activities: “Forestal Mininco has a strong commitment to the conservation of native forests, demonstrated in its interest in understanding and protecting them, determining the presence of endangered plant and animal species, and identifying, managing and monitoring high conservation value areas (HCVAs)” (Forestal Mininco 2017).

The three largest firms go further than smaller firms and by joining the NGP initiative they are considering their impacts on ecosystem services such as “water provision, scenic beauty, carbon storage, recreation and tourism opportunities, and biodiversity conservation” (Masisa 2017). However, even the smaller firms accepted that their operations must account for biodiversity: “We are aware that our company’s future depends on nature’s future. As such, we take care over every detail of our production process, with the aim of assuring environmental sustainability” (Compañía Agrícola y Forestal El Alamo 2017).

Cooperation with stakeholders interested in and affected by decisions regarding biodiversity is accepted as an important part of management activities: “we must

have all those who are interested in this subject at the table” (I6, Manager, Forestry Firm). Universities and conservation NGOs are valued for their expertise: “ARAUCO [...] is spearheading joint scientific research programs with universities, public institutions and NGOs; encouraging innovation through the development of projects; and is managing the environmental monitoring of biodiversity and research programs related to the fulfilment of environmental commitments.” (ARAUCO 2017: p. 82). As one manager put it: “there’s a level of specialisation that the company could never have” (I27, Manager, Forestry Firm).

Local community support is important: “[t]his work is being carried out jointly with the community, which plays a fundamental role in the protection of the remaining native forests, as well as in the care after the planting of native species or in their natural regeneration.” (CMPC 2017: p. 215). Firms are “going to handle and have to develop science and technology, and the procedures to achieve that aren’t something that they understand in detail, so they are going to need lots of support from universities, from NGOs and from communities to be able to advance. This is an important point for forestry firms” (I25, Manager, Forestry Firm).

Stakeholder engagement is also about retaining social legitimacy: “who you are paying for research is done with a certain [level of] attention to showing that the practices that are being implemented are harmless and that they are also good for biodiversity” (I31, Manager, Forestry Firm). Biodiversity is valued for multiple reasons, not simply sustainability: “you’re conveying that you’re a company that’s concerned about these subjects and that generates value, it generates internal value and it generates value amongst stakeholders and, finally, it generates commercial value too” (I65, Manager, Forestry Firm). Managers argued efforts to consider biodiversity are complex, with uniform approaches unsuited to managing diverse demands across different areas: “it has taken us a lot of time to sit at the same table, talk about common issues, and that takes time. And if you need to develop... you know local... information, you need to develop management plans at a local level, all of that needs to be worked together with all the actors ... in the field” (I4, Manager, Forestry Firm).

Managers emphasised limits to forestry firm responsibilities regarding biodiversity: “you have to reach a point where you are capable of, of management ultimately, you can’t prioritise everything [because] that means you can’t manage everything [...] For us biodiversity management is based on this mechanism of prioritisation” (I66, Manager, Forestry Firm). Managers were defensive about

plantation practices, arguing that they should not be expected to meet the demands of conservation NGOs and others that they adapt their practices: “it’s purely ‘conservation’ and they’re not looking at the beneficial role of plantations. They see it as not good, sometimes, because they’re just one species, over large areas, and what’s more they’re cut-down, so they like native forest, so, for them, there must only be conservation, but that’s one extreme” (I7, Manager, Forestry Firm).

4.4.1.2 Salmon farming

Salmon producers seldom refer to “biodiversity”, preferring to communicate about sustainability: “Marine Harvest is aware of the environmental and social challenges that the aquaculture industry is facing” (Marine Harvest 2017c). Producers associate sustainability with the viability of the industry: “Today the focus is on people, benefits and the planet; aquaculture must be socially and environmentally sustainable to be profitable in the long term” (Marine Harvest 2017c). Like forestry firms, salmon producers declare a responsibility for biodiversity: “we feel that we are part of the community in which we live and we are convinced that our development should be in harmony with our surroundings, not only with the environment, but also with society. As a company we are strongly committed to manage our growth responsibly and sustainably to give the best we can to future generations.” (AquaChile 2017).

Producers focus on managing impacts at a site level and along the supply chain: “We focus on good farm management in an effort to increase survival, manage disease, reduce medicine use and prevent escapes, all of which safeguards wild fish populations and biodiversity” (Marine Harvest 2017b: p24). Investment in science and technology feature prominently: “[t]his mission has led the company to introduce technology and world-class to its value chain” (Friosur 2017). GSI members introduced the Fish Feed Ratio (FFR) to indicate fish content in feed and demonstrate efforts to reduce impacts on wild fish populations: “Marine Harvest is driving change in industry practices and pioneering technology that will ensure a sustainable supply of food for the future” (Marine Harvest 2017a).

As in forestry, producers recognise the need for stakeholder engagement regarding impacts on biodiversity: “[n]owadays what people are requesting, what some retailers are requesting, is that effectively you are sustainable across a broad spectrum” (I42, Manager, Salmon Producer). Producers refer to multiple stakeholders “Blumar understands Sustainability as collaborative work with its

stakeholders; defined as workers, clients, providers, contractors, communities, investors, the natural environment, society, and regulatory bodies; to generate economic, social and environmental value in the medium and long term” (Blumar Seafoods 2017: p. 62). That work includes “keeping a constant dialogue with the community and the authorities” and obtaining “international certificates that endorse our processing practices and our important commitments to the environment” (AquaChile 2017).

Yet tensions with stakeholders regarding biodiversity, particularly conservation NGOs, is common: “we’re a long way apart, indeed, as we were discussing before it’s because they are requesting that antibiotic use is more open” (I62, Manager, Salmon Producer). Some conceded that they needed to do more both in terms of community engagement and improving knowledge of biodiversity: “ultimately, we’re falling short in, in investing more in science to better understand the environment” (I62, Manager, Salmon Producer). As one manager put it: “currently we know more about space than we do about the sea” (I42, Manager, Salmon Producer). Instead, producers prefer to focus on EIAs, meaning “each producer conducting environmental studies on their concessions, but there aren’t environmental studies of the [wider] area, or larger zones” (I62, Manager, Salmon Producer).

Although admitting some shortcomings, producers mostly defended current practices: “Cermaq has developed an antibiotic policy emphasizing a sustainable use of antibiotics. Antibiotics are used only when strictly needed and only upon approval by an authorized veterinarian” (Cermaq 2015: p. 17). Producers also point to ecological challenges faced in Chile that are less prevalent elsewhere: “there are issues with the environment, such as Caligus, sea lice, there are areas that have more and others with less, and [quantities] don’t 100% depend on what you do, so, this indicator is difficult to fulfil” (I49, Manager, Salmon Producer). Consequently, achieving standards such as the ASC are seen as: “a rather ambitious certification and for most companies it’s costly to implement” (I41, Manager, Salmon Producer).

Managers were clear that biodiversity came secondary to market considerations. “[T]he main concern in this business is always going to be making money and after this, if you’re making money, sure, you’re going to take decisions more... conceived more for the natural environment and in reducing environmental impacts” (I63, Manager, Salmon Producer). Managers identified multiple

limitations on their capacity to act regarding biodiversity to defend their stance: ultimately, there are so many fronts to work on; there are environmental issues, labour issues, issues with local community relations” (I62, Manager, Salmon Producer). Although financial constraints were a more acute issue for smaller producers with fewer concessions, even larger producers cited profit margins as a reason for inaction on biodiversity: “you can improve, certify, reduce production, search for the best feed, already major expenditures, and obviously, these are going to depend on whether business is good” (I63, Manager, Salmon Producer).

4.4.2 Differences between corporate and stakeholder accounts regarding biodiversity

4.4.2.1 Forestry

Stakeholders agree that forestry firms have a “different attitude to that they had 15 years ago” (I59, Government Agency). Many cited the role of FSC Chile and needing to meet new standards “if certification hadn’t existed, perhaps this bridge for dialogue, to go beyond certification, wouldn’t have existed, the conditions wouldn’t have existed” (I8, Government Agency). Firms were exposed to new forms of knowledge: “other professionals entered, for example biologists, sociologists, anthropologists, who were very rare to see before” (I8, Government Agency). Consequently, “what certification has done is to bring home that there are rising standards, rising environmental requirements” (I14, Conservation Biologist, University). Firms accept they must consult over decisions affecting biodiversity: “before the firm was the owner: ‘this is my land, and it is private land and, therefore, I’ll do what I want with my private land’. This has changed [...] it has ensured more effective communication with the same groups that didn’t happen before” (I8, Government Agency).

Yet stakeholders who have worked closely with forestry firms felt they could go further “we’re still at a very basic level” (I1, Conservation Biologist, University). Stakeholders noted: “certification systems are defined by landowner, not by landscape” (I30, Government Agency), failing to encourage innovation regarding biodiversity: “[w]ith respect to the High Conservation Value Forests, generally they are forests conserved simply for exclusion from use, and not for monitoring, nor to transform them into an asset for, or part of, a system of conservation” (I59, Government Agency). Some went further: “the [FSC] management plan is not a plan that allows you to look at biodiversity, maybe its destruction” (I23, Conservation NGO).

Many stakeholders also felt that the big three firms were slow to respond, “because we have a high concentration of land amongst a few companies, I’d say that that the companies delay, ultimately they delay in acknowledging these effects” (I5, Government Agency). Firms were seen as conservative in regarding further reform, summarised as: “stop, too risky, too innovative” (I14, Conservation Biologist, University). Whilst welcoming increased dialogue, stakeholders felt that the firms used it as a tool to manage the reputational impact of contentious topics, rather than to engage in a concerted effort to resolve underlying issues: “mere discussion won’t be enough [...] they find it hard to understand that these are long processes that won’t simply be resolved [by] collecting information, but [by] showing a change of action” (I59, Government Agency). Some were also suspicious of forestry firms’ intentions, feeling that they found excuses for not acting: “[w]hy has the huillin, the river otter, disappeared? *It’s climate change*... it’s a handy tool, the tailor-made response” (I24, Conservation NGO).

Although stakeholders generally agreed that forestry firms had changed in terms of their activity, there were different opinions about how best to achieve further reform. Some conservation NGOs defended talking to and compromising with forestry firms to achieve change: “normally we don’t like to leave our comfort zone, but we left our comfort zone” (I22, Conservation NGO). All stakeholders – conservation biologists, environmental consultants, NGOs, and state representatives – felt that whilst practices had changed, forestry firms’ remained focussed on productivity and plantations, with limited regard for biodiversity itself.

4.4.2.2 Salmon farming

Stakeholders had contrasting views on salmon producer understanding and consideration of biodiversity. Some were positive: “[i]n terms of sustainability, I think we’ve made fairly good progress” (I70, Conservation NGO). Conservation NGOs, representative of state authorities and scientists working along the supply chain pointed to investment in new technologies and moving concessions out of lakes as examples of reducing impacts on biodiversity. A few felt attitudes were changing, away from seeing “native fauna as species that threaten salmon” and that “a new awareness is increasingly evident” (I5, State Agency), reflected in commitments to support Blue Whale conservation, for example. Producers have moved from a “less rigorous” to “a better understanding of these variables” (I68, State Agency). Even stakeholders critical of producers felt that relations had

changed: “now there is some proximity, [for example] with people from SalmonChile [...] it wasn't always this way” (I43, Marine Biologist, University).

Some felt that market and social pressure was having an influence on: “how the product and how it is produced are perceived” with “pressure by NGOs, like us” (I61, Conservation NGO). Others noted producers had begun to look beyond the supply chain for learning: “recently they have realised that [this] information is necessary” (I44, Aquaculture Scientist, University). Representatives of state agencies accepted that salmon producers faced multiple challenges: “they are caught in a tight spot, it's an inflexible and complex context, in that it's very hard to change course” (I5, State Agency). Even those with a more positive outlook felt ASC standards, the most demanding in environmental terms, would be difficult to achieve: “it's not that they aren't viable for Chile, it's just that it takes a lot to achieve them” (I70, Conservation NGO).

Whilst conceding salmon producers face significant challenges, many stakeholders argue they must do more regarding biodiversity: “yes, they've progressed, but many issues remain [unresolved]” (I43, Marine Biologist, University). Many were critical of producers' attitude to change: “[it is] an extremely aggressive sector” with a “brutal willingness to invest, to [take] risks” (I5, State Agency). Stakeholders feel producers resist change, preferring to: “talk about sustainability, but I think they lack a definition, an understanding of what sustainability really means. They believe it is... that this tripartite balance doesn't exist, and they only advance on economic issues, and a little on social ones, but [only] how they interpret social links and interactions” (I61, Conservation NGO).

Consequently, “the relationship with communities continues to be unfriendly, it's like a private enterprise that uses the space but doesn't necessarily interact with the others” (I37, Community NGO). Several stakeholders cited producer attitudes to engagement on environmental and social issues as the basis for their poor image: “the view of the salmon farming sector at a national level isn't so favourable, because the salmon farming sector has been very inward looking” (I68, State Agency). Stakeholders wonder whether salmon producers really understand their impacts on biodiversity: “there's a very superficial view, we believe that they aren't asking the right questions” (I61, Conservation NGO). As one observer working on projects in Puerto Montt put it: “one is left with the feeling that there is no learning in the industry” (I36, State Agency).

Table 4.3: Key themes regarding biodiversity across forestry and salmon farming in Chile

	Forestry	Salmon Farming
Corporate accounts	<ul style="list-style-type: none"> • Focus on native forest, HCVAs and community engagement when discussing biodiversity • Impact of FSC certification on conservation efforts and change in organisational culture/ attitudes towards native forest conservation • Stakeholder dialogue positive for building understanding but also time consuming • Limits to responsibility for native forest conservation • Importance of plantations for providing timber and reducing impacts on native forest 	<ul style="list-style-type: none"> • Focus on management of impacts at a site-level and along supply chain (e.g. FFR) when discussing biodiversity • Emphasis on science and technology (e.g. antibiotics, salmon genetics) to manage ecological threats (e.g. caligus, SRS predators) • Financial instability and restrictive sanitary and environmental regulations limit capacity to reform • Stakeholder engagement is complicated by poor image and failures in communication • Importance of salmon farming to the Chilean economy and ensuring stable food supply
Stakeholder accounts	<ul style="list-style-type: none"> • FSC certification led to small changes in corporate attitudes and operations regarding native forest • Forestry firms are reactive rather than innovative: change only occurs through external pressure • Forestry firms could do much more to reform plantation practices • Firms exploit unstructured dialogue to avoid further reform • Further forest conservation is complicated by fragmented governance and limited state interest regarding biodiversity 	<ul style="list-style-type: none"> • Producers are more aware of sustainability but do not understand biodiversity or their impacts on it • Producers are resistant to reforming current practices, particularly antibiotic use • Poor relationships with local communities are due to producer attitudes and failure to reform current practices • Current regulations regarding biodiversity are inadequate but the state lacks the interest or capacity encourage reform

4.5 Discussion

The findings demonstrate contrasting perceptions and actions regarding biodiversity in Chile, both between the forestry and salmon farming sectors and businesses and stakeholders. This section considers the role of local contexts in shaping business perceptions and actions regarding biodiversity and implications of the findings for debates regarding the business case for action on biodiversity and the role of reporting in biodiversity management by business. It concludes by reflecting on limitations and avenues for future research.

The forestry and salmon farming cases support the association between business sector and approaches to biodiversity, but indicate that factors specific to Chile are also important (Bhattacharya and Managi 2013; Boiral and Heras-Saizarbitoria 2017b; Boiral and Heras-Saizarbitoria 2017a). Mirroring findings in other contexts forestry firms focus on certification, minimising operational impacts and local community engagement (D'Amato *et al.* 2016; Boiral and Heras-Saizarbitoria 2017a; Toppinen *et al.* 2015). Similarly, salmon producer views on sustainability and dealing with threats align with narratives identified elsewhere (Vormedal 2017). Non-sector specific factors also feature. Forestry firm attitudes and actions regarding biodiversity are focussed on native forest conservation and have evolved with the implementation of FSC certification. Salmon producers consider biodiversity through what they see as Chile's restrictive regulations regarding the environment, sanitation and the concessions system. Bigger firms are doing more than smaller firms in each sector. However, these differences largely reflect scale and underlying attitudes regarding biodiversity are more closely aligned with the firm's sector than its size. Consequently, perceptions and actions regarding biodiversity reflect sector differences, but local contexts also influence developments (Boiral and Heras-Saizarbitoria 2017a).

Businesses in both sectors consider biodiversity more in terms of managing an external reputational risk than exploiting an opportunity (D'Amato *et al.* 2016). Firms do enough to meet regulatory requirements and market expectations, but neither sector is thinking innovatively about the role they can play in biodiversity conservation. Instead, protecting core operations remains the priority. Forestry firms safeguard plantation practices by doing enough to retain FSC certification. In formal reports they emphasise conservation and community engagement, whilst downplaying negative impacts in plantations (Boiral and Heras-Saizarbitoria 2017b; Joutsenvirta 2009). As one stakeholder summarised: "they are still in the era of High Conservation Value Forests, and eventually [wildlife]

corridors, but they don't look much beyond that" (I59, State Agency). Salmon producers highlight efforts to reduce impacts on biodiversity through EIAs, along the supply chain, investing in technology, and bigger firms via the Blue Whale conservation project, for example. Managers defend antibiotic use by highlighting the range of ecological, regulatory and financial challenges that they face. Producers also suggest that poor communication about their impacts on biodiversity, rather than comprehension of alternative approaches, is a key problem.

Although firms in both sectors advance an ethical/ moral case to act on biodiversity in formal reports, manager and stakeholder interviews indicate that these concerns are not as high on corporate agendas as some studies have suggested (D'Amato *et al.* 2016; Boiral and Heras-Saizarbitoria 2017a; Liempd and Busch 2013). As the findings demonstrate, firms in both sectors feel there are strict limits on their responsibilities to act regarding biodiversity conservation. Firms in both sectors are resisting pressure to go beyond what is strictly required (FSC standards in forestry, environmental regulations in salmon farming). Each sector deploys slightly different techniques to minimise responsibilities regarding biodiversity. Forestry firms emphasise their adherence to FSC standards to underline their conservation credentials, whilst using discussion to delay further reforms desired by stakeholders. Salmon producers blame regulatory and environmental challenges without being prepared to invest more to investigate alternative approaches to managing impacts. Whilst outwardly accepting moral responsibility for acting regarding biodiversity, firms in both sectors are avoiding the fundamental reforms required to meet these commitments in practice (Liempd and Busch 2013; Jones and Solomon 2013; Natural Capital Coalition 2016).

The limited impact of formal reporting in changing how either sector understands or acts regarding biodiversity aligns with the findings of other studies (Boiral 2016; Jones and Solomon 2013; Tregidga 2013). Even the practices of bigger firms in forestry and salmon farming, and who adhere to GRI requirements, demonstrate its limited impact in leveraging change (Rimmel and Jonäll 2013; Milne and Gray 2013). Stakeholder accounts indicate that forestry firms – and salmon producers even more so – still struggle for legitimacy at a local level (Ehrnström-Fuentes and Kröger 2017; Boiral 2016). Yet by complying with voluntary standards in forestry and statutory regulations in salmon farming alongside formal reporting, firms retain legitimacy in the markets they sell to. Applying more sophisticated reporting tools, such as the NCP, might address problems with transparency.

However, managing biodiversity entails more than agreeing a set of indicators: it means integrating multiple perspectives and values (Jones and Solomon 2013; Milne, Tregidga and Walton 2009; Ruckelshaus *et al.* 2015). Whilst Chilean forestry is far from a perfect case, progress came through dialogue with stakeholders changing the debate from “confrontational, ideological, value-based, to something much more evidence based” (I5, Government Agency).

Formal reporting focussed on local contexts is problematic, not least in complicating attempts at direct comparisons in performance between firms and across different settings. However, integrating different views into biodiversity reporting could more accurately reflect the local contexts firms are operating in, for instance demonstrating competing conservation priorities (Barkemeyer *et al.* 2015; Landrum and Ohsowski 2018). Reporting against baselines set in the local context would also provide more reliable measures of progress made regarding biodiversity restoration. Focussing on increased dialogue, rather than communication, could ensure practices that are more effectively tailored to achieving consensus between firms and local stakeholders, rather than masking tensions between competing priorities as the cases here demonstrate. Ultimately, the findings here suggest that achieving a change in corporate perspectives regarding biodiversity is likely to require broader systemic changes too. Managers of forestry and salmon farming firms may have over-emphasised the limitations on their capabilities to act regarding biodiversity. However, firms may need state assistance to map-out priorities regarding biodiversity and incentivise change through regulatory reform (Ebeling and Yasue 2009; van den Burg and Bogaardt 2014).

Although the findings advance understanding of business perceptions and actions in several ways, further work is required to substantiate the work here. Firstly, the findings relate to two sectors within the same national context, and may not be replicated elsewhere. For instance, state agencies may be more knowledgeable about biodiversity and have more coherent conservation policies than in Chile. Accordingly, stakeholder engagement might be more structured and/ or corporate biodiversity strategies may be more proactive (Vormedal 2017). Similarly, sector dynamics may be different, with firms able to use formal biodiversity reporting to differentiate from competitors to a greater extent than the findings here suggest (particularly in the case of the two biggest forestry firms) (Boiral and Heras-Saizarbitoria 2017a). Secondly, this study covered basic reporting mechanisms. Examining more advanced reporting such as the NCP

(Natural Capital Coalition 2016) and measurement tools like IBAT (Liempd and Busch 2013) might demonstrate alternative, potentially more developed, corporate understandings of biodiversity in relation to their local contexts than the findings here suggest. Thirdly, although this study identified few differences in perceptions and actions regarding biodiversity within each sector, exploring individual organisations in detail, with more systematic sampling of firms by factors such as size and ownership may reveal routes to changing organisational cultures and achieving reform from within, rather than relying on external pressure.

4.6 Conclusion

This paper has combined corporate and stakeholder accounts to demonstrate that business perceptions and actions regarding biodiversity are contingent on multiple, interacting factors relating to both the sector and context they operate in. The contrasts between the forestry and salmon farming sectors in Chile reflect different operational impacts on biodiversity. However, perceptions and actions are also shaped by distinct regulatory contexts and forms of stakeholder engagement. Formal corporate reporting provides a window into perceptions and action regarding biodiversity but has failed to leverage change with businesses downplaying negative impacts and emphasising positives (Boiral 2016). Stakeholder "counter" accounts provide alternative and additional information that firms may be unwilling to disclose, particularly regarding negative impacts on biodiversity (Boiral 2013). A more holistic view confirms that both sectors perceive biodiversity as a reputational risk with actions generally orientated to manage external expectations. Despite pressure to reform, businesses focus on core operational aims and express clear limits to their responsibility to manage impacts on biodiversity. Whilst these findings apply to the Chilean context and must be tested elsewhere, there are implications for current debates and future research on corporate reporting on biodiversity.

Firstly, biodiversity reporting needs to more accurately reflect the local contexts businesses are based in. Such an approach complicates comparisons of performance between firms, even in the same sector, and in developing suitable indicators. However, accounting for local contexts can help in measuring progress against baselines. It could also be tailored to integrate and reflect different objectives and views on what is important regarding impacts on and management of biodiversity. If these considerations are not taken into account, some stakeholders – especially local communities – are likely to remain frustrated

with corporate actions regarding biodiversity, as firms retain legitimacy with distant markets at the expense of local populations (Ehrnström-Fuentes and Kröger 2017). Secondly, the findings highlight potential limitations to a business case for biodiversity framed within business self-interest. If appeals are based on potential opportunities or risks alone, the findings suggest – as have other studies – that businesses will use reporting as tool to manage perceptions rather than increase transparency regarding biodiversity (Boiral 2016; Milne and Gray 2013; Milne, Tregidga and Walton 2009). Increased stakeholder dialogue may widen debate on the values businesses should share, what biodiversity means, and the potential and limits of corporate action on biodiversity. In the absence of broader reform, alongside changes in consumer expectations regarding biodiversity performance, little substantive change is likely in Chile – or elsewhere – through corporate reporting alone.

4.7 Bibliography

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Frame C: Contrasts in forestry and salmon farming activities. Images: Thomas Smith (2016)

Native forest restoration, conservation and water management activities contrast with clear-cutting of non-native plantation forest (top four photos). Salmon producers operate across Puerto Montt with some smolts visible from the SalmonChile headquarters. A short walk along the harbour reveals opposition from some to their activities and their perceived effects.

Chapter 5 – Social underpinnings of ecological knowledge: business perceptions of biodiversity as social learning

This chapter has been accepted as:

Smith, T., Holmes, G. and Paavola, J. Social underpinnings of ecological knowledge: business perceptions of biodiversity as social learning *Organization & Environment* (IN PRESS)

Abstract

Biodiversity loss presents a serious business risk, particularly for natural resource-based sectors. Improved ecological knowledge has been identified as a means to change perceptions and motivate operational reform regarding biodiversity, but the processes by which businesses gain such knowledge remain unclear. One possible process is to use social learning. Social learning describes processes of ecological knowledge transfer and identifies essential components of successful learning processes. Social learning is applied to forestry and salmon farming in Chile. The role of the Forestry Stewardship Council as a “bridging organisation”, prompting learning by forestry firms, contrasts with the absence of such an organisation in salmon farming. This paper demonstrates how even with improved ecological knowledge firms may not fully transform operations, instead seeking to protect core activities from substantive reform. The paper reflects on potential applications of social learning to other socio-ecological contexts, and areas for future research regarding business and biodiversity.

5.1 Introduction: biodiversity, business, and ecological knowledge

Biodiversity – the variety and variability of genes, species, and ecosystems – underpins life. Its loss poses serious risks to business operations, threatening resource availability, supply chains, and “ecosystem services” such as water provision (Bishop 2012; Evison and Knight 2010; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). These risks are recognised at a global level (Evison and Knight 2010; Natural Capital Coalition 2016; World Business Council for Sustainable Development 2012) but further research is needed to understand business perceptions and actions regarding biodiversity in local contexts (Reade *et al.* 2015; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). Ecological knowledge can help businesses to transform operations regarding biodiversity, but gaining this knowledge often requires collaborations beyond organisational boundaries (Pogutz and Winn 2016; Boiral and Heras-Saizarbitoria 2017). Managing impacts and dependencies on biodiversity can therefore be very complex, and so biodiversity management means integrating diverse and sometimes competing forms of knowledge (e.g. scientific, economic, and indigenous) and values (e.g. spiritual, commercial, social, normative) (Boiral and Heras-Saizarbitoria 2017). The processes by which learning occurs, and how ecological knowledge converts into action across different contexts remain unclear. We use social learning as the lens through which to explore the processes of ecological knowledge transfer in the Chilean forestry and salmon farming industries.

Social learning has been successfully applied to explore biodiversity management in natural resource based settings (Siebenhüner, Rodela and Ecker 2016; Berkes 2009) but rarely used to understand learning by business (d'Angelo and Brunstein 2014). Social learning is rooted in exploring processes in socio-ecological systems (SES), where “people depend on resources provided by ecosystems, and ecosystem dynamics are influenced, to varying degrees, by human activities” (Chapin *et al.* 2009: p. 2). Consequently, it is suited to understanding contexts where businesses must account for multiple social and ecological factors. Forestry and salmon farming are vital to the Chilean economy, but where forestry firms have sought to control their impacts, salmon producers remain largely inactive (Latta and Aguayo 2012). We investigate the role of the Forestry Stewardship Council (FSC) as a “bridging organisation”, enabling forestry firms to learn about biodiversity, different values associated with it, and to reform operations. We contrast the forestry and salmon farming cases to

emphasise the importance of bridging organisations in enabling learning and action, and highlight the role of stakeholders and institutions in prompting and enabling learning about biodiversity. We consider why ecological knowledge transfer may lead to reform, but not transformation, of operations regarding biodiversity.

