ENVIRONMENTAL PROBLEM-SOLVING: AN APPLICATION OF INSTITUTIONAL THEORY AND SYSTEMS THINKING TO THE ALEXANDER SKUTCH BIOLOGICAL CORRIDOR

by

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ABSTRACT

This research utilizes Soft System Methodologies (SSM) in the application of an institutional theory framework to explore the link between worldviews, institutions, and environmental problem-solving (EPS). Using the institutionally-complex context of the Alexander Skutch Biological Corridor (ASBC) in Costa Rica, I employ an SSM intervention and a grounded theory inductive approach to investigate how organizations construct multiple problem-solving modes. The work demonstrates the effects of incompatible logics on shared environmental transformation projects that are dependent on the interaction of various agents. Idiosyncratic issues, emergent conditions, pre-existing conditions, aggravating organizational responses and mitigating organizational responses are introduced as theoretical constructs that help explain the evolution of institutional complexity within ASBC, and its impacts on EPS. The findings suggest that institutional complexity has impaired the problem-solving capacity by reducing coordination and polarizing issues. The result is a situation that leads to simplistic EPS that is not aligned with viable and effective solutions to the problems that motivated the creation of the corridor.

"Do not try and bend the spoon. That's impossible.
Instead only try to realize the truth.
There is no spoon."
The Matrix

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"Courage doesn't mean you don't get afraid. Courage means you don't let fear stop you" Bethany Hamilton

The journey towards getting to write these acknowledgements has been lengthy, stimulating and overwhelmingly tough. Here we are, you are reading, and I am done writing. It is liberating. I wanted to know why environmental problems are so hard to solve. I found my own answer in my very own way. As my work suggests, many more people will discover theirs. I feel proud to have concluded this journey that sets the mark for another beginning.

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To the people in the corridor, I dedicate this work to you; it is yours, thank you for joining me on the journey.

FOREWORD

The plan of study (POS) for this research included three nested components: organizational studies, systems thinking and EPS in the tropics. By including these components I was able to understand strategies, constraints, and challenges that organizational actors encountered when problem-solving. I used this knowledge to identify lessons that can aid the articulation of collaborative efforts in the future. The most significant lesson found was that improvements in environmental problem-solving capabilities will depend on the creation of new shared meanings that can mobilize action by organizational actors.

In the first component, the work led me to understand the roles that different organizations assume in framing, proposing, and determining problem-solving approaches. The institutional theory constructionist perspective highlighted how participating actors drew on different worldviews to create and promote specific problem-solving approaches. In fact, I learned how the social context and interplay of actors can generate limits on the available problem-solving approaches. Most importantly, I was able to witness how economic, social and environmental systems interact in designing environmental solutions in a real biological corridor.

In the second component, systems thinking, I learned, adapted and put into practice a methodology useful for navigating multi-systemic environments. Using Soft System Methodologies, I managed to apply techniques and tools towards real-life intervention. I learned among many other things, how to identify points for intervention aimed at improving EPS efforts. These were valuable lessons for my professional future.

For my final POS component, EPS in the tropics, I developed a deep understanding of biological corridor creation, implementation, and management—a formal EPS approach integral to biodiversity conservation strategies in Costa Rica. I explored the institutional dimension of EPS to discover how multiple conflicting institutional demands can create a context that greatly impairs problem-solving capacity by increasing polarization and reducing coordination.

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LIST OF ACRONYMS

ASBC	Alexander Skutch Biological Corridor
CATWOE	Costumer, Actor, Transformation, Worldview, Owner, Environmental Constraint
CCT	Centro Científico Tropical
EPS	Environmental Problem Solving
HAS	Human Activity System
LC	Local Committee
MBC	Mesoamerican Biological Corridor
MAG	Ministerio de Agricultura y Ganadería
POS	Plan of Study
SINAC	Sistema Nacional de Areas Protegidas
SSM	Soft System Methodology
UNA	Universidad Nacional
YU	York University

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1. INTRODUCTION

Environmental issues are complex, filled with incompatible worldviews, plagued with uncertainty, and extremely political. Inaction, paralysis, and derailment are recurrent problem-solving challenges in environmental transformation projects (Bardwell, 1991; Barrett, Brandon, Gibson, & Gjertsen, 2001; Beeton & Lynch, 2012; Scholz, Mieg, & Weber, 1995, Funtowicz & Ravetz, 1995; Meadows, 2008). Biological Corridors exemplify the complexity of environmental problem solving (EPS), involving changes in regulations, human behaviour, and governance arrangements.

The Alexander Skutch Biological Corridor (ASBC) in Costa Rica was created to address the environmental degradation in the area (Rapson, Bunch, & Daugherty, 2012), and at the same time to increase the productive capacity of coffee farmers. The original engineers of the corridor created a plan to change the agricultural practices of small farmers from sun-grown coffee to the more environmentally-friendly shade-grown coffee (Daugherty, 2005). They designed a local coffee brand and connected coffee production in the corridor with the Canadian market. After 18 years, the ASBC corridor has helped to reverse the deforestation rate with a relevant, yet random increase in the forest cover within the area. However, the coffee selling initiative failed and lost its connection with the Canadian market. This situation brought challenges for the managers of the corridor. They are struggling to articulate strategies to guide forest recovery and critical connectivity of areas along the corridor, and to stimulate the creation of economic alternatives for the local population. The stakes are high for the communities living within the ASBC. In addition to a biodiversity conservation strategy, the corridor now symbolizes opportunities to protect rural lifestyles and achieve increased economic production.

Despite the challenges, the ASBC has many advantages, including: financial resources, involved communities, participating organizations from civil society and the state, scientific production, and significant human capacities. But it does not escape the uncertainties and incompatibilities that characterize environmental problem-solving. Currently, the implementation of the corridor's management activities is a patchwork of modest achievements (Martinez, 2017). Meanwhile, the Local Committee (LC), which is the local management authority responsible for the ASBC, has struggled to implement the

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strategic plan and engage with all the communities. Lack of resources, human capacity and time are some of the plausible causes (F. Montoya, personal communication, November 17, 2017). This research explores this problem by identifying opportunities for improvement to reduce institutional paralysis, and increase implementation of the management plan, by means of providing feedback to relevant actors amidst the elaboration of a new management plan.

Drawing from the fields of institutional theory and systems thinking, this work will be a theoretical and empirical exploration of the effect that organizations and their logics have over the outcome of shared environmental transformation projects that depend on the interaction of multiple agents. This research uses a focus that goes beyond material issues, to one that sees the multidimensional social field and its institutions (Bourdieu, 1985). In the environmental problem solving social field no one view represents consensus, and consequently, most issues are contested (Beeton, Witt, & Boonchai, Unpublished). This contestation has led some authors to characterize environmental problem solving as a war of institutional logics (Hoffman & Ventresca, 2002). The nature of environmental problems means that organizational cultures, also called institutional logics, can be in conflict, either between organizations or between groups within the organization (Beeton, Witt & Boonchai, Unpublished). However, little to no attention has been given to the link between incompatible institutional logics and organizational outputs, especially when considering societal issues that can only be addressed by the collaboration of multiple organizations.

How do these conflicting demands affect the capacity to solve environmental problems? Conflicting logics (worldviews) can generate tension, but they can also be sources of diversity that bring novel solutions through the construction of hybrid logics and new organizational fields (Battilana & Dorado, 2010; Greenwood, Raynard, Kodeih, Micelotta, & Lounsbury, 2011). Extending the current focus on material practices to one that includes ideological practices, and explaining the complex social processes involved in the inter-institutional world of environmental problem-solving, will deepen our understanding of EPS. Given the lack of attention to this subject, and the potential importance that logic incompatibility has over the outcome of EPS initiatives, generating new theory is critical. The rationale for this approach will be described in Chapter 2 where I begin by looking at environmental problem solving from a constructionist perspective, and seek a definition that can expand the current focus. Then, the section

employs this constructionist approach to propose ontological and epistemological convergences between institutional theory and systems thinking. I present reasons for introducing institutional theory as the anchoring theoretical framework and Soft System Methodologies as the vehicle for exploration and intervention.

In Chapter 3, I explain in detail the research strategy, methodologies, techniques, the unit of analysis and data sources. The section describes the opportunities and challenges of operating the institutional theory framework using Soft System Methodologies. SSM methodology is a potent approach to explore situations in which worldviews collide. With the incorporation of the institutional theory framework, it was possible to examine the institutional dynamics that generate and maintain these conflicts between worldviews.

Chapter 4 will present the research findings by showing the results of the SSM intervention through three emerging themes: the creation of biodiversity connectivity; the creation of economic wealth; and the protection of healthy, rural sustainable lifestyles. These themes (Purposeful Human Activity Systems in the language of SSM) embody the purpose that different worldviews have built for the corridor. The section will then discuss how these themes were used to identify perceived problematic situations and feasible and desirable prospects for improvement to tackle them. The section also presents the results from grounded theory analysis. Using the data from 32 interviews, archival documents, and the information generated during the workshop, the chapter explores the link between institutional complexity and the output of the ASBC.

Chapter 5 summarizes the conclusions in which I propose that institutional complexity in the corridor has made the organization uncoordinated and polarized. To contribute to the literature on the link between complexity and EPS, I conceptualize three core conditions that generate complexity. These conditions are precursory conditions, EPS wickedness, and emergent conditions. Precursory conditions precede the creation of the corridor; EPS wickedness appeared when the corridor was designed, and emergent conditions appeared during its management. I also conceptualize two organizational responses to the experience of complexity: aggravating and mitigating. Aggravating responses increase the experience of complexity, and mitigating responses act as coping mechanisms that would help the organization to escape the impacts of the experience.

This research presents evidence to support that the above-noted conditions and responses generated an evolution of complexity within the corridor's organizational field. The experience of institutional complexity in the field has moved from restrained complexity to volatile and back to restrained (Raynard, 2016). I show that institutional complexity associated with the ASBC has produced grave impacts on the environmental problem-solving capacity within the corridor. These impacts are inactivity, project blockade, increased focus on idiosyncratic issues over systemic ones, and outputs for the corridor that are simplistic and disconnected from effective solutions.

The Alexander Skutch Biological Corridor in its 18 years of existence presented a unique opportunity to analyze how and in what way institutional complexity affects environmental problem-solving. EPS and biological corridors, characterized by multiple governance arrangements, logics, actors and complicated issues, are an ideal place to look at these dynamics. To understand how to design environmental problem-solving approaches that can consider institutional interplay and dynamics represents valuable avenues for new research. This research represents an initial engagement with this challenge. Asking:

Can the application of Soft Systems Methodologies informed by Institutional Logics Theory improve the implementation of the Alexander Skutch Biological Corridor management plan?

How, and with what effects, has institutional complexity influenced the Alexander Skutch Biological Corridor implementation?

2. LITERATURE REVIEW

This research positions itself in the Organizational Studies, Systems Thinking and Environmental Management fields to explore the role of institutions in environmental problem-solving within biological corridors. From Organizational Studies, I draw on the authors that have built institutional theory and neo-institutional frameworks in the environmental context to understand the deeper and more resilient aspects of social constructions. From Systems Thinking, I draw on epistemological critiques, methodology, and strategies to operationalize social theories and integrate complex phenomena. Here, Soft Systems approaches offer methodologies that converge with the epistemology and ontology of institutional theory. This convergence allows for the operationalization of theory on real-world problematic situations. Finally, from the Environmental Management field, this research draws upon critiques of the role organizations play in the increasingly institutionalized management of biological corridors (Barrett et al., 2001; Beeton & Lynch, 2012). I draw on this discipline as a transversal pillar to understand the influence that organizations and institutions, in their context, have on the outcomes of environmental problem solving (EPS).

Constructionism is the ontological paradigm that will allow the connection between these previously disconnected ideas and disciplines (Berger & Luckmann, 1991). The world in which this research lives is one that originates in "the thoughts and actions of ordinary members of society and is maintained by them" (Berger and Luckmann, 1966 p.33). The subjective nature of the paradigm provides a basis for the inclusion of many worldviews, and the power struggles for constructing and imposing the "legitimate" world-view, by producing and reproducing meanings (Bourdieu, 1985). Through this paradigm, I explore and challenge EPS from the mechanisms in which environmental problems and solutions are socialized, and the struggles that result. As such, EPS is framed, **first, as a multiplicity of worldviews** or logics that interact (Berger & Luckmann, 1991; Thornton & Ocasio, 2008), and second **as a contest** born in the struggles within the social space as described by Bourdieu (1985).