We demonstrate how it is possible to apply social learning to understand processes of ecological knowledge transfer to business, highlighting how the social context (particularly regulations and stakeholder interactions) shapes perceptions and actions regarding biodiversity in relation to operations in forestry and salmon farming in Chile. We respond to calls to advance understanding of the tensions underlying corporate sustainability (Van der Byl and Slawinski 2015) by exploring some of the unique challenges that tackling biodiversity loss presents, particularly the processes by which firms might deepen their ecological knowledge (Winn and Pogutz 2013). Our findings have potential applications to understanding learning and action regarding biodiversity in other contexts where natural resource-based firms are operating. We conclude by exploring strengths and limitations of this research, regarding applications to other contexts and sectors, and identify future avenues of research.

5.2 Factors in business learning about biodiversity

A wide variety of literature indicates the importance of ecological knowledge in influencing business perceptions and actions regarding biodiversity. In this section, we identify the gaps in understanding processes of ecological knowledge transfer that we address through our study.

Ecological knowledge influences corporate perceptions regarding biodiversity. Concern about biodiversity loss is higher in sectors that face greater operational risks related to biodiversity (Bonini and Oppenheim 2010). Firms with biodiversity policies are often from sectors with the largest exposure to and impact on it, such as utilities and mining (Bhattacharya and Managi 2013). Measuring and reporting impacts on biodiversity aids comprehension (Jones and Solomon 2013; Samkin, Annika and Dannielle 2014; Rimmel and Jonäll 2013; c.f. D'Amato *et al.* 2015). Ecological knowledge is also important in motivating operational reform: better measurement is seen as critical in motivating operational reforms to account for biodiversity (Natural Capital Coalition 2016). Pogutz and Winn (2016) found the

process of learning about ecological impact stimulated operational innovations at food producer Barilla for instance, leading to deep reforms in farming practices.

The social context is vital in influencing ecological knowledge transfer. Stakeholders are integral to the learning process: suppliers and local authorities may shape corporate reforms regarding biodiversity (Pogutz and Winn 2016) and NGOs and public bodies can help businesses prioritise biodiversity activities (Overbeek, Harms and Van den Burg 2013; van den Burg and Bogaardt 2014). NGOs and conservation scientists assist businesses in understanding biodiversity's complexity and why conserving it matters (Boiral and Heras-Saizarbitoria 2017), for example by providing information in terms that they and other decision-makers can more easily understand (Oakleaf *et al.* 2013; Ruckelshaus *et al.* 2015). NGOs can also help to reduce operational impacts on biodiversity, by providing expertise and advice via formal collaborations (Robinson 2012).

Rules and regulations and voluntary governance arrangements can shape the business case to act regarding biodiversity influencing, and sometimes specifying, who is involved in providing ecological knowledge (Mulder and Koellner 2011; Wolf and Primmer 2006; Lambooy and Levashova 2011). Voluntary governance arrangements such as FSC certification require businesses to consult conservation NGOs and local communities regarding conservation measures (Boiral and Heras-Saizarbitoria 2017). Regulations regarding biodiversity may also influence when and how firms choose to engage with stakeholders concerning operational impacts (Houdet, Trommetter and Weber 2012; Rätty *et al.* 2016). Some regulations may stimulate reactive corporate strategies focussed on limiting stakeholder engagement, rather than proactive approaches that seek to account for biodiversity at the outset, and which include consulting multiple stakeholders (Houdet, Trommetter and Weber 2012).

Current literature indicates several gaps in understanding learning processes regarding biodiversity. Ecological knowledge influences corporate perceptions of biodiversity, whilst stakeholders and institutions shape processes of ecological knowledge transfer. The characteristics of successful learning processes, where biodiversity is accounted for and different forms of ecological knowledge are considered, remain unclear. The mechanisms by which different stakeholders influence business perceptions and actions regarding biodiversity are also

uncertain. Formal arrangements, such as inter-organisational agreements, may be critical to ensuring transformation regarding biodiversity management in some contexts, but informal relationships, like ad hoc working groups, may be important in others (Westley and Vredenburg 1997). By focussing on external processes we do not suggest that the internal dynamics of businesses are insignificant (Bansal and Roth 2000): gaining internal buy-in is important to ensure that boardroom decisions on biodiversity are implemented (Overbeek, Harms and Van den Burg 2013; Paoli *et al.* 2010). Multiple external processes influencing learning about biodiversity by businesses remain unexplored, though. We next outline how we will explain these processes.

5.3 Explaining business learning about biodiversity

The empirical literature highlights the importance of social contexts, particularly rules, regulations and stakeholder engagement in shaping learning about biodiversity. We outline below how social learning, supported by the concept of boundary objects and institutional theory, advances understanding of ecological knowledge transfer and operational reform.

Social learning describes the process through which new ecological knowledge translates into action regarding biodiversity (d'Angelo and Brunstein 2014; Siebenhüner and Arnold 2007; Siebenhüner, Rodela and Ecker 2016). We define social learning as “a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks” (Reed *et al.* 2010: "Conclusions") and “a process where organizations display behavioural changes” (Siebenhüner and Arnold 2007: p. 341). Communication with stakeholders is key to learning, enabling relationships to develop, different forms of knowledge to be transferred, and prompting changes in the outlook of the organisations involved (Siebenhüner, Rodela and Ecker 2016). As relationships evolve, knowledge and competences “scale-up”, facilitating the co-development of new biodiversity management practices (Berkes 2009; Pahl-Wostl *et al.* 2007).

Learning processes regarding biodiversity and ecosystem management are often dynamic, involving interactions between formal and informal institutions (Siebenhüner, Rodela and Ecker 2016). “Bridging organisations” are essential in facilitating these interactions, enabling dialogue and collaboration between firms and stakeholders (Berkes 2009; c.f. Folke *et al.* 2005; Reed 2008). As a “formal,

third party entity distinct from the individuals or organizations it connects” (Sternlieb *et al.* 2013: p. 121), (Folke *et al.* 2005), a bridging organisation provides a site for dialogue, knowledge transfer, trust building, conflict resolution, and potentially ad hoc cooperation to tackle specific issues (Berkes 2009; Sternlieb *et al.* 2013). Bridging organisations therefore span multiple functions and services, facilitating stakeholder engagement and learning, as well as enabling co-management of biodiversity and ecosystems (Berkes 2009).

Social learning and bridging organisations do not fully explain why in some instances co-management procedures may only result in “single loop” learning (superficial behavioural change), rather than “double loop” learning (transformation of attitudes and values) (Berkes 2009; d'Angelo and Brunstein 2014; Reed *et al.* 2010; Siebenhüner and Arnold 2007). Co-management procedures can be considered as a “boundary object”, operating within the broader functions of bridging organisations (Folke *et al.* 2005), enabling agreement between diverse actors on biodiversity management practices, but allowing for divergent views on the ultimate purpose of the procedures themselves (Carlile and Reberntsch 2003; Nicolini, Mengis and Swan 2012; Star and Griesemer 1989). Consequently, businesses might perceive co-management procedures as an end in their own right, focussing on tactical alliances, and minimal compliance, resulting in partial and provisional learning (Nicolini, Mengis and Swan 2012; Carlile and Reberntsch 2003). Whilst bridging organisations enable new procedures to develop therefore, businesses might treat these as boundary objects, resulting in more symbolic change.

Social learning also fails to explain what motivates learning processes amongst businesses regarding biodiversity, or why consequent operational reforms may not be uniform amongst all businesses. Social learning can be conceived as a process of de-institutionalisation, where existing practices are no longer socially desirable (Oliver 1992). Businesses can deploy different strategies in response to pressures to reform regarding biodiversity (Scherer, Palazzo and Seidl 2013; Boiral 2016). Some might concede to all demands or negotiate a compromise, resulting in substantive, possibly transformative reform (Scherer, Palazzo and Seidl 2013). Others may make symbolic concessions, managing stakeholder perceptions about the extent of reform (Scherer, Palazzo and Seidl 2013; Boiral 2016). The sources of pressure may also influence the extent of reform. Beyond-compliance reform is often due to pressure from customers, suppliers, or competitors, whereas more limited, sanction-avoiding behaviour occurs where

pressure from regulators, NGOs or civil society (Delmas and Toffel 2008; Testa, Boiral and Iraldo 2015). Firm size may also moderate the speed, depth, and/ or extent of reform, and hence the depth of learning that occurs (Delmas and Toffel 2004). Smaller firms are less visible and may not be compelled, or have the resources, to reform to the same degree as larger firms. Consequently, in evaluating the extent of operational reform regarding biodiversity, the sources of institutional pressure placed on businesses, and the size and resources of the businesses involved, must be considered.

To summarise, social learning provides a means to analyse ecological knowledge transfer processes. Where learning is occurring, we expect to see a bridging organisation help foster dialogue between diverse stakeholders, and the scaling-up of biodiversity co-management. A specific focus on co-management procedures themselves helps understand the degree of learning. Operational reform may vary depending on what businesses need to do to retain or regain social legitimacy, and the sources of social pressure. There may also be differences between firms, depending upon strategic choices and firm size.

5.4 Case Studies

Understanding corporate perceptions of biodiversity requires consideration of many variables relating to social and ecological contexts. Case studies enable detailed investigation of multiple variables, helping to understand phenomena in their context (Cresswell 2008; Yin 2014). Multiple cases can advance new theories and concepts (Eisenhardt 1989; Yin 2014). We adopted a “polar type” approach (Eisenhardt and Graebner 2007: p. 27), examining two sectors operating in contrasting socio-ecological contexts, with different responses to biodiversity management (see Table 5.1 and case histories below).

Table 5.1: Ecological interdependencies of forestry and salmon farming sectors⁵

Potential Impacts	Forestry	Salmon Farming
Operations on biodiversity	Damaging/ Reducing Biodiversity	
	<ul style="list-style-type: none"> Deforestation and degradation of native forest leading to reduction/ loss of habitat and species Land conversion, e.g. loss of space for agriculture and food production Reduction of non-timber resources for foraging species Pesticide use leaching into water supply Reduction in ecosystem services, e.g. water retention and soil nutrients 	<ul style="list-style-type: none"> Antibiotics and/ or hormones entering wildlife stocks Disease and/ or parasite transfer to marine fauna Effluent and eutrophication reducing water fauna Escapes introduce non-native species and predation of marine fauna Land conversion (where inland) Stress on wild fish stocks due to conversion to salmon fish meal
	Protecting/ Increasing Biodiversity	
	<ul style="list-style-type: none"> Plantations on degraded soil reduce stress on native forest and can prevent further soil erosion 	<ul style="list-style-type: none"> Reduced stress on wild fish stocks Reduction in land conversion for other protein sources, e.g. beef
Biodiversity on operations	<ul style="list-style-type: none"> Diseases spread more easily in monocultures, e.g. if all pine Growth cycles determine species choice for plantations (~10 to >80 years) 	<ul style="list-style-type: none"> Damage to cages, e.g. by seals Harvesting dependent upon hatching and growth rates (~2 to 3 years) Microbes and sea lice kill salmon Predation, e.g. by seabirds and seals

5.4.1 Forestry

Biodiversity management has changed considerably in Chilean forestry since the early 2000s. The 1974 Forestry Law (Ley 701) subsidised forestry firms planting on deforested and degraded land, but also saw firms substituting native forest with commercial plantations (Zamorano-Elgueta *et al.* 2015; Echeverria *et al.*

⁵ Drawn from PAWSON, S. M., A. BRIN, E. G. BROCKERHOFF, D. LAMB, T. W. PAYN, A. PAQUETTE and J. A. PARROTTA. 2013. Plantation forests, climate change and biodiversity. *Biodiversity and Conservation*, **22**(5), pp.1203-1227. and DIANA, J. S. 2009. Aquaculture production and biodiversity conservation. *BioScience*, **59**(1), pp.27-38.

2006). Substitution officially ended in 2003 after US NGO ForestEthics campaigned against retail chain Home Depot's purchase of timber sourced from native forests. In response, Arauco and CMPC, Chile's two largest forestry firms, signed commitments to stop harvesting native forest (Heilmayr and Lambin 2016). Forestry firms resisted pressure for further reform, particularly to adopt FSC certification: with support from state development agency CORFO instead created CERTFOR, their own certification standard organisation, with limited protections for native forest (Heilmayr and Lambin 2016). Substantive reform occurred when a pulp mill owned by Arauco contaminated the Río Cruces wetlands, resulting in the death of thousands of black-necked swans. Facing widespread public protest, Arauco and CMPC joined FSC Chile, achieving FSC certification in 2012 (Sepúlveda and Villarroel 2012).

After joining FSC Chile, cooperation between forestry companies, local communities and conservation NGOs has increased. A forestry dialogue (Diálogo Forestal), launched in 2009, brought together community and conservation NGOs with the major forestry firms to discuss issues related to plantation and native forest management. Chile's three largest forestry firms (Arauco, CMPC and Masisa) are involved in the World Wildlife Fund (WWF) New Generation Plantations (NGP) initiative, exploring ways to coordinate biodiversity management efforts such as the establishment of wildlife corridors to aid species migration across plantation sites (New Generation Plantations). Forestry firms also joined representatives from CONAF, the forestry agency, and other state agencies, community and conservation NGOs, and indigenous communities on the Chilean government's Forest Policy Council (CPF). The CPF has produced a strategy for Chilean forestry until 2050, including achieving sustainability (CONAF 2016). Tensions remain: forestry firms have yet to commit to the CPF's proposed strategy, conflicts with the indigenous Mapuche over land ownership are growing and disputes with local communities persist (Salas *et al.* 2016). However, the status of biodiversity has evolved with FSC membership, with greater dialogue regarding conservation.

5.4.2 Salmon Farming

Biodiversity management remains a peripheral concern in salmon farming in Chile. With state assistance, salmon farming rapidly expanded from the mid-1980s, but its geographic concentration in the Los Lagos region resulted in increased ecological stress, prompting a series of regulatory reforms in the early 2000s, including Environmental Impact Assessments (EIAs) and rules on

sanitation (Barton and Fløysand 2010). The outbreak of Infectious Salmon Anaemia (ISA) virus in 2007 exposed poor practice amongst producers and the inadequacy of these regulations (Buschmann *et al.* 2009). Recommendations from a “salmon roundtable”, comprising state agencies, salmon producers and their suppliers (Bustos-Gallardo 2013) led to tighter biosecurity regulations, a new Superintendent of the Environment (SMA), and increased oversight and enforcement powers for state agency Sernapesca (Barton and Fløysand 2010). Whilst producers have adopted voluntary standards, including ISO14000, Global GAP and Best Aquaculture Practices (BAP), certification has not had the same impact in salmon farming as in forestry (Cid Aguayo and Barriga 2016). The eight largest producers in Chile joined the Global Salmon Initiative (GSI), committing to achieving Aquaculture Stewardship Council (ASC) standards, but its reforming potential remains uncertain (Cid Aguayo and Barriga 2016).

Ecological crises have complicated stakeholder relationships: protests about redundancies following the ISA crisis led to industry association SalmonChile’s offices being burned down in 2009 (Latta and Aguayo 2012). An algal bloom in early 2016 forced some producers to close farm sites, writing-off a large proportion of their stock and dumping it in the sea (AQUA 2016). The simultaneous declaration of a Red Tide by the Chilean government prompted rioting by fishermen and local communities who blamed salmon producers for the crisis and loss of their livelihoods (Paz Infante Heymann 2016). Local communities and conservation NGOs remain peripheral stakeholders: neither group was invited to help the salmon roundtable response to the ISA crisis (Bustos-Gallardo 2013). Whilst GSI members participated in the WWF-led Aquaculture Dialogues, all producers have resisted the efforts of conservation NGO Oceana to disclose levels of antibiotic use (Esposito 2016).

The forestry and salmon farming cases demonstrate the evolution of contrasting approaches to conservation. Despite continued conflicts with stakeholders biodiversity appears to have gained higher profile amongst forestry firms. The FSC appears to have helped enhance ecological knowledge in forestry, but it is unclear how it has aided learning, or the depth of learning that has occurred. Little appears to have changed in salmon farming, but the reasons underlying continued inaction regarding ecological crises merits closer examination. In the next section, we detail our use of mixed methods to explore corporate perceptions and actions regarding biodiversity in Chilean forestry and salmon farming.

5.5 Data collection and analysis

Data collection was based on a method developed by Rydin and Falleth (2006) to research institutional and stakeholder dynamics in natural resource management. In stage one, we reviewed company websites and sustainability and annual reports, identifying key themes, projects, stakeholders, stated business priorities and activities regarding biodiversity. Documentary material often only provides partial insights: corporate reporting on biodiversity is generally characterised by selective disclosure on actions and motivations (Lähtinen *et al.* 2016; Boiral 2016; c.f. Rydin and Falleth 2006). Consequently, in stage two, we used interviews to explore key themes in greater depth.

Our principal interview targets were managers engaged with operations. We also approached business development and corporate relations managers in the largest firms if their role included some engagement with biodiversity. Managerial risk perceptions are vital in determining biodiversity management by businesses (Lambooy and Levashova 2011; Sharma and Nguan 1999) and we expected managers to offer strategic insights into the challenges and opportunities presented by the integration of biodiversity into operations. We interviewed stakeholders to 1) understand stakeholder priorities regarding biodiversity, and 2) triangulate views about interactions, minimising the possibility of “retrospective sense-making” and impression management by business participants (Eisenhardt and Graebner 2007: p. 28).

Stakeholder relevance regarding biodiversity varies depending on local context (Boiral and Heras-Saizarbitoria 2017; Reade *et al.* 2015). Accordingly, we considered the case histories of both sectors to generate our sample and revised our list following discussions with researchers, former managers, and industry observers based in Chile. Supplementing Boiral & Heras-Saizarbitoria’s (2017) approach using corporate reports and websites, we reviewed industry association, certification and Chilean government websites to identify stakeholders. In forestry, we checked FSC Chile board membership; and participants involved in the Diálogo Forestal (forestry dialogue) and NGP processes in Chile. In salmon farming, we searched for environmental consultants working on EIAs and explored websites of organisations involved in environmental and social campaigns. Conservation scientists, NGOs, local communities, and the state are recognised as key stakeholders regarding biodiversity management (Boiral and Heras-Saizarbitoria 2017; Pogutz and Winn 2016). We added representatives of industry associations, and community-based

NGOs to our sample for both sectors; environmental consultants in forestry, and senior managers and directors of oceanography firms, laboratories and feed suppliers in salmon farming (see Figure 5.1).

Some stakeholders were not included in this study (see Figure 5.1). Trades unions had limited involvement in biodiversity policy; certification bodies were also more peripheral stakeholders in Chilean salmon farming regarding biodiversity. The main retailers in both cases are based outside of Chile, but managers, NGOs working with retailers, and state representatives provided sufficient information to be able to understand retailer priorities regarding biodiversity management. We were unable to identify specific shareholders or corporate investors to approach, drawing instead on current and former managers to account for investor priorities. In mitigation, no participant mentioned active investor involvement regarding biodiversity, although with more time and resource we would target investor interviews.

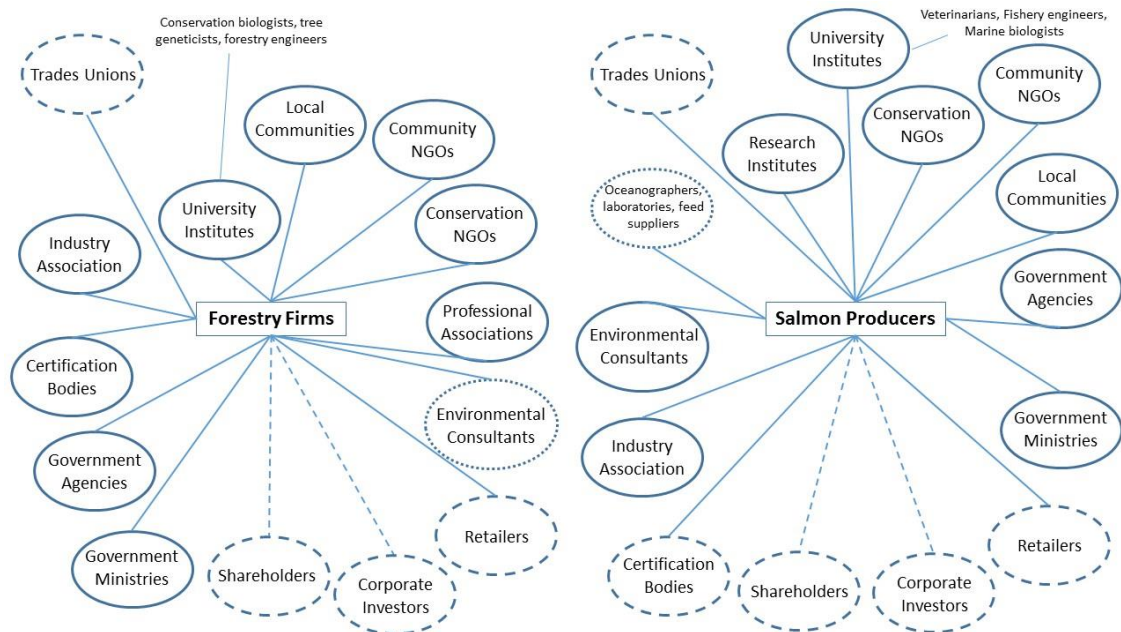


Figure 5.1: Stakeholders involved in biodiversity in Forestry and Salmon Farming in Chile

Fieldwork took place in Chile from November 2015 to May 2016, comprising 70 interviews in the Metropolitan, Bio Bio, Araucania, and Los Lagos Regions (see Table 5.2 for a summary). We also visited forestry operations and attended a forestry industry conference. Most interviews were face to face (three were via Skype), conducted in Spanish (four were in English). We continued until

saturation, i.e. until similar themes reappeared and new interviews yielded few insights (Bauer and Arts 2000). We had multiple records for each participant type to achieve a spread of interviews across firms and stakeholder types and to account for individuals and organisations unable to participate. We contacted named individuals directly; otherwise we contacted the relevant organisations requesting interview with someone in the target position. We cross-referenced our list of organisations with each participant to check for possible additions.

Table 5.2: Participants by sector and type

Respondent Type	Forestry	Salmon Farming	Multiple sectors	Total
Key informants/ Industry Experts				
Former managers; industry observers; researchers	2	2	1	5
Business Managers and Senior Managers, Directors				
Business Development/ Corporate Relations	5	2	-	7
Operations/ Environment	6	8	-	14
Stakeholders				
Conservation biologists (University)	2	2	1	5
Environmental Consultants	2	-	3	5
FSC Board Members	2	N/A	N/A	2
Industry Association representative	2	2	-	4
NGO representative	3	2	7	12
Professional Association representative	1	-	-	1
State representative	3	3	4	10
Supply chain (Breeding & Eggs, Diagnostics, Fish Feed, Genetics, Oceanography)	-	5	-	5
Total	28	26	16	70

We conducted interviews as guided conversations, structured around themes, retaining flexibility to explore important topics that had not been foreseen prior to interviews (see Figure 5.2). We checked terminology and suitability of interview content through conversations with key informants, along with the first five interviews for each case.

Business Managers	Stakeholders and Key Informants
<ul style="list-style-type: none"> Participant's role and expertise within firm; engagement with operations and understanding of biodiversity 	<ul style="list-style-type: none"> Individual/ Organisation's role and aims regarding biodiversity/ conservation; reforms that stakeholder wants to see/ is campaigning for
<ul style="list-style-type: none"> Main challenges facing firm regarding biodiversity 	<ul style="list-style-type: none"> Conservation challenges in Chile (If local organisation, focus on challenges in region)
<ul style="list-style-type: none"> Use of tools/ standards, e.g. FSC, ASC, to manage impacts on biodiversity Optional follow-up questions <ul style="list-style-type: none"> How tools and/ or standards help firms to manage impacts Challenges of implementing these tools/ standards 	<ul style="list-style-type: none"> Perceptions/ experiences of forestry firm and/ or salmon producer regarding <ul style="list-style-type: none"> Understanding of biodiversity Efforts regarding biodiversity management/ conservation
<ul style="list-style-type: none"> Challenges firm has faced/ is currently facing in implementing biodiversity practices 	
<ul style="list-style-type: none"> Impact of state regulations on corporate biodiversity strategy (e.g. Environmental Impact Assessments (EIAs), sector-specific laws) 	<ul style="list-style-type: none"> Perception/ experience of certification and/ or regulations in moderating forestry firm and/ or salmon producer actions regarding biodiversity
<ul style="list-style-type: none"> Stakeholder involvement in decision-making regarding biodiversity management Optional follow-up questions <ul style="list-style-type: none"> How decisions are communicated Stakeholders who make decision-making more problematic Sources of disagreements How manage disagreements 	<ul style="list-style-type: none"> Level and forms of engagement with forestry firms and/ or salmon producers Optional follow-up questions <ul style="list-style-type: none"> Involvement in decision-making/ consultation Areas of agreement/ disagreement
<ul style="list-style-type: none"> Views on main challenges and opportunities for firm regarding biodiversity in the next 5 to 10 years 	<ul style="list-style-type: none"> Views on main challenges and opportunities for forestry and/ or salmon farming regarding biodiversity in the next 5 to 10 years

Figure 5.2: Interview content by participant type

Interviews were independently transcribed by a native Spanish speaker and checked against original recordings; the four interviews in English were transcribed by the authors. We used NVIVO 10 to conduct multiple stages of coding, focussing on manager interviews (Bazeley and Jackson 2013). All coding was conducted by the lead author, with regular progress updates to refine codes. Through “within-case” data analysis (Eisenhardt 1989: pp. 539-540) we developed individual codes in Spanish, finalising them in English, and after several iterations created group and theme level codes (see Figure 5.3). We identified similarities and differences across cases using “cross-case” data analysis (Eisenhardt 1989: pp. 540-541).

	1. Individual coding	2. Group codes	3. Theme codes (x = group code)
Forestry	Change in attitude forestry firms Change in forestry more than certification Change in profile biodiversity Clear-cut practices endure Examples of cultural change Innovations with respect to biodiversity Masisa as a leader	Change in Chilean forestry over time (a)	Change in Forestry and biodiversity (a) Forestry Firm Interactions with Stakeholders Forestry Firm Perceptions of Biodiversity Institutional Impacts Plantations (b)
	Positive contribution plantations Important economic role plantations Plantations efficient Plantations save native forest Support for extension Ley 701	Positive contribution plantations (b)	
Salmon Farming	Algae Bloom unpredictable Climate change as major challenge Conditions are different in Chile Seals attacking nets SRS a major priority Trade-offs with feed Trade-offs with location	Environmental challenges (c)	Challenges (c) Change on the way Impact ISA Impact of regulations (d) Salmon farmer perceptions of industry Stakeholder interactions
	EIA structures measuring of impact Environment Department established after new regulations introduced Focus on monitoring Laws frequently change Legal focus on below surface Present aim to meet regulatory requirements Use of regulations to structure efforts to measure impacts	Activities defined by legal framework (d)	

Figure 5.3: Section of coding trees for forestry and salmon farming cases

5.6 Findings

The analysis identified three key themes from the material: 1) contrasting perceptions of biodiversity and responsibilities regarding its conservation between forestry and salmon farming firms; 2) the divergent impact of the FSC in forestry and state regulations in salmon farming in framing perceptions, learning and actions, and; 3) how engagement with stakeholders affected learning about biodiversity. In the discussion section, we consider how social learning helps explain the findings.

5.6.1 Priorities relating to biodiversity and perception of conservation role

Managers of forestry firms spoke with confidence about their approach to biodiversity and their change of mind-set about biodiversity: “[b]efore productivity was the objective: pine and eucalyptus. Today it is productivity as well as conservation” (I54, Forestry Firm). Managers accepted their responsibility to conserve: “[we] bear a great deal of responsibility: we can’t hide. We’re very visible and we’re aware of the demands [on us]” (I6, Forestry Firm). Water management at plantations has become a public issue as droughts have increased. Managers accepted the need to co-decide conservation priorities with stakeholders: “problems need to be identified and discussion needs different viewpoints to find solutions” (I6, Forestry Firm). The three largest forestry firms engage more with conservation NGOs, local communities, and native forest-based projects and biodiversity related initiatives, such as NGP, than other forestry firms. But managers at all forestry firms emphasised that conservation had moved up the agenda, and anticipated increased responsibilities for native forest conservation to retain FSC certification: “standards will continue to rise each year; you started here but you must continue raising what is required” (I7, Forestry Firm).

Salmon producers framed biodiversity in terms of pursuing sustainability and how challenges such as diseases and environmental crises complicate achieving it. One manager summarised, “the development of a sustainable industry has had many ups and downs, it has been through various crises and this has made it quite unstable” (I40, Salmon Producer). Caligus (sea lice) and diseases such as Salmon Rickettsial Syndrome (SRS) were considered major threats, and greater in Chile than elsewhere: “Norway barely uses antibiotics, but they don’t have SRS; since we have these bacteria we fight them with antibiotics, we use a large

amount” (I63, Salmon Producer). Antibiotics were also identified as a challenge for achieving ASC certification. Salmon producers’ interest in biodiversity is focussed on protecting salmon, for example through investments in treatments and genetic improvements, rather than through marine conservation and reduction of ecological impacts. Producers are aware of these impacts, but focus on insulating themselves from, rather than engaging with, biodiversity: “this is a firm producing salmon, not a firm of the natural environment” (I63, Salmon Producer).

5.6.2 Standards and regulations: framing the business and biodiversity relationship

Biodiversity management in forestry firms is framed by FSC standards, particularly: commitments to identify, restore and conserve native forest; sustainable management plans and species surveys; and consultation of communities neighbouring native forest and plantations regarding water quality and supply. “I believe that this [FSC certification] explains a great deal regarding [forestry firms and] biodiversity” (I7, Forestry Firm). Adapting to FSC standards was challenging, but now integrates with, and helps structure, operational practice: “initially we began with very complex management systems, with a lot, a lot, of bureaucracy, checking documents, but ultimately that has become more flexible because it is part of the business’s culture” (I25, Forestry Firm). Legislation was rarely mentioned, except restrictions on cutting down native species. Managers and stakeholders alike felt that FSC standards took forestry firms beyond state regulation: “the legal requirements [in Chile] aren’t [...] as high as in other parts of the world” (I66, Forestry Firm).

In salmon production, regulations are more important for biodiversity management than certification. Managers felt that the severity and quantity of rules and regulations on sanitation, biosecurity, and site monitoring constrained their competitiveness, capacity to act, and complicated efforts to become sustainable: “there are many more regulations here in Chile, I believe there’s much more bureaucracy than in Norway” (I51, Salmon Producer). Producers felt that the industry was under considerable economic pressure: “the amount of regulation, outbreaks of illnesses, natural events, like [algae] blooms, have meant that the industry is not in a good way financially” (I46, Salmon Producer). Whilst economic pressure was a bigger issue for firms with fewer sites, even managers of the largest firms highlighted the resources committed to deal with

environmental and sanitary regulations and considered that high costs complicated efforts to achieve higher standards: “it’s difficult because the ASC [certification] is complex, ASC is onerous; it’s really expensive” (I57, Salmon Producer).

5.6.3 Stakeholder interactions

The institutional context has influenced interactions with stakeholders regarding biodiversity in both sectors, albeit in very different ways (see Table 5.3). Forestry companies have increasingly interacted with university-based conservation biologists, conservation NGOs, and local communities; all previously peripheral to firms’ decision-making. Managers of the largest forestry firms highlighted how stakeholder engagement had helped build their understanding of operational impacts on biodiversity: “forestry firms are going to tackle and have to develop science and technology and procedures to realise activities they don’t understand in detail, and so they are going to need a lot of support from universities, NGOs and communities to be able to progress” (I25, Forestry Firm). Researchers helped forestry firms to learn about the native forests they owned and to understand local conditions: “there are research agreements with different providers and universities, and various studies are conducted to advance understanding of native forest” (I66, Forestry Firm). Several managers noted how in response to local community concerns about plantations and water use, firms were investing more in understanding links between forest biodiversity and water as an ecosystem service. Conservation NGOs helped firms to understand what works in conservation terms and how activities are perceived by civil society: “it’s been a worthwhile task, being able to improve practices related to biodiversity and with social matters” (I25, Forestry Firm).

Stakeholder engagement has also been about legitimisation and obtaining and retaining a social licence to operate: “credibility and integration with other groups is much easier when working with a university, for example, than just the company directly with the community” (I27, Forestry Firm). Managers considered the state mostly absent and researchers and conservation NGOs also viewed that conservation is a low priority for the state. The managers did not want greater state involvement: “the government moves slowly, doesn’t have the knowledge, doesn’t understand, [conservation] isn’t amongst its priorities” (I6, Forestry Firm).

However, forestry firms have not fully integrated stakeholder perspectives: managers defended plantation practices such as clear-cutting and monoculture, for instance. They felt that there were limits to their responsibility for biodiversity conservation and that trade-offs remain: “if there were infinite resources, fine, we could devote all of our resources to [conservation], but if you don’t prioritise, you aren’t going to be effective, you’re going to aim randomly and you aren’t going to achieve anything” (I66, Forestry Firm). Other tensions and disagreements also remain, including with local communities and the Mapuche over land rights. Some conservation NGOs were frustrated by what they saw as forestry firms using dialogue to hinder reform, rather than achieve a consensus on priorities: “the aim of the companies is to delay, delay and delay and make little progress” (I24, Conservation NGO). Tensions with the state over ever-shifting governmental priorities complicate efforts at reaching agreements with stakeholders: “this is the third time I have invited CONAF to meet to discuss a joint management plan [...] they still haven’t responded” (I54, Forestry Firm). Managers were wary of greater state involvement: “it slows progress, including progress in projects that could be very good, very well managed from the point of view of biodiversity” (I25, Forestry Firm). The three largest forestry firms interact more with conservation NGOs and local communities than other firms, but local community engagement and efforts to investigate operational impacts have increased across the sector: “nowadays there’s joint work with universities and study of the subject of clear cutting” (I65, Forestry Firm). To summarise, relationships with stakeholders have evolved with implications for conservation practices (see Table 5.3).

In salmon farming, producers engage primarily with state agencies and along the supply chain with feed suppliers, genetics firms, environmental consultants and private laboratories. Producers and state agencies mostly interact over the monitoring and enforcement of sanitation and environmental regulations. One manager summarised: “in terms of the natural environment nowadays, we’re quite constrained in terms of the impacts that we can have and, what is more, we’re overseen by Sernapesca, by the SMA, by the Ministry of Defence. As such we receive a lot of visits to our centres” (I63, Salmon Producer). State regulations frame producer priorities and interactions regarding biodiversity: “aquaculture depends on Subpesca [a state agency], which is not even a ministry, and this sub-ministry is a division of the Ministry of Economy. As a result, in terms of priority, every investment must go through this same route” (I40, Salmon Producer). Producers gave examples of cooperation with the state to enhance understanding of the natural environment, such as providing information on the spread of algae, but were focussed on fulfilling regulatory obligations, not

discussing reform. Producers worked with academic researchers in specific areas such as illnesses, but these collaborations were sporadic and short term. Consultants were preferred for many tasks such as monitoring and EIAs. Managers criticised academic scientists for failing to understand producer priorities: “I’ll probably look for a consultant, someone who will give me quicker answers; perhaps they won’t be the best, but they will suit me for the time being” (I57, Salmon Producer).

Stakeholder engagement regarding biodiversity was less about knowledge, mitigating impacts and conservation, and more about maintaining existing practices. GSI members have signed-up to the WWF’s Blue Whale monitoring campaign; some have also formed links with other marine conservation organisations. Yet even GSI members expressed caution about these interactions: “having a tie with an NGO is a responsibility that needs to be maintained; it is not easy” (I49, Salmon Producer). NGO-producer relationships were considered hostile: “NGOs are a world that we can have dialogue with, but dialogue requires two people willing to talk” (I62, Salmon Producer). NGOs that have opened dialogue with salmon producers have found it difficult to convince producers of the need to change a mind-set that focusses purely on meeting legal obligations, and is “very minimalist, very short term” (I61, Conservation NGO).

Managers felt the problem regarding biodiversity was about poor communication and misunderstandings about or mischaracterisations of their activities, rather than operational reform. Educational programmes in local communities, emphasise one-way communication, not two-way dialogue, for instance: “how to educate and transfer [knowledge] to the community is an issue, to your neighbours, so that they know how things work” (I51, Salmon Producer). To summarise, there is considerable disagreement over industry practices, particularly antibiotic use, producer impacts on biodiversity, and industry opposition: “we must come out and defend how we’re doing things within the industry” (I63, Salmon Producer).

Table 5.3: Stakeholder engagement regarding biodiversity in Chile

	Forestry		Salmon Farming	
	Forms of interaction	Reasons for interaction	Forms of interaction	Reasons for interaction
Conservation NGOs	<ul style="list-style-type: none"> • FSC Chile • Forestry Dialogue • NGP • CPF • Consultations, e.g. concerning forest management plans 	<ul style="list-style-type: none"> • Credibility with local communities and civil society • FSC certification 	<ul style="list-style-type: none"> • Specific agreements, e.g. WWF large crustacean campaign 	<ul style="list-style-type: none"> • Advice and expertise to help achieve ASC certification
Environmental consultants	<ul style="list-style-type: none"> • Conducting EIAs 	<ul style="list-style-type: none"> • Expertise • Legal obligations • Scientific credibility • FSC certification 	<ul style="list-style-type: none"> • Conducting EIAs • Creating monitoring systems • Surveys, e.g. benthic 	<ul style="list-style-type: none"> • Expertise • Legal obligations
Local communities & Community NGOs	<ul style="list-style-type: none"> • FSC Chile • Consultations, e.g. siting access roads, water management plans 	<ul style="list-style-type: none"> • Reduce opposition to activities in and around plantations • FSC certification 	<ul style="list-style-type: none"> • Environmental education programmes • Clean beaches campaign 	<ul style="list-style-type: none"> • Improve communication with local communities and reduce conflict

	Forestry		Salmon Farming	
	Forms of interaction	Reasons for interaction	Forms of interaction	Reasons for interaction
State	<ul style="list-style-type: none"> • Information provision, e.g. species planted • Negotiations <ul style="list-style-type: none"> ○ Local authorities, e.g. concerning forest management plans ○ National, e.g. CPF 	<ul style="list-style-type: none"> • Legal obligations 	<ul style="list-style-type: none"> • Information to various agencies concerning environmental impact and sanitation • Negotiating regulations, e.g. Salmon Roundtable 	<ul style="list-style-type: none"> • Legal obligations
Universities	<ul style="list-style-type: none"> • FSC Chile • Ecosystem and species surveys • Research, e.g. tree genetics 	<ul style="list-style-type: none"> • Scientific credibility • Local scientific knowledge and expertise • FSC certification 	<ul style="list-style-type: none"> • Funding specific projects, e.g. to develop new technologies • Exchange information on salmon diseases 	<ul style="list-style-type: none"> • Intersection of research interests

5.7 Discussion

We applied social learning to understand processes of ecological knowledge transfer and operational reform regarding biodiversity in forestry and salmon farming in Chile. In this section, we reflect on the degree to which social learning helps explain these processes, particularly the role of bridging organisations. We also discuss the importance of social pressures in both motivating and stimulating different degrees of learning. We highlight the limitations of social learning as an approach, along with areas for future research.

The forestry case suggests social learning can be a useful tool helping to explain the process of ecological knowledge transfer, by demonstrating how knowledge can change perceptions and transform operations (Pogutz and Winn 2016; Winn and Pogutz 2013). Manager and stakeholder testimony indicates a change in attitudes and behaviour by forestry firms regarding biodiversity. Formerly resistant, they now accept their conservation responsibilities regarding native forest, and that these are likely to increase under the FSC. Competencies have scaled-up, with firms adapting and refining management systems to incorporate new standards. Trust has also increased, demonstrated by the growth in dialogue, especially with previously peripheral stakeholders such as conservation NGOs and local communities (see Table 5.3). Cultural change in forestry firms took time, but they now understand more about native forest flora and fauna, as well as different stakeholder priorities regarding native forest and plantations, for instance how local communities perceive links between plantation management and ecosystem services such as water provision. The biggest firms are also beginning to understand other potential conservation measures, through dialogue via the NGP.

The findings also indicate the importance of bridging organisations in enabling learning, providing a means to engage with, and act on multiple stakeholder views regarding forest biodiversity (Boiral and Heras-Saizarbitoria 2017). FSC Chile is a distinct third party entity that, although resisted by firms at first, connected conservation NGOs, conservation scientists and local communities in a way that CERTFOR never could (Sternlieb *et al.* 2013). FSC Chile fulfilled multiple functions: besides providing certification standards that structured forestry firm reforms, it also provided the basis to facilitate further linkages between forestry firms and stakeholders, including the Forestry Dialogue, NGP, and latterly the CFP (see Table 5.3) (Berkes 2009; Sternlieb *et al.* 2013). It was both a site on which to construct action, and for building trust, fostering networks, and

addressing conflict regarding native forest. The absence of any such entity in salmon farming reinforces the importance of these multiple functions. There is limited consensus regarding what salmon producer conservation priorities should be (e.g. alternatives to antibiotic use) or their capabilities to act. Producers emphasise challenges and stakeholders highlight their limited engagement, for example. Interactions remain selective and sporadic, and knowledge transfer is partial (see Table 5.3). As one stakeholder put it: “one is left with the feeling that there is no learning in the [salmon farming] industry” (I36, State Agency).

Our findings question the implicit assumption that learning leads to positive, lasting change (d'Angelo and Brunstein 2014; Siebenhüner and Arnold 2007; Siebenhüner, Rodela and Ecker 2016). Exploring learning processes helps understand why ecological knowledge transfer might lead to single-loop, rather than double-loop, learning. Certification standards acted as a boundary object within the umbrella of FSC Chile: a uniform set of procedures, but perceived differently by each participant in terms of their purpose. Conservation scientists and conservation NGOs saw certification as a means for further reform, whereas for forestry firms certification was an end in itself, providing a means to retain access to key markets, support a social licence to operate in Chile, and protect plantation practices. Forestry firms know more, but have also used their knowledge to both retain legitimacy and slow the pace of further reform. Engaging with conservation scientists provides vital expertise, but also boosts credibility of results; similarly, conservation NGOs provide advice but also bolster credibility (see Table 5.3). Adhering to certification standards enabled forestry firms to engage with different stakeholder groups whilst also avoiding more fundamental reform regarding plantations and Mapuche land claims that go to the core of operations (Scherer, Palazzo and Seidl 2013).

The forestry and salmon farming cases suggest that social learning may be limited – or may not even occur – in certain socio-ecological contexts. The ecological crises in salmon farming, combined with a preeminent role for multiple Chilean state agencies, have limited ecological knowledge transfer. Prescriptive regulations following the ISA Crisis, alongside the fragmented, occasionally contradictory role of the state have discouraged and sometimes prevented innovation. Producers have focussed on investing in site-level, often shorter-term solutions. Sporadic engagement with other stakeholders (see Table 5.3) is characterised by limited trust and understanding of alternative views about marine biodiversity. The conditions to stimulate learning simply do not exist. The

limited appeal of the ASC to producers, especially regarding difficulties implementing environmental standards mean it is not a ready-made solution as FSC Chile was. FSC Chile enjoyed widespread legitimacy, integrating diverse stakeholders and meeting multiple priorities. FSC certification structured forestry firms' ability to go beyond compliance. The ASC does not provide sufficient cause to believe that it will provide social licence to operate, and with the state the preeminent stakeholder, compliance is a sufficient legitimisation strategy (Oliver 1992; Scherer, Palazzo and Seidl 2013).

Our study has several limitations, indicating various future research needs. Firstly, our approach must be applied to other socio-ecological contexts. The FSC is a relative success story in Chile, but exploring ecological knowledge transfer in tropical countries such as Brazil or Indonesia, and countries such as the USA; with more comprehensive environmental regulation regarding forestry, would help understand the relative importance of bridging organisations. Exploring other countries would also further understanding of the contextual factors motivating action and inaction regarding biodiversity (Bansal and Roth 2000). Salmon producers in Chile face distinct ecological challenges compared to Scotland or Norway, and sell to different markets. Producers in these countries may have different outlooks regarding biodiversity and express greater capabilities to manage issues like algae blooms than managers in Chile. The role of the state may also be different in other contexts, helping to facilitate learning via more flexible regulations or evidence provision, rather than acting as a barrier to ecological knowledge transfer.

Secondly, the role of bridging organisations needs examining in other sectors and certification structures, for instance the Roundtable on Sustainable Palm Oil (RSPO). Learning needs and challenges are likely to vary across sectors: retailers have greater reputational exposure but more indirect ecological dependencies; in financial services investment decisions generally rest on long term risk factors regarding returns, rather than short term profits. Thirdly, investigating how organisations internalise ecological knowledge could help strengthen understanding to what extent characteristics such as firm size, resources, leadership and internal team relationships influence the extent of internal reform. Our study noted some differences between bigger and smaller firms, but examining buyer, shareholder and investor expectations, and team dynamics would help understanding how firms of different sizes balance demands for conservation with maximising productivity. Finally, longitudinal

studies would help to understand how learning about biodiversity evolves alongside stakeholder relationships.

5.8 Conclusion

This paper used social learning to address gaps in understanding processes of ecological knowledge transfer, and how knowledge translates into operational reforms regarding biodiversity (Pogutz and Winn 2016). We applied our approach to explore contrasts in perceptions and actions regarding biodiversity by forestry firms and salmon producers in Chile. Social learning highlights the integral role of bridging organisations as a site for enabling learning about biodiversity and co-management of impacts on it. The FSC fostered dialogue with formerly peripheral stakeholders, enabling forestry firms to understand and incorporate multiple forms of ecological knowledge; certification helped them to structure reforms. The forestry case also demonstrates the limits of ecological knowledge in changing perceptions and prompting substantive reform. Forestry firms better understand their impacts on biodiversity, and different stakeholder priorities regarding its management, but reforms have been compliance-focussed. Firms' attitudes are largely unchanged, focussed on protecting plantation practices rather than integrating alternative values. Under FSC Chile, certification has served as a boundary object, with forestry firms seeing standards as the end goal, but by stakeholders as a basis for further reform.

The findings support the case for focussing on business activities within the local, socio-ecological context in which they are occurring (Boiral and Heras-Saizarbitoria 2017; Reade *et al.* 2015). Whilst the forestry case suggests that ecological crises and social pressures can prompt albeit limited reform, the salmon farming case demonstrates how they can also reinforce existing practices. State-led responses have restricted innovation and reinforced its role as the pre-eminent stakeholder. Salmon producer engagement with other stakeholders, and a willingness to countenance substantive reforms to address potential impacts on marine biodiversity remains limited. Our study suggests that sometimes stakeholders can have a negative rather than a positive influence on ecological knowledge transfer to businesses (Boiral and Heras-Saizarbitoria 2017). Social learning must be applied to other socio-ecological contexts to understand whether the same stakeholders play similar roles in other institutional systems. Our approach is also untested beyond natural resource-based sectors: social learning may be less useful as a tool for understanding ecological

knowledge transfer where operations are not directly interdependent with biodiversity.

For scholars and practitioners alike, we emphasise that whilst ecological knowledge is important if businesses are to account for biodiversity, the institutional mechanisms by which knowledge is attained, and competing stakeholder conceptions of what is important about biodiversity, must be considered. Use of measurement and reporting tools should be integrated with broader stakeholder management, and employee recruitment, strategies: who to bring in, when, and how must be carefully considered. Regulators need to consider if rules and activities facilitate or complicate such processes. Biodiversity is dynamic, complex and sometimes intangible: different contexts require different responses, and as knowledge develops, so too must practices. In learning about biodiversity and how best to manage it, businesses need to embrace internal and external tensions (Van der Byl and Slawinski 2015) across social and ecological systems. Only by integrating different forms of knowledge and values regarding biodiversity can they hope to become fully adaptive (Folke *et al.* 2005).

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Frame D: Biodiversity and challenges to legitimacy. Images: Thomas Smith (2016)

In forestry conflict with the Mapuche is growing (top left) whilst some in local communities see native forest as a legitimate source for firewood and other uses (middle left). Salmon producers remain unpopular and were the source of protests during fieldwork (top and middle right). The state does not escape blame either, as the graffiti on a bus shelter regarding the red tide declaration shows.

Chapter 6 – Corporate responsibility and the challenge of biodiversity at the organisational level

This publication is currently being revised as:

Smith, T., Paavola, J., Holmes, G. “Corporate responsibility and the challenge of biodiversity at the organisational level”. *Business & Society* (In progress)

Abstract

Businesses need to do more to tackle biodiversity loss, but little is known about the challenges they face in taking biodiversity into account, or the best approach to tackling these challenges. In both theory and practice, ecological and social factors are often considered in isolation, and solutions focus on the organisational level, with limited reference to the systemic tensions between markets, society, and nature that organisations must contend with. We advance the use of paradox theory, combined with political ecology, to outline the unique challenges that biodiversity presents to business, and what corporate strategies to manage these challenges must consider if they are to be successful. We advance paradox theory by demonstrating the importance of considering social and ecological factors across multiple levels, and the importance of past actions in determining current predicaments and future solutions. We highlight a weakness in political ecology wherein firms are often considered as a largely homogeneous actor, when in fact corporate strategies can vary across different contexts and lead to different results for the environments and societies in which they operate. We use the cases of forestry and salmon farming in Chile to illustrate our points. We conclude biodiversity is a global issue, but corporate strategies must be embedded in local social and ecological contexts.

6.1 Introduction

Businesses need to do more to tackle biodiversity loss (Evison and Knight 2010; Reade et al. 2015), but little is known about the challenges they face in taking biodiversity into account. Some scholars have argued for the need to adapt operations to account for ecological limits (Whiteman, Walker and Perego 2013; Winn and Pogutz 2013) and highlighted the potential improved organisational capabilities from considering biodiversity (Pogutz and Winn 2016; Sharma and Nguan 1999; Boiral and Heras-Saizarbitoria 2017). It remains unclear to what extent organisations can integrate and tackle these challenges on their own, and to what extent they need outside assistance. We advance debates regarding corporate involvement in biodiversity by considering what is achievable at an organisational level and what may require more fundamental, systemic reform. We do so by integrating paradox theory (Smith and Lewis 2011; Van der Byl and Slawinski 2015) to help understand challenges relating to biodiversity at the organisational level, with the political ecology of the firm (Caprotti 2012; Orsatto and Clegg 1999) to understand social and ecological challenges at a systemic level. We advance paradox theory by highlighting those aspects of biodiversity that differ and may require contrasting approaches to other issues in corporate sustainability. We contribute to political ecology by considering businesses as a diverse group of actors, demonstrating differences in how they manage tensions regarding biodiversity at the organisational level.

Paradox theory offers a platform to understand organisational challenges to tackling impacts on biodiversity and what businesses need to do to tackle these challenges. Paradox theory recognises that businesses are embedded in complex systems and that sustainability and CSR issues are not discrete (Scherer, Palazzo and Seidl 2013). Biodiversity has been overlooked as an issue in corporate sustainability, including within paradox theory. We will demonstrate that although there are parallels to other aspects of sustainability management, e.g. climate change, air pollution, water management, certain issues are unique to biodiversity and business and require further analysis. Critically, how businesses operate in complex socio-ecological systems remains under-explored. Paradox theory acknowledges the importance of a systemic view, but doesn't identify what the tensions are at a systemic level or how they might translate to the organisational level. Corporate sustainability literature often focusses on impacts on the organisation, but not the other way around (Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). Without a systemic view, we only partly understand the scale of sustainability challenges

facing organisations and only have a partial understanding of the degree to which they can be adequately managed at the organisational level.

Political ecology provides a link to the systemic level and a deeper understanding of socio-ecological systems. Political ecology focusses on the contexts that different actors operate in and has been used to understand diverse socio-ecological systems (Gerber 2011; Vandergeest, Flaherty and Miller 1999), highlighting tensions between competing priorities regarding markets, nature, and society. It is particularly useful for highlighting the role of the physical environment in shaping social relations and of different values regarding biodiversity held by different actors, i.e. the political dimensions of biodiversity and how these views in turn shape actions affecting biodiversity. Political ecology is weak in understanding dynamics at the organisational level though, tending to portray firms as a homogeneous set of actors. The management and organisational literature demonstrates that organisational differences must be scrutinised and that pressures on businesses relating to environmental issues are often not isomorphic (Testa, Boiral and Iraldo 2015).

Combining political ecology and paradox theory, the strengths of one can be used to address the weaknesses of the other and vice-versa. We use the cases of forestry and salmon farming industries in Chile to demonstrate how these two theories can be combined to explore the possibilities and limits of organisational responsibility regarding biodiversity management. We conclude by demonstrating how our approach can be adapted and applied to other contexts.

6.2 Literature Review

The challenges presented by biodiversity to business sustainability and CSR strategies need exploring in greater detail. Some have already been identified: quantifying and valuing biodiversity (Mulder and Koellner 2011) and knowing which tools to apply and how (D'Amato *et al.* 2016; McNab *et al.* 2015) are problematic. Generating a commitment to act from the board level downwards often involves changing organisational cultures (Nidumolu 2013; Overbeek, Harms and Van den Burg 2013), a time-consuming activity. External pressure, especially from NGOs, can help create a sense of urgency and strengthen the business case for considering biodiversity (Overbeek, Harms and Van den Burg 2013), but even where there is a strong determination to integrate considerations about nature into strategies and operations, achieving change can be difficult in

competitive, market-based contexts (Kearins, Collins and Tregidga 2010). Moreover, tackling impacts on biodiversity presents challenges at multiple levels and across multiple functions (Nidumolu 2013). It is unclear to what extent biodiversity should be considered as a distinct issue in corporate sustainability. It is also unclear what challenges arise through different responses to tackling biodiversity. Does perception management, focussed on playing down concerns about a firm's ecological impacts, reduce or negate biodiversity as an issue? Does acknowledging biodiversity as an issue, and for example engaging stakeholders and adopting operational reforms, bring new, more complex challenges?

Paradox theory offers a way to explain how the challenges related to biodiversity present at an organisational level, and a blueprint for how they might be tackled. Paradox theory is focussed on understanding the nature of the tensions facing organisations, and has been applied as a tool for assessing tensions in CSR and corporate sustainability (Hahn *et al.* 2014; Scherer, Palazzo and Seidl 2013; Van der Byl and Slawinski 2015). There are several dimensions to organisational paradox: here we concentrate on a few core elements to guide our enquiry into business and biodiversity. Smith & Lewis (2011) identify four key tensions relating to the key functions of an organisation: Learning (i.e. knowledge acquisition and interpretation), Belonging (identity and personal relationships, e.g. creating and maintaining a cohesive organisational culture), Performing (identifying and implementing the right processes), Organising (i.e. forming strategies and goal setting). Although not exhaustive (Smith and Lewis 2011), the list provides a sound starting point for our enquiry. Businesses also face cross-cutting challenges, spanning their own organisations from individual to organisational levels, as well as the systems that they operate in (the institutional level) (Hahn *et al.* 2014). Spatial challenges also exist, with different demands in different contexts (Hahn *et al.* 2015).