I will clarify that for this research the constructs of worldviews and logics are used interchangeably. I considered them as an isomorphism between institutional theory and SSM (Checkland, 2000; Hoffman, 2012; Thornton & Ocasio, 2008). As with logics, worldviews are created by cultural processes—they are

structured by norms and taken for granted behaviours that are produced and reproduced through continuous social interactions.

Examining EPS from a constructionist paradigm presents an opportunity to go beyond traditional explanations and expectations of efficiency and process. This allows movement from arguments grounded in economic, legal or technical dimensions, to recognize the symbolic and ideological constraints born in the repetitive actions, behaviours, and values of those involved. Therefore, this research is a "break with the *economism* that leads one to reduce the social field, a multi-dimensional space, solely to the economic field and the relations of economic production, which are thus constituted as co-ordinates of social position" (Bourdieu, 1985, p. 723). This approach pays attention to the resiliency of social structures and the resistance towards transformation and intervention. It also seeks to explain the well documented difficulty to reach effective results in EPS (Barrett et al., 2001; Beeton & Lynch, 2012), by recognizing that issues and solutions are continuously invented by the actors that take part in the process. The constructionist approach moves away from the quest for efficiency rooted in orthodox organizational theory (Checkland, 2000), neo-classical economics and neo-economic institutionalism (Rivas, 2003), which use a lens of rationality to understand and evaluate EPS challenges, failures, and success. I aim to avoid—without disregarding the value of efficiency-based analysis—the assumption that there are privileged points of view for measurement, analysis, and evaluation (De Marchi & Ravetz, 2001), where problems exist as a gap between performance and goals (Checkland, 2000). In contrast, problem-solving and effectiveness become not a rational outcome, but a "negotiated product of repeated interactions" between organizational actors and the environment in which they function (de los Santos, 2004). This analysis will not only be more productive, contextual and historical, but will also allow for understanding how different levels of analysis interact.

The framework and justification for this approach are based on the work of constructionist institutional theorists and system thinkers. These are researchers concerned with collective rationalities (DiMaggio & Anheier, 1990) and shared social agreements about the nature of reality (Checkland, 2000; Funtowicz & Ravetz, 1995; Meadows, 2008; Midgley, 2003). This is done by identifying and linking theory and methods from authors in both disciplines who emphasize constructionism and EPS. Pluralism also influences this research as no one theory or set of theories can ever be comprehensive (Midgley, 2000).

Researchers need to investigate values, beliefs, and multiplicity of worldviews by using epistemological lines that embody the application of multiple modes of reality, perception, and practice.

To accomplish the aforementioned goals, the first section of this chapter reviews environmental problems and problem-solving from the perspective of wicked problems and constructionism. Next, I present reasons for introducing institutional theory as the theoretical framework for the research. In the following segment, systems thinking is discussed as an application-oriented discipline, which can close the gaps left by the institutional theory framework. Explicitly, the lack of application to real-world problems and the failure to include the needs of the environment are complemented by soft systems approaches well suited for the task. Institutional theory is also revisited as an ideal theoretical framework to anchor soft system methodologies, which addresses the critique of systems thinking's loose theoretical frameworks (Jackson, 2003; Midgley, 2000). Finally, in the last section biological corridors—their origin, evolution and critiques—are looked at from the institutional perspective. The literature will reveal a contested definition of "corridor" that has left room for objectives that divert from biodiversity conservation. These critiques are partly fueled by the growing uncertainty over the corridors functionality, efficacy, and worth as a management strategy. This section will show corridors as something more than stretches of habitat, but institutional spaces where the negotiations between organizations affect the pursuit of ecological objectives.

2.1 ENVIRONMENTAL PROBLEM SOLVING: THE CONSTRUCTIONIST PARADIGM TO ADDRESS WICKED PROBLEMS

This section is dedicated to building a broader definition for "environmental problem solving" or EPS—one that considers participating actors, their views, and negotiations, and not just the gap between process and goals (Checkland, 2000). There is a generalized feeling that environmental problems are impossible to solve, seeming pervasive, permanent and mostly intractable (Dennison, 2008). As such, environmental challenges are wicked problems with many paths worth exploring and rarely is there one right solution. Solving environmental issues entails more than finding a technical solution since environmental choices reflect politics, social values, and expectations as much as scientific facts (Bardwell, 1991; Beeton & Lynch, 2012). This definition for EPS is lodged within a constructionist

paradigm and the widely accepted understanding of environmental problems as wicked (Bardwell, 1991; Head & Alford, 2008).

Presenting the concept of wicked problems, Rittel and Webber (1984) included a set of ten characteristics that to some degree merged the social construction of reality within the nature of wicked problems. Three of them are particularly relevant to expanding the rooted, efficient, and rationalist approach to problem-solving.

- there is no definitive formulation of a wicked problem

- solutions to wicked problems are not true or false; they are worse or better

- every wicked problem is inherently unique

These characteristics of wicked problems have appreciation of social actors and social complexity in common, two things that escape traditional efficiency-centred approaches to problem-solving. The definition and formulation of issues differ according to the appreciation of social actors (Bardwell, 1991; Checkland, 1994; Concklin, 2005; Rittel & Webber, 1984), and different appreciations make wicked problems appear inherently unique and to not have a solution. Appreciation is also linked to social complexity (Concklin, 2005). Flood and Carson (1993) and Head and Alford (2008) note this link by usefully assuming that complexity is born from different perspectives of people, and is not only a quality of things. but the various appreciations that people have for them. For example, a tropical wetland forest is already incredibly complex biologically. Yet the different appreciation that people have for these places dramatically increases its complexity. The higher the diversity of actors and their institutional locations, the higher will be the complexity for wicked problems. Different actors possess different information about the issue, and have strong values that shape the nature of the problem, but most importantly have expectations associated with the decision maker (Head & Alford, 2008). The nature of wicked problems, tainted by appreciation and closely related to people's perceptions and values, forces us to examine them in the context of the social field. Therefore, using paradigms, approaches and tools beyond the traditional analytical model of science, such as constructionism (Berger & Luckmann, 1991), institutional logics (Thornton & Ocasio, 2008) and soft system methodologies (Funtowicz & Ravetz, 1995; Midgley, 2000) is necessary.

It's clear that the nature of wicked problems depends on how issues are **perceived and problematized** in the social field. The social field will dictate how problems are perceived, so much so that Newson (1992) proposed that environmental progress is catastrophe perception driven. This perception does not necessarily encompass an objective physical reality with absolute negative consequences, but the subjective observation of a problematic situation. For example, a degraded ecosystem that can't sustain essential species will only be a problem if a human considers it to be one. The moment this phenomenon becomes an "issue to be fixed" a subjective reality is moulded. This recognition "occurs in a context, which reflects the way society has evolved, the culture, or cultures who are interested in the problem" (Beeton, Witt, & Boonchai, Unpublished p. 25). Drawing from social constructionism (Berger and Luckmann, 1966), the EPS process is subjectively constructed from the thoughts, decisions, attitudes, values and behaviors of actors, and, "is a world that originates in their thoughts (ordinary members of society) and actions and is maintained by them" (Berger and Luckman 1966 p.33). If wicked problems cannot be solved because they are highly dependent on how people perceive, define and addresses them, then problem-solving as an activity that problematizes an issue and builds solutions needs to be understood as socially constructed. The ultimate unfortunate implication is that the environment itself has a minimal claim in the process. Based on this rationale, from here on environmental problem solving will be defined as *the transformational process that leads from a current adverse environmental state to a desired one, determined by the optimum environmental condition as relevant to the values, goals and motivations of a society.*

To build the above definition I also draw on essential characteristics from the meaning of problem-solving (Oxford, 2017), and the precise account of "environmental problem" by Beeton, Witt and Boonchai (Unpublished). If to "problem solve" is "to find a solution to a difficult or complex question or situation" (Oxford, 2017), I acknowledge three conditions integral to this review: (1) the "situation" to solve most be defined by someone; (2) "the finding of solutions" involve some form of *ad hoc* or formal structure; and (3) there is an end goal. From Beeton, Witt and Boonchai's (Unpublished) definition of environmental problem I set boundaries for the "problem/situation," they accurately define as "a mismatch between the desired state and a current state" (Beeton, Witt and Boonchai, Unpublished p. 137). These characteristics and the complexity of the natural environment help build a comprehensive definition of EPS to guide the

analysis for this research that is focused on the process and its construction, rather than a traditional problem-centric approach.

Authors from the disciplines of environmental management and environmental sociology offer further support for this constructionist approach. For example, Hoffman and Ventresca (2002) recognize environmental problems as "distinctive" given the combination of technical and social elements, where social political and cultural processes modify which environmental issues, problems and solutions are given attention and defined (Hoffman & Ventresca, 2002). This recognition is congruent with what Beeton, Witt and Boonchai (Unpublished) define as the "desired state," which recognizes that the definition of the issue, the provision of its solutions, and the modes of policy intervention applied vary and are contested. This aligns with the EPS working definition in this paper, implying the dissonance between "current" and "desired" state originates in the agency of the members of a particular society. Their perception of the problem and agency over the rest of the group will also inform and constrain the nature and range of viable solutions and alternatives. It is important to remark that, despite this construction, consequences on the natural world are real as species go on exiting, water is polluted, and ecosystems are destroyed. But it is the human context (commercial, political, social and environmental) that determines how a process of problem manifestation occurs, is understood, and how solutions are reached.

In our highly institutionalized world, organizations, institutions and their interactions, are in charge of producing EPS (Barrett et al., 2001; Beeton & Lynch, 2012; Oberthür & Stokke, 2011). Yet little attention has been given to their interactions (Venkataraman, Vermeulen, Raaijmakers, & Mair, 2016). Even less attention has been given to the link between the organizational interplay and environmental problem-solving outputs. When considering environmental issues that can only be addressed by the collaboration of multiple organizations, this interaction is of exceptional importance. To target these knowledge gaps, the research moves from dealing just with the complexity of environmental problems to include the institutional complexity in which issues are addressed.

Institutions are a mechanism for social order as they give means of action and cohere individuals (Thornton & Ocasio, 2008). Internalizing the role of institutions in the social construction of EPS can shed valuable light to mobilize practical and tangible methodologies for problem-solving. In the next section I will explore institutional theory and the quest for legitimacy as a lens to understand why, despite the

existence of formal tools and methodologies, environmental problem solving remains chaotic, uncoordinated, and random.

2.2 INSTITUTIONAL LOGICS THEORY: ORGANIZATIONS, INSTITUTIONS AND ENVIRONMENTAL PROBLEM SOLVING

Problem-solving and its outcomes have not been the central focus of the business-oriented institutional theory. Nonetheless, its theoretical background in organizational behaviour and the resiliency of societal structures is fundamental to this research. The purpose of this section is to introduce institutional theory, and the concepts of organizational field, legitimacy, and institutional complexity. These are relevant constructs to understand the well-documented difficulty to solve environmental problems in an inter-institutional world (Friedland and Alford, 1991). This introduction is not an easy task given the theory gap on the link between environmental problem solving and institutional theory. I focus on the academic referents that have used this theory to look at environmentalism and environmental non-government organizations.

Institutional theory is a general approach to the analysis of how institutions, through their underlying logic of action, shape heterogeneity, stability, and change in individuals and organizations (Thornton & Ocasio, 2008). Institutional theory uses inductive analysis of organizational change to discover the effect that different institutional environments, influenced by mental frameworks and collective rationalities, have on performance (Hernández, 2008). Here, the effect of institutions is informed by underlying methodological individualism, where all human action is explained by the individual interactions of the structures legitimated by institutions (Hernández, 2008). For the institutional theorist, qualitative research has become a significant paradigm suitable for the study of values and beliefs, using techniques like ethnography, grounded theory, and content analysis. More recently, it has embraced mixed methods, using ideal types, discourse analysis, and quantitative modelling. This has well positioned the institutional logics approach to continue to address questions about the cognitive meaning of culture and institutions. (Thornton & Ocasio, 2008).

Institutional theory investigates the reciprocal influence that institutions, and their logics, have over individuals through their imposition of restrictions and offering means of action. From this perspective,

EPS is emphasized as behavioural and cultural in character—not merely economic or technological—given that individual beliefs, cultural norms, and societal institutions guide the development of the technological and economic activity (Hoffman & Jennings, 2015). This approach will provide an analytical guide to **frame EPS processes as a product of institutional interaction** as the research looks at institutions and organizations without losing sight of the individual actors and their means of action.

Hoffman and Ventresca (2002) are essential referents. Their work recognizes environmentalism as an institutional war given the complexity of the issues, the diversity of governance arrangements, and the systems of meaning and actors (Hoffman & Ventresca, 2002). Their work informs the need for EPS to not only understand value systems of agents in society, specifically organizations, but the contest in which these organizations exist and find means of action to further their objectives (Bardwell, 1991; Concklin, 2005; Rittel & Webber, 1984).