Sustainability issues present temporal challenges: organisations must find long term solutions to problems like climate change whilst also attending to short term demands, for example to meet shareholder commitments (Gao and Bansal 2013; Slawinski and Bansal 2015). There are also challenges related to the different strategies businesses employ in balancing competing stakeholder demands regarding sustainability issues. A strategy focussed on minimising or manipulating an issue may avoid the need for fundamental change, but risk angering one or more stakeholder groups owing to a lack of reform (Berger,

Cunningham and Drumwright 2007; Hahn *et al.* 2014; Scherer, Palazzo and Seidl 2013). Alternatively, businesses may partially adapt, wholeheartedly meeting stakeholder demands regarding a specific issue, necessitating change in a specific division or function of the firm (Berger, Cunningham and Drumwright 2007). A paradox approach involves widespread, extended and detailed stakeholder engagement, and an acceptance of the potential for fundamental operational and strategic reform (Berger, Cunningham and Drumwright 2007; Hahn *et al.* 2014; Scherer, Palazzo and Seidl 2013). Such an approach may be more successful in the long term, but require substantive and potentially painful internal reform and extended and continued stakeholder dialogue to be successful (Gao and Bansal 2013; Scherer, Palazzo and Seidl 2013).

Paradox theory acknowledges tensions between organisational aims and the priorities of other actors (e.g. state agencies, civil society actors), but offers limited insight into the nature of the systemic tensions that organisations must operate. Political ecology is concerned with systemic tensions, particularly between markets, nature, and society (Neumann 2009; Srinivasan and Kasturirangan 2017; Turner 2009). Political ecology is especially helpful in understanding how social values and practices are influenced by ecological contexts and vice-versa (Vandergeest, Flaherty and Miller 1999). Natural resources and related ecosystem services are a source of economic growth; ecological disasters promote uncertainty, and may even result from poor operational practices (Vandergeest, Flaherty and Miller 1999). Businesses can be seen as entities “mediating” ecological and social relationships (Caprotti 2012). Industrial processes can affect ecosystem services provision for example, both negatively (e.g. deforestation reducing flood risk prevention) and positively (e.g. investment in wetlands increasing biodiversity). Corporate sustainability acknowledges firms as political actors (Scherer and Palazzo 2007; Slawinski and Bansal 2015), but political ecology goes beyond the organisation to consider interactions and power dynamics between actors, and how these manifest as systemic tensions. Changes in social relations mean power can shift (Orssatto and Clegg 1999), with consequences for biodiversity. For instance, ecological degradation might mean conservation of a specific species or habitat becomes a priority, forcing an organisation to reform practices or invest in conservation measures.

A central weakness of political ecology is its treatment of the firm as a ‘black box’, an actor assumed to be largely unaffected by, and generally reacting in a

homogenous fashion to, systemic challenges. As noted, corporate sustainability and strategy literature, including paradox theory, demonstrates that this is not the case. Paradox theory and political ecology complement each other, highlighting tensions at the organisational and systemic level respectively, but don't entirely fit. Co-evolution helps to bridge the two theories, by highlighting the contingencies between the two levels (Murmman 2013; Porter 2006). Business and biodiversity can be considered as a co-evolving relationship: from the bottom-up, stakeholder management and communication strategies have an impact on biodiversity (e.g. through resource use, operations leading to habitat destruction), as well as the shape and relevance of regulations governing biodiversity. From the top down, ecological contexts, market demands and societal priorities can all affect organisational practices (e.g. resource scarcity increasing costs and reducing competitiveness, poor practices resulting in a loss of social licence to operate) (Murmman 2013). Just as the paradox approach suggests, these dynamics are not static: change can occur over time. Coevolution helps to link the organisational focus of paradox theory with the socio-ecological focus of political ecology. The next section outlines how paradox theory and political ecology can be combined to explain the tensions that firms face.

6.3 Modelling challenges across levels

The previous section summarised how paradox theory and political ecology address tensions at different levels. This section introduces a model (Figures 1 and 2 below) to illustrate how these theories might be used to complement each other.

The figures below have been developed around the concepts introduced above, as well as visual frameworks developed in both environmental science and management and organisations. The presence of boundaries are modelled on Rockström et al's work on safe operating spaces (see Rockström *et al.* 2009p. 472; c.f. Whiteman, Walker and Perego 2013) and Dearing et al's (2014 p. 228) refinement to create the concept of a safe and just operating space for humanity. The different levels are drawn from Starik and Rands' (1995 p. 913) model of multilevel and multisystems relationships and Hahn et al's (2015 p. 301) framework to analyse tensions in corporate sustainability. The distribution of the shading in Figure 6.1 reflects shifts from a more ecocentric (y-axis) to a more anthropocentric (x-axis) set of priorities. The temporal shifts, indicated by the

arrows in Figure 6.2 are also drawn from Hahn et al's (2015) model (c.f. Slawinski and Bansal 2015).

Figure 6.1 incorporates the idea that ecological systems form a planetary boundary, with individual, organisational and societal systems embedded within them. (Starik and Rands 1995; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013; Hahn *et al.* 2014). There are points where all interests align, but also where there are substantial differences. At point 1 organisational priorities overlap with prevailing societal interests, but do not favour ecological priorities, for instance. One example where this might occur would be mining for precious metals for consumer electronics: advancing technology but resulting in severe ecological damage. At point 2, organisational priorities overlap with ecological priorities but not societal ones. One example might be where a firm creates a private protected area to address ecological damage inflicted elsewhere, but simultaneously preventing local communities from accessing natural resources that they benefit from or even depend upon. Point 3 is where interests align across levels. For instance, the mining firm has opted to abandon its original plans in favour of a less damaging option such as further mining of an existing site.

Figure 6.2 demonstrates, aligning priorities across levels requires an organisation to account for multiple and interrelated contradictions (Slawinski and Bansal 2015; Hahn *et al.* 2017; Hahn *et al.* 2014). Whilst individuals, organisations and societies are embedded within ecological systems, it is possible to move beyond boundaries. Consequently, managing tensions means finding strategies that successfully align or manage the tensions between different priorities at different levels and between different groups (Berger, Cunningham and Drumwright 2007; Scherer, Palazzo and Seidl 2013). Furthermore, and as paradox theory suggests, tensions exist between levels and over time (Gao and Bansal 2013; Slawinski and Bansal 2015). Societal needs and priorities can shift over time, meaning actions considered appropriate, effective and legitimate in the present may not be so in the future. Organisations can mediate these tensions to a certain extent, adapting strategies to align with priorities at different levels (Hahn *et al.* 2017; Berger, Cunningham and Drumwright 2007; Scherer, Palazzo and Seidl 2013). However, even though firms can exercise a degree of choice, as political ecology suggests there are tensions between societal and ecological levels and which may lie beyond organisational capabilities.

The next section outlines the cases that the model will be applied to. Although the model could reflect multiple tensions, here we focus on the four categories specified by Smith and Lewis (2011). The implications of the findings for the model are covered in the discussion.

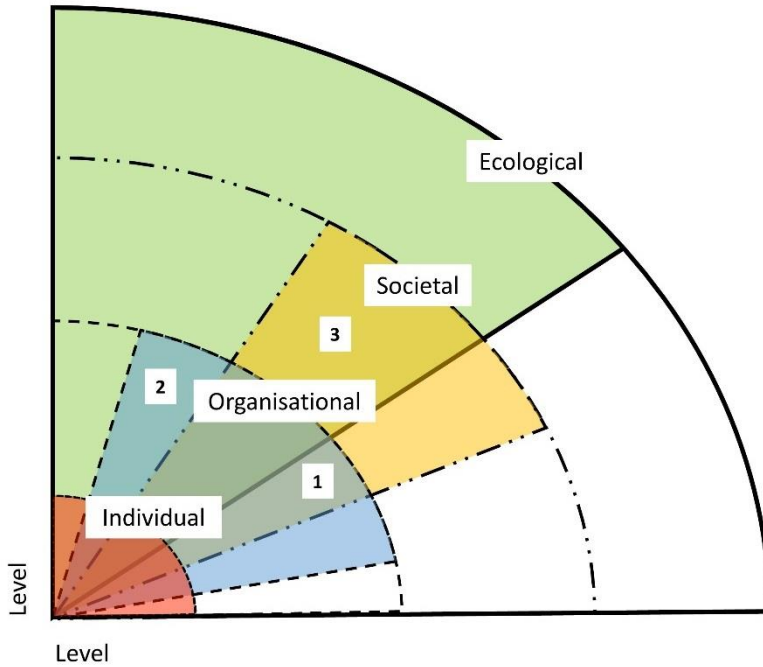


Figure 6.1: Priorities across different levels

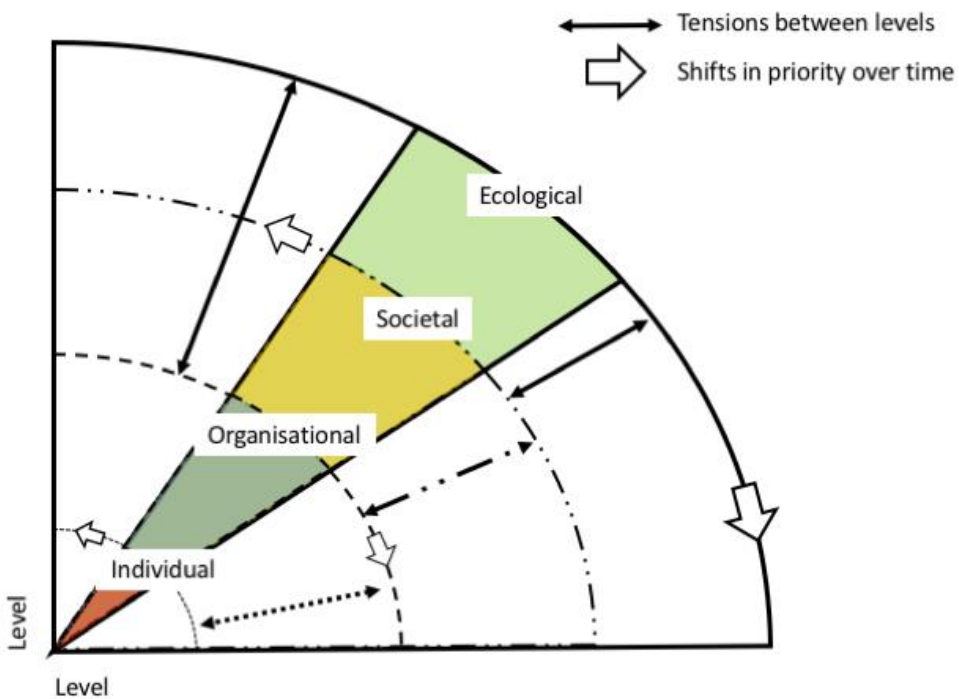


Figure 6.2: Tensions between levels

6.4 Materials and Methods

6.4.1 Case selection

Different sectors face multiple, divergent threats regarding biodiversity loss: as the previous section demonstrated, there is a lack of understanding about 1) how these threats/ challenges manifest at an organisational level and 2) to what extent individual organisations can respond to these challenges. Case studies are ideally suited to explore the complexity of examining multi-level, multi-dimensional phenomena (Cresswell 2008; Yin 2014). Van der Byl and Slawinski (2015: p. 72) also advocate using qualitative approaches that integrate case studies “when conducting empirical studies of paradoxical sustainability tensions. Forestry and salmon farming firms are both natural resource-based sectors, but have taken different approaches to biodiversity management and conservation in Chile. Examining two cases increases the range of challenges that can be considered and enables comparisons to be drawn about the impact of different social and ecological factors at the organisational level. In the following section, we outline what is already known about the challenges these two sectors face regarding biodiversity amidst the social, economic, political and ecological context in which they operate.

6.4.1.1 Forestry and Salmon Farming in Chile

Modern Chilean forestry was conceived as a key sector in powering Chile’s export-led, natural resource based growth (Heilmayr and Lambin 2016). Ley 701, the Chilean forestry law, subsidised rapid expansion of plantations on previously degraded soil. Under this law forestry firms also substituted native forest for large-scale monocultures, a practice that continued until the late-1990s (Zamorano-Elgueta *et al.* 2015). Following a campaign led by US-NGO ForestEthics targeting suppliers of retail chain Home Depot, Arauco and CMPC, Chile’s two biggest forestry firms, agreed to no longer harvest native forest (Heilmayr and Lambin 2016). Pressure for further reform to forestry practices continued, though. Firms initially responded by creating their own standard, CERTFOR, with support by state development agency CORFO (Heilmayr and Lambin 2016). After a pulp mill owned by Arauco was found to have contaminated the Río Cruces wetlands resulting in the death of thousands of black-necked swans (Ehrnström-Fuentes 2015), both Arauco and CMPC committed to FSC certification, achieving it in 2012 (Sepúlveda and Villarroel 2012). FSC certification prompted various reforms concerning native forest conservation and has been found to have slowed deforestation (Heilmayr and Lambin 2016).

The implementation of FSC certification demonstrates that the forestry sector can respond to conservation challenges, yet these should be set in the context of a failure to fully address social and environmental demands (Salas *et al.* 2016). These challenges include the continued tensions with local communities regarding the limited benefits they enjoy from neighbouring forestry activities, and growing land disputes with indigenous Mapuche (Heilmayr and Lambin 2016). Historic substitution of native forest for plantations also remains controversial (Salas *et al.* 2016), as are issues related to continued problems with poor management of natural forests and the persistence of widespread clear-cutting of plantations. Forestry firms remain poorly perceived, as the Río Cruces case demonstrated (Ehrnström-Fuentes 2015); (Salas *et al.* 2016). The forestry case raises several questions: firstly, how were firms able to achieve change? What role did internal factors (leadership, culture, resources) play relative to external pressure and assistance? Secondly, what more could forestry firms be doing? Why are they not doing more? Studies indicate the need for systemic changes in the form of new laws and regulations to address these challenges (Salas *et al.* 2016), but this question has not been explored in detail.

Salmon farming in Chile underwent rapid development between the 1980s and 2000s, but since then has suffered a series of social and ecological crises, notably an Infectious Salmon Anaemia virus (ISAv) outbreak in 2008 (Barton and Fløysand 2010) and more recently algae blooms and a red tide that wiped-out large proportions of salmon stock (AQUA 2016). Ecological crises have been accompanied by severe protests, with salmon producers poorly perceived by stakeholders (Salgado *et al.* 2015). Producers have faced various external pressures from non-industrial stakeholders, some from government (e.g. new forcing regulations on biosecurity and monitoring), others from environmental NGOs promoting voluntary reforms (e.g. adopting third party certification) (Cid Aguayo and Barriga 2016). Biodiversity and its conservation remains a low priority, though. This may partly be due to a current institutional context that appears to be poorly equipped to deal with the economic, social and environmental challenges facing the industry (Iizuka and Katz 2015). Several studies point towards the need for more fundamental reform of governance (Iizuka and Katz 2015), particularly the role of science in underpinning policy (Bustos-Gallardo 2013).

The attitude and responses of producers themselves also appears to be a problem. Producers have resisted calls for greater transparency regarding antibiotic use, for example (Esposito 2016). There are a few examples of producers opening-up, such as through the aquaculture dialogues, run in conjunction with the World Wildlife Fund (WWF) (Cid Aguayo and Barriga 2016), but generally stakeholder participation is limited: local communities and conservation NGOs often have little or no input into key decision-making that affects biodiversity and ecosystems surrounding operations (Salgado *et al.* 2015). Consequently, there is little dialogue and debate regarding what the aims of the industry should be (Cid Aguayo and Barriga 2016). Salmon producers are operating in a complex environmental, economic and social context, complicating responses to acting regarding biodiversity, but it is unclear to what extent contextual factors constrain conservation activities and to what extent producers can act but are unwilling to do so. As with forestry, how challenges manifest and are dealt with at the organisational level remain largely unexplored.

6.4.2 Fieldwork

We blended a document review and interviews to understand the challenges regarding biodiversity in our two cases. We reviewed corporate sustainability reports and websites to outline the key issues regarding biodiversity in each sector that firms reported on. Our document review informed the main stage of fieldwork, involving interviews of senior and middle managers from firms in both sectors, as well as key stakeholders involved in or affected by decisions and actions regarding biodiversity. Here we concentrate on the interview data where we explored in detail the challenges in each sector regarding biodiversity.

6.4.2.1 Interview content

We conducted interviews as guided conversations, exploring themes tailored to respondent type (business or stakeholder) and relevant for the sector (e.g. specific certifications and regulations) (see Figure 6.3 below). Interviews with managers drew on information from formal reporting and were designed to explore in greater detail how businesses in each sector perceived biodiversity at organisational level, where the challenges lie in acting on biodiversity (e.g. implementation, building consensus, etc.), and to establish the how different stakeholders were felt to help or hinder efforts to manage biodiversity. Interviews were tailored.

Stakeholder interviews focussed on establishing the proximity and forms of engagement with the sector and different firms (e.g. strategic involvement with direct input into decision-making, or more monitoring from outside and/ or experiencing the results of decisions and activities). These interviews also focussed on understanding stakeholder priorities regarding biodiversity, the demands they make on firms and the forms of pressure they apply, thereby understanding the sorts of challenges that they present to firms. We used stakeholder interviews to cross-reference claims by managers about the challenges faced and actions undertaken, and establish areas of disagreement. Stakeholders are important in triangulating experiences and avoiding a partial view and/ or the risk of retrospective sense-making of activities by managers (Eisenhardt and Graebner 2007). Stakeholder views have been shown to be important in understanding activities in both Chilean Forestry (Ehrnström-Fuentes and Kröger 2017) and salmon farming (Salgado *et al.* 2015).

Business Managers	Stakeholders and Key Informants
Participant's role and expertise within firm: engagement with operations and understanding of biodiversity	Participant's role and expertise (within organisation/ in individual capacity)
Main challenges facing <FIRM> in relation to biodiversity PROBE: Definition of biodiversity e.g. native forest, marine fauna, etc.	Individual/ Organisation's role and aims regarding biodiversity/ conservation
If use any tools to measure and manage impacts on biodiversity PROBES: FORESTRY: FSC, PEFC, Company specific SALMON FARMING: ASC/ BAP/ Global GAP or other standard	Level and forms of engagement with FORESTRY FIRMS and/ or SALMON PRODUCERS. PROBE: Involvement in decision-making/ consultation; areas of agreement/ disagreement
POTENTIAL FOLLOW-UP QUESTIONS How does <STANDARD> helps firm to manage impacts Challenges of implementing <STANDARD>	NATIONAL/ INTERNATIONAL ORGANISATIONS: Conservation challenges in Chile LOCAL ORGANISATIONS: Conservation challenges in region
Challenges <FIRM> has faced/ currently faces in implementing biodiversity practices	Perception of FORESTRY FIRM and/ or SALMON PRODUCER understanding of biodiversity
Impact of state regulations have on policies regarding biodiversity PROBES: GENERAL: Use of EIAs FORESTRY: Ley 701 SALMON FARMING: Fishing Laws	Perception of FORESTRY FIRM and/ or SALMON PRODUCER Efforts to manage impacts on biodiversity
Stakeholder involvement in decision making: Who and How	Perception of importance of certification and/ or regulations [TAILOR TO STAKEHOLDER TYPE]
POTENTIAL FOLLOW-UP QUESTIONS: How decisions are communicated If any stakeholders who make decision-making regarding biodiversity more difficult PROBES: Sources of disagreements How seek to resolve	Reforms that STAKEHOLDER wants to see/ is campaigning for
[IF TIME] Views on main challenges and opportunities for <FIRM> regarding biodiversity in the next 5 to 10 years Additional points/ ideas	[IF TIME] Views on main challenges and opportunities for <INDUSTRY> regarding biodiversity in the next 5 to 10 years Additional points/ ideas

Figure 6.3: Interview themes for managers and stakeholders

6.4.2.2 Sample

We created our sample based on organisations and individuals identified via literature on both sectors, and discussions with experts in both sectors in Chile. Our business sample consisted of managers and senior managers of the main forestry and salmon producing firms in Chile. The stakeholder sample included representatives of state ministries and agencies, university researchers, environmental consultants and NGOs working in conservation or based in local

communities. We also included senior managers and directors of suppliers in the supply chain to understand supply chain dynamics and its impacts on salmon farms (see Table 6.1 for a summary of interviewees).

6.4.2.3 Interviews

We conducted 70 interviews between November 2015 and May 2016 in the Metropolitan, Bio Bio, Araucania and Los Lagos Regions of Chile. Interviews were primarily face to face (three were conducted over Skype); 66 interviews were in Spanish and four in English. Participants were recruited via e-mail and telephone, sometimes after recommendation by other participants. Fieldwork continued until the point of saturation, i.e. until similar themes continually reappeared and new interviews yielded few or no insights (Bauer and Arts 2000)

Table 6.1: Respondents by sector and type

Respondent Type	Forestry	Salmon Farming	Multiple sectors	Total
Key informants/ Industry Experts				
Academic researchers; former managers; industry observers	2	2	1	5
Corporate Representatives				
Business Development/ Corporate Relations	5	2	-	7
Operations/ Environment	6	8	-	14
Industry Association representative	2	2	-	4
Stakeholders				
Conservation biologist (University)	2	2	1	5
Environmental Consultant	2	-	3	5
FSC Board Member	2	N/A	N/A	2
NGO representative	3	2	7	12
Professional Association representative	1	-	-	1
State agency and ministry representative	3	3	4	10
Supply chain (Breeding & Eggs, Diagnostics, Fish Feed, Genetics, Oceanography)	-	5	-	5
Total	28	26	16	70

6.4.3 Analysis

Interviews were professionally transcribed and then checked against the recordings by one of the researchers. We used NVIVO 10 to analyse the interviews. Our analysis was multi-staged: 1) Reading through interviews to identify themes and issues; 2) Coding by respondent type (forestry firm manager, salmon producer manager, conservation NGO, etc.), to identify areas of

agreement and differences of opinion between firms and stakeholders about challenges regarding biodiversity management. We identified both challenges and solutions reported by respondents, as well as those we observed through the process of analysis. 3) Comparison of similarities and differences of challenges in each sector.

6.5 Findings

In this section, we detail how forestry firms and salmon producers have dealt with the challenges and opportunities biodiversity presents in Chile. We examine the challenges presented by biodiversity; how contrasting responses are shaped by both the ecological and social contexts in which firms are operating; and the consequences of the strategies adopted by firms in each sector.

The challenges forestry firms and salmon producers face regarding biodiversity are shaped by a combination of social and ecological factors. Native forest destruction by forestry firms became a visible issue in the 1990s, but it was only with concerted social pressure – and later market issues – that firms adapted practices. Firms have focussed on intensifying plantation productivity instead, but multiple pressures remain, notably dealing with indigenous Mapuche claims to land given to the forestry firms: “the big problem is the Mapuche conflict that is in fact an issue inherited from the malign interventions of successive governments” (I8, State Agency). Salmon producers operate in a difficult ecological context that shapes their activities, with a range of direct ecological threats to their operations: “the biological cycles of bacteria are immensely quicker than those of salmon and, as such, the speed of, of adaptation is much quicker” (I64, Salmon Supply Chain); “today it's much more complicated and it's a high-risk business because it is contingent on environmental contexts, such as the recent algae bloom” (I44, Fisheries Engineer). SRS and sea lice are a big issue: “between 85% and 90% of antibiotic use in Chile relates to one disease, that is SRS” (I57, Senior Manager: Salmon Producer).

Strict regulations introduced to control for sanitary and environmental risks have complicated salmon producer operations: “they have complicated [reaching] deadlines, the cost has risen a lot, the current cost of Chilean salmon production is greater than producing in Scotland, greater than in Norway” (I48, Salmon Supply Chain). Producers also often lack the market and incentive to act: “our main client is Japan and Japan basically isn't requesting any form of certification”

(I50, CEO, Salmon Producer). Consumer demands regarding practices also remain minimal: "if all consumers agreed that there mustn't be pollution of any form and that it's necessary to conserve biodiversity in Chiloé or of any number of fjords, great, salmon farming would have long since changed, would have changed its mode of production, but it isn't like that" (I69, Salmon Supply Chain). Conversely, FSC certification enabled forestry firms to reform, since it was: socially accepted and demanded by international markets: "without FSC certification, sales were beginning to fall, therefore biodiversity became an important element [to consider]" (I11, Environmental Consultant).

External expertise was also important in facilitating change in forestry: "a new type of professional arrived, for example biologists, sociologists, anthropologists, that previously had been uncommon to see in a [forestry] firm" (I8, State Agency). Managers and various stakeholders noted a lack of equivalent scientific expertise in salmon farming "forestry engineers are everywhere, but there aren't many aquaculture engineers" (I43, Marine Biologist). There also appears to be a lack of a cohesive framework around which to build: "there's no sectoral institute here such as exists in Norway, for example, that works with the industry and is financed publically and with the industry" (I45, Salmon Supply Chain). The lack of baseline data regarding salmon producer impacts on biodiversity also means it is difficult to reach any form of consensus on a way forward: "we don't have studies saying if this is a phenomenon, or this is climate change or this happens due to that, there's nothing, because there aren't baseline studies" (I61, Conservation NGO). This problem affects forestry firms too, in terms of proceeding with further reform: "there might be changes in our procedures [in the future], in our crop management, but currently, I don't know... those of us who worry about this don't have the pieces [of evidence] to say 'listen, this needs to be done differently'" (I33, Manager: Forestry Firm).

In both cases businesses felt that there were clear limits to what they could do to manage biodiversity. Forestry firms cited the difficulties of working at a landscape level without adequate coordination by the state: "we are one actor on the ground, we are not the only one, look, there's agriculture, local communities, indigenous communities, [local] authorities, industries, millions of things in the same area where you are and you can't force or place all of the management on one actor, and I think this is what is becoming clearer over time with NGP" (I66, Senior Manager: Forestry Firm). Salmon producers faced what they felt was a more acute issue at a seascape level: "each firm carries out environmental studies on

its concessions, but there aren't environmental studies by area or macro zones, meaning that what we have in the end in Chile is a model that somehow subdivides space in the sea with limited underlying technical rationale" (I62, Senior Manager: Salmon Producer). Individually, producers felt that they were limited in what they could achieve, especially without sector-level and nationally coordinated strategies: "we don't have a large scale, long term strategic plan regarding how we are going to use resources and, because this doesn't exist, all debate occurs at the micro level" (I40, Senior Manager: Salmon Producer).

Firms in both sectors face considerable challenges to adequately address biodiversity loss on an individual basis but there is more that they could do, as stakeholders emphasised and some managers admitted. Even stakeholders supportive of the salmon farming industry were critical of limited efforts by producers to address challenges: "in the Chilean [salmon farming] industry there is a lack of investment in research, certainly" (I56, Salmon Supply Chain). They have also failed to cooperate, despite managers admitting that this was part of the solution: "an industry that has been incapable of updating its vision of how to organise itself" (I68, State Agency). Moreover, salmon producers have proven capable of instituting reforms when required. Following the ISA crisis, AquaChile's invested in the ecologically sound "Verlasso salmon", backed by various NGOs and currently a stable source of income for the firm. More recently, several producers have engaged in a blue whale monitoring initiative, realising that they can aid conservation without major upheaval: "this is useful information and it doesn't cost us anything, only noting the coordinates, and [...] some training to know which species we are talking about" (I49, Manager: Salmon Producer).

Although going further than salmon producers in pursuing reforms, there are some clear limitations to forestry firm strategies, led largely by market and social perceptions rather than ecological priorities: "you set Spot A against Spot N, which is much more important from a biological point of view, but in truth there's no-one there or no-one that is concerned about it because there's no community there" (I66, Senior Manager: Forestry Firm). This approach can have severe consequences for biodiversity: "it's very easy to revert, if you are only concerned about public approval, to revert to issues relating to people and biodiversity remains...is forgotten [...] if you only go with ecosystem services, in truth it restricts, you also almost restrict it to what directly affects me" (I53, Conservation NGO). Consequently, the bulk of conservation efforts mean core operations remain largely untouched: "we have these two parts, firstly those programmes

where you put money and do things, protecting species, and the other where you change the way you do business, they are two different things” (I17, Industry Association). Overall, the approach of forestry firms has led to change, but stakeholders feel it has stagnated, with a range of conservation issues unresolved: “yes, we’ve made a lot of progress, far from where we started, but I’m still left feeling that - How do you put it? - there are many new issues due to change, the [political] landscape has changed” (I30, State Agency).

6.6 Discussion

In this section we consider the implications of integrating paradox theory and political ecology to understand the challenges organisations face regarding biodiversity. We do so by applying the combined theories to the cases of forestry and salmon farming firms in Chile, highlighting the need for a systemic view that accounts for socio-ecological dynamics. We consider the implications of the findings for the advancing the use of paradox theory and political ecology both in combination and as separate approaches for explaining tensions regarding biodiversity. We finish by reflecting on limitations of action at the organisational level in the absence of reform at an institutional level.

The findings demonstrate the utility of applying paradox theory and political ecology to understanding the challenges biodiversity poses to business. As with other issues in corporate sustainability, there are tensions regarding knowledge acquisition, adapting organisational cultures and processes and redefining goals. As paradox theory suggests, responding to these challenges requires firms to engage with complexity, rather than seeking to avoid it. Forestry firms have gone further, but also appear to be pursuing a strategy to minimise biodiversity concerns by acceding to some demands regarding native forest conservation, but resisting calls to reform plantation practices (Berger, Cunningham and Drumwright 2007). Their approach has worked for a while, but frustration amongst stakeholders is growing, leaving stakeholders suspicious that forestry firms are now using the FSC to prevent further, more substantive change. The outcome of this strategy is modelled in Figure 6.4, with the grey area representing the failure to fully align ecological and societal priorities through certification.

Salmon producers have tended to try to avoid biodiversity as an issue, placing blame for problems beyond the organisation (Scherer, Palazzo and Seidl 2013). Their avoidance tactics have failed, though: some managers even admit it and

pressure for further fundamental reform remains. As Figure 6.5 demonstrates, salmon producers have selectively engaged with social and ecological issues but have been unable to find a means to align (admittedly disparate) societal and ecological priorities. The experience in both cases suggest that in the long term, a more complex approach, with greater stakeholder engagement is required, as witnessed with other sustainability issues (Gao and Bansal 2013; Scherer, Palazzo and Seidl 2013).

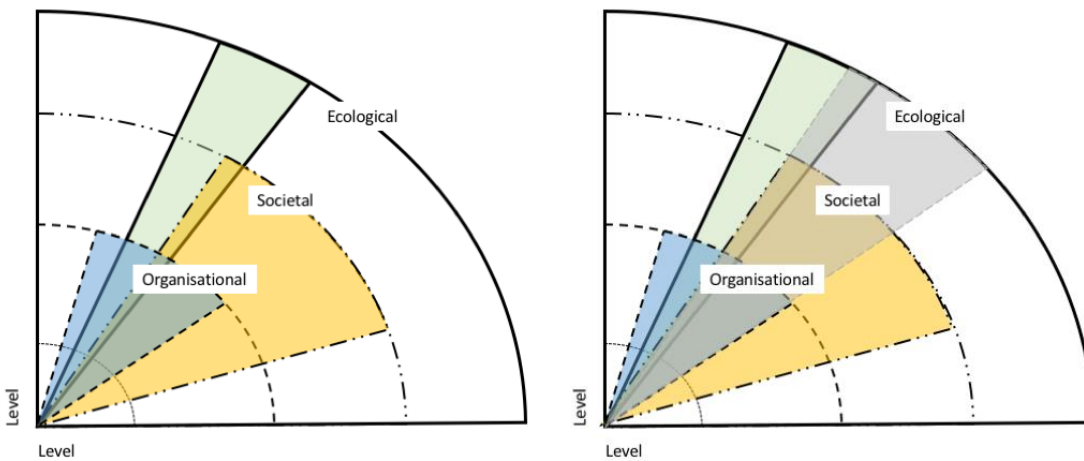


Figure 6.4: Partial adaptation strategies in forestry.

Adopting FSC Certification (L) addresses some tensions but leaves others unresolved (R)

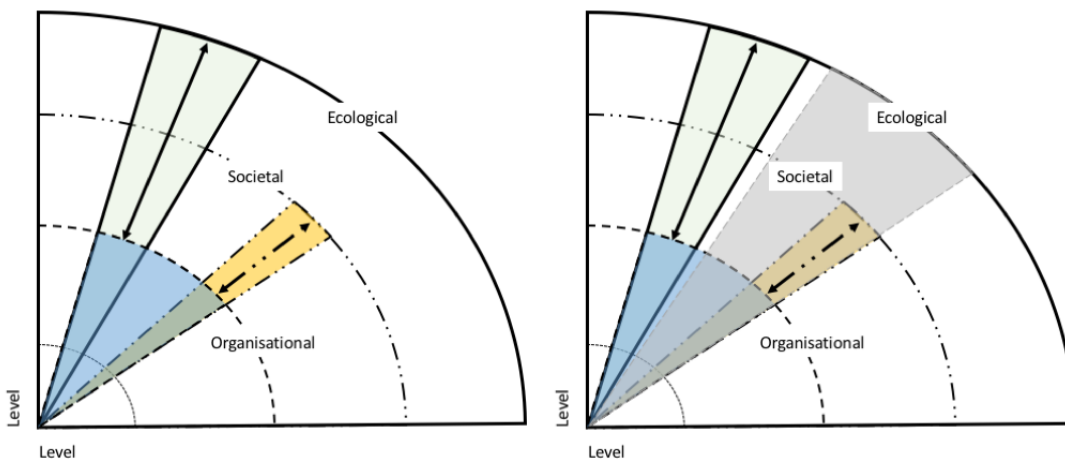


Figure 6.5: Avoidance strategies in salmon farming

Selective and fragmented responses to social and ecological tensions leave most challenges completely unresolved

Biodiversity presents challenges not fully considered by paradox theory, though. Firstly, as political ecology suggests, ecological factors are inseparable from social issues. Ecological contexts frame the challenges faced by firms: SRS in Chilean waters helps drive the high levels of antibiotic use by salmon producers compared to operations in Norway and other major salmon farming nations, for instance. Yet, salmon producer responses are circumscribed by the concession system that they operate in: institutional reform could shape different responses, helping producers to align different interests (see the shaded area in Figure 6.5). Forestry firms are unable to consider native forest conservation without acknowledging the priorities of local communities and indigenous Mapuche groups. Acknowledging only social dimensions is also risky: adopting a strategy focussed on social issues means that firms may be diverted from fundamental reforms that are important for biodiversity and ecosystems. For example, in the forestry case being led by local community priorities means that some areas of high biodiversity are overlooked (see the shaded area in Figure 6.4).

Secondly, whilst paradox theory acknowledges the importance of time, it focusses on future rather than historical impacts (Gao and Bansal 2013; Slawinski and Bansal 2015). Past actions define present socio-ecological challenges regarding biodiversity. An ongoing challenge for forestry firms is seeking to redress damage caused during previous waves of plantation expansion. Previous poor practices by salmon producers mean that present efforts to address problems are met with suspicion. Paradox theory acknowledges time as a dimension, but has focussed on current and future actions, e.g. mitigating impacts of and contribution to climate change, rather than the significance of past actions in determining present challenges. Responses to biodiversity are also value-laden. Scientific knowledge and expertise are important, but different groups prize the same resource for different reasons: firms must balance these priorities. The interweaving of ecological, institutional and historical factors means that what constitutes a legitimate response varies across different contexts. In the case of the models, expectations have not really shifted over time, but the shaded areas demonstrate the failure of forestry firm and salmon producer strategies to fully align with a longstanding demand that organisations in each sector act in more ecological and socially responsible ways.

Thirdly, the cases here also suggest that whilst there is plenty that businesses can do to manage tensions at an organisational level, there are systemic

characteristics of biodiversity that may require broader societal action to manage, if not resolve them. FSC certification enabled change in forestry firm conservation practices, but cannot resolve continuing difficulties in achieving landscape level cooperation. The weak state and regulatory framework have proven inadequate. This is not to suggest that firms are powerless to effect change. The contrasting challenges and responses witnessed here highlight a weakness in the political ecology literature. Firms are not homogeneous actors: responses are contingent on multiple factors, and the challenges in each sector demonstrate how different outcomes may occur, even where market priorities predominate (partial force for good in forestry; powerful disincentive in salmon farming). Stakeholder accounts suggest salmon producers overplay the difficulties they face and could do far more to address ecological damage. Certainly, AquaChile's investment in Verlasso salmon and cooperation regarding the blue whale initiative demonstrate that producers can go further, without systemic change. However, without state-led discussions regarding fundamental reform, such as zonal management, producers are largely limited to site-level responses. The difficulty of bridging these divides is reflected in the distance between societal and ecological priorities illustrated in Figure 6.5. Moreover, where forestry firms could call on external expertise to assist measurement and monitoring, salmon producers lack such an enabling framework.

The multi-level dimensions of sustainability, from individual to systemic levels, is a long-running debate in corporate sustainability (Starik and Rands 1995), and acknowledged in paradox theory (Hahn *et al.* 2014). Biodiversity management defies simple, discrete solutions, limited to one institutional level or organisational domain (Mace, Norris and Fitter 2012): there are multiple influences (Shrivastava 1994). The cases here demonstrate the inadequacy of purely ecocentric approaches (Shrivastava 1994), or those that rely on scientific knowledge focussing on ecosystems and ecological dimensions alone (Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). Successful corporate sustainability strategies must instead integrate multiple dimensions, as has been suggested for the markets that they operate in (Gómez-Baggethun and Muradian 2015). Consequently, responses must be embedded in local contexts (Reade *et al.* 2015) whilst acknowledging wider systemic limitations. As has been noted with specific biodiversity projects, state assistance may be necessary (Lambooy and Levashova 2011). Successful biodiversity management strategies may also vary depending upon the context in which they are implemented, as is often the case with enacting CSR (Matten and Moon 2008). There is no single blueprint for

success, but paradox theory, integrated with political ecology, offers guiding principles upon which corporate biodiversity strategies could be founded.

6.7 Conclusion

Biodiversity presents many challenges that are found in other issues in corporate sustainability, as shown by the fit with paradox theory. We have demonstrated additional dimensions, specific to biodiversity that merit closer attention. Biodiversity loss may be a global problem, but tackling it requires local solutions, grounded not only in better understanding ecological factors affecting their operations, but related social factors too. For businesses to fully engage in managing impacts and dependencies on biodiversity, research, dialogue and operational reform, rooted in better understanding socio-ecological contexts is likely to be necessary. Political CSR approaches are unlikely to be successful, indicating a significant role for a paradox approach, with the caveat that organisations reflect on tensions that lie beyond the organisation. Firms are far from powerless to effect change, but understanding and adapting to systemic tensions may necessitate firms accepting that they must compromise in the interests of wider societal benefits that arise from conservation, rather than maximising individual organisational gains from fully exploiting terrestrial and/ or marine resources.

We have combined paradox theory and political ecology to understand the possibilities and limits of organisational capabilities regarding biodiversity in two industrial sectors. Following some simple guidelines, our approach can be applied to other contexts and related sustainability issues, such as climate change. Firstly, political ecology indicates the need to understand the socio-ecological context that organisations operate in. Specifically, the benefits each stakeholder group derives from their ecological context, how they value it, and interactions between different groups regarding these priorities need to be outlined. Examining how perceptions have evolved – or not evolved – over time, is vital to understand the source of competing priorities regarding a specific ecological context. Secondly, paradox theory indicates the importance of understanding challenges across different organisational dimensions. We focussed four core elements: these can be refined, depending upon the scope of the study in question, to examine subsets of organisational functions, and/ or interactions between teams, for instance. Thirdly, the interdependencies between organisational strategies and socio-ecological contexts must be accounted for.

Social norms change over time and an approach regarding biodiversity may function in the short term, but lose legitimacy over time. Finally, our approach favours in-depth case-studies but is not restricted to qualitative enquiry: quantitative-based methods, for example employee or stakeholder surveys, may help in broadening enquiries across geographic boundaries.

Further work is also needed to understand whether there are broad principles that can be applied across different contexts, or whether bespoke solutions are always necessary when it comes to biodiversity. Finding a means to implement, measure and report on change, is likely to be difficult, especially given that different stakeholders are interested in different facets of biodiversity (Boiral and Heras-Saizarbitoria 2017; Koellner *et al.* 2008). Combining biodiversity measurement, scientific expertise, local knowledge, stakeholder management strategies and internal change management strategies, present a further set of challenges and indicate the need for case studies focussing on the internal workings of organisations grappling with biodiversity management. For instance, Rio Tinto's recent reversal of their attempts to apply a uniform "Net Positive Impact" approach to biodiversity management across their operations, in favour of local, site-based initiatives, may be a worthwhile case in point (Rio Tinto 2018). Further use of the co-evolutionary angle may help in understanding firm capabilities in their wider socio-ecological contexts. When it comes to biodiversity and business, it's sustainability, but not as we know it.

6.8 Bibliography

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Frame E: From seed to sawmill – Images: Thomas Smith

Plantation forestry is a refined process, from seed selection to harvest to timber classification. Salmon farming works on a similar (albeit less visual) logic.

Chapter 7 – Discussion: Understanding biodiversity at the organisational level

7.1 Overview

Biodiversity loss is a worldwide problem requiring global and local level solutions (Bishop 2012; Reade *et al.* 2015; Steffen *et al.* 2015). Businesses can play an important role in conservation efforts, ranging from corporate philanthropy to operational reform (Robinson 2011; Reade *et al.* 2015; Pogutz and Winn 2016). There is a wealth of research on issues related to corporate sustainability and the natural environment, but a relative paucity of work focussed on biodiversity per se (Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013; Boiral 2016; Jones and Solomon 2013). This thesis addressed the lack of empirical work regarding business action and inaction to manage impacts on biodiversity. It focussed on how both businesses perceive biodiversity and their responsibilities and capabilities to manage their impacts on it, and the factors that influence those perceptions. It sought to demonstrate how existing concepts in organisations and management research can be applied in understanding business as an actor in conservation, and to emphasise the importance of the social and ecological context in shaping business involvement in biodiversity.

This chapter begins by summarising the findings from the three results chapters, how they fulfil the three research questions, and addresses overarching themes arising from the three chapters. It then considers the implications of this research in relation to current debates within corporate sustainability and conservation, both in terms of research and practice. The chapter concludes by considering the limitations of this inquiry, and future research directions.

7.2 Summary of findings

Each of the results chapters focussed on one of the three research questions. This section briefly summarises the findings from each chapter in relation to the three research questions. It then considers cross-cutting themes arising from the results and that link the three chapters.

7.2.1 What does corporate reporting tell us about business perceptions and actions regarding biodiversity?

Chapter 4 used corporate reporting and stakeholder accounts to examine the factors shaping business perceptions and actions regarding biodiversity. The findings confirmed a link between business sector and perceptions and action (or inaction) regarding biodiversity. Differences between sectors were greater than those between firms of different sizes within each sector. However, responses are also shaped by multiple ecological and social factors related to the context in which businesses are operating. The Río Cruces crisis and growth of dialogue with stakeholders via the FSC appears central to the (albeit limited) changes in biodiversity management in forestry. Conversely, sanitary and environmental regulations and the concessions system, alongside poor stakeholder relations, have complicated reform in salmon farming. The findings demonstrate the limitations of formal reporting in motivating substantive change regarding biodiversity. Instead, firms have used reporting to maximise the image value from any conservation activity whilst minimising concerns regarding impacts on nature. Biodiversity is still perceived as a reputational risk rather than a business opportunity.

7.2.2 How do stakeholders help businesses understand and act on biodiversity?

Chapter 5 focussed on the processes by which businesses learn about and act on biodiversity. Through the concept of social learning, it established the role that stakeholders can play in ecological knowledge transfer. The forestry case demonstrates how FSC Chile acted as a bridging organisation, enabling dialogue with previously peripheral groups. FSC certification standards helped structure forestry firm reforms regarding native forest conservation. The findings established the importance of a supportive context to facilitate the function of bridging organisations. The salmon farming case demonstrates how learning is less likely in contexts where it is more difficult to bridge business and stakeholder priorities, and where ecological challenges are more complex and solutions contingent on collective rather than individual action. The findings demonstrate that not all stakeholders are helpful: in salmon farming particularly, the Chilean state lacks the knowledge or capacity to encourage collaboration and enforce necessary reforms by producers. Chapter 5 also concluded that learning and resulting reform may be selective and partial, leading to a slow degradation in stakeholder relationships over time.

7.2.3 What challenges do businesses face in understanding and acting on biodiversity?

Chapter 6 explored the challenges that businesses face in acting on biodiversity by combining the paradox approach with political ecology. Whilst it is desirable for businesses to integrate multiple, sometimes conflicting, priorities regarding biodiversity into their operations, it established that that it may be very difficult to achieve in practice. Forestry firms and salmon producers could be more proactive in exploring innovative, collaborative solutions to managing impacts on biodiversity. However, solutions are complex and must account for interlinking social and ecological factors, meaning strategies to resolve biodiversity challenges are context dependent. In both cases, business responses are viewed through the prism of past impacts and actions regarding biodiversity. In forestry, historic substitution and the Mapuche conflict remain challenges to their legitimacy at local and national levels. Salmon producers are judged by responses to the ISA crisis and recent algae bloom. Resolving these challenges may also lie beyond the capability and remit of individual firms or even sectors, particularly where area-based approaches are required. The difficulties of restructuring salmon farming concession and advancing NGP at the landscape-level in forestry indicate the limits of reforms at an organisational level in the absence of systemic change.

7.3 Cross-cutting themes

There are several themes that appear across the three results chapters. Each theme is expanded on below, including consideration of how it fits with current research on business and biodiversity.

7.3.1 Socio-ecological context, business and biodiversity

To fully understand links between business and biodiversity, the social and ecological context in which they are operating must be accounted for. The findings consistently demonstrate that past impacts on biodiversity – and how stakeholders perceive business responsibilities for addressing these impacts – have shaped what biodiversity means and how businesses respond. Mapuche land and the historic legacy of government-sanctioned substitution shapes forestry debates (González-Hidalgo and Zografos 2017). SRS and the concession system present unique challenges for salmon producers in Chile (Tecklin 2016). This is not to discount sector: controversies such as the role of plantations in preserving biodiversity (Bremer and Farley 2010; Paquette and

Messier 2010; Pawson *et al.* 2013), and challenges regarding sea lice and antibiotic use (Aaen *et al.* 2015; Kreitzman *et al.* 2018) mirror those found elsewhere. Moreover, all three results chapters align with other studies identifying differences in businesses perceptions and action between sectors (Bhattacharya and Managi 2013; Boiral and Heras-Saizarbitoria 2017a; Bonini and Oppenheim 2010). (Primmer and Wolf 2009). However, Chapter 4 concluded that it was not possible to separate sector and context and Chapters 5 and 6 concluded that local social and ecological conditions are vital in determining what constitutes an appropriate response by business.

In terms of biodiversity, ecological embeddedness is as much about accounting for different values as it is forms of knowledge (Landrum and Ohsowski 2018; Whiteman and Cooper 2000; Whiteman and Cooper 2011). Past actions influence levels of trust between businesses and stakeholders and shape which actions are deemed appropriate regarding biodiversity. Accounting for historic substitution is a central component of conservation in forestry, for instance. The findings demonstrate dangers of failing to integrate social and ecological considerations. Forestry firms and salmon producers view biodiversity through the prism of social legitimacy, their strategies focussed on managing perceptions rather than integrating different views. These strategies may work in the short term but fail in the long term, though (Pache and Santos 2013). For conservationists, whilst sector differences are incorporated into current guidance such as the Natural Capital Protocol (2016), the findings suggest successful solutions must factor-in the local context that businesses operate in to a far greater extent than at present (Salafsky *et al.* 2001; Caballero-Serrano *et al.* 2017; Ferri, Pedrini and Pilato 2016).

7.3.2 Making the business case for biodiversity

The findings have implications for how the business case for biodiversity is framed. The business case for biodiversity is frequently based on business self-interest, both the opportunities from acting and risks of inaction (Natural Capital Coalition 2016; Winn, Pinkse and Illge 2012; TEEB 2010; Evison and Knight 2010). Chapter 4 outlined how managers generally perceive biodiversity as a reputational and regulatory risk. Chapters 5 and 6 demonstrate the consequences of treating biodiversity as an externality rather than integral to their operations. Whilst partially accepting responsibility to conserve and native forest, forestry firms take learning as far as is necessary to meet FSC standards. Despite the biggest firms being a little more enterprising by engaging with the NGP initiative, they are not moving at the pace that stakeholders want. Salmon

producers face severe ecological threats and the regulatory infrastructure limits their capability to achieve reform by themselves. Yet salmon producers could be more proactive, for instance being prepared to engage in two-way dialogue regarding what they can and cannot realistically achieve and accepting that they might not have everything their own way. Forestry is far from a perfect example, but forestry firms used a similar line of defence before committing to FSC certification.

Although acting on biodiversity can deliver benefits to business, appeals based solely on self-interest appear unlikely to prompt substantial reform. Action often requires business to address past impacts whilst awaiting long term, uncertain benefits. Forestry firms have improved reputations and relationships with conservation NGOs and local communities through engagement in conservation (Boiral and Heras-Saizarbitoria 2017b; Boiral and Heras-Saizarbitoria 2017a; Brody *et al.* 2006; Cardskadden and Lober 1998). Yet their *modus operandi* remains limiting responsibilities to protect core operations (Ketola 2009). Instead, routes must be found to advance the moral case for biodiversity regarding the role businesses are expected to play in managing impacts on biodiversity, and their capacity to act in the contexts in which they are operating (Bansal and Song 2017; Schaltegger and Burritt 2018; Schuler *et al.* 2017). Developing a more honest and open dialogue would avoid outcomes such as that detailed in Chapter 5 where FSC certification acted as a boundary object, perceived as the basis for reform by stakeholders but a tool to limit responsibilities by forestry firms. Moving to a point of parity is an uncomfortable position for a business, but as the paradox view suggests businesses must embrace uncertainty to fully account for biodiversity (Hahn *et al.* 2015; Hahn *et al.* 2014; Scherer, Palazzo and Seidl 2013; Van der Byl and Slawinski 2015). For conservationists, advancing the business case also means acknowledging likely trade-offs for businesses and thinking of how to communicate and help manage these, rather than solely focussing on win-wins.

7.3.3 The state as essential in enabling business action on biodiversity

The findings demonstrate the need for the state to create frameworks that enable reforms regarding biodiversity by business (Robinson 2011; Ebeling and Yasue 2009; Lambooy and Levashova 2011). Chapters 5 and 6 coincide with findings elsewhere in exposing the limitations of the FSC in enabling reform regarding biodiversity, especially at a landscape level where more actors are involved (Ebeling and Yasue 2009; Moog, Spicer and Böhm 2015). Chapter 5

demonstrated the limits of the FSC as a bridging organisation: certification has taken firms beyond legal compliance, but big forestry firms have been able to manipulate dialogue to resist pressures for fundamental reform. Chapters 5 and 6 highlight the dangers of the state as the dominant stakeholder in salmon farming, to the exclusion of other groups. Whilst it has not yet prompted hoped-for reforms, the CPF demonstrates the ability of even a state with limited credibility regarding conservation to bring all relevant actors to the table. Reforms do not have to be completely original: they could be based on certification standards (Dyke *et al.* 2005). Moreover, well-designed statutory regulation can guarantee a level playing field in a national context in ways certification cannot, making cooperation regarding biodiversity desirable, if not necessary (IUCN 2012; Kearins, Collins and Tregidga 2010). A proactive state can reduce uncertainties about the benefits of cooperation and reform: a major barrier to change in both forestry and salmon farming.

The findings also demonstrate that besides creating frameworks to facilitate reform, the state may also need to adopt a proactive approach to enable different voices in conservation to be heard. Prospects for change are complicated by the fragmented, inconsistent approach of the Chilean state towards conservation and its role in facilitating native forest substitution and creating the dysfunctional salmon farming concession system (Latta and Aguayo 2012; Pelfni and Mena 2017). It has excluded different views stakeholders from reform processes, including the salmon farming roundtable, and the creation of CERTFOR. Its limited knowledge and expertise regarding biodiversity is acknowledged by all sides, including state officials themselves. However, it is the one actor capable of taking a strategic view spanning multiple levels and scales, as the interviews demonstrate. The state may not have to lead changes, acting instead to coordinate efforts to address gaps in knowledge and expertise. Whilst forestry firms express caution at state involvement, and salmon producers attack the regulatory system, there is a latent frustration at the state's failure to provide clearer guidance, as established in other contexts (van den Burg and Bogaardt 2014; Overbeek, Harms and Van den Burg 2013). Given that strategies regarding biodiversity are largely orientated around reputational, regulatory and market concerns, there is a space for the state to facilitate a lead. Stronger enforcement does not have to be restrictive: applied in the right way it can aid proactive strategies (Sharma and Nguan 1999).

7.4 Implications of research

This research has several implications for debates within corporate sustainability and conservation regarding business involvement in biodiversity in theory and practice. This section considers the implications of the research for these debates.

7.4.1 Biodiversity as an issue in corporate sustainability

A key question underlying this study is whether biodiversity is distinct from other issues in corporate sustainability. Chapter 2 outlined potential similarities and differences between biodiversity and climate change based on existing evidence. This section considers firstly how biodiversity is different from other issues in corporate sustainability and secondly what these findings imply for debates concerning corporate sustainability more generally.

7.4.1.1 Why is biodiversity different?

The findings in this study indicate that biodiversity should be considered as a distinct issue in corporate sustainability. The next section discusses these differences along several dimensions (see Table 7.1 for a summary).

As noted in Chapter 2, ONE scholars have called for an increased focus on the ecological embeddedness of business, i.e. the biophysical contexts in which they operate (e.g. Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). Issues such as climate change are also be driven by and have direct and indirect impacts on business operations and strategies. Yet there has been limited discussion regarding the strongly localised, context-specific character of biodiversity. For instance, the operational challenges that forestry firms and salmon producers face are in part driven by the specific ecological contexts that they are operating in. There are parallels between the ecological threats salmon producers face compared to elsewhere, but some threats (e.g. SRS) are unique and others (e.g. algae blooms) occur more frequently than elsewhere. Although the effects of climate change also vary geographically, these are not necessarily directly linked to local operations, whereas with biodiversity they often are. In forestry for example, issues such as water provision are directly related to debates regarding plantation activities. Whilst salmon producers have ecological impacts beyond the context in which they operate, through feed for instance, local impacts from antibiotic use and eutrophication create the greatest issues. The

link to local ecological contexts extends to other sectors like mining with direct operational impacts on biodiversity, but could also apply to others such as financial services: for example through investments being direct linked to destruction of a specific habitat (Mulder and Koellner 2011).