2.2.1 LEGITIMACY AND EPS

Institutional theory is built around the concept of legitimacy as an explanation for the success and survival of organizations (Dart, 2004; Thornton & Ocasio, 2008). Legitimacy brings benefits through acceptance of the organization's social group, which sets social expectations through coercive, normative and cognitive forces (Dart, 2004; Thornton & Ocasio, 2008). By conforming organizations become legitimate and are rewarded with multiple resources. The quest for legitimacy will influence organizational behaviour, inform decision making and determine acceptable goals and means. For example, the "legitimate" environmental non-profit will gain more means to enact change, promote their mission, and above all, access to funding, resources and personnel (Hoffman, 2009). Legitimacy is thus a valuable construct when investigating the role of organizations when building solutions for environmental issues. An organization might have the mission and goal to solve the environmental problems, but the "primary task will always be to secure the resources necessary for survival" (Hsu & Jiang, 2015), whether this includes the accomplishment of their goals or not. This suggests that legitimacy, rather than efficiency, is a higher quality explanation to the common complaint about "inefficiency" and incapacity to satisfactorily reach environmental problem-solving goals (Venkataraman et al., 2016).

To understand how legitimacy impacts EPS, the organizational field is a very useful construct that helps guide enquiry about who is part of the social context, and what are the main prescriptions that grant legitimacy. After all, legitimacy is a product of the interaction between multiple actors (Suddaby, Bitektine, & Haack, 2017). For example, In Tanzania, there are six conservation non-profits that shift their vision strategically to align with priorities of international development agencies, without any specific technical reason to guide their decisions (Banks, Hulme, & Edwards, 2015). This is evidence of environmental non-profits changing the way they frame problems and solutions whenever there is a new constituency in the field (Banks, Hulme & Edwards, 2015; Hoffman & Ventresca, 2002). This shows how the organizational field construct provides information about changes that might be technically unexplainable or inadequate.

2.2.2 THE EPS ORGANIZATIONAL FIELD AND LOGICS

The organizational field is a "community of organizations that partake of a common meaning system and whose participants interact more frequently with one another than with actors outside the field" (Scott 1995). The field boundaries are hard to determine, and in the environmental context it can be demarcated as a geographic area (Hoffman & Jennings, 2015; Thornton & Ocasio, 2008). The organizational field is the context that contains the social members of an organization, including their relationships and channels of dialogue and discussion (Hoffman, 2006). Here, the adoption of schemas and material practices are done in the form of the logics dominant in the field. Institutional logics are the socially constructed pattern of material practices, assumptions, values, beliefs and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality (Thornton & Ocasio, 2008). The actors operate as carriers of logics using specific practices and patterned behaviours (Thornton et al. 2012).

From an Institutional theory perspective, the organizational field and the dominant logics generating legitimacy will constrain the methods and possibilities available for EPS. This constraint is particularly relevant for biological corridors considering much discussion happens in choosing corridors as viable solutions to biodiversity conservation at the expense of possibly better alternatives (Bennett & Mulongoy, 2014; Simberloff, Cox, & Mehlam, 1992).

Beyond Hoffman and Bertels (2010) and Hoffman and Jennings (2015), there is little research that identifies and characterizes the organizational field of environmental problem-solving. One possible glimpse into this field is to investigate organizational fields with similar limitation to that of EPS, such as environmentalism, health care and human provisioning services.

In the EPS organizational field, the first dominant actor identified by DiMaggio and Anheier (1990) is the state. State logic symbolizes power and coercion by seeking rationalization and regulation of human activity by legal and bureaucratic hierarchies (Atack, 1999; Hsu & Jiang, 2015; Knutsen, 2012). In most places, environmental issues are defined by the role of the state. Until 1990 conventional wisdom held that the central government should manage all conservation efforts with a top-down approach (Barrett et al., 2001). In fact, coercion by authorities marks environmental problem solving, as often precious biodiversity is within countries with weak institutions and corrupt governments (Barrett et al., 2001).

The identification of the state as a dominant actor points to the civil society as another central agent. With objectives outside of market logic, civil society generally builds their legitimacy contrary to market discipline or the state's coercive authority (Dart, 2004; DiMaggio & Anheier, 1990). This logic involves solidarity, shared values and collaboration (Atack, 1999; Knutsen, 2012; Venkataraman et al., 2016). In EPS it is embodied by the right to benefit and prosper from a healthy environment, which is a right well captured in the Earth Charter epitome of a healthy environment as a fundamental right (Hoffman & Bertels, 2010; Beeton, Witt and Boonchai, Unpublished). Civil society and the state logics can be incompatible, especially if government policies go against the interest of individuals or damages nature (Atack, 1999).

Other authors suggest that the EPS social context includes different sectors, pointing to "the market" and firms as significant referents. Andrew Hoffman (2009) identifies firms as the vehicles pushing the market logic in the environmental field by providing resources, personnel, and influence. A remarkable example is presented in Finley-Brook's (2007) evaluation of the Mesoamerican Biological Corridor. It shows how resource providing firms and international banks gave higher legitimacy to market-based solutions when designing the corridor. Business logic is noticeable for efficiency, competition, and short-termism as guiding principles, mostly informed by capitalistic societies and neo-liberalism. This logic brings more incompatibilities to the EPS organizational field. A neoliberal regime that celebrates

individualism, market-based solutions, and a small government is hostile to the extension of social and environmental rights (Garrow & Hasenfeld, 2014).

From the literature, we can deduce that private firms, the state and the civil society (represented by organizations like non-profits, church and community groups, etc.) are central actors of the EPS organizational field (Hoffman & Jennings, 2015). These actors are aggregated by the common interest to participate in the environmental problem-solving construct, and they construct and defend different realities to legitimize their views (Hoffman, 2009). Nonetheless, also distinct within the field are scientist and academics who present a benchmark of relevant, high-quality data about the environment's condition—data that is not institutional in its character (Hoffman & Jennings, 2015). Yet the measurement systems, organizations or individuals consuming such data deemed acceptable are all institutionally constructed and built into policy (Hoffman & Jennings, 2015).

Hoffman (2010) asks, "who is part of the environmental movement?", to which he concludes that this heterogeneous field "is an interconnected series of smaller networks based on issues of relevance to the individual members" (p.56). He describes a fragmented, uncoordinated field with lingering incoherence that seems to exist from global to local scales that are almost inherent to environmental issues. In fact, for environmental managers, the nature of environmental issues means that organizational cultures can be in conflict. This occurs either between organizations or between groups within organizations, who pursue their own interest often with conflicting goals, distinctive political backgrounds, and limited knowledge and awareness of each other (Beeton & Lynch, 2012; Beeton et al., Unpublished).

The most compelling evidence to show this uncoordinated fragmentation within EPS comes from a study of institutional interaction summarized by Oberthür & Stokke (2011). Within global environmental governance they recognize a multiplicity of arrangements and over 900 multilateral environmental agreements that generate counterintuitive, conflicting, and saturating interactions in the efforts to tackle issues of the environment. Within this extensive, yet specific context with supposedly overarching agreements, these interactions generate interlocking structures that frequently go beyond the environmental realm. The result is situations in which one institution affects the development or performance of another (Oberthür & Stokke, 2011). To give an example, at least four international institutions—the World Trade Organization, The International Union for the Protection of New Varieties of

Plants, the International Treaty on Plant Genetic Resources for Food and Agriculture and the Convention for Biological Diversity—co-govern the provision, conservation, and use of plant genetic resources. They put forward incompatible prescriptions that mutually influence each other's development and effectiveness (Oberthür & Stokke, 2011), a situation that will only get more clouded as other actors participate.

Other evidence also supports the notion of EPS as a fragmented, complex and conflicting field. One dramatic example is the current and heated debate over the conservation of biodiversity between proponents of the "traditional" top-down, coercive central government approach, and the "new" approach based on community empowerment (Barrett et al., 2001; Chapin, 2004). An exemplary quote from this debate illustrates the conflicting institutional demands perfectly: "It makes no more sense to valorize the community as the best defender of conservation in all cases than it does to claim that national governments are always in the best position to protect nature" (Barrett et al., 2001, p. 499). The debate goes beyond one of process to one of ideology, representing very well the clash of logics in the creation of solutions to protect biodiversity. This has created a deep, false, conflicting, and damaging dichotomy between community and the central government (Barrett et al., 2001). The varied contexts of EPS suggest that competition of conflicting logics persists on different environmental problem solving organizational fields, ranging from the global environmental governance to local protection of biodiversity.

2.2.3 INSTITUTIONAL COMPLEXITY THEORY

The following draws on institutional complexity for understanding the quality of EPS output by investigating the capacity that organizations have to articulate a viable environmental problem solution amidst conflicting demands. For example, it is recognized that NGOs faced with the pressure to be accountable "upward" to donors rather than "downward" to beneficiaries are forced to focus on short-term projects, rather than long-term structural change (Banks et al., 2015). The literature suggests that to experience institutional complexity two conditions need to be met. First, to be simultaneously accountable to and influenced by various competing constituents, and second, to participate in a fragmented field with sides to choose (Greenwood et al., 2011). The existence of WWF and Greenpeace within the same

organizational field is a good example, with very different strategies both organizations can tap into different constituencies (Hoffman & Bertels, 2010).

The above discussion suggests the EPS space is best investigated as an organizational field with elevated levels of institutional complexity. With at least three main central actors and a multiplicity of organizations, governance arrangements, and uncoordinated demands, the result is fragmentation of the social space. This situation on its own is problematic and endangers success. In addition, this fragmentation and the endurance of competing logics are two main characteristics of institutional complexity. Paraphrasing Greenwood et al. (2011), organizations face institutional complexity whenever they confront incompatible prescriptions from multiple practices and beliefs. Organizational field processes fundamentally shape the nature of that complexity (Greenwood et al. 2011).

Raynard (2016) recognizes four analytically distinct patterns of complexity: segregated, restrained, aligned and volatile complexity (Fig. 1). For her, each configuration reflects a distinctive institutional landscape where at least two components of complexity are in play. The components she identifies are logic incompatibility, jurisdictional overlap, and unsettled prioritization of logics. Logic incompatibility is when the prescriptions and proscriptions of multiple logics are incompatible or not easily combined (Greenwood et al., 2011). Previously, authors have characterized these incompatibilities as simply occurring over goals or means (Pache & Santos, 2010), but more recently attention has turned to the degree of incompatibility (Raynard, 2016). Jurisdictional overlap occurs when demands imposed by logics target the same jurisdictional spaces. The overlays are exacerbated when the focus of the logic is clearly delineated, and the jurisdictional boundaries are defended (Raynard, 2016). Unsettled field prioritization refers to when actors seek to usurp the dominant institutional order by contestation and collective inaction. This happens when there is no organization with the power to compel consensus around a particular course of action (Raynard, 2016).
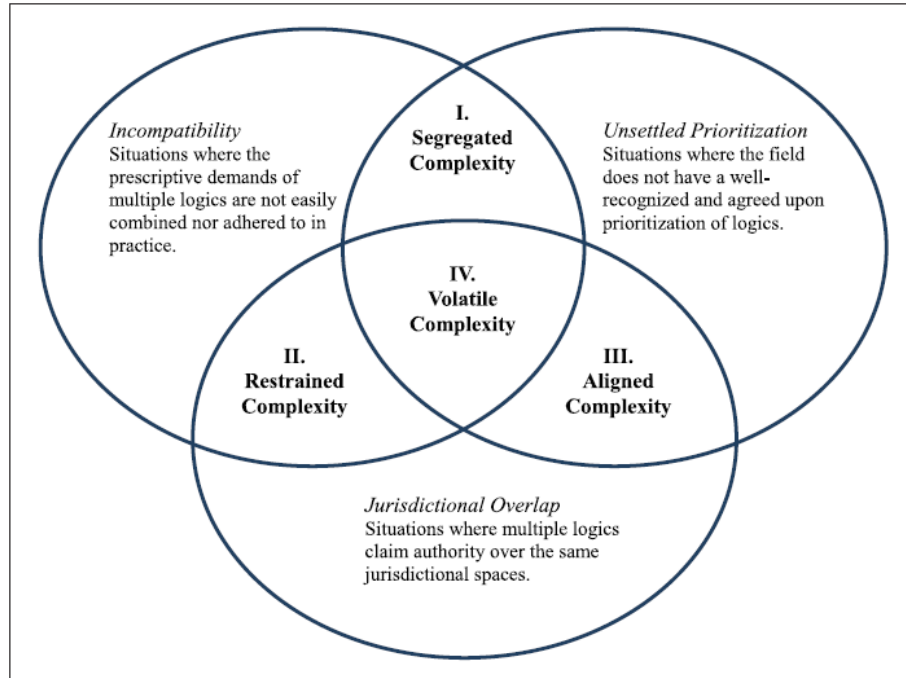
Figure 1: Raynard's (2016) institutional complexity analytical model.

Understanding institutional complexity is a key, underexplored resource to study our capacity and that of our institutions to effectively articulate solutions to environmental problems. For example, in the Mesoamerican Biological Corridor conflicts occurred when the original conservation scope was expanded to socioeconomic goals in order to pacify beneficiaries. Conservationists contested the expansion by arguing the corridor would take on problems it cannot solve. At the same time, environmental agencies were accused by the government of using the corridor for fundraising marketing purposes (Miller, Chang, & Johnson, 2001). The colliding of these institutional worlds in the same jurisdictional space has dramatically compromised the effectiveness of the corridor as an environmental solution.

Inadvertently, institutional complexity has been recognized by environmental managers as a cause of failure, paralysis, and conflict (Barrett et al., 2001; Beeton & Lynch, 2012; Oberthür & Stokke, 2011). This is mostly due to coordination breakdowns which are key to productively tackle wicked environmental problems (Barrett et al., 2001). If coordination within environmental problem solving becomes fragmented and inept, social polarization is expected to rise (Hoffman, 2015), complicating the situation even further. The effort to tackle climate change is a relevant example. With more data, information and disciplines

involved, the more concepts, labelling and ascriptions appear with multiple opportunities for antagonism (Hoffman, 2015). Paraphrasing Hoffman (2015), one person's heroic sacrifice against an environmental problem might be seen by another as a terrorist attack on the environment. (p.18).

Institutional theory and its constructs are very suited to explore EPS (Hoffman & Jennings, 2015), and is the anchoring theoretical framework of this research. However, there are limitations to institutional theory when applied to environmental contexts, including:

- The merely analytical approach lacks intervention capacities which are much needed with the current state of the world (Thornton & Ocasio, 2008). There is also the frequent failure to explore less prominent voices outside the core institutions that are critical in the local context of environmental issues (Hoffman & Jennings, 2015).

- It has difficulties to tackle issues of coercion, power and corruption (Hoffman & Jennings, 2015)

- Weakness in systematically linking environmental catastrophes, like a fishery collapse and its collateral consequences, to institutional systems. (Hoffman & Jennings, 2015)

- Most prominently, by spending most of its time in institutional change, the theory has struggled to connect human systems with the environment and its independent needs (Hoffman & Jennings, 2015).

Institutional theory and organizational studies have failed to place institutions within the boundaries of the environment in which they exist (Hoffman & Jennings, 2015). Nonetheless, these gaps do not reduce its usefulness as an explanation. But it needs to be complemented in ways that, first, make the theory applicable to real-world problems that is a lingering issue in the social sciences (Jackson, 2000), and second, allow integration within other systems by using paradigms compatible on their understanding of the nature of reality and their means of creating knowledge.

2.3 SYSTEMS THINKING

In order to extend institutional theory into environmental domains, I propose that systems thinking can act as a way to expand and complement gaps, and to adequately explore the socioecological system. Systems thinking is a way to address the identified lack of connections between the natural and social

spheres (Hoffman, 2015), and to operationalize institutional theory into real-world problems. In fact, some system thinking streams are specialized in system integration that links environmental considerations and human systems (Flood & Carson, 1993). It is a framework of thought that helps us to deal with complex things and gives freedom to challenge paradigms, creating goals and measurement to identify root causes of problems and see new opportunities (Meadows, 2008). For this research, systems thinking provides a methodology to successfully operationalize institutional theory framework to real-world environmental problem-solving in the context of a biological corridor. To convey this idea, the section will review the systems thinking tradition, its principles, and evolution, as well as both hard and soft approaches.

During the 1940s, system thinking emerged within the biological discipline with a "general system theory" (von Bertalanffy, 1969). Informed by 300 years of mechanistic approaches, it was assumed that systems of all types could be identified by empirical observation of reality, and could be analyzed and enhanced (Jackson, 2000). Therefore, there were two main concerns: learning about systems in their natural conditions, and developing methodologies to intervene and change those systems. By applying lessons from operations research during the Second World War to industrial companies and government agencies, a powerful hard systems approach was created. It would permeate into orthodox organizational theory, where organizations are seen not as a continuously changing product of human interaction, but as collectives that arrange themselves to pursue collective objectives and goals (Checkland, 2000). The first wave became a strong current in business, management and the organizational disciplines. To this day it claims that problems are gaps between performance and goals (Checkland, 2000).

Soft System approaches came in the second wave, according to Checkland (2000). The second wave of systems thinking tackles criticism that it struggled to deal with ill-structured strategic problems that were loaded with value disputes, high stakes, and urgent needs for decisions (Flood & Carson, 1993; Jackson, 2000; Midgley, 2000). The second wave introduced soft system methodologies, critical systems, and post-normal science, along with researchers who developed qualitative soft systems thinking. Soft approaches take into account appreciative systems to expand the goal seeking model in ways that could help intervention in human affairs—suitable for ill-defined, messy or wicked problems (Flood & Carson, 1993; Jackson, 2000).

Checkland (2000) makes a critical clarification to the soft approach, suggesting that intellectually the division of both hard systems and soft systems does not refer to its existence in nature, but to the *systemicity* required in soft situations. The hard tradition assumes the world is comprised of systems that can be engineered to achieve objectives. The soft tradition understands the world to be problematic, and the process of inquiry into the problematic situation needs to be organized as a system; from taking the world to be systemic to taking the process of investigation to be systemic (Checkland, 2000, p. 50). This *systemicity* is the condition that makes soft approaches ideal to operationalize the institutional theoretical framework. A systemic process of inquiry into the institutional context of environmental problem solving can help the framework to be applied in the intervention of real-world issues and to fruitfully place institutions within broad systems in the boundaries of the natural world. It can even successfully take into account the interests of the environment itself when analyzing institutions and logics.

Systems Thinking can address complex real-world problems set in social systems that transcend the traditional approach of science (Jackson, 2000). In this tradition, those interested in addressing complex problems in social systems limit the use of science as the central epistemological paradigm. The scientific method is positivistic, reductionist, and relies on hypothesis testing that is unviable in many real-world issues (Jackson, 2000). As reviewed in the first section, in most cases wicked environmental problems involve uncertain facts, values in dispute, high stakes, and urgent decision making. For these, the traditional "hard" objective scientific facts are tough to generate, and the 'soft,' subjective value-judgements becomes necessary (Funtowicz & Ravetz, 1995). Real life complex problems have no single valid formulation, meaning no replicability that allows experiments to test a hypothesis (Jackson, 2000). Soft System thinking is a response to mechanistic science that assumes our knowledge of the world reflects reality more or less accurately by using methods to builds "objective" knowledge about the world. Moreover, a mechanistic approach to EPS rooted in efficiency sees the environment, the economy, and other social systems as machines that can be deconstructed into parts, into which we can intervene to produce better results (Midgley, 2000). This approach has significantly failed and continues to do so. Systems thinking breaks with mechanism quite similar to how institutional theories break with efficiency.

In fact, this is the heart of the ontological compatibility that facilitates the linkage between Institutional Theory and Systems Thinking. Both disciplines recognize the subjective nature of reality, creating a

fundamental philosophical divide with the natural sciences (Funtowicz & Ravetz, 1995; Hoffman & Jennings, 2015; Midgley, 2000). For systems thinking, this nature is engraved in criticism of the object/subject dualism of the scientific method and the possibility of objectiveness. Gerald Midgley (2000, 2003) has written plenty about this conception. Drawing from his discussion, it is impossible to attain objectiveness within the study of systems, given that the observers are also part of the system. In systems thinking "decisions to undertake observations are made by taking account of these interconnections, and observations of human behaviour can feedback to transform what is observed" (Midgley, 2003, p. 84). The substance of this independent observation critique is equivalent to that of bounded rationality and mental frameworks drawn within institutional theories, where "people bring different knowledge resources to observations, so there can never be any guarantee that they will see things in the same ways." (Midgley, 2003, p. 85). This similarity reveals a shared ontological paradigm of subjectivism and constructionism in which nature is understood through the cultural lens of society (Hoffman & Jennings, 2015).

This is a dramatically essential foundation. For example, elements within systems are defined as a representation of some phenomena of the natural and social world by a name that informed observers agree exist, or could exist, and whose existence would be worth assuming to gain insight (Flood & Carson, 1993). Consequently, system boundaries are socially constructed to define the limits of knowledge that is taken as pertinent in the analysis (Midgeley, 2000). This is a break with the objective paradigm that brought Midgely (2000) to embrace value loaded observations and worldviews. For him, observation implicates a social or personal construction of whatever is observed. As a consequence, the values of observers inform conclusions, the framing of observation, and the methods to be selected for the observations. In particular, personal constructions tell about what is being included and excluded from the boundaries of the analysis (Midgley, 2000).

The ontological and epistemological similarities between both disciplines are evident. The shared constructionist paradigm brings forward an epistemological encounter that allows for the use of mixed methods. For both disciplines, the knowledge built is a socially constructed fact (Checkland, 1994; Hoffman & Jennings, 2015). For institutional theorists, the diffusion of those facts depends on the institutional mechanism (Hoffman & Jennings, 2015). For systems thinking, at least the modern version,

the social construction of reality is embodied in the form of appreciative systems theory (Checkland, 2000). People appreciate reality, and in viewing the world they make value judgements about particular events, which leads to action that becomes a part of the events stream; institutions influence and even articulate that appreciation (Checkland, 2000; Hoffman & Jennings, 2015; Jackson, 2000). For system thinkers, this appreciation applies to observers and subjects (seen as equal for systems thinking), and it contributes to a holistic understanding of the situation at hand. Different perspectives are at the root of this discipline as they can bring new possible solutions and overarching mutual agreements (Jackson, 2003).

Therefore, there are differences in approaches to producing knowledge between the traditional social sciences and systems thinking. The difference between both disciplines is detailed by Jackson (2000), who argues that for systems thinking, the methodology is more than the methods. The methodology is concerned with the principles of method usage, and questioning the methods that might be employed in some activity. Here the methodology is a higher order and establishes the principles behind the use of methods and model. On the contrary, for social sciences methodology is often subordinated to theory and its primary interest is to improve conceptual frameworks. Sometimes obsessive, this constant construction of a theoretical armour has made social sciences lack application in real life situations. For systems thinking the word methodology describes an organized set of methods and techniques employed to intervene in and change a real-world problem, mainly because the emphasis of systems methodologies is to deal with the concerns of the client or problem owner. Despite this, systems thinking has engaged in theory building, but this is not where its core interest lies as its emphasis is application. This interest in application has been criticised for theory neglect, as in some cases systems thinking operates with weak theoretical frameworks made up of poorly theoretical systems ideas (Jackson, 2003). According to Jackson (2000), in doing this system thinking has failed to take full advantage of opportunities to learn from practice and to develop as a discipline.

Fortunately, as systems thinking can complement institutional theory´s weak application, the social sciences can bring robust theoretical frameworks to systems thinking. Paraphrasing Jackson (2000), research and interventions that draw on the social sciences robust theoretical frameworks and the real-

world user-oriented methodologies of system thinking, can set up an agenda which will enable both to work together to be further enhanced and solve environmental problems.

To achieve this agenda, it is essential to consider the distinct types of research that can take place. Checkland (2000) and Jackson (2000) refer to them as Mode 1 and Mode 2 but have different accounts of the two ideal types. I consider that Jackson's synthesis is better for this research. According to him, Mode 1 uses theoretical, disciplinary frameworks through a methodology regarded as good practice in the discipline, to test a hypothesis or analyze an area of concern in the discipline. Mode 2, on the other hand, is governed by the issue or area of interest at hand, rather than the theoretical framework. Mode 2 knowledge is produced to satisfy the demands of users, and research is organized in negotiation with those who will find the outcomes useful. For Checkland (2000), the Mode 2 focus on the problem brings particular attention to the role that methodology and methods play, transforming it into a transferable problem-solving capacity. In turn, in applying Mode 2, there might not be a strong concern for theoretical framework anchoring. There is no suggestion in the literature that these methodologies are mutually exclusive. In fact, for my research agenda there are opportunities for creating approaches that include both modes.