Biodiversity also varies across socio-ecological contexts. Socio-ecological interactions are not specific to biodiversity: human activities contribute to climate change and effective responses may require increased stakeholder engagement and potentially operational reform. The severity of impacts due to climate change and resultant pressure for reform may also vary across geographies. Yet biodiversity involves a different forms of knowledge and means engaging with a different set of stakeholders (see Table 7.1). Moreover, as the results demonstrate, responses to biodiversity are as much shaped by local social contexts as ecological ones. Disputes regarding Mapuche land claims in forestry and the regulation of concessions in salmon farming are inherently bound-up with the issue of biodiversity conservation, for instance. Moreover, as Chapters 5 and 6 demonstrated, successful learning and strategies regarding biodiversity must consider local social and political conditions. What works in one setting may not work in another due to alternative stakeholder priorities and a different set of regulations in place. Rather than apply a generic set of practices, successful stakeholder engagement by businesses must be tailored to the socio-ecological context (Ives and Kendal 2014).

The influence of local socio-ecological contexts in shaping responses by business is reflected in the challenges of reporting impacts and performance regarding biodiversity raised in Chapter 4. Producing standardised and easily communicable indicators is complex (Boiral and Henri 2017; Jones and Solomon 2013). The variance in species and habitats means comparisons across contexts are often asymmetric (Mulder and Koellner 2011), especially where there are contrasting ecological challenges. For instance, metrics such as antibiotic use are only partially informative when comparing salmon farming in Norway and Chile. Measuring impacts against context-specific baselines may be part of the solution (Bull *et al.* 2014; Virah-Sawmy, Ebeling and Taplin 2014). However, agreeing on what should be measured and how it should be measured is not necessarily an objective choice: metrics and measurements are often difficult to apply, and those selected likely to be favoured by some and not others (e.g. Jones and Solomon 2013; Bull *et al.* 2013; Robertson 2006; Dempsey 2013). Moreover, whilst scientific measurements can provide baselines and outline the scale of

reform required, they do not prevent reporting and actions being interpreted through the prism of historical activities. Salmon producers now provide scientific information such as FFR, but this has little meaning in the context of stakeholder criticisms regarding concession management and contributions to algal blooms and red tides. With biodiversity, businesses must demonstrate how they are atoning for damage already done (Jones and Solomon 2013; Schrempf-Stirling, Palazzo and Phillips 2016).

The historical dimension of biodiversity is not just what being accounted for therefore, but also which values are being considered and who businesses are accountable to for their actions. Again, there are parallels to climate change, where the challenge of incorporating different forms of knowledge and competing values also applies (Busch 2011; Hörisch, Freeman and Schaltegger 2014; Pinkse and Kolk 2012; Okereke, Wittneben and Bowen 2012). Climate science, like conservation, is contentious and value-laden, and there are few legally enforceable agreements at global or national levels to manage impacts (Pinkse and Kolk 2012). However, biodiversity presents unique difficulties in reconciling scientific, technical and traditional forms of ecological knowledge and values (Whiteman and Cooper 2000; Rist *et al.* 2016; Reed *et al.* 2010). Moreover, whilst technological solutions to tackling emissions at plant level or along the supply chain may be universally applied, the practice of conservation itself has direct impacts on the context in which it is enacted (Baumgaertner and Holthuijzen 2017; Batavia and Nelson 2017; Manfredo *et al.* 2017). As Chapter 4 demonstrated the philosophical, technical and practical challenges associated with biodiversity reporting go beyond definitions of what is being accounted for and how it is measured, to which values are considered and who businesses are accountable to (Jones and Solomon 2013). What constitutes legitimate action varies according not only to preferences amongst conservationists, but to the values attached to the species and/ or habitat(s) within the specific context in which action occurs. Table 7.1 summarises how the findings contribute to understanding these differences, split along several dimensions.

7.4.1.2 Linking biodiversity to debates regarding corporate sustainability practices

The differences between biodiversity and other issues in corporate sustainability noted above have implications for wider debates regarding sustainability management.

The findings indicate that to be truly sustainable, businesses must integrate and seek to manage tensions between different priorities (Gao and Bansal 2013; Hahn *et al.* 2015; Hahn *et al.* 2014; Van der Byl and Slawinski 2015). Chapter 4 illustrated how formal reporting can be used to manage perceptions of the degree to which different local stakeholder priorities are being addressed (Ehrnström-Fuentes and Kröger 2017). As early ONE literature recognised though, to become ecologically sustainable businesses might need to adopt a different role and outlook in how they engage with society (Gladwin, Kennelly and Krause 1995; Shrivastava 1995). The forestry and salmon farming cases demonstrate the dangers of businesses failing to redefine their role and instead seeking to minimise their responsibilities. Both sectors justify their approaches to biodiversity on meeting legal obligations and pointing to the unresolved question of how to meet worldwide demand for their products whilst also conserving biodiversity. Yet as Chapter 6 concludes, avoidance or partial acceptance strategies have not resolved anger and conflict tied to past actions. Instead, they negatively influence stakeholder perceptions of current business actions, even when these actions may be positive for biodiversity and society.

Consequently, the results highlight the need to embrace the interconnectedness between social and ecological dimensions of biodiversity. Businesses must pursue dialogue rather than rely on reporting, agree to co-creating and co-managing with stakeholders rather than simply consulting them, and be honest about limits to their capabilities. Biodiversity conservation involves value judgements; trading-off local (and global) conservation priorities with local (and global) needs (e.g. Reade *et al.* 2015; Martin, Maris and Simberloff 2016; Newbold *et al.* 2015). Businesses must somehow engage with and accommodate these tensions in their own strategies and operational reforms (Berger, Cunningham and Drumwright 2007; Hahn *et al.* 2015; Hahn *et al.* 2014; Van der Byl and Slawinski 2015). Although the policies resulting could mitigate against further growth in both sectors in Chile, it might also lead to reforms that encourage innovative, sustainable uses of the abundant native forest and marine resources that they currently ignore. Neither sector is prepared to actively embrace the uncertainty that would come from engaging in debate about the best means to achieve these seemingly conflicting aims.

Yet the findings also highlight the real world “messiness” of corporate sustainability in practice and the need to understand organisational inaction

(Slawinski *et al.* 2017). The interconnections between social and ecological factors regarding biodiversity make it harder to manage impacts effectively. The forestry and salmon farming cases show how neither sector has been able to delineate the issue – ecological factors impinge on the social and vice-versa. The findings also reflect the challenges of tackling an issue that spans multiple levels and dimensions, including epistemic and normative, geopolitical and spatial. To fully integrate tensions at the organisational level may lie beyond either sector at present, as noted at 7.3.3. Granted, as Chapter 6 concluded, action could be far more substantial than at present, but ultimately the challenges are of a scale that lies beyond even sector-level responses. The regulatory context mitigates against more substantive action at a landscape level in forestry and increased cooperation in salmon farming. For all of the limitations of the strategies adopted by forestry firms and salmon producers, from reporting to stakeholder engagement and certification, both sectors remain economically viable (albeit only just in the case of salmon farming).

The messiness of enacting biodiversity also relates to tackling temporal tensions. To date, the debate on time and sustainability has mostly focussed on the misalignment between achieving reform to address long term impacts whilst delivering on short term priorities (Busch 2011; Okereke, Wittneben and Bowen 2012; Slawinski *et al.* 2017). Although that challenge relates to biodiversity though, tensions often relate to addressing past impacts (i.e. damage to natural heritage) rather than controlling for potential future damage (Bansal and DesJardine 2014; Slawinski and Bansal 2015; Slawinski *et al.* 2017). The past is a factor in issues such as climate change too: baselines are set in order to limit climate impacts, for example. However, biodiversity conservation and restoration baselines involve a value judgement about what should be returned to (Bull *et al.* 2014; Bull *et al.* 2013). Not only do baselines determine the scale of effort required, but they raise questions regarding which parties are responsible for acting, and to what extent they are held solely responsible for previous degradation and destruction. A key factor driving debates regarding native forest restoration in Chile relates to the degree to which the forestry is held responsible given that their actions were sanctioned – and encouraged by – the Chilean government. Managing temporal tensions in biodiversity relate more to addressing past (contested) injustices (or perceived injustice) inflicted by and on previous generations, rather than potential damage to future ones.

Table 7.1 Similarities between biodiversity and climate change as corporate sustainability issues

Dimension		Similarities	Differences
Physical	Climate impacts and biodiversity loss	<ul style="list-style-type: none"> • Direct and indirect physical impacts affecting business, e.g. availability of natural resources, increased operational costs, supply chain disruption (Busch 2011; Evison and Knight 2010) 	<ul style="list-style-type: none"> • Climate impacts might be localised but the ecological impacts of biodiversity loss are context-specific • Solutions to tackling biodiversity must be tailored to local ecological context: e.g. species to conserve/ reintroduce will vary; threats vary across contexts
	Stakeholder engagement/ interactions	<ul style="list-style-type: none"> • Need to engage wide range of stakeholders; possible need for MSIs (Pinkse and Kolk 2012) 	<ul style="list-style-type: none"> • Different set of stakeholders to deal with at global, national, local and site levels: e.g. conservation NGOs instead of climate change organisations • Local communities may be more directly and immediately affected by organisational impacts on biodiversity and ecosystem services that it underpins, e.g. water provision and flood protection
Socio-ecological	Policy and Institutions	<ul style="list-style-type: none"> • Political effects/ impacts and public policy responses mirrored across global and national levels (Busch 2011; Okereke, Wittneben and Bowen 2012) <ul style="list-style-type: none"> ○ International conventions/ targets, Paris Climate Agreement; Aichi Targets ○ Policy levels, e.g. IPCC and IPBES 	<ul style="list-style-type: none"> • Distinct policy fields, governed by separate conventions and advisory bodies: e.g. IPCC and IPBES are separate bodies

Dimension		Similarities	Differences
	Knowledge and values	<ul style="list-style-type: none"> • Need for new scientific knowledge and expertise in business (Whiteman, Walker and Perego 2013) • Climate change and biodiversity are both contested fields 	<ul style="list-style-type: none"> • Distinct epistemic communities: e.g. conservation biologists, ecologists, conservation social scientists vs. atmospheric scientists, geochemists, geologists, paleoclimatologists, climate change economists • Climate change policies are principally based on scientific evidence regarding drivers of climate change. Biodiversity conservation reflects a fusion of scientific knowledge with traditional knowledge and values: e.g. in deciding what to conserve and how to do it (CITE IPBES report)
Opportunities and challenges	Conceptual	<ul style="list-style-type: none"> • Challenges across multiple levels, from the individual to the systemic level (Slawinski <i>et al.</i> 2017) • Climate change and biodiversity present ecological limits that cannot be exceeded in the long term (Whiteman, Walker and Perego 2013) • Temporal dimension challenges businesses to trade-off short term priorities against investments in operational reforms to realise a long term, often uncertain benefit (Busch 2011; Okereke, Wittneben and Bowen 2012; Slawinski <i>et al.</i> 2017). 	<ul style="list-style-type: none"> • Climate change mitigation is about limiting future temperature increases. Biodiversity restoration means setting returning to a baseline set in the past
	Practical	<ul style="list-style-type: none"> • Operational, reputational risks from inaction and potential for competitive advantage from action (Okereke, Wittneben and Bowen 2012) • New reporting requirements and operational reform (Kolk, Levy and Pinkse 2008) 	<ul style="list-style-type: none"> • Emissions across contexts (e.g. CO₂/ NO_X per KG) are comparable, but it is harder to achieve standardised indicators for biodiversity

7.4.2 Business as an actor in conservation

The findings suggest that business motivations, capabilities and their sense of responsibility for managing impacts on biodiversity are contingent on a wider range of factors than often acknowledged in debates regarding markets and partnerships in conservation. Current guidance integrates sectoral differences into framing risks, opportunities and pathways to acting (Evison and Knight 2010; IUCN 2012; Natural Capital Coalition 2016). Yet it pays limited attention to the importance of local contexts in shaping perceptions and actions, as demonstrated in Chapter 4. External challenges to initiating change are often overlooked too. In both cases examined here, businesses can do more to account for their impacts but ecological and institutional contexts, as well as stakeholder dynamics, can circumscribe what action is likely to be viable and successful, as Chapter 6 emphasises. The NCP acknowledges that lasting solutions will require “new ways of working that bring together the views of all stakeholders” and an “enabling policy environment” for change to occur (Natural Capital Coalition 2016 p. 1). Yet businesses cannot consider biodiversity in a vacuum: internal reform means little if stakeholder perceptions of business intentions and actions are not considered at the outset.

The findings suggest that businesses can be an awkward partner in enacting conservation. As the forestry case demonstrates it is possible to engage with businesses and achieve reform. Whilst their attitudes to biodiversity have not shifted, forestry firms have had to adjust to a new reality. Managers might overplay the scale of resistance to change and reform required, but there was a genuine change in behaviour. These limited changes relied on the confluence of a unique set of circumstances, where scientifically grounded arguments, concerted public pressure and fears over market access forced a change. However, as critics of engaging with businesses suggest, bona-fide win-wins are likely to be the exception rather than the rule (Doak *et al.* 2014; Miller, Soulé and Terborgh 2014). The biggest forestry firms have been able to manipulate engagement with conservation NGOs and local communities legitimising damaging plantation practices (Adams 2017; Doak *et al.* 2014; Miller, Soulé and Terborgh 2014; Büscher *et al.* 2012; MacDonald 2010). FSC membership has meant that market and economic imperatives have overridden priorities expressed in local contexts to some degree too, reflected in stakeholder frustrations with stalled reforms (Büscher and Dressler 2012; Ehrnström-Fuentes and Kröger 2017).

Yet avoiding business involvement in conservation does not appear to be the answer either. Forestry firms and salmon producers apparently perceive biodiversity as a “barrier to overcome” and are keen to maximise control in managing it (Arsel and Büscher 2012; MacDonald 2010). Perceptions and strategies are also strongly influenced by market logics rather than local priorities (Doak *et al.* 2014; Miller, Soulé and Terborgh 2014; Büscher *et al.* 2012). But as Chapters 4 and 6 demonstrate, strategies in both sectors are designed to navigate around what they perceive as a liability, and to account for more than the market (Faggi, Zuleta and Homberg 2014). Moreover, salmon producers favour the dysfunctional status quo in which they operate partly because there are few viable alternatives given current market and regulatory conditions. Partnerships are unlikely to provide the solution on their own, particularly in challenging corporate cultures that don’t consider biodiversity. Measured approaches that consider their vulnerabilities, and which offer a chance for genuine learning can be used to leverage positive reform, in place of defensive retrenchment as has occurred in salmon farming (d’Angelo and Brunstein 2014; Foxon, Reed and Stringer 2009).

7.4.3 Conservation policy in Chilean forestry and salmon farming

This research supports the conclusions from other recent studies on conservation policy and biodiversity management in Chile. In forestry, the devastating forest fires of 2017 exposed shortfalls in the current system (Gómez-González, Ojeda and Fernandes 2018). Coordinated and transparent landscape-level planning is needed to reconcile different stakeholder priorities regarding land use (Gómez-González, Ojeda and Fernandes 2018; Manushevich 2016). The legacy of ISAV still pervades policies and outlooks in salmon farming (Bustos-Gallardo 2017) but change looks unlikely without regulatory reform (Salgado *et al.* 2015; Lacy, Meza and Marquet 2017). The findings coincide with calls within Chile for scientifically informed policy (Simonetti 2011) and the need for widespread public consultation when pursuing conservation actions (Cárcamo *et al.* 2014). The findings add to the literature on forestry and salmon farming in Chile by demonstrating that change is unlikely given prevailing attitudes to conservation amongst managers in these two sectors, and the wider challenges they face. They indicate that although the regulatory and market systems in Chile are critical, understanding managerial perceptions are also important.

7.5 Contributions to theory

7.5.1 ONE/ Corporate sustainability

Besides providing a more detailed understanding of biodiversity as an issue in corporate sustainability, this study has also contributed advances in the application of several theories in ONE research.

Firstly, this research answered calls to integrate theories from other disciplines into ONE research (Hahn *et al.* 2017; Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Williams *et al.* 2017; Winn and Pogutz 2013). Chapter 5 demonstrated how social learning helps explain the process of ecological knowledge transfer. The study could have applied sensemaking, widely deployed in ONE research, including to understanding business interactions with ecological contexts (e.g. Whiteman and Cooper 2011). However, social learning provides a more systematic approach, outlining the essential a priori features that underline successful learning process (e.g. bridging organisations). Sensemaking by contrast is more useful as a post hoc description of the process itself. Moreover, whilst sensemaking has been applied to describe learning at an organisational level, it is more often deployed at an individual (e.g. managerial) level. Social learning is more rigorous in terms of understanding institutional interactions between businesses and stakeholders, for example through the description of scaling-up in capabilities. Social learning is also flexible: it can be combined with other theories – in this case institutional theory and the concept of boundary objects – and applied across multiple contexts. Consequently, social learning could be used not only to understand biodiversity in other contexts but also to other issues and processes, for instance interactions in MSIs other than the FSC.

This study also highlighted the contributions that political ecology can make to understanding tensions in corporate sustainability. Chapter 6 demonstrated how the focus on interactions between social and ecological systems in political ecology can provide a more comprehensive understanding of challenges beyond the organisational level. Political ecology also emphasises how tensions regarding biodiversity are not simply a case of competing forms of scientific knowledge and challenges in communicating this knowledge, but of competing worldviews. Political ecology is a reminder that biodiversity management is not simply an application of objective science: choices must also be made regarding competing preferences too. Political ecology can also be combined with other theories: in this case paradox theory, but given that it has been applied across

many issues it might well be used in conjunction with other approaches too. This is not to imply that political ecology is necessarily a neat fit with ONE research. Where corporate sustainability scholarship tends to seek ways to better integrate the natural environment into organisations, political ecology sees capitalist and natural systems as inherently contradictory. However, political ecology can still be used in more instrumental ways, such as in Chapter 6. It could also be used as a basis for further research on the likelihood of organisations becoming sustainable without fundamental reform of the market-orientated systems in which they operate.

Secondly, the results support the call for increased scientific knowledge in corporate sustainability research and practice (Starik and Kanashiro 2013; Whiteman, Walker and Perego 2013; Winn and Pogutz 2013; Pogutz and Winn 2016). However, to date debate has tended to focus on natural science, overlooking the utility of insights derived from conservation and environmental social science research (Whiteman, Walker and Perego 2013; Winn and Pogutz 2013). Successful biodiversity management is not simply about putting conservation science into practice. Social learning demonstrates the importance of interacting with and integrating the perspectives of a wide range of stakeholders, not just conservation biologists. Political ecology emphasises that the challenge of achieving operational reform regarding biodiversity goes beyond understanding and assimilating scientific knowledge. Businesses must balance different understandings of what reforms to implement, how to implement them, and why they should be implemented. Alternative forms of knowledge and perspectives shape how businesses are able and are expected to act in different contexts. Consequently, theories from beyond ONE support the view that biodiversity, its conservation and restoration goes beyond an objective process: multiple subjectivities are involved.

Finally, this study advanced established approaches in ONE research. The paradox approach, institutional theory and boundary objects have all been extended into understanding corporate responses to biodiversity. Paradox theory is growing in importance in corporate sustainability research and Chapter 6 reinforced its normative, descriptive and instrumental potential (Hahn *et al.* 2018). The relative failure of forestry and salmon farming sector strategies regarding biodiversity serve to support the desirability of a paradox approach. Paradox theory was also crucial for understanding how tensions highlighted at a systems level by political ecology present at an organisational level. For all of its normative appeal though, the results indicate potential limits to the practical application of a

paradox approach. The salmon farming case in particular demonstrates the difficulty of enacting necessary reform in the absence of either support from major societal actors such as the state or a regulatory context that encourages and facilitates positive reform at an organisational level. The results of one study are far from definitive, but signal further work may be required with respect to how multiple tensions can be successfully integrated – or at the very least managed/coped with – at an organisational level.

Institutional theory underpinned both the study methods and were a key component of analysis in Chapter 5. This study demonstrated how institutional theory – widely applied across ONE research – can be applied to support research into biodiversity and its conservation. It provided a framework that has enabled the integration of a wide range of theories, including social learning and boundary objects. It filled some of the gaps left by social learning in terms of explaining how and why learning processes are initiated. Boundary objects have been explored in mainstream management studies, but rarely in corporate sustainability research. The concept of boundary objects also addresses a weakness in social learning regarding why learning processes may not be positive in the long term. The application of the concept to the case of FSC Chile articulates how a process of reform may be embarked on for different reasons and how seemingly positive corporate sustainability processes may begin to breakdown. Consequently, it demonstrates the dangers of implementing reforms without fully embracing the principles underlying them.

7.5.2 Conservation science

The major conceptual contribution to conservation science is outlined in 1.4.2 above. Understanding businesses as a more complex, conflicted and bounded actor than they are sometimes framed in the literature provides a counterpoint to some of the prevailing orthodoxies currently used to understand them (e.g. Adams 2017; Büscher *et al.* 2012; Bennett *et al.* 2017a; Bennett *et al.* 2017b). The application of ONE concepts such as paradox theory and boundary objects in conservation science provides a window into theory and research that has not been accessed to date, and which could prove useful in developing understanding of what successful engagement of business in conservation does and does not look like. For instance, demonstrating the limitations of social learning – often framed in very positive terms – highlights the dangers of and downsides of collaborations where there is a mismatch in motivations from the outset. Integrating ONE theories and concepts with established approaches in

conservation science also helps demonstrate how the best research from both disciplines can be combined and communicated across multiple audiences. In the process it contributes to efforts to promote social science and human dimensions more fully into conservation science (Bennett *et al.* 2017a; Bennett *et al.* 2017b)

7.6 Strengths and limitations of research

The case study approach, particularly contrasting two cases within the same national context unlocked how multiple factors combine to influence business perceptions of biodiversity. The case study approach also helped in identifying different stakeholder relationships and the impact of different stakeholders on attitudes and action regarding biodiversity. Integrating managers and stakeholder interviews also offered several benefits. Stakeholder perspectives helped triangulate official corporate lines, and to understand the degree and forms of pressure they place on firms, as well as the access they enjoy. Examining the operations of two natural resource based industries highlighted the challenges regarding biodiversity beyond specific initiatives such as PES and offsetting that have been the principal focus of studies to date.

Using guided conversation ensured that the research was grounded in understanding biodiversity as different individuals saw it. It also helped in unlocking issues, such as the internal debates within some companies that had not been anticipated beforehand. In-depth reading and coding of corporate reports maximised the value of limited material, bringing the focus onto the consistency of wording between formal communications and informal interviews. However, other methodologies, such as the corpus approach, might offer a means to explore a greater range and volume of corporate reporting, enabling cross-country and cross-sector comparisons.

There are several limitations to this study, demonstrating needs for future research. Firstly, the findings are highly context-dependent. Some underlying principles may apply regardless of the setting from which they have been drawn. The findings align with those examining business motivations regarding protected area interventions (Meißner and Grote 2017), the importance of state backing in biodiversity investment (Koellner, Sell and Navarro 2010; Lambooy and Levashova 2011), attitudes to forest certification in other contexts (Dyke *et al.* 2005; Ebeling and Yasue 2009; Faggi, Zuleta and Homberg 2014) and reactive

strategies regarding biodiversity (Räty *et al.* 2016). However, salmon producers that also operate in Chile appear to be more proactive in other contexts (Vormedal 2017). Whilst some studies align with the findings that businesses perceive biodiversity more as a risk (D'Amato *et al.* 2016; Houdet, Trommetter and Weber 2012; Mulder and Koellner 2011; Overbeek, Harms and Van den Burg 2013; Räty *et al.* 2016), others suggest some business leaders see long term opportunities (Bonini and Oppenheim 2010). Consequently, further work is required to understand the dynamics of business perceptions and actions regarding biodiversity within developing and developed countries and other sectors.

Secondly, although this study incorporated stakeholder views future studies could take a more systematic approach, examining different degrees of stakeholder influence. More precise mapping of stakeholder influence over time might enable a clearer understanding of the interrelationships between engagement of certain stakeholders and variations in the salience of biodiversity as an issue in each industry (Mitchell, Agle and Wood 1997). This study might also have benefitted from understanding more about the dealings between forestry firms and the Mapuche people, and the role of traditional ecological knowledge alongside technical and scientific knowledge. Similarly, although largely based outside of the country and potentially difficult to access, understanding the priorities of institutional investors and major shareholders and their reactions to demands to reform might help to understand the potentially countervailing influence of these groups. Social network analysis – qualitative or quantitative – could further strengthen understandings of interactions.

Thirdly, future studies could incorporate conservation science to a greater degree to establish a clearer picture of the actual impacts and dependencies of firms in each sector, as opposed to relying on the interpretations of managers and stakeholders. Tracing the status of knowledge and how it has grown within each sector might enable a more systematic view of how ecological knowledge may transform but also be manipulated to avoid further reform. Moreover, to truly understand the obstacles to ecological embeddedness within firms, internal dynamics between teams, and the influence of different individuals in driving – or resisting – reform must be analysed. Integrating micro and macro-level enquiry into the research design, as has been recommended in understanding inaction on climate change, may also be fruitful (Slawinski *et al.* 2017). Combining surveys

and/ or focus groups with multi-sector audits of corporate reporting might tease-out differences between individual and organisational perspectives, for instance.

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Chapter 8 – Conclusion

This thesis sought to advance our understanding of business perceptions and actions regarding biodiversity. Using the cases of forestry and salmon farming, it has provided insights into biodiversity as an issue for business and business as an actor in biodiversity conservation. The thesis demonstrated the impact of the socio-ecological context in shaping business responses to biodiversity. Social dimensions of biodiversity are a repeated theme throughout the results. Stakeholder engagement regarding conservation, institutional arrangements (certification, regulations) and the role of the state in encouraging reform all factor into shaping businesses' comprehension of and sense of responsibility for managing impacts on biodiversity. The limitations of a business case for biodiversity founded on appeals to self-interest and the prospect of win-wins for business and nature (and society) have been demonstrated. Businesses are rarely proactive, seeking instead to restrict responsibilities for managing impacts on biodiversity through their communication and stakeholder engagement strategies, and relying on weak leadership by the state.

Whilst further work is needed to substantiate these findings, this thesis has several research implications. The ONE literature boasts a rich, varied and thorough evidence base on every aspect of business, including how they interact with the systems in which they are based. This research complements the existing body of work by integrating concepts from conservation science, demonstrating some of the similarities and differences between biodiversity and other issues in corporate sustainability. By itself, qualitative and case-based data does not provide definitive proof. Combined with the insights from conservation science and the existing empirical base on this issue though, this research supports the view that some aspects of biodiversity merit further enquiry. Questions regarding the balance between scientific and other forms of knowledge, temporal and spatial challenges and uncertainties regarding roles and responsibilities all feature in other issues in corporate responsibility. Specifically, this research suggests that the business case for biodiversity is highly context-dependent, reflecting interconnected social and ecological factors.

Early ONE scholarship argued that managing tensions in corporate sustainability means integrating thinking about interconnections between social and ecological systems (Bansal and Song 2017; Hoffman and Jennings 2015; Purser, Park and

Montuori 1995; Starik and Rands 1995; Hahn *et al.* 2017). This research indicates that this foundational work still has something to say regarding the direction of current and future research into corporate sustainability. This research has only scratched the surface in the concepts advanced here. The focus has been on bigger businesses, with a strong institutional focus and mostly at the organisational level. Further research at multiple-levels would help in understanding how tensions regarding biodiversity manifest and are dealt with, and advance comprehension of crossovers with other sustainability challenges (Starik and Rands 1995; Slawinski *et al.* 2017). For instance, at the individual level, interactions between managers and representatives of different organisations would help understand how values and forms of knowledge are interpreted and why some are favoured over others. Enquiries using stakeholder and resource-based theories of the firm, and combinations of the two could offer alternative perspectives to those offered in this thesis. Crossovers between corporate responsibility and sustainability in relation to biodiversity have been noted, but require further enquiry (Bansal and Song 2017). Overall, the findings serve as a start for several potential routes of future work in ONE.

The application of evidence and concepts from ONE and related literatures provides insights, lacking in to date in conservation social science, into how and why businesses operate (Bennett *et al.* 2017a; Bennett *et al.* 2017b). This thesis has demonstrated that business perceptions and actions regarding biodiversity are contingent on a wider range of factors, and are less homogeneous than previous work has suggested. The findings do not negate concerns about the consequences of business involvement in conservation, particularly regarding outcomes of stakeholder engagement. However, they demonstrate that there are limits to organisational capabilities and indicate that the moral basis for the business case may need to be explored if fundamental, lasting reform is to occur. This research demonstrates that ONE scholarship on institutional theory and the paradox approach for instance, can provide the methodological rigour that is demanded of social science contributions in conservation (Teel *et al.* 2018). However, this research only represents a small step: other concepts from ONE could be drawn on besides those applied here. Stakeholder theory could advance understanding of best practice regarding natural resource management amongst conservationists, for instance (Reed 2008; Rist *et al.* 2016; Sterling *et al.* 2017).

This research has a bearing on current policy debates regarding business and biodiversity. Businesses are expected to form an integral component of plans to

meet the CBD's post-2020 targets for biodiversity. With stronger links planned to the UN's SDGs, biodiversity is likely to move up international and national policy agendas, with an increased spotlight on business (PwC 2015; Sullivan, Thomas and Rosano 2018). Presently, the focus is on complementarities between business growth and biodiversity conservation and the opportunities businesses can realise by reducing impacts on nature. Yet, the cases of forestry and salmon farming highlight how in the absence of a supportive infrastructure, i.e. markets and regulations orientated to supporting – rewarding, even – conservation efforts, fundamental and lasting reform regarding impacts is unlikely.

Even without such reform businesses are capable of doing more than they are at present. But the results indicate that more effort should be made in considering how biodiversity becomes an internalised priority rather than an externalised tragedy. Science alone is not going to resolve the problem of biodiversity loss (Hunter, Redford and Lindenmayer 2014). More open dialogue at global national, and local levels about what the priorities should be and who is responsible is vital. The Delphi method and structured decision-making offer possible routes to successful collaborative management at a relatively low cost. Ecology cannot be discounted: agreeing and implementing best practices can only ever mitigate, rather than eliminate “ecological surprise” (Folke 2006; King 1995). When it comes to biodiversity though, moving to a point where businesses are open about their capabilities and society is clear on its priorities would be a good start.

The voices articulating biodiversity's many forms and humanity's relationship with it are almost as diverse as nature itself. This research moved from air-conditioned offices in Santiago and Puerto Montt to production sites, nature reserves and the foot of a volcano in search of those voices. Chile is but one case yet it exemplifies many of the challenges that businesses face in accounting for biodiversity. During a site visit, one manager described the contrast between plantations and native forest as that of “two worlds”. The same could be said of life within a salmon smolt and that beyond. Production and profit versus conservation and restoration; markets taking precedence over nature. This study has focussed on understanding the social and ecological factors that shape these two worlds and how we might bridge them. As the cases of forestry and salmon farming in Chile indicate, reform may be challenging but it is essential for corporate sustainability and potentially societal harmony. The results indicate that bringing biodiversity into business may require more than partial, largely symbolic reform. But they also suggest that increased transparency, dialogue, learning and a clearer

understanding of business roles and responsibilities regarding biodiversity may offer routes to more substantive change. Businesses may yet be part of a compromise with nature rather than a challenge to it.

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Chapter 9 – Appendices

9.1 Appendix A: Ethics Review Approval

Performance, Governance and Operations

Research & Innovation Service

Charles Thackrah Building

101 Clarendon Road

Leeds LS2 9LJ Tel: 0113 343 4873

Email: ResearchEthics@leeds.ac.uk



UNIVERSITY OF LEEDS

Tom Smith

Sustainable Research Institute

School of Earth and Environment

University of Leeds

Leeds, LS2 9JT

ESSL, Environment and LUBS (AREA) Faculty Research Ethics Committee

University of Leeds

26 November 2018

Dear Tom

Title of study: Why are businesses involved in biodiversity?

Ethics reference: AREA 15-038

I am pleased to inform you that the above research application has been reviewed by the Chair of the ESSL, Environment and LUBS (AREA) Faculty Research Ethics Committee and following receipt of your response to the Chair's initial comments, I can confirm a favourable ethical opinion as of the date of this letter. The following documentation was considered:

Document	Version	Date
AREA 15-038 Applicant responses to reviewer comments.doc	1	16/11/15
Ethical_Review_Form_TSmith_DRAFT_v3.2_2015-11-16.doc	2	16/11/15
AREA15-038 TomSmith_fieldwork_assessment_form_medium_risk_2013_2015-11-03.doc	1	02/11/15
AREA15-038 Sumario-de-Investigacion_TS_2015.pdf	2	16/11/15
Participant_Information_E-mail_v3.docx	1	16/11/15
AREA15-038 Consent_E-mail_v2.docx	1	02/11/15
AREA15-038 Business-Biodiversity-Concept-Note_TS_2015.pdf	2	16/11/15

The Chair made the following comments about your application:

Many thanks for the assurance that your research does not present a danger to either you or your participants. Given the level of anonymity likely for the local groups, and the local knowledge of your supervisory team, we are happy for the project to proceed but ask that you keep a critical eye on this aspect of the research and respond actively to any changes to that picture, if necessary in conjunction with advice from the University.

Many thanks also for elaborating on the need for verbal consent. The email now more clearly details the expectations of the interview and provided the interview is set up in response to the email we are happy for them to go ahead with verbal consent. Given that the interviews will be recorded, we suggest, where possible, the verbal consent is recorded as part of that process.

Please notify the committee if you intend to make any amendments to the original research as submitted at date of this approval, including changes to recruitment methodology. All changes must receive ethical approval prior to implementation. The amendment form is available at <http://ris.leeds.ac.uk/EthicsAmendment>.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, and other documents relating to the study. This should be kept in your study file, which should be readily available for audit purposes. You will be given a two week notice

period if your project is to be audited. There is a checklist listing examples of documents to be kept which is available at <http://ris.leeds.ac.uk/EthicsAudits>.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to ResearchEthics@leeds.ac.uk.

Yours sincerely

Jennifer Blaikie

Senior Research Ethics Administrator, Research & Innovation Service

On behalf of Dr Andrew Evans, Chair, [AREA Faculty Research Ethics Committee](#)

CC: Student's supervisor(s)

9.2 Appendix B: Recruitment Materials

9.2.1 Recruitment e-mails with informed consent

9.2.1.1 Stakeholder version

Consentimiento_Informado_ES_S_2015-12-04.docx

Estimado/a participante:

Le invito a participar en mi investigación que trata de como negocios Chilenos consideran la biodiversidad.

Detalles de la investigación

Hay una profundidad de estudios que tratan de la relación entre negocios y sostenibilidad en general pero poco que enfoca en las relaciones entre negocios y la naturaleza. Mi logro es fortalecer el entendimiento de esta relación. Mi investigación considera entrevistar ejecutivos, consultantes, representantes de varias ONG, académicos y responsables del sector públicos. Mi investigación está financiada por la Universidad de Leeds.

Me interesa su opinión

Quiero realizar una entrevista que trata de sus opiniones sobre las relaciones entre negocios y biodiversidad en general y de industrias específicas que conoce usted. Me interesa su opinión de los retos que se enfrentan negocios en cumplir responsabilidades en proteger la biodiversidad.

La entrevista dura hasta una hora y se puede pasar cuando y a donde se convenga. Es posible hacerlo por teléfono o por un servicio como Skype también.

Voy a grabar y hacer transcripto de la entrevista para utilizar en análisis. En vez de nombrarle en la investigación, utilizo una descripción en términos de su papel (como "Director", "Gerente", etc.) y el tipo de organización para que trabaja (como "Empresa Forestal", ONG, etc.). Cualquier cita en materiales publicados solo se atribuye a su papel y organización y nunca a su nombre. Todas las grabaciones y transcripciones se mantendrá en una forma segura y retenidos por los servidores de la Universidad de Leeds hasta cinco años desde hace la conclusión de la investigación. Si usted decide que no quiere que este incluido su entrevista, tiene que contactarme antes de que empiece el análisis (el 31 de Julio 2016).

Para enterar más de mi investigación o de la entrevista, por favor mándeme un e-mail o llámeme.

¡Le saluda atentamente y de antemano muchísimas gracias!

Thomas Smith
Candidato Doctorado

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School of Earth and Environment
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Chile +56 9 7707 9375
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www.see.ac.uk/people/t.smith

9.2.1.2 Business version

Consentimiento_Informado_ES_N_2015-12-04.docx

Estimado/a participante:

Le invito a participar en mi investigación que trata de como negocios Chilenos consideran la biodiversidad.

Detalles de la investigación

Hay una profundidad de estudios que tratan de la relación entre negocios y sostenibilidad en general pero poco que enfoca en las relaciones entre negocios y la naturaleza. Mi logro es fortalecer el entendimiento de esta relación. Mi investigación considera entrevistar ejecutivos, consultantes, representantes de varias ONG, académicos y responsables del sector públicos. Mi investigación está financiada por la Universidad de Leeds.

Me interesa su opinión

Quiero realizar una entrevista que trata de los retos en su industria en general, las actividades de su empresa que afectan y están influidas por la biodiversidad y además los retos y oportunidades presentados en considerar la biodiversidad en sus actividades.

La entrevista dura hasta una hora y se puede pasar cuando y a donde se convenga. Es posible hacerlo por teléfono o por un servicio como Skype también.

Voy a grabar y hacer transcripto de la entrevista para utilizar en análisis. En vez de nombrarle en la investigación, utilizo una descripción en términos de su papel (como "Director", "Gerente", etc.) y el tipo de organización para que trabaja (como "Empresa Forestal", ONG, etc.). Cualquier cita en materiales publicados solo se atribuye a su papel y organización y nunca a su nombre. Todas las grabaciones y transcripciones se mantendrá en una forma segura y retenidos por los servidores de la Universidad de Leeds hasta cinco años desde hace la conclusión de la investigación. Si usted decide que no quiere que este incluido su entrevista, tiene que contactarme antes de que empiece el análisis (el 31 de Julio 2016).

Para enterar más de mi investigación o de la entrevista, por favor mándeme un e-mail o llámeme.

¡Le saluda atentamente y de antemano muchísimas gracias!

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9.2.2 Concept note

Thomas Smith

23/10/2015

¿Por qué las empresas se involucran en temas de biodiversidad?

Importancia y relevancia del asunto

Biodiversidad – es decir, la variedad de la vida y los ecosistemas en el que especies viven – está en peligro (Steffen et al., 2015, UNEP, 2010). Varias iniciativas, apoyadas por el sector privado, se han formado para conservar la naturaleza a la que pertenece y disminuir, sino eliminar, las actividades que la dañan (Bishop, 2013, Evison and Knight, 2010, UNEP, 2010). Las respuestas esperadas incluyen alcanzar “neto positivo” (Rainey et al., 2015), el “desacoplamiento” del crecimiento económico sobre el impacto ambiental asociado (Unilever, 2015, Fischer-Kowalski et al., 2011) y compensación en términos de biodiversidad (Gardner et al., 2013, Kate and Jeter, 2012). Sin embargo, existe mayor conciencia al respecto, la deforestación y la sobrepesca continúan creciendo y aunque unas empresas toman acciones, otras no están seguras de lo que pueden hacer (McKinsey, 2010).

Lo que sabemos y lo que no

Es posible crear una lista de razones de porqué unas empresas emprenden acciones y otras no. Por ejemplo es más probable que sectores con mayor vulnerabilidad a los riesgos asociados con la disminución de la biodiversidad reaccionen (Bhattacharya and Managi, 2013, Lambooy and Levashova, 2011). Además, nuevos mercados ofrecen oportunidades para crecer o manejar los riesgos (Koellner et al., 2010, Lambooy and Levashova, 2011). Por el contrario, existen impedimentos que incluyen dificultades para identificar qué tienen que medir y cómo hacerlo (Koellner et al., 2008, Lambooy and Levashova, 2011) y existe falta de información relevante sobre la biodiversidad y esto interactúa con las operaciones cotidianas (Ebeling and Yasue, 2009, van den Burg and Bogaardt, 2014). Sin embargo ciertos aspectos del contexto donde operan las empresas dan paso a preguntas que son necesarias de responder: ¿Cuándo son importantes estos factores de contexto? ¿Dependen estos del lugar, del tamaño de la empresa o de otros aspectos?

Objetivo de la investigación

El objetivo principal de esta investigación es explorar las relaciones entre las empresas y la biodiversidad, y mejorar el entendimiento de cómo ellas entienden y se relacionan con los distintos aspectos de la biodiversidad. En particular esta investigación se centra en tres preguntas:

- ¿A qué retos se enfrentan las empresas a la hora de entender la biodiversidad?
- ¿Qué papel juega las relaciones entre los stakeholders y los esfuerzos de las empresas a la hora de entender la biodiversidad?
- ¿Hay alguna diferencia entre como las empresas presentan su relación con la biodiversidad y la realidad actual?

Chile y con quién quiero hablar

Chile es un caso ideal para investigar estas preguntas. Su bosque es un tesoro de biodiversidad y, además, su costa y su fondo marino forma parte de un ecosistema valioso. Hay que crecer económicamente, pero al mismo tiempo hay que proteger los bosques y los fondos marinos. Mi investigación estará centrada en industrias con conexión estrecha con ecosistemas naturales de alta biodiversidad, como lo son las industrias forestal y salmonicultura. Estos sectores no son solo importante a la economía chilena sino además presentan desafíos de cuidar la naturaleza. Entender mejor las prioridades de las

Thomas Smith

23/10/2015

empresas y de los stakeholders en estos sectores puede ayudar un mejor entendimiento de cómo hacer crecer estos sectores y al mismo tiempo apoyar esfuerzos para cuidar la biodiversidad. Estoy interesado en hablar con directores y gerentes de compañías de estas industrias, con representantes del sector público involucrados en temas medioambientales. Además me gustaría hablar con investigadores de universidades y representantes de ONG de conservación y protección medioambiental.

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9.2.3 Curriculum Vitae

Hoja de Vida: Thomas Smith

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eets@leeds.ac.uk	http://www.see.leeds.ac.uk/people/t.smith	+56 9 7707 9375

Nacionalidad: Británico

Fecha de nacimiento: 18/11/1981

Cargo: Doctorando (2º año de 3)

Título de tesis: ¿Por qué las empresas se involucran en temas de biodiversidad?

Títulos Académicos y Profesionales

Licenciatura

- London School of Economics: (BSc) Gobierno e Historia, 2004

Postgrado

- Universidad de Manchester: (MA) Gobierno y Políticas Públicas, 2007
- Universidad de Oxford: (PGCE) Certificado de enseñanza, 2005

Profesional

- Sociedad de Investigación de Mercado (MRS): Certificado Avanzado de Investigación Social y de Mercado, 2008

Experiencia Profesional

- Gerente de Investigación: Investigaciones Sociales, Equipo Internacional, Ipsos MORI, Londres, 2012 – 2014
- Ejecutivo Senior: Investigación de Mercado, Equipo de Servicios Financieros y Negocios, Synovate, Londres, 2011 – 2012
- Ejecutivo: Investigación de Mercado, Equipo de Consumo, GfK NOP, Londres, 2010 – 2011
- Ejecutivo: Investigación de Mercado, Equipo de Servicios Financieros, GfK NOP, Londres, 2007 – 2009

Otra experiencia

- Coordinador, Campaña de Comida y Sostenibilidad, Asamblea de Londres, 2010 – 2011
- Voluntario, Conservación y Desarrollo de Comunidad, Global Vision International, Reserva Yachana, Ecuador, 2010

Biografía

Me interesa la relación entre las empresas y la biodiversidad. De una u otra manera la naturaleza provee un rango de servicios que apoyan a las empresas, por ejemplo la regulación de ciclos naturales como las inundaciones. Además ofrecen oportunidades de mercado: tangibles – como alimentos, madera, etc. – e intangibles como oportunidades de recreación. No obstante, hay desafíos: las prioridades del mercado no siempre coinciden con la necesidad de conservación de la biodiversidad ni con las necesidades de las diferentes partes interesadas. Hay una falta de entendimiento en cuanto a cómo las compañías manejan estas diferentes presiones y los desafíos asociados con entender lo que significa biodiversidad para sus operaciones. Proveer respuestas a estas preguntas puede ayudar a las compañías a manejar mejor estos desafíos y asegurar beneficios para ellas mismas y el medio ambiente. Mi experiencia profesional es en negocios, manejo proyectos para organizaciones internacionales (por ejemplo el Banco Mundial) y compañías multinacionales (por ejemplo HSBC, Barclays y Accenture, entre otros), cubriendo Europa, África y Asia del Sur. He vivido en Ecuador en España y he estudiado Español como parte de mi licenciatura y a través de cursos profesionales en España, Inglaterra y Ecuador, incluyendo un énfasis en negocios.

9.2.4 Sample thank you e-mail

Estimada REDACTED

Muchas gracias por hablar conmigo el jueves pasado y prestarme tanto tiempo para tratar de mi tema, especialmente cuando estás muy ocupada y viajando mucho.

Disculpe por el hecho de que mi resumen al principio de nuestra conversación fue un poco desarreglado. Sin embargo, espero que te ofreciera algo interesante y mereciera la pena de hablar conmigo. Tan pronto como tengo un análisis más arreglado te contactaré. Creo que el trabajo del REDACTED es muy interesante y distinto de lo que hacen otras ONGs que están involucradas con asuntos respecto a acuicultura.

Si tienes alguna pregunta respecto a mi investigación solamente necesitas mandarme un correo. ¡Espero tener resultados que puedo compartir antes del fin de este año!

¡Que estés bien y estamos en contacto!

Saludos

Tom

9.3 Appendix C: Interview Guides

Used for general reference: questions were adapted for each interview.

9.3.1 Forestry

Pre-interview checks	Timing
Antes de empezar, querría comprobar algunas cosas...	
<ul style="list-style-type: none"> • Objetivos de la entrevista <ul style="list-style-type: none"> ○ <i>Es importante cobrar opiniones de muchas fuentes</i> ○ <i>Me interesa su experiencia y conocimiento del tema forestal</i> • Tiempo <ul style="list-style-type: none"> ○ <i>¡En toda probabilidad podemos hablar durante mucho tiempo, pero entiendo que usted está muy ocupado! Anticiparía que nuestra conversación dure más o menos una hora</i> ○ <i>[Si no está bien] No importa, podemos hablar hasta el punto que tenga que irse</i> • <i>Voy a grabar nuestra conversación</i> <ul style="list-style-type: none"> ○ <i>[Si es necesario] Quiero grabar nuestra conversación para que pueda enfocar en escuchar en lo que dice usted. Además me pueda ayudar al punto de análisis</i> • <i>¿Antes de empezar tiene usted alguna pregunta?</i> 	2 mins
<i>Section total [Running total]</i>	2 [2] m
Introduction and Warm-up	Timing
¿Podría usted resumir – brevemente – su papel corriente?	
PROBES <ul style="list-style-type: none"> • <i>¿Y cuales son sus prioridades corrientes en su puesto?</i> • <i>¿En qué proyectos se involucra usted?</i> • <i>¿Cuales son sus objetivos como [puesto]/ los objetivos de su equipo/ departamento/ organización durante los próximos 2 o 3 años?</i> 	3 mins
¿Qué son los objetivos principales de su empresa en este momento?	
PROBES <ul style="list-style-type: none"> • <i>¿Comparte esta definición su organización?</i> <ul style="list-style-type: none"> ○ <i>[Si es diferente] ¿Cómo es diferente? ¿Por qué esta diferente?</i> • <i>¿Cree usted que es una definición común en Chile?</i> 	3 mins
<i>Section total [Running total]</i>	5 [7] m
Business and Biodiversity	Timing

Los retos y oportunidades que se enfrentan la industria forestal en general	
FOLLOW-UP: Los retos que se enfrenta esta empresa específicamente	
CLARIFY: Retos en general – no solamente en relación a biodiversidad/ sostenibilidad	5 mins
Retos y oportunidades específicos en relación con la biodiversidad	
CAUTION: Move away from “sustainability” and “environmental” – ensure focus is on biodiversity PROBES <ul style="list-style-type: none"> • ¿De qué forma son retos? (Operaciones, estrategia, etc.) • ¿Son problemas que existen en la industria forestal en general? ¿(No son específicas a esta empresa)? 	5 mins
Herramientas y estándares	
PROBES <ul style="list-style-type: none"> • ¿Ayudan los estándares (ej. Del FSC, CERTFOR)? • Uso de herramientas especiales 	10 mins
¿Ayudan a las empresas las regulaciones del estado?	
PROBES <ul style="list-style-type: none"> • ¿Qué retos presentan las regulaciones al respecto a la industria forestal? • ¿Hay regulaciones que la empresa le gustaría abolir o cambiar? • ¿Hay alguna regulación que la empresa querría introducir? 	10 mins
[If CSR/ CR programme] La biodiversidad en el contexto del programa de responsabilidad corporativa [If no CSR/ CR programme] ¿Por qué no hay un programa de responsabilidad corporativa?	
<i>Section total [Running total]</i>	30 [37] m
Stakeholders	Timing
Quisiera enfocar en sus “stakeholders”. El termino stakeholder es un termino estrechada de algunas formas y puede cubrir a muchas personas y una variedad de grupos. Enfoco aquí en stakeholders quienes tienen algo que ver en relación con la biodiversidad y específicamente los stakeholders a quienes se acerque consejos. ¿Quiénes son?	

PROBES <ul style="list-style-type: none"> • Specific examples 	5 mins
<i>¿Cuándo toman decisiones que impactan a la biodiversidad quien es más importante involucrar en estas decisiones? ¿O prefieren tomar decisiones y comunicar después?</i>	
EXAMPLES: State, local community, suppliers, markets, certification agencies PROBES <ul style="list-style-type: none"> • <i>¿Cuales retos se presentan la necesidad involucrar otros?</i> 	5 mins
<i>¿Hay stakeholders quienes opinan hacen que el proceso de tomar decisiones es más difícil y que dure más tiempo que quieran?</i>	
PROBES <ul style="list-style-type: none"> • <i>¿En que vías evitan o asumen estos retos?</i> 	7 mins
	17 [55]m
Closing elements	Timing
<i>¿Hay algo más que querría añadir usted?</i>	
<ul style="list-style-type: none"> • Ideas adicionales 	2 mins
<i>¿Puede sugerirme de otras personas quienes yo deba entrevistar?</i>	
<ul style="list-style-type: none"> • Detalles de contacto • Porque son importantes 	2 min
Gracias	
<ul style="list-style-type: none"> • Carta de negocio • Posible de hacer contacto 	1 min
	<i>Section total [Running total]</i>
	5 [55-60] m

9.3.2 Salmon Farming

Consentimiento informado	2 minutos
Aclarar objetivos de la entrevista	

- **Objetivos de la entrevista**
 - *Es importante cobrar opiniones de muchas fuentes*
 - *Me interesa su experiencia y conocimiento del tema forestal*
 - *Referencia a la empresa específicamente*
- **Creo que podemos cubrir todo dentro de una hora. ¿Le conviene?**
- **Voy a grabar nuestra conversación**
- **¿Antes de empezar tiene usted alguna pregunta?**

Introducción	5 minutos (7 total)
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1. **He leído un poco de [NOMBRE DE EMPRESA] y sus actividades pero ¿podría usted resumir – brevemente – su papel corriente y los proyectos en que usted está involucrado?**

Aunque mi foco es en la relación entre negocios y la biodiversidad, es importante entender el contexto más amplio – de la sociedad, del mercado, de la política pública, entonces me interesa...

2. **¿Cuáles son los retos que se enfrentan a [NOMBRE DE EMPRESA]?
¿Y cuáles son las oportunidades que quieren aprovechar?**
 - Marea Roja – Medidas para superar el problema

Negocios y la biodiversidad	30 minutos (37 total)
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Dado este contexto de un rango de proyectos y diferentes retos...

3. ¿Qué perfil tiene la biodiversidad dentro de [NOMBRE DE EMPRESA]?

- EJEMPLOS de cómo es una prioridad
- ¿Algo que entra en proyectos o prácticas específicos? ¿O viene como parte del programa de sostenibilidad?

La biodiversidad es un concepto complejo y como hemos cubierto ya, tiene diferentes dimensiones

4. ¿Qué herramientas específicas utiliza [NOMBRE DE EMPRESA] para medir sus impactos sobre la biodiversidad?

PROMPTS: Por ejemplo...

- Encuestas científicas
- Información de SERNAPESCA
- EIAs

FOLLOW-UP [IF NOT MENTIONED]

- ¿Qué innovaciones ha hecho [NOMBRE DE EMPRESA]?

5a. Salmonicultura es una industria muy compleja, especialmente respecto a interacciones con la biodiversidad. ¿Cuáles son las fuentes de información más importantes de información e investigación científica para [NOMBRE DE EMPRESA]?

PROMPTS

- Enlaces con académicos y universidades
- Enlaces con Intesal
- Inversión en encuestas y conservación
- Información por parte de SERNAPESCA y INFOP

5b. ¿Qué ha sido el impacto de la certificación por las prácticas de [NOMBRE DE EMPRESA] respecto a la biodiversidad?

PROMPTS

- ¿Qué son los retos más grandes en adoptar certificación de ASC?

- [SI NO TIENEN ASC]: ¿Por qué han adoptado BAP?
- ¿Qué ventajas crees que van a traer a la compañía?
- Pensar de forma diferente de sus responsabilidades

6. ¿Cuáles otros cambios podrían hacer [NOMBRE DE EMPRESA] a sus prácticas para ayudar a la conservación de la biodiversidad?

PROBES/ PROMPTS

- Disminución del uso de antibióticos
- Reducir eutroficación
- Reducir cantidad de peces en cada jaula

7a. ¿Qué barreras previenen a [NOMBRE DE EMPRESA] de hacer más al respecto a la biodiversidad?

PROMPTS

- Recursos para cambiar procesos
- Dificultades en adaptar a nuevos procesos
- Falta de información sobre la biodiversidad
- Resistencia interna y la necesidad cambios de cultura
- Accionistas
- Cadena de valor

[SI NO MENCIONA PROBLEMAS INTERNAS, EMPIEZA CON] Normalmente cuando una empresa quiere cambiar operaciones o estrategia hay barreras internas también...

7b. ¿Cómo consigue en superar resistencia interna a cambios para tomar en cuenta la biodiversidad?

- Argumentos para convencer colegas
 - Ventaja competitiva
 - Riesgo en el futuro a su comercio/ sus ventas
 - Presión del mercado
 - Riesgo en términos de publicidad/ imagen publica

Cadena de valor y Stakeholders	14 minutos (51 total)
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Me interesa cómo la cadena de valor influye a las acciones de [NOMBRE DE EMPRESA] respecto a la biodiversidad

En términos de la cadena de valor...

- 8a. ¿Qué exigen los compradores más grandes que haga [NOMBRE DE EMPRESA] respecto a la biodiversidad?**
- 8b. ¿Cómo ayudan los proveedores de alimentación y los farmacéuticos en reducir los impactos de [NOMBRE DE EMPRESA] sobre la biodiversidad?**
-

La cadena de valor representa un grupo de stakeholders. En términos de Chile y Los Lagos especialmente...