When bringing together robust theoretical frameworks and applied methodologies, such as proposed by this research, it is crucial to remember Midgley's (2000) advocation to break the idea of "observation as opposition to intervention." He proposes that observation and intervention are two parts of the problem-solving endeavour. Where one does not oppose the other, recognizing observation as part of the practice of intervention that is just as valuable and value-full as others (Midgley, 2000). I follow his recommendation, aiming to draw upon the robust framework (observation) of institutional theory and the applied approach of soft systems methodologies (intervention). This utilizes the respective strength of social sciences and systems thinking. Jackson (2000) agrees that Social Sciences are the place to turn when looking for robust theoretical anchoring that can be applied to solving real-world problems using systems thinking methodologies. This linkage should result in an improved capacity to learn about the framework, methodology and problem, and to act on environmental problems (Jackson, 2000).

2.4 BIOLOGICAL CORRIDORS AS ENVIRONMENTAL PROBLEM SOLUTIONS

This last section gives an introduction to biological corridors from the EPS perspective. I will present the original reason for their existence, and the conditions that made them a viable alternative for the conservation of biodiversity. I will also introduce the rationales that were deployed to design and promote biological corridor creation in Mesoamerica and Costa Rica. Furthermore, much has been discussed about the question "do biological corridors really work?", but other relevant questions need to be addressed as well, mainly: who has benefited the most from biological corridors; who is most harmed by the existence of corridors; and how have corridors been created? Addressing these questions places this research in a position to study the logics and the institutional interplay that enables or disables the successful implementation of these solutions. As the previous sections suggested, each biological corridor must be seen within the general institutionalized context that has promoted them as solutions.

Biological corridors were initially designed to address habitat loss and habitat fragmentation, the two leading global and local scale threats to the functionality of biodiversity. Habitat loss on its own is a significant threat to biodiversity, and fragmentation isolates and breaks populations, generating higher risks of extinction (Beier & Gregory, 2012). The strategy, which became mainstream in the 1990s was motivated by theoretical and empirical observation suggesting that increased interchange of individuals among populations may increase local and regional population persistence (Rosenberg, Noon, & Meslow, 1997). Based on this, as an environmental solution, biological corridors aimed to support the conservation of biodiversity by enabling species movement (Rosenberg et al., 1997). As part of the movement to protect natural spaces, biological corridors were advocated as the primary means to connect isolated populations. The public interest and ease of understanding on "greenways" greatly benefited the process (Rosenberg et al., 1997).

The primary ecological rationale for biological corridors is to increase population persistence by allowing the continued exchange of individuals among a previously connected population (Rosenberg et al., 1997). This premise was proposed by Wilson and Willis in 1975 (Simberloff et al., 1992) and was quickly adopted by the World Conservation Strategy. This global strategy had the support of strong institutional partners, including the International Union for the Conservation of Nature, the United Nations

Environmental Program and the World Wildlife Fund with a remarkable publicity campaign (Simberloff et al., 1992).

A shallow evaluation of the literature reveals two main trends when looking at corridors. First, the definition of "corridor" is complicated, vague, varied and contested. Second, there is much uncertainty built around the implementation of corridors as viable problem-solving strategies. When it comes to how corridors are defined, the conservation literature is filled with multiple contested definitions, revealing an ambiguity in the use of the term. Its use in a varied set of disciplines has resulted in multiple vague and contradictory definitions, and its vagueness has incentivized vigorous debates over their importance to conservation (Rosenberg, Noon, & Meslow, 1995; Rosenberg et al., 1997; Simberloff & Cox, 1987; Simberloff et al., 1992) Some definitions attached to the word "corridor" include: riparian linear habitats; linear artificial habitats like railroads; greenbelts and buffer zones; large biogeographic regions like land bridges; discrete refuges for migratory birds; underpasses and tunnels; and finally strips of land intended to facilitate movement between larger habitat (Simberloff et al., 1992). Each of these emphasize different management characteristics that go from functionality to structure, form, and context. Conflict in these management features is evident in cases such as the Alexander Skutch Biological Corridor. The current management plan that guided the implementation of the corridor by the Local Management Committee includes at least five different definitions of a Biological Corridor, each of them giving weight to different principles and functions (Onca Natural S.A., 2014). Including:

- the corridor is a linear patch of habitat

- the corridor is a mosaic of different land use types managed to achieve connectivity

- the corridor is a wide geographic area of private properties whose purpose is to achieve connectivity

- the corridor is a social space for facilitating discussion between social actors, economic investment for conservation and sustainable use of biodiversity

- the corridor is a geographic space of continuous natural and artificial ecosystems to facilitate the dispersion of species

In recent decades the biological corridor definition has expanded from that born in Landscape Ecology. It was initially defined as a strip of land in a degraded landscape attached to a patch of similar vegetation

(Simberloff & Cox, 1987). This expansion has not come cheaply, making things even vaguer. Now discrete elements on the landscape have been extended to new constructs that involve a multiplicity of land uses, including both ecological and human processes. Thus, when issues such as the significance of corridors to the maintenance of biological diversity are debated, disagreement may arise simply as a consequence of divergent understandings of the concepts (Rosenberg et al., 1995). Consequently, the issue of corridors is not only contested on ecological terms, but also on its social and economic significance. This expansion was legitimized by the inclusion of corridors as part of the United Nations Biological Biodiversity Strategy, and the establishment of regional corridors like the Mesoamerican Biological Corridor. These corridors integrate biological conservation with sustainable use (Bennett & Mulongoy, 2014; Canet-Desanti, Herrera, & Finegan, 2012; Finley-Brook, 2007; Miller et al., 2001). The extension from the ecological perspective of restoring focal land strips, to the inclusion of sustainable development as a core concept, inevitably incorporated a new market logic for building solutions and actions to manage the socio-economic conditions of surrounding areas (Finley-Brook, 2007). Not surprisingly, many corridor initiatives include public-private partnerships involving the promotion of certified products, environmental services, and the creation of market channels (Finley-Brook, 2007). The expansion would also increase the complexity of corridor creation and management. Now corridors have to deal with multiple governance arrangements, community development strategies, environmental education and business development.

Indeed, after 40 years since their first introduction, the term "corridor" means different things to different people. This ambiguity has contributed to the controversy over their efficacy, and left room for the pursuit of objectives far from the original ecological goals. For ecologists, the definition or the lack of it, is associated with the determination of their value as management tools (Rosenberg et al., 1995). But for people with different worldviews, this loose demarcation leaves room for contest, providing actors with an opportunity to exploit contradictions to serve their interests (Hartley, 2005). Supporting evidence for the later comes from the concern among the scientific community that corridors are being constantly reframed to serve donor agendas (Finley-Brook, 2007). Archie Carr, one of the most prominent voices of conservation in Costa Rica during the 1980s, and one of the creators of the Paseo Pantera (later the Mesoamerican Corridor), believed that rather than biodiversity strategies, corridors represented the

"creation of little green enclaves of social justice and opportunity" (Finley-Brook, 2007, p. 102) In which case, biodiversity goals would be displaced to attend for human needs with most of the efforts being donor-driven (Finley-Brook, 2007). This demonstrates how the lack of agreement on definition leaves much space for subjective construction that derails corridors from the original ecological goals. This ideological contest over meaning calls for a research approach that sees corridors as sectorally subjectively constructed solutions by actors taking part in the problem-solving process—not only as strips of land with trees but as grounds for institutional interplay.

For uncertainty in biological corridors, the literature reveals a discussion centred on the efficacy and validity of corridors as a management strategy for the conservation of biodiversity. The spectrum encompasses studies that highlight corridors as the most valuable alternative to the preservation of wildlife, to those who deem corridors harmful to the conservation of biodiversity. This debate is sparked by uncertainty over the impact of corridors on the movement of animals in the landscape, and the survival of isolated populations. Research has failed to produce unquestionable evidence of the efficacy of corridors (Beier & Gregory, 2012; Bennett & Mulongoy, 2014; Simberloff et al., 1992).

For some authors in the 1990s the effectiveness of corridors to facilitate movement of species was "almost an article of faith," as the perceived urgency gave little time for tests and this uncertainty was put aside for the prudence of restoring natural corridors (Simberloff et al., 1992). Few studies have demonstrated that corridors actually increase the rate of successful movement of animals between patches. Many studies are ambiguous and unconvincing, facing questions over the methods used and the impossible replicability (Beier & Noss, 1998; Rosenberg et al., 1997; Simberloff et al., 1992). There is scant evidence that wildlife corridors work in vast, human-dominated landscapes (Hughes, 2012). Almost all research measures only whether animals move from patch A to patch B, rather than explicitly testing genetic diversity or long-term occupancy (Beier & Gregory, 2012). This uncertainty has been carried through the years, generating a gap between corridor research and corridor design (Hughes, 2012). Most research has been done on strips of land under 150m long, yet corridor design usually targets broad mix use landscapes that are much more significant (Beier & Gregory, 2012).

Beyond the discussion of the actual efficacy of corridors, there is also added uncertainty about their function. Some studies focus on the corridor connectivity function, while others address the critical habitat

function and claim that all corridors should be protected in the face of uncertainty (Beier & Noss, 1998; Bennett & Mulongoy, 2014; Simberloff et al., 1992). This debate demonstrates the difficulty in separating the corridor function of supporting species movement in the landscape, from that of simply adding habitat (Rosenberg et al., 1995). Failure to reconcile connectivity and habitat function has arisen from the uncertainty of the current evidence, and contributes to the controversy over the value of biological corridors. This gives room for critics to argue, based on the trade-off between management strategies, that in a degraded environment corridors compete for economic resources that could be better employed for superior options (Beier & Noss, 1998; Simberloff & Cox, 1987; Simberloff et al., 1992). As one observer remarked, "the corridor would thus be a very expensive way to move very few woodpeckers" (Simberloff et al., 1992, p. 499).

The previous recapitulation indicates that the best ways to achieve the desired attributes and functions of corridors, mainly ecological functions, are often unclear (Williams, 1998). Establishing biological corridors is a very complicated process. Shape, size, structure, location, width, purpose, cost, competing land uses, effectiveness, and target species are just some of the often-unclear attributes, functions, and considerations (Williams, 1998). High stakes and high uncertainty have helped conservationists exploit the ease of corridors as a solution to be sold to the public, and for skeptics to misinterpret the "disagreement among experts" to persuade agencies that habitat loss and fragmentation should proceed unhindered (Beier & Noss, 1998). In both cases, each side has called for the other to bear the burden of proof that corridors effectively preserve biodiversity, or that corridor destruction will not harm target populations (Beier & Noss, 1998; Simberloff et al., 1992).

For corridors, we see a complex landscape that is contested, full of uncertainty, and high stakes, given the degraded state of biodiversity. Biological corridors respond to real-world threats to the environment. Despite the uncertainty, they unquestionably increase the actual habitat area in landscapes. In the absence of evidence, it is safe to assume that a connected landscape is better than a fragmented one (Beier & Noss, 1998). Yet corridors don't exist in isolation as interested parties promote their creation. As mentioned for the MBC, parties might be motivated by objectives far different from those of the environment. To understand the link between parties, their goals and the output of corridors, it becomes necessary to see the corridors from an institutional perspective. It is essential to look beyond

the movement of species and the ecological situation, to the human system that contains the organizations that negotiate, promote, and manage the corridors, as within this interplay lies the coherence between desired and expected results.

Indeed, little literature addresses the institutional context of biological corridors. One exception is Finley-Brook (2007), who explains how the Neoliberalism paradigm permeated the design of the MBC. However, Finley-Brook missed a fascinating question: how did Neoliberal logic manage to be imposed over the environmental logic that originally prompted the corridor?" This question embodies the institutional interplay of biological corridors. Her study reveals that institutionally, corridors are heavily contested on their meaning, purposes, and means, with significant gains for the winners. Biological corridors seem to be continuously reframed and constructed based on needs that are unhinged with the needs of the environment. The shifts are driven by the logics of organizations that take part in its conceptualization. Finley-Brook's (2007) analysis of the Mesoamerica Biological Corridor and Archie Carrs' words reveal how aid agencies, international governments, donors, and international NGO's significantly influenced the purpose to match their agendas (Finley-Brook, 2007, p. 102). For example, the market logic of the international development banks, the United Nations Development Program and foreign agencies are conspicuously evident in the establishment of the MBC. They gave higher priority to market-based solutions, promoting sequestration of carbon to offset pollution from industrial countries, the establishment of *in situ* gene banks that open the door for pharmaceutical usage, and the emphasis on ecotourism promotion. Additionally, Finely-Brook (2007) reveals how the organizational interplay has made the MBC suffer from internal contradictions that led to the achievement of few tangible results, extremely long implementation periods, and no real on-the-ground implementation of corridors.

The MBC shifted from an ecologically motivated purpose to one of welfare and poverty relief (Miller et al., 2001). With agendas mainly determined by foreign agencies, development banks, foreign consultants, corporations and central governments, the people that live within the corridor were often seen as beneficiaries rather than agents (Finley-Brook, 2007). With the MBC, NGO's immediately recognized a massive opportunity for fundraising, becoming vital service providers that held scientifically and technical capacities not developed in the region. This put international non-government organizations in a position of legitimacy to shift the framing of biological corridors (Finley-Brook, 2007). In a context such as this, the

quality of the corridor's output will depend more on performance and goals, and on the "negotiated product of repeated interactions in the broader, institutionalized, social context" (De los Santos, 2005). Hence, institutions, their logics and the context should be a central part of the analysis of biological corridors.

Simberloff et al. (1992) ask if resources are insufficient for different biodiversity protection management strategies, which would be more useful? Beyond the uncertainty in selecting corridors as a viable choice, their question indicates the high stakes in setting priorities and determining who is in charge of setting these priorities. Logics and institutions will have an influential role to play when these priorities are filtered and selected at the societal level. For an ecologist, it will be the quality of habitat patches, for an economist the cost-benefit analysis, and for others, the support corridors can bring to local peoples. All of these are valid, yet the pursuit of all simultaneously might be paradoxical. This brings attention to inconsistencies that might arise when doing so, and the role that people and organizations will play when problems are framed, and solutions are constructed.

2.5 SUMMARY

This literature review has positioned the research as an approach that goes beyond material processes to one that understands environmental problem-solving in the symbolic realm, and as a negotiated outcome involving multiple social and institutionalized interactions. Like institutional theorists, systems thinkers recognize that societal forces, such as macrosocial and economic forces, will inevitably impact the value judgments that influence decision making, and influence which facts are acceptable, which solutions are worthy, and which outcomes are suitable (Midgley, 2003). This is an especially useful approach to understand biological corridors. As we have examined, biological corridors have two simultaneous natures; one as an objective ecological reality within their boundaries, and second, a subjective one dominated by the complex institutional negotiations that created, promoted and supported their functioning. Both need attention, but so far the first one has received the most attention.

Based on the literature, I propose four main reasons to draw on the epistemological encounter between Institutional Theory and Systems Thinking as the basis for this research. First, both disciplines are all about the context. Solving environmental issues entails more than finding a technical solution

(Bardwell, 1991). As well as respecting scientific facts, environmental choices reflect politics, social values, and expectations (Sampson & Hair, 1990) that are part of the social context. Second, they provide opportunities to analyze the behaviour of organizations at various levels helping to understand the influence of field level and micro level actors and their interaction (Pache & Santos, 2010). Third, environmental problem solving is contested organizational ground. An institutional perspective grasps the multiple institutional logics and demands that determine the organizational behaviour and its eventual outcome in problem-solving (Pache & Santos, 2010). Institutional logics and the organizational field are constructs that can help to understand why it is so difficult to solve environmental problems. Finally, both disciplines help to understand the opportunities for agency that individuals and organizations have within that context (Thornton & Ocasio, 2008). The level of influence an organization and its ability to mobilize change within the system will ultimately determine its effectiveness in solving systemic problems (Banks, Hulme, & Edwards, 2015). Adapting Dart (2004), this allows us to move away from a rationalist and economics-based theorizing to a perspective that includes broader sociological understandings of environmental problem solving (p. 412).

This research aims to contribute to the existing gap in the literature between the connection of institutional logics and environmental problem-solving outcomes. Institutional theory will act as a lens to understand the behaviour of agents. Systems thinking will provide methodologies for data collection; integration of information; and intervention.

3. RESEARCH DESIGN AND METHODOLOGY

The research strategy draws first on soft systems methodologies (SSM) to intervene in a perceived problematic situation within the ASBC corridor, and second, on a grounded theory approach to extend existing theory on the link between institutional complexity and environmental problem-solving. Current theoretical perspectives miss how institutional complexity affects EPS output (Greenwood et al., 2011; Hoffman & Jennings, 2015). Therefore, formulating a hypothesis for qualitative testing is premature and an inductive approach is appropriate.

3.1 ABOUT SSM

Soft systems methodology (Checkland, 1994, 2000) is ideal for dealing with complex, unstructured problematic situations. It was designed for and applied to human organizational and institutional change, including the application of some of its techniques to protected area management (Bunch, 2003; Cleland & Wyborn, 2010). It is an iterative, continuous learning process intended to create transferable problem-solving skills. SSM does this by systematically investigating problems arising from different accounts of reality which are shaped by different worldviews (Jackson, 2003). SSM also uncovers and structures human activity into models of purposeful action. According to Checkland (2000), purposeful action characterizes messy, problematic situations, where humans take action seeking to keep relationships instead of achieving goals. Purposeful Human activity systems are imbued with values, intentions, and norms that are rooted in the worldview (logic) that make each system meaningful in a specific context (Bunch, 2003). The models are useful for discussion, structuring debate around diverse ways of seeing a problematic situation, and creating spaces for identifying viable alternatives for multiple stakeholder perspectives. By expressing problematic situations from different worldviews, key themes are identified and modelled as systems of purposeful human activity relevant to the debate on desirable and feasible change (Bunch, 2003). The methodology is very valuable for operationalizing institutional theory because, among many other reasons, it allows for the inherent biases of the observer to be accounted for, rather than erased (Checkland, 2000; Weedmark-Kish, 2013). As a Costa Rican biologist that has worked in

many conservation projects, I have inherent preconceptions about how EPS is executed or is expected to be achieved, and these need to be included in my analysis.

Originally, SSM operated in the form of a workshop, and has evolved from seven stages to four. The stages can be quite flexible in the techniques employed, embracing a variety of other methods and sources of information (fig. 2). According to its creator, the methodology can and should be adapted individually to each situation (Checkland, 2000). For this work, several adaptations, like the use of interviews, were made to adjust to research time frames and the needs of the participants.

Figure 2: The inquiry/learning cycle of the contemporary form of Soft System Methodologies as represented by Checkland (2000).

3.2 ABOUT GROUNDED THEORY

This research followed the grounded theory tradition as recapitulated by Suddaby (2006), which was based on the work of Glaser and Strauss (1967). I chose grounded theory due to its focus on theory production and its embrace of the researcher's role as an active element of research. Drawing on Suddaby (2006), grounded theory is an interpretative process, not a deductive one, and it steps away from positivist models of science that separates researchers from their objects. An interpretive ontology rests on the assumption that human beings impose their internal perceptions to create their realities. For this reason, grounded theory elicits fresh understandings about patterned relationships between social actors, and how these relationships actively construct realities (Suddaby, 2006). It allows one to make statements about how actors interpret reality instead of testing hypotheses, which is most useful for discovering theory from data (original source not found Suddaby, 2006 quoting Glaser & Strauss, 1967).

3.3 RESEARCH STRATEGY

An Institutional logics theoretical framework and a pluralistic methodology based on grounded theory, critical systems heuristics, appreciative enquiry and soft system methodologies guide this research. The research design is centred around a problematic situation (Midgley, 2000), and guided by the principles of appreciative inquiry (Kinni, 2003). Following the discussion from chapter 2, the research methodology is divided into two main phases: intervention (Mode 1) and theory production (Mode 2). In Mode 1, the research employed a grounded theory approach to analyze the theoretical question about the influence of institutional complexity on environmental problem-solving in a case study of the Alexander Skutch Biological Corridor. In Mode 2, the research operationalized an institutional theory framework using Soft System Methodology to intervene in the problematic situation within the ASBC.

The case study of the ASBC involved gathering baseline information using semi-standardized interviews that targeted a broad set of stakeholders. This included organizations and people that participated in the creation and management of the corridor, or/and were essential referents in the day to day life of the corridor. The interview data was organized and summarized to be presented back to the LC during the workshop. I operated an action research approach in which during a four-hour workshop,

members of the LC expressed the problem situation, undertook conceptual modelling of relevant systems, generated alternatives and discussed viable options for improvement. By using SSM methods, the workshop served a dual purpose by shaping further discussions and information that enhanced the interviews. The intervention produced tangible results about the problematic situation and improvement opportunities. It also supported validation of the initial inductive analysis. It was a unique opportunity to have the participants' perspective on assumptions and conclusions that were produced during the initial analysis, which substantiated the overall analytical process and its findings.

Case study methodology, which uses rich, empirical descriptions, based on a variety of data sources is ideal for the encounter between institutional logics theory and systems thinking (Eisenhardt & Graebner, 2007). It organizes social data, without losing the unitary character of the social under investigation, while keeping the detail of its interaction with its context (Araluz Solano, 2005). The selection of the ASBC as a case study, follows the criteria of Eisenhardt and Graebner (2007) of unusual revelatory character, extreme exemplarity, and opportunities for in-depth access to data. This research follows Araluz (2005) principles, recapitulated by L. Williams (2016) who adapts them well:

- The case study approach focuses on inquiries of how and why.
- There is no experimental design; who investigates cannot control the events under investigation.
- The aim is to deeply investigate a determinate process, by keeping a comprehensive view of the phenomena.
- The research seeks no generalization in the statistical definition of the term.

This methodology chapter first presents the research unit, in this case defined as the ASBC organizational field. This section includes background information on the corridor and the current situation, the institutional context, and the actors to be considered for the sample. Then, the section "Institutional context and sample selection" describes how the institutional actors within the corridor inform the selection of the research sample. Following this section, the "Data Sources" section describes the techniques used to gather data including the interviews and the SSM workshop. The "Data analysis" section organizes the details of the Mode 2 approach of the research, namely the workshop using SSM. The Mode 2 approach is presented first since methodologically it still represents observation and data collection while the Soft System Intervention took place. Mode 1 is introduced later, summarizing the

methods employed to analyze the gathered data to produce a contribution to the literature on institutional complexity and EPS.

3.3.1 RESEARCH UNIT AND STUDY SITE

The organizational field and the outline (conservation category) of the ASBC and its boundaries is the central unit of analysis for this case study. Supported by Thorton and Ocasio's (2008) warning, the organizational field concept is problematic when identifying scientific boundaries of a population sample unless it can be defined, as in this case, as a geographic region. The ASBC has clear physical and organizational boundaries, a context of a multiplicity of logics, and a governance structure linked to environmental transformation objectives. The ASBC as a research unit defines the boundaries to demarcate what is not relevant to the analysis (Midgley, 2000) and identifies the applicable members of the social field under investigation.

3.3.2 CREATION AND PURPOSE OF THE ALEXANDER SKUTCH BIOLOGICAL CORRIDOR

The ASBC, created in 2005, is located in the Pacific versant of the Talamanca Mountain Range in Costa Rica, and includes a core and buffer area. In the northern part, the corridor is delimited by the Chirripó National Park and Las Nubes Biological Reserve. To the east, the limit follows the Cedral watershed to the Calientillo river until reaching the Pital river (Fig. 3). The southern boundaries follow forest remnants along the Los Cusingos Biological Reserve. To the west, the corridor follows the trajectory of La Hermosa river. The Peñas Blancas Watershed is the core of the corridor and provides most of the ecological altitudinal connectivity with an incomplete riparian habitat linear patch, defined as the central focal element (Centro Científico Tropical & ASOCUENCA, 2016; Daugherty, 2005; Onca Na, 2014). The core area is a strip of land following the Peñas Blancas river from an altitude of 750 meters above sea level in Los Cusingos Biological Reserve to 1300 masl in Las Nubes Biological Reserve (LNB). Within the corridor, these protected areas are some of the most intact forest patches. There are seven communities: Quizarrá, Santa Elena and Montecarlo are closer to the core of the corridor, while San Francisco, San Ignacio, Santa María, Santa Marta and Trinidad are in the buffer area. Four elements are

very characteristic of the corridor: 1) the Peñas Blancas river that connects the upper and lower section of the corridor, touching both protected areas, LNB and Los Cusingos; 2) the historical figure of Alexander Skutch, a champion of the conservation agenda, and the world community of Ornithologists; 3) birds, with the Guaco or laughing falcon (*Herpetoptheres cachinnans*) as the symbol of the corridor; and finally 4) the coffee production matrix that informed the original creation of the ASBC, in which transition from sun-grown coffee to shade-grown coffee was center stage (Daugherty, 2005).
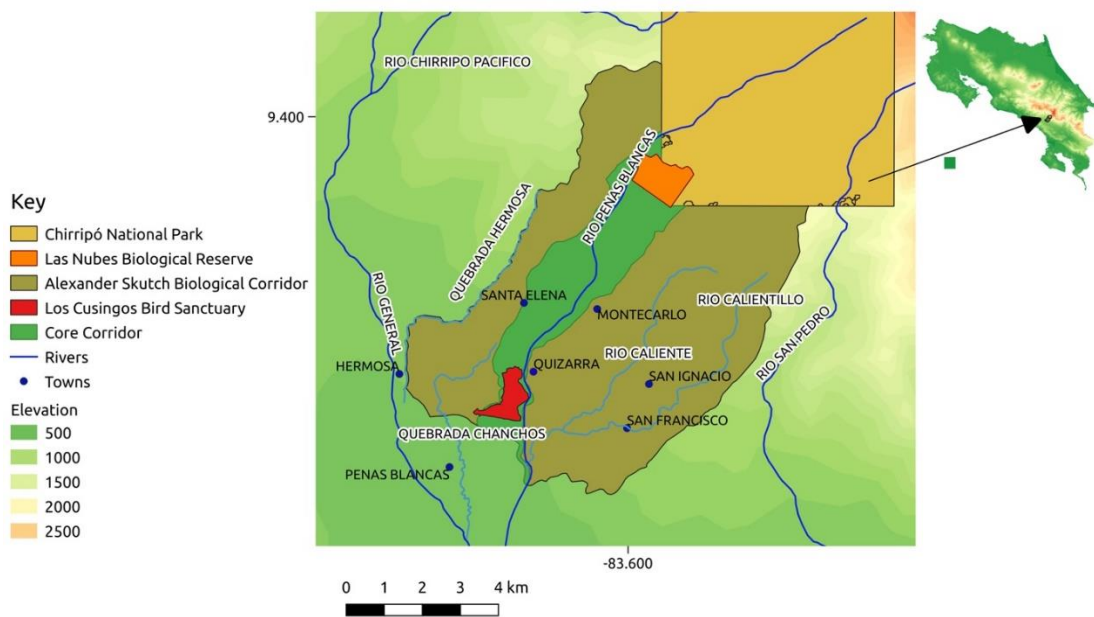
Figure 3: Alexander Skutch Biological Corridor. Source (Jiménez, Montoya, Bolaños, & Alvarado, Under Preparation)

It is hard to identify an account that summarizes the creation of the corridor. Based on Daugherty (2005), when first created, the corridor consisted of forest patches of various sizes, ages and species composition: agricultural fields (primarily coffee and sugar cane), pastures and degraded lands. Three main topics dominated the creation of the corridor, the conservation of biodiversity, the production of market-based solutions to incentivize conservation, and the pursuit of community development. The main partners that took part in its construction were York University, The Tropical Science Centre (CCT), and the local agro-producer cooperative Coopeagri. They based the corridor on a joint project that aimed to

transform the agricultural mode from sun-grown coffee to shade-grown coffee, which is a more sustainable strategy for production. The creation of a corridor-certified brand to target the boutique coffee market in Canada with the help of Timothy's World Coffee supported this transformation. This was the central rationale for the creation of the corridor, merging ecological production with green consumerism to incentivize farmers to conserve their lands with potential earnings exceeding even those of fair-trade coffee (Daugherty, 2005). It was expected that community development, improved landscape and better local economies would be achieved simultaneously.

The objectives of the corridor varied greatly through the years as the mission, vision and strategic priorities have changed continuously to include: archeological protection; waste management; creation of small business; tourism; education; research; economic development; and regional planning (Centro Científico Tropical & ASOCUENCA, 2016; Daugherty, 2005; Onca Na, 2014). From the strategic plans it can be concluded that, as an environmental solution, connectivity and restoration of habitat has remained as the overarching purpose. Research from Acuña Prado et al. (2017) suggests that the corridor has been partly successful at achieving this overriding goal. Their study from 2005 to 2016 shows a tendency of continuous increase of forest cover and forest patches, with a 5.6% increase for the 11 years of their research. Primary forest recovered 3.6% of the total land area, for a total of 35% of the ASBC area. This increase of 339 hectares seems to come from the conversion of human grasslands, coffee farms, and bare land. It is not possible to establish causality of that recovery, but it is clear that the corridor has created a context that can motivate reforestation. The reversal of the deforestation trend from 1998-2008 reported by Rapson, Bunch, & Daugherty (2012) is evidence to support that claim. Nonetheless, there is no information available to suggest that purposeful habitat restoration fully accounts for that recovery. It is equally possible that this recovery came from other causes, for example, macroeconomic processes that have produced abandonment of the land. Finally, it is important to remark that with the forest another element in the landscape has grown, which is infrastructure. After 11 years infrastructure has increased by 1.3% and represents 4.6% of the ASBC total area (Acuña Prado et al, 2017).

The previous recapitulation draws a picture of a landscape recovery that seems poorly connected to the management of the corridor or its purpose as an environmental solution, achieving habitat creation and not necessarily habitat connectivity. The random recovery has happened in agricultural areas, mostly

cow fields and coffee farms, and not associated with the connectivity within watersheds, along with increasing pressure in this area by the development of infrastructure. In fact, Acuña et al. (2017) show little recovery in the main connectivity route, mainly the Peñas Blancas watershed, suggesting no intentional pattern for connectivity (Acevedo, Arroyo, & Obando, 2016).

There is little information available to precisely determine the original motivation to create the corridor. Technical documents suggest that these causes vary greatly depending on the stakeholder worldviews. The Costa Rican historical context that produced biological corridors as a reliable environmental solution might shed some light on the question of its creation. Costa Rica has over 37 biological corridors institutionalized in the National Program for Biological Corridors. Mainly seeking to establish protected areas and connectivity, corridors were promoted as a strategy for the conservation of biological biodiversity for the benefit of society (Acevedo et al., 2016; Alvarado et al., 2016). This promotion happened as a direct result of the creation of the Mesoamerican Biological Corridor in 1997 (Alvarado et al., 2016). The Mesoamerican corridor was a regional plan specifically designed to expand the idea of conservation from that of "no-use protected areas," to include sustainable development. It greatly emphasized the sustainable use of resources and ecosystem services as a means to improve the livelihood of socially vulnerable inhabitants in rural areas rich in natural resources (Alvarado et al., 2016; Finley-Brook, 2007; Miller et al., 2001). With the Mesoamerican Corridor came a break from the concept of no use to embracement of market-based solutions that somewhat permeated the design and establishment of biological corridors in Costa Rica (Finley-Brook, 2007; Miller et al., 2001). This context indeed informed the creation of the ASBC.

3.3.3 INSTITUTIONAL CONTEXT AND SAMPLE SELECTION

To select the sample of the interview participants, it was necessary to have a basic understanding of the ASBC's organizational field. The boundaries of the organizational field depend on issues of particular importance for those organizations participating (Lepoutre & Valente, 2012). Subsequently, the sample aimed to include all the formalized organizations that found the corridor to be of particular importance to them, and who participated in its creation and management.

Having reviewed the available literature on the institutional context of the corridor, knowledgeable local informants were consulted for the selection (organizational or individual) of a preliminary list of over 30 organizations. Based on this selection, the first list of interviewees was generated and validated with the same local informants, including the major paper's second reader (FM). I applied three criteria for the selection of the final sample: 1) the actor was part of the ASBC Local Council; 2) the organization was formal and the corridor was of particular relevance to its interests; and 3) the actor participated in the creation or had privileged information about the corridor (Example: a consultant working during management plan elaboration). The final selection was arranged on institutional sectors that shared common characteristics, and it was validated with master program research supervisor (MB) and second reader (FM) who have been working in the ASBC for some years.

It is essential to summarize the general institutional context of the corridor to substantiate the sample selection. According to the National Decree 40043, biological corridors are under the authority of the National Program for Biological Corridors (Programa Nacional de Corredores Biológicos, PNC), which is part of the National System for Protected Areas (Sistema Nacional de Areas Protegidas, SINAC). Besides the National Program for Biological Corridors, they are under the authority of the National Council for Biological Corridors and are locally managed by the Local Committees. LC's have few legal tools and are participation spaces for the management and consolidation of corridors, whose objectives are: (a) strengthen protected areas and connectivity; (b) create adaptation measures for climate change impacts; (c) to protect ecosystem services; (d) the strengthening of urban and land planning by articulating with other sectors; and (e) the creation of governance models for the sustainable use of biodiversity (Gobierno de la Republica & Ministerio de Ambiente y Energía, 2006). It is a lax and broad legal grounding. According to legislation, they are constituted by one representative from the National System for Protected Areas, members of non-profit organizations, community organizations, productive organizations, other relevant government institutions, municipalities and other interested parties. The member of SINAC acts as the secretary of the council, and all members donate their time (Gobierno de la Republica & Ministerio de Ambiente y Energía, 2006). This legal constitution informed the previously mentioned selection criteria for my research participants, which includes: 1) the members of the

committee; 2) the formalized organizations; and 3) those who on voluntary basis actively participate in the LC and have a particular interest to partake in the corridor.

With the input from the work of Arauz-Beita & Arias-Navarro (2014), the most recent ASBC Strategic Plan, and the information provided by local informants, I identified seven main institutional sectors; the State, community organizations, community development, academia, agricultural, business, environmental non-profits, and civil sectors (see Table 1). In most cases, there is no inflexible discrete division in the categorization of the sector. Community organizations might have business activities, and the agricultural sector might participate in business development that is non-related to agricultural production. For analytical and sampling purposes, organizations were categorized based on their core activities and shared characteristics, as this would provide initial information about their motivations, needs and interests within the corridor. As Table 1 indicates, institutionally the corridor is a vibrant mix of organizations that represent different constituencies and logics, sharing the common interest to partake in the construction of various aspects of the ASBC. In the corridor, organizations have unclear organizational boundaries; with only over 2000 inhabitants living within the ASBC, it is common for board members to be shared between groups, associations, committees and cooperatives, making the organizational boundaries somewhat vague.

Table 1: Institutional referents included in the sample.

Sector	Characteristic	Participating representatives in the ASBC Organizational Field
State	Central and local government representation. The intense focus on agricultural livelihoods and the existence of protected areas demands the Ministry for the Environment and the Agricultural Ministry collaborate intensively. Local government have taken a secondary role due to its focus on centralized settlements like Perez Zeledón. Mostly join in the form of appointed representatives and agents taking part of the management in the area.	Ministry for Environment and Energy (MINAE) National System of Protected Areas (SINAC) Ministry for Agriculture Perez Zeledón Municipality
Community Development	Their common interest in the corridor is the provision of infrastructure development and service. This brings this groups to participate actively in the protection of forest and particularly the provision of water. They are made by voluntary community members that manage the organizations through board members and compact institutional arrangements with few employees.	Asociación de desarrollo San Francisco (ADI) Asociación de Desarrollo Santa María (ADI) ASADA Santa Elena ASADA Santa Marta ASADA Montecarlo

Community Organizations	Comprised of Mostly Associations addressing the multiple needs of the local populations. These groups agglutinate women, farmers, students and young people that share a common interest in the well-being of the inhabitants. Their activities range from business promotion to education and conservation of resources. These organizations are formed by a board and associates.	Asociación de Mujeres Unidas de Quizarrá (AMUQ) Asociación de Mujeres Unidas de Santa Elena (AMESE) ProRíos Asociación de turismo Rural Ecológico del Corredor Biológico Alexander Skutch (Turecobas) Comité de Conservación Forestal (Cocoforest) Asociación de Dueños Vistas del Chirripó
Business	These are entrepreneurs and business development of different sizes, employing part of the population that lives within the boundaries of the ASBC. They share the interest of producing economic activities that are linked yet separated from agricultural production. The shared interest in agritourism has brought them closer to the activities within the corridor.	Vistas del Chirripó Hacienda Altagracia New Earth Preservation RISE Fincas La Bernina Asociación de Mujeres Activas del Corredor Biológico Alexander Skutch (AMACOBAS) Centro Turístico Bajo del Mapache
Agricultural	The sector includes agricultural production referents, involved in the management of soils and watersheds, promotion of agriculture and the improvement of the livelihood of producers. They engage with the corridor management to improve the diversification of agricultural production and the creation of added value for the products or their members.	ASOCUENCA Coopeagri
Civil Sector	Mostly represented by non-profits or non-governmental organizations interested in the conservation of the natural resources in the corridor.	CCT Ríos Vivos
Academia	This sector is mostly represented by universities, as other present academic institutions like junior and high schools gave little to no relevance to the institutional life of the corridor. They share an interest to develop, research and education for beneficiaries in the communities.	UNA York University

The sample was partly determined by the availability of informants, and many organizational actors or leaders within the corridor have no knowledge or interest in the corridor (Arauz-Beita & Arias-Navarro, 2014). The sample included people that participated in the creation of the corridor, people that manage it on a day to day basis, and other people that have significant stakes in the ASBC. I anticipated that the information they would provide would represent a comprehensive organizational view of the ASBC.

3.3.4 DATA SOURCES

The case study of the ASBC was developed by collecting archival data (like the management plans) and relevant literature, performing interviews, and documenting the workshop results. My previous work

in the corridor and the input from the second lecturer (FM) identified the relevant research and archival data.

3.3.4.1 The interviews

An institutional theory framework informed the creation of the interview, by drawing from the constructs of the organizational field, legitimacy, institutional logics, and institutional complexity. I completed interviews with 32 people, with 22 interviews conducted prior to the workshop on February 2018, and 11 more completed after the workshop in March 2018. Based on the research sample criteria, I selected individuals from different organizations representing seven sectors to participate in the study.

The interview included a structured set of 28 questions and consisted of 5 parts: participant's necessary information and rapport generating questions; the context of the corridor; purpose and expected results; organizational relationships; and questions about the local committee functioning (including organizational climate survey). Unscheduled probes were used when necessary to explore the varying ways participants understood particular situations (Berg, 1998). Participants were categorized in two groups—either members of the ASBC local committee or local stakeholders. Those in the LC, given their position, would be asked all the interview questions, while the participants that were not part of the council would receive a reduced version of the interview comprising 20 items. In total, 11 interviews were delivered to LC members and 21 to relevant stakeholders. There were two exceptions for the interviews, one unstructured, open-ended interview and one standardized interview given by email.

I considered that the inductive approach taken for the design of the interview, with a combination of qualitative and quantitative queries was consistent with my research question and the data needs for the SSM workshop. With the interviews, I sought viewpoints from the main organizational sectors that participate in the ASBC. Key informants and leaders from the organizations shown in Table 1 most likely represented different logics interacting within the corridor, with different values, objectives and worldviews (Hoffman & Bertels, 2010; Thornton & Ocasio, 2008). The interview allowed people to critically appraise the creation and management of the biological corridor since its inception 18 years ago, while envisioning future opportunities in an appreciative fashion (Kinni, 2003).

The organizational climate survey followed the gathering of primary participant data. In the survey, interviewees reviewed the process, people, structure and resources dimensions of the LC. Placed at the initial part of the interview, my focus with this section was to generate triangulation data that would later be useful in the workshop and theoretical analysis. If institutional complexity is associated with the deficient performance of the corridor, other technical explanations, like lack of resources, need to be taken into account. A quantitative paradigm seemed more suitable for these purposes (Berg, 1998). The survey was only delivered to members of the Committee as they have privileged information on the organization's operations.

In the rapport section, participants had the opportunity to think about the area they live in, while generating rapport by talking about their relationship with the corridor as a geographical area, including what they love or dislike. This section provided incredible input for the construction of a rich picture, mainly through data generated when asked to describe the area previous to the creation of the corridor and the things that have since changed. The appreciative enquiry approach started to permeate with questions such as: what makes this area flourish and pleasant?

The following section dealt with the context of the corridor. It asked about the role participants had in the conception of the corridor, the current and original purpose of the ASBC, the fulfilment of the purpose and their personal and organizational interest in the corridor. In this section, an adaptation of Ulrich's heuristic question was included to consider issues of coercion and power (Ulrich, 2005). This section was the core of the institutional theory enquiry, giving participants the opportunity to discuss their organization's interest, satisfaction with the corridor, and barriers to achieving those activities. Certain that logic incompatibility was relevant for complexity and that this incompatibility is related to goals or means, interview questions addressed issues of inconsistency in strategies and objectives (Greenwood et al., 2011). This section also included questions on organizational relationships. As Checkland (2000) noted, in soft systems, individual behaviour is best explained by relationship seeking behaviour rather than goal seeking. I also included them to understand how the organizational field was configured in the ASBC.

Finally, to complement the organizational analysis within the operations of the Local Committee, further questions allowed participants to express their views on organizational management priorities. The five strategic objectives of the current management plan for the corridor were presented to the

participants. I asked them to sort the objectives based on their priority, and to enlist the organizations that work on those objectives more or less actively. From an institutional theory perspective, the objectives of the corridor are determined by the interplay of actors and their logics (A. Hoffman & Bertels, 2010; A. Hoffman & Jennings, 2015). Assuming that objectives were connected to logics, understanding which organizations aligned with each objective would help understand the complexity of the field and its fragmentation.

In the overall interview, the questions that explored complexity aimed first to understand existing logics in the field, and second to uncover how intense the cooperation or competition is between existing logics (Raynard, 2016). Questions targeting the purpose of the corridor, the interest of the actors, the prioritization of objectives, the barriers to achieving individual goals, and the mapping of organizations working each objective would design to probe for this information. One question particularly revealing of each logic was what should be the purpose of the corridor? It was designed to uncover logics, as they would inform about the idiosyncratic means and goals for the corridor. If more information regarding complexity and logics was deemed to be necessary by the researcher, unscheduled probing would seek to uncover concerns, perceptions, motivations, relationships, values and underlying conflicts. For example, when participants were asked who is affected by the existence of the corridor, it was anticipated that narrow thinking and social acceptability could prompt a "no one" response. Of course, how could protecting biodiversity hurt someone, so I would reframe the question to who has benefited less? Such probing would also attempt to elicit vivid and deep descriptions of events, asking: could you tell me what made you so passionate about protecting nature?; how did this event change your perspective?; Can you tell me the story?; Precisely, what was so significant to you about this event (observation)? These questions put me in a position to explore themes of particular significance to participants, and helped me to escape my biases and allow different avenues of exploration. At the end of each interview, I asked the participants if they thought someone they knew should partake in this research to strategically expand my sample.

3.3.4.2 The Workshop

Having concluded the initial round of interviews, the data was organized and processed for the workshop. This included the results from 22 interviews—11 from the local committee and 11 from local stakeholders. The work was conducted in collaboration with the Local Committee. Its members were the primary focus for the intervention, with 9 of the 12 active members of the LC participating. The workshop was held at the ASBC in Los Cusingos Biological Reserve on the 19th of February 2018.

The intervention followed the SSM's logical structure (to be explained in the analysis section) for inquiry and learning, which is presented in Fig. 2 and was significantly enriched using interviews. In a variation of Chekcland's (1994) original design, I used interviews to gather overall information on the institutional context of the corridor to be presented and to guide the discussion during the workshop.

Table 2: The research strategy, main techniques and data sources, and the SSM intervention stages.

Phase	Stage	Methods and Techniques	Data Source	Data Analysis
Mode 2: SSM Intervention	Expressing the problem situation	Structured Interviews Organizational Climate Survey (During the interview) Rich Picture	Systematization of interview Validated Rich Picture Validated Purposeful Activity Models Identified alternatives for improvement ASBC Strategic Plans Relevant legislation	Systematization of Interviews Discussion with stakeholders Comparison of Purposeful Activity Models with Stakeholders
	Developing models of relevant human activity	Human Activity Models - Root Definition (PQR) - CATWOE		
	Using models to stimulate thinking about organizational change	Comparison and debate about actions for improvement		
Mode 1: Grounded Theory	Expressing the problem situation	Structured Interviews (same) Workshop discussions	Interview Transcripts Workshop debrief Analytical Memos Reflective Memos Field Notes Expanded Notes	Coding Mental diagrams Triangulation

The intervention operationalized in the research articulated only three stages of the SSM cycle. A summary of the stages, techniques, data sources and analytical tools is shown in Table 2. The three stages included in this research followed those adapted from Bunch (2003): (1) expressing the problematic situation, (2) developing models of relevant human activity systems, and (3) using those

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models to stimulate thinking about organizational change. As the problematic situation was not previously defined, just situated within the organizational level of analysis, it was necessary to simultaneously explore two levels: the corridor and its issues and the organization in charge of its management. For the results, this implied that a problematic situation might be identified for the corridor, and another might be identified for the operation of the organization. Consequently, strategies for improvement would be determined for both.

First, I aimed to find out about the problematic situations with the ASBC in real-world conditions. This input was later used to guide the collection of information that helped formulate root definitions and human activity system models that illuminate worldviews and motivations of those involved in the creation and management of the corridor. Then, the built models became useful tools to generate discussion and debate of situations perceived as problematic. The structured debate over the accommodation of conflicting interests helped identify feasible and desirable actions to bring about improvement within the corridor. It is hoped that the defined actions will support the implementation of the new strategic plan.

All the information generated in the workshop was documented during the activity by a research assistant. After the workshop a debrief session was conducted, including the researcher, research assistant and Master's Program research supervisor. It included taking notes, pictures and making diagrams as the workshop unfolded. It is important to remark that when it comes to research strategy, the workshop represents analysis and data collection simultaneously. Conservation, themes, interactions and information generated during the workshop added up to data from the interviews for the grounded theory analysis. Yet, the techniques deployed during the workshop and action research by the participants involved analysis and results on their own.

3.3.5 DATA ANALYSIS

3.3.5.1 Mode 2: SSM Intervention

3.3.5.1.1 Expressing the Problem Situation

This stage returned the information from the interviews to the participants and used it to identify problematic situations. It aimed to achieve a representation of the problematic situation(s) in as neutral as

way possible (Flood & Carson, 1993). This was accomplished with the development of a rich picture and discussion over the results of organizational data (including an organizational climate survey). The rich picture targeted issues that could exist in the context of the corridor, and the organizational data would support the discussion of issues within the organization.

A rich picture is a collaboratively developed drawing that includes elements of human situations, including actors, components, interactions, and relationships within the situation. It can be built in many ways, and it is best executed with a method that is familiar to the researcher (Checkland, 2000). It responds to "how we see the situation at present, its main stakeholders, and issues" (Bunch, 2003; Checkland, 2000). Such a picture then enables selection of a viewpoint (or viewpoints) from which to further study the problem situation (Bunch, 2003). In this case, I built a background for a rich picture of the ASBC that presented elements identified from the information in the interviews, such as stakeholders and themes. This was a painting presented during the workshop, and put forward for stakeholders to enrich by depicting within the painting all the pertinent relationships between elements and themes identified in the interviews, and new features that arose during the workshop. Participants engaged with the rich picture by adding elements, using (+) to symbolize increase and (-) to signify a decrease, they also employed red colours to mean undesired changes and green for desired ones.

For the identification of the problematic situation within the ASBC managerial organization, input from the interviews was presented during the workshop with particular emphasis in the organizational climate survey developed by the author. Given that the survey is not as comprehensive as the rich picture, additional information (generated with targeted questions during the interview, on the strategy of the organization, its vision and mission) was presented. Participants discussed this information and expressed the problematic situation pertaining to the local committee at the organizational level. Extra information provided for discussion included a recapitulation of successful and not so successful projects managed by the organization, questions on the purpose of the organization, the strategic goals and priorities of the organization and legislative context of the corridor. In all cases, information was arranged and organized into visual elements for better discussion. Some of this information was quantitative and acted to triangulate the debates (Berg, 1998).

Chronologically, during the workshop the organization was explored before we looked at the corridor itself, as I believed that discussion of the problematic situation in the corridor would be more productive if the organizational issues were attended to first. This order of exploration provided shared understanding within the organization to look at higher level issues.

3.3.5.1.2 Developing models of relevant human activity

The purposeful human activity system models (HAS) used in SSM are thinking devices, whose role is to help structure exploration of the problem situation identified in the previous stage (Checkland, 2000). They do not purport to be representations of anything in the real situation; they are accounts of concepts of pure purposeful activity based on declared worldviews (Checkland, 2000). These can be used to stimulate and structure debate, and they can also shift perspectives of the actors participating. Depending on the viewpoint taken on a problem situation, a variety of themes may be identified and modelled as systems, highlighting critical actors and critical relationships from specific worldviews. In this work, two SSM techniques were employed in the creation of the models during the workshop. Both were developed by the participants on that day based on systems they considered relevant. A precise definition of purposeful activity is the first requirement to model these systems. In SSM purposeful activity requires Transformation (T), by an actor using an input to obtain an output (Checkland, 2000). This was the first technique employed, referred to as PQR. The technique creates a written statement that described the activity system to be modelled, consisting of three questions: what to do (P), how to do it (Q), and why do it (R)? For each of the identified systems, the participants were prompted with the questions, and the statements were formulated.

Once the transformation was defined, and there was clarity about the purposeful activity regarded relevant by the participants, it was possible to model the systems further using the technique CATWOE. This technique is a mnemonic that refers to customer/victim (C), actor (A), transformation (T), worldview (W), ownership (O) and environmental constraint (E). It is intended to cover at least three levels: system, subsystem, and broader system. It prevents thinking from being too narrow and stimulates thought on whether or not to build other models (Checkland, 2000). As