- 9. ¿Qué formas de apoyo ofrece el gobierno para que [NOMBRE DE EMPRESA] pueda tomar en cuenta la biodiversidad en las decisiones?**
- ¿Cómo ayuda la Mesa del Salmón?
- 10. Parece que hay bastante distancia entre las empresas y ONGs y académicos. ¿Crees que ONGs y académicos puedan tomar un papel más grande en ayudar a [NOMBRE DE EMPRESA] en manejar y medir sus impactos sobre la biodiversidad?**

PROMPTS/ PROBES

- Ejemplos específicos en que ONGs o/ y académicos podrían ayudar a negocios
- Ejemplos de vías en que ONGs hacen más difícil el proceso de tomar decisiones respecto a la biodiversidad
- ¿Especialmente cuando tienen opiniones opuestas a sus objetivos?

El futuro	5 minutos (56 total)
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Gracias por su tiempo. Hemos tratado de una variedad de temas. Si es posible, tengo dos preguntas más...

10. ¿En su opinión, cuáles serán las fuentes de presión más fuertes sobre [NOMBRE DE EMPRESA] al respecto a la biodiversidad en los próximos 10 años?

PROMPTS

- Crisis
- Cambios en el mercado

11. ¿Hay un tema importante de que no hemos hablado y cree que es importante o algo más que querría añadir usted?

Conclusión	4 minutos (60 total)
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12. ¿Puede usted recomendarme de otras personas quienes yo deba entrevistar?

Gracias y carta de negocio

9.4 Appendix D: Interview themes

Forestry firms			
ID	Theme 1	Theme 2	Theme 3
4	FSC has transformed forestry practices regarding biodiversity: it gave a structure to new practices	Social aspects of biodiversity are crucial: ecosystems services such as water, as well as forest products such as firewood factor into thinking	Managing biodiversity is complex and multi-level: different stakeholders have interests at different levels
6	Arauco has become more innovative in terms of its thinking in relation to the value of their forests	Priorities have to be agreed upon together, but dialogue needs structure and direction, otherwise little is achieved	The state is very much behind the times and offers little in terms of direction. Arauco and NGOs are ahead in this respect
7	Profitability at the heart of planting decisions: ideal locations in terms of climate not necessarily the most profitable due to poor infrastructure	The industry has changed hugely in the last 15/20 years: certification has had a major positive impact in helping to provide the guidelines by which to manage biodiversity	The challenges facing small producers are very different to those of medium and large firms such as Comaco
25	Masisa an early leader in terms of thinking about biodiversity; optimistic view of the potential for forestry, especially with NGP	Certification was fundamental in changing processes, and cultural change followed as a result of pressures to change	Dialogue is good, but only if structured and if parties involved are prepared to listen
27	Biodiversity is something that all forestry firms have to engage with, but certification provided a structure and a logic by which to act	Implementing change is a time-consuming process; it takes time to agree what should be done with stakeholders, and then to implement change	The demands on forestry firms are going to increase
31	Bioforest have to negotiate between what's ideal and what Arauco want to achieve	Over time, Arauco have become more positive about investigating and understanding biodiversity	The social dimension of biodiversity adds immense complexity, and goes beyond Bioforest's capabilities
33	Biodiversity has gone-up the agenda and forestry firms now have a greater understanding of it compared to 20 years ago	FSC was critical in ushering-in change and has been critical in raising standards	Certain practices endure, however, e.g clear-cut
34	Ignisterra is operating in a completely different market and under completely different regulations compared to the rest of the sector in Chile	Entire operations are viable due to lenga's scarcity and quality, and therefore the high price it commands in foreign and domestic markets	Operations are very tightly regulated but work because lenga is such a special wood
54	Chilean forestry as a whole has undergone a huge amount of change	Full cultural change takes time to institute, as was the case in CMPC	What CMPC can achieve is bound TCE by the attitudes and preferences of different local communities and key individuals in different regions
65	HCP different from other forestry firms in terms of financing and focus entirely on forest management	HCP's motivations concerning conservation stem from a genuine desire to care for biodiversity in and of itself, and not	Plantations can play a positive role in conservation, not only protecting native forest but

Forestry firms			
ID	Theme 1	Theme 2	Theme 3
		because of the commercial benefits that this stance confers	also as part of a wider landscape function
66	Biodiversity a major component of Arauco's thinking	Difficult to separate biophysical/ scientific aspects of biodiversity from wider social aspects: need to consider issues from all sides	NGP has a great deal of potential but there's a need to integrate a wide range of stakeholders if it is going to function... it is also a LT process

Salmon producers			
ID	Theme 1	Theme 2	Theme 3
41	Camanchaca is progressive and open to new ideas in relation to sustainability and the environment, but regulations restrict how far they can go	More cooperation is required, both amongst salmon farmers and between salmon farmers and stakeholders. However, the state needs to facilitate that process	Salmon farming is complex and the issues it faces in environmental and institutional terms complicate the task of becoming sustainable
42	AquaChile has to meet a wide range of very exacting standards on a number of fronts, in addition to complying with multiple regulations that restrict the latitude of salmon farmers to act in a sustainable manner. Regulations and standards together do not necessarily equate with efforts to become sustainable	The ISA crisis forced AquaChile to pause and think about processes and products, and was the impulse behind Verlasso	The use of antibiotics is justified, and comparisons with other countries and very different conditions is unfair
46	Yadran do what they have to do, but no more: this is largely down to limited resources. Hence achieving standards such as the ASC are beyond their capabilities	Regulations, in particular in relation to health and sanitation, are incredibly prescriptive and restrictive, and in the process require the dedication of greater resource that could be employed elsewhere	There are a series of trade-offs facing salmon farmers, e.g. in relation to feed, location of cultivation centres, etc.
49	Los Fiordos is a leader in sustainability and goes beyond legal requirements, but achieving ASC standards and being sustainable is difficult, e.g. attempts to reduce antibiotic use are not straightforward	Some issues are greater than that which Los Fiordos or any single salmon farmer can deal with; state involvement and fair regulations are critical	Working with WWF can be difficult, but they have raised an awareness of issues within the firm that did not exist before
50	Caleta Bay are focussed on reducing impacts: notably antibiotic use and feed quantities	Caleta Bay do understand that they have an impact and appreciate that a balance has to be struck in the relationship between their activities and the environment, albeit that it is not easy with salmon farming, as with any intensive process	Chilean Salmon Farming faces some major challenges, e.g. climate change, and will have to adapt, but the future is bright: it will become an ever more important industry in the future

Salmon producers			
ID	Theme 1	Theme 2	Theme 3
51	Ventisqueros has put in a lot of work in recent years to become a leader in terms of sustainability and caring about sustainability is a part of the company's culture. Its German ownership has been a central component of these efforts	As as part of its efforts to become more responsible in relation to the environment, a lot of resource has been dedicated to rethinking how operations function and into sharing knowledge and expertise to improve these aspects	There is more that salmon farming can achieve as a whole and the idea of corporate responsibility on a scale beyond the immediate operations of the firm - in relation to society as well as the environment - is still relatively new (and developing as a result)
57	MultiExport is a leader in relation to sustainability and has been concerned about the environment for a long time	Work with WWF is a relatively new development but there are mutual benefits to be had and the Blue Whale campaign has a lot of attractions	It is difficult to achieve a consensus amongst Salmon Farming companies: the limited reach of GSI is clear evidence of this
62	Salmon Farmers could do an awful lot more than they are. In certain respects their thinking is behind the times and they have failed to grasp what needs to be done; Los Fiordos is no exception, but it has made great strides in terms of sustainability, and its internal culture and actions mean that it is a leader amongst Salmon Farmers in the industry	Salmon Farmers do suffer from a poor image, generated through past actions, but they compound this problem by being poor communicators, failing to open-up and explain why they act in certain ways, as well as to actively work to dispel certain myths or untrue claims against the industry	The social aspects of sustainability are an area where Salmon Farmers - Los Fiordos included - can make great strides. Salmon Farming can have a positive future
63	Salmones Austral is focussed on productivity and this is the lens through which it perceives matters relating to the environment. This is not to say that the environment isn't important... just that it has to be viewed through the production lens, and linked to that, profitability	Salmones Austral's activities in relation to the environment and biodiversity are circumscribed by the legal framework in general (e.g. in relation to sanitation) and by concessions in particular. There is limited space for involvement. Certification is a secondary concern.	Salmon Farmers are not responsible for the Red Tide/ Algae Bloom. It is a serious challenge in terms of social relations, but there is little that Salmon Farmers can do to mitigate the effects of Blooms

Conservation Biologists				
ID	Sector	Theme 1	Theme 2	Theme 3
1	Forestry	The lack of institutional coherence and unclear priorities in Chile make the task of pursuing conservation policies much harder	Forestry firms have changed: their attitude is different, although their primary aim remains productive. Lack of urgency means that it is hard to achieve reform: no reaction until there's a crisis, and then stating that should have acted beforehand	Certification has made a difference, but newer, younger employees also view certification differently: it is not an imposition, it is something that they buy into

Conservation Biologists				
ID	Sector	Theme 1	Theme 2	Theme 3
9	Multiple	Institutionally Chile is very weak: without stronger institutions, little progress is likely regarding big companies and conservation	There is a lack of political will to bring about change: a combination of division within the state and powerful interests' lobbying	The biggest pressure likely to be brought to bear on firms is via public pressure - for that better information is needed
14	Forestry	Institutionally Chile is weak and its approach to conservation is outdated. Cooperation is vital	Certification alone is insufficient to achieve change, offering a base to work from. Greater public pressure is needed to move firms onto the next step	There are some positives that can be held onto, but a number of reforms that need to occur if those positives are to be realised
43	Salmon Farming	Institutional change is critical to bringing about necessary reforms: answers lie with the state	Information vital for reform to come about: need for multi-disciplinary advice to help out - and to integrate local community	Change has occurred, but is minimal and insufficient to resolve challenges facing salmon farming
44	Salmon Farming	Knowledge in the salmon industry in Chile is limited. Large scale business models means removed from local conditions	Need for fundamental systemic reform, including increased research investment and consultation of wider expertise	Salmon industry is important to Chile but without reform it will continue to struggle

Environmental consultants				
ID	Sector	Theme 1	Theme 2	Theme 3
11	Multiple	Biodiversity is an externality for firms: they will react when it becomes a material issue, as it did for mining and, latterly, forestry. Profits come first though, as the dip in mining demonstrates	FSC standards were transformative (and were resisted). Forestry firms have integrated new processes and now consider local communities where before they ignored both	The greatest barriers to change are internal from Andres' experience in Arauco. Change had to be forced through and justified in terms of what it meant to the firm and profits, not in terms of considering the ethics of impacts on nature and society
12	Forestry	The main contribution of certification is not in raising standards but in opening-up forestry firms to stakeholders	There are differences between firms: change in Masisa came about due to an internal commitment, in Arauco due to external pressure, and CMPC are better at PR than real change	The personnel who lead changes count. There are limits to the change that can be implemented when employees work counter to the culture of a firm, however

Environmental consultants				
ID	Sector	Theme 1	Theme 2	Theme 3
21	Multiple	Changes are beginning to occur, albeit very slowly. Attitudes towards change are mostly externally defined	The market has been a powerful force for change in Chile especially, but there are disadvantages to relying on the market in that issues change and it fosters a reactive rather than proactive attitude to biodiversity	Mining firms have gone further than forestry or salmon farming firms. Forestry firms have made some changes but have much further to go in their thinking about biodiversity: salmon farmers are doing next to nothing and don't care
26	Multiple	Changes are happening: mining firms are ahead of forestry and salmon farming, although even in mining with the market for copper nosediving, cutbacks in environmental programmes evident	Difficult to achieve change without a proper system in place to provide a baseline, means for comparison, etc.	The social aspect of biodiversity is undeniable and very powerful in bringing about change: companies are realising their responsibilities
29	Forestry	Systemic change is needed to protect forest biodiversity, particularly re-balancing power between Arauco and CMPC and small and medium forest owners, who collectively own a lot of land but who have limited market power and capabilities	The bigger forestry firms favour the status quo, even though the pressures to reform are growing, particularly due to climate change	FSC certification is not the answer: it began as an initiative of small NGOs but has become a tool of the big firms, a means to protect their image

Industry Associations				
ID	Sector	Theme 1	Theme 2	Theme 3
13	Forestry	Plantations play a vital dual role: meeting a societal demand for wood and in protecting biodiversity through raising productivity on small areas of land, sparing further native forest destruction	Biodiversity conservation is a societal challenge: big companies are the wrong ones to pursue because they are pursuing best practices and are already highly efficient	Biodiversity in terms of species, habitats, etc. is an interest of select stakeholders rather than the whole of society. If societal values change, forestry practices will change, mediated via markets
32	Forestry	There's a big difference between the big 3 and other firms and forestry owners in Chile in terms of technology and efficiency. The big 3 dominate debate	Plantations have a major role to play in protecting biodiversity because they meet productive demands, even if practices are criticised. The challenge is to continue to produce more with the same amount of land	Reaching solutions requires dialogue, but there is a great deal of mistrust between stakeholders, partly due to historic differences

Industry Associations				
ID	Sector	Theme 1	Theme 2	Theme 3
52	Salmon Farming	Intesal is helping to coordinate scientific knowledge in the industry, integrating knowledge from different sources, with tangible results in terms of raising understanding	There are many technological developments that can and will help the industry in becoming sustainable, and will in turn help the environment	The institutional setting is complicated, with multiple interests, multiple ecological scales and multiple rules and laws in place. The fact that many laws are outdated makes becoming sustainable even harder
58	Salmon Farming	Industry is disposed to change and is concerned about the long term, but it is difficult because there are multiple immediate challenges and multiple interests to navigate, both within the industry and across various stakeholders	The state has to take the lead and help coordinate a response that all can agree on: substantive change is only possible with greater state support and facilitation of dialogue	SalmonChile are open to talking more to NGOs but there are multiple forms of interaction that occur, some more sporadic than others. Some NGOs are also anti-industry, so cooperation is difficult

NGOs				
ID	Sector	Theme 1	Theme 2	Theme 3
3	Multiple	State support is necessary to ensure that projects are viable, but state bodies and representatives are often disinterested, unhelpful, and lack knowledge and expertise regarding conservation: running community projects is very difficult as a result	They prefer to work from the bottom-up so that projects reflect community priorities: big companies prefer to avoid these sorts of projects since they can't take control	Conservation is poorly supported and financed in Chile. Change will only come about with greater societal awareness of the issues regarding biodiversity, and a will by the state to act
10	Multiple	Sustainability has risen-up the agenda in Chile, partly due to foreign firms importing higher standards, and partly due to increased public consciousness meaning that issues can't be ignored. Biodiversity remains a low priority though	Mining is ahead of agriculture, forestry and salmon farming. Multiple issues remain but require concerted public pressure to ensure that change occurs	
18	Forestry	Change will not be achieved through traditional business models: they are focussed on maximising production and not conservation	Fundamental changes in laws are also necessary to level the playing field, incentivise reform and innovation, and provide a direction of travel	Tools such as the FSC will only ever have a limited impact. Forestry firms reacted to market and (to some extent) social pressure, but practices and mentalities are largely unchanged

NGOs				
ID	Sector	Theme 1	Theme 2	Theme 3
22	Multiple	Forestry firms have reformed, but there is a great deal more that they could do; they are at the beginning of this process, rather than the end of it, as the NGP discussions demonstrate	The degree to which action is taken depends partly upon the individuals that you deal with and their ability to influence others and determine company policy	FSC Certification has made a difference but its continued viability is conditional on whether it remains critical to forestry firms' social licence to operate. To do that means re-inforcing the credibility of the FSC, e.g. by proving the role it can play in assisting conservation
23	Multiple	Changes have taken place but there are plenty of reforms that could be made, although they would require state backing and historically the state has failed to fulfil that role	Sees the CPF as a force for bringing about change and a means to resolve some of the most pressing issues	Flavia can only see conflict escalating in both forestry and salmon farming: in forestry due to tensions with the Mapuche, and in Salmon Farming the move into Patagonia and encroachments into protected areas are going to the source of dispute
24	Forestry	The critical link between the social and ecological aspects of biodiversity lies in the links between plantation management and effects on ecosystem services	Forestry firms have changed in some ways, but they remain resistant to change in many respects, and rarely go beyond FSC demands	Serious tensions and sources of disagreement remain. The original sources of dispute (native forest substitution) may have been resolved, but intensification remains a serious issue
28	Forestry	AIFBN will continue to take a radical, critical stance of forestry firms	AIFBN has been proven right in the past and will continue to advance arguments based on rigorous research	Disputes are unlikely to disappear in the future and serious challenges remain
37	Multiple	Need for greater power at municipal level: greater responsiveness	Degree of reform by forestry and salmon farming firms has been very limited	Without either greater will on the part of central government, or greater power at the municipal level, local priorities are likely to be ignored and tensions are likely to increase
38	Multiple	The state lacks direction in terms of strategy regarding salmon farming. Regional governance is constrained and largely revolves around economic imperatives. Central government is fragmented	State - producer relations on a strategic level are sporadic. Salmon producers generally only engage with the state when they need support	Salmon producers show little sign that they are willing to reform, or to fully engage with local communities. They are difficult to work with, and their CSR efforts to date are a long way from what is needed

NGOs				
ID	Sector	Theme 1	Theme 2	Theme 3
53	Multiple	Pursuing change in Chile is complicated by the institutions in place. The Environmental Impact Assessment system is restrictive and there is no coherence across government on what biodiversity is or what companies should be doing	It is difficult to get companies to change for multiple reasons, partly due to the institutional context, but also because they are inherently conservative and favour established practices over new ways of doing things	Pursuing change in companies is complicated and there is only so much that can be achieved at an organisational level, even when you know about what might prompt change and what won't. Systemic change is needed
61	Salmon Farming	WWF are using certification as a means to an end: get sustainability and environment on the agenda	Working with SF is a slow (and frustrating) process! It takes a long time and a lot of effort to achieve change	WWF have been heavily criticised for their stance, but in spite of making some compromises, e.g. over feed, they remain committed to reform and have more faith in evidence-based arguments rather than hostile campaigns
70	Salmon Farming	Zonal management approach vital if going to achieve change: has to be at scale	Positive, collaborative approach also important: need to focus on solutions and not continually debate difficulties	Institutions are important, but a supply chain focus can help in achieving the solutions that participant outlines

Salmon Farming Supply Chain				
ID	Sector	Theme 1	Theme 2	Theme 3
45	Salmon Farming	Investment in genetic research in salmon farming has increased in recent years and expertise is ahead of other industries, e.g. tilapia farming. Although finance still remains an issue	Reliance on suppliers to provide solutions to a certain extent. Some producers are integrating the supply chain so that they control hatching through to production	The links between universities and producers are tenuous. Universities have expertise but don't offer what the industry is demanding. Some form of institute to bridge interests might help change that situation
47	Salmon Farming	Firm is committed to making changes in the industry as a whole	Salmon Farmers are also committed to becoming sustainable, but the rate of change depends on economic circumstance	The industry is moving in the right direction, with the ASC a marker of the way forward
48	Salmon Farming	Salmon farming has advanced technically but it is under a great deal of economic pressure: sustainability unlikely to come high up the agenda. Producers are also generally focussed	Salmon farming in Chile faces multiple pressures: economic, reputational and ecological - climate change makes occurrences such as algae blooms even more difficult to predict	Institutionally salmon farming is very complex and there are few signs of a way forward: few actors are clear on what they need to do or where they need to go. There is no clear definition of

Salmon Farming Supply Chain				
ID	Sector	Theme 1	Theme 2	Theme 3
		at site, not industrial, level		what biodiversity means in salmon farming
56	Salmon Farming	Substantial scientific advances in salmon farming since 2000: various drivers (and barriers) to further change, including need to understand impacts but scarce resources to tackle problems	Solutions in Salmon Farming complicated by scale of industry and geographic limitations that operate in. The government also needs to play a bigger role, especially in funding scientific research	Positive view of direction of travel of industry: becoming sustainable will be very painful, but the need to improve practices and stakeholder relations is obvious, and will occur with global pressures increasing
64	Salmon Farming	Salmon farming as an industry in general has been beneficial, including to the economy around Puerto Montt, and it is unfairly criticised in certain respects	Scientific research is under-funded though, especially on the part of the producers. The owners respond to the market and are focussed on profit maximisation, rather than increasing understanding	Biodiversity remains low on the list of priorities. It should be higher, but it isn't on the agenda either in the industry or more generally, and will remain this way unless there is greater public investment in scientific research

State				
ID	Sector	Theme 1	Theme 2	Theme 3
5	Multiple	Institutionally Chile has reformed but has much further to go! Conservation is hamstrung by a lack of information	Biodiversity has risen in public consciousness but the main focus in public policy remains on development and not conservation. Big firms are very much left to their own devices on that front	Forestry and Salmon Farming have reformed but both still have some way to go
8	Forestry	FSC has brought about change and forced firms to think and act in ways that they had not previously	The opening of dialogue has helped forestry firms to understand others' priorities, especially local communities, and to realise that their demands are not as exacting as they might have feared	There are still tensions and suspicions between different actors, and the government could do more to help lead on conservation matters, but it lacks both will and expertise
19	Forestry	CONAF's role is tightly and strictly defined, although it does have some latitude to act, for example pursuing particular initiatives	CONAF's role is central to the governance of forestry in Chile, although biodiversity is a minor aspect beyond its role in overseeing protected areas	

State				
ID	Sector	Theme 1	Theme 2	Theme 3
30	Multiple	Certification had an impact because it was the result of market and social pressure	Biodiversity is a peripheral concern: firms are motivated by risk, and it isn't a risk	Biodiversity a difficult concept in forestry for several reasons: mistrust between different actors, lack of state coordination & regulation, LT nature of results, and lack of visibility of end product
35	Salmon Farming	SERNAPESCA has insufficient resources to fulfil its wide-ranging remit	Salmon farming is vital to the Chilean economy (employment and exports)	Weak state institutions (agencies and regulatory structure) create problems in the industry
36	Salmon Farming	Conservation efforts difficult to achieve within protected areas, let alone outside	Bringing different actors together a major challenge: within government the MMA has to contend with a lack of understanding of biodiversity and a development focus, beyond government the distance between different parties	Institutions are inadequate to achieve conservation aims. Lack of information, monitoring and a unifying vision hamper efforts to bring about reform
59	Forestry	The CPF has the potential to bring about substantial change, and there are some areas of common ground where progress can be made on conservation	Participant is sceptical to what extent forestry firms have fundamentally reformed. They have made some changes, but these represent small steps rather than great strides, and have directed changes to answer social pressures rather than considered their impact on biodiversity at a deeper level	The bulk of the responsibility for reform lies with the largest forestry firms: they own the largest amounts of territory and have the greatest capacity to bring about change
60	Multiple	The main pressure for change comes from international bodies such as the OECD and market pressures, not from government. In public policy terms Chile lags behind many developed countries	The Chilean state is predominantly focussed on economic development not biodiversity; e.g. subsidies for forestry firms and salmon producers. The MMA also has limited resources and limited power to enforce change across ministries	Clientalism is manifest across government, both at an individual level and amongst ministries. There's a desire to keep companies at arms length to not be seen to be collaborating, but also to not impose regulations from above

State				
ID	Sector	Theme 1	Theme 2	Theme 3
67	Multiple	It is difficult to engage companies in conservation, partly due to institutional constraints and partly because the pressure and urgency isn't there to go further than they currently are	There are multiple systemic issues that make it difficult to produce a coherent and coordinated response for salmon farming. It is also difficult to raise the profile of biodiversity when producers are under a great deal of economic pressure	The MMA has to fight for influence: economic interests prevail and it is difficult to convince other ministries about why biodiversity matters. The MMA has to pursue strategic alliances
68	Salmon Farming	System in its present form is broken, as the problem with concessions demonstrates. It is very difficult to achieve reform though	There's a need to bring different groups together, but the government does not really best know how to manage things: that is where the council comes in	The future of the industry relies on an intelligent approach that takes into account sustainability and an effort to differentiate Chile from its competitors

Former managers/ Industry observers/ Researchers				
ID	Sector	Theme 1	Theme 2	Theme 3
2	Forestry	Biodiversity is a difficult concept to grasp and means different things at different scales. The challenge for big forestry firms is very different to smaller ones due to the visibility and scale of their operations	Forestry has changed in Chile, but not in terms of conscience but because of market demands and attempts to maintain a positive image. Forestry firms are now more open	Plantations are poorly perceived and much-maligned, but unfairly so in some respects
15	Forestry	It's not easy to be a B Corp and pursue sustainability but with the will to do it, it is possible. Opportunities have to be worked for, but they can be found over time. What needs to be done shifts over time, i.e. being sustainable is dynamic		
16	Multiple	Informal interactions are critically important in understanding how business and the state interact, including regarding environmental - and within that - conservation policy	The environment does not count in Chile: business and economic rationales predominate	

Former managers/ Industry observers/ Researchers				
ID	Sector	Theme 1	Theme 2	Theme 3
39	Salmon Farming	Mussel farming is a relatively young industry and is still maturing: it is low profile and there is plenty of growth potential. The industry is lucky in that its ecological impacts are limited, and that production processes are simple. Unlike salmon farming there are few trade-offs	St Andrews cares about biodiversity because part of the sales appeal of mussels is the natural element, plus retailers demand high standards and various certifications to prove that these are being met	
69	Salmon Farming	Investment in R&D in general science of SF in Chile has increased, but biodiversity still very low on the list of priorities, partly due to financial constraints and partly because there is little benefit in producing results that will be rejected by critics	The lack of knowledge and expertise required to make informed decisions at an industry level, and on regulatory changes is reflected in the current legal structures governing salmon farming	The debate concerning salmon farming and biodiversity is polarised around ideology and not facts. Dialogue concerning regulations would draw the focus away from ideology and towards impacts and contributions

Miscellaneous				
ID	Sector and Stakeholder Type	Theme 1	Theme 2	Theme 3
17	Forestry: Professional Association	Forestry is unfairly criticised in some respects. Plantations have a bad image, but their economic and environmental contributions are often not recognised, and don't figure in the public's imagination. Forestry firms are also often condemned for their historic, not present day, activities	Certification has helped to change practices, and biodiversity is better protected now than before, but it hasn't improved the image of forestry firms. It has not resolved multiple local issues.	There are limits to what forestry firms alone can achieve. Some stakeholder demands need state backing and systemic change, e.g. resource demand. The proposed biodiversity agency and CONAF reforms are not the answer

Miscellaneous				
ID	Sector and Stakeholder Type	Theme 1	Theme 2	Theme 3
20	Forestry: FSC Board	FSC certification has been transformative. It was adopted in response to market access concerns, and the big firms resisted it at first, but it has led to cultural changes, with firms prepared to talk and also having learned about alternative perspectives	Biodiversity is very low on the agenda: it is important as a social issue, but no more than this. Firms still view native forest as non-productive	The state is largely irrelevant in Chilean forestry, but needs to take a bigger role if questions about ecosystem management are to be resolved
55	Forestry: FSC Board	FSC has had a big impact on forestry, not least in terms of forcing forestry firms to open-up, and dialogue has in turn helped to foster change within firms, albeit that organisational cultures do not change overnight	FSC goes further than laws and the institutional context in which forestry firms go; i.e. it is the difference between something being done and nothing being done	FSC does have certain vulnerabilities: forestry firms have become more powerful within FSC Chile and the resource asymmetry with other organisations mean achieving change is slower and more difficult. Firms still have to negotiate though, and practices therefore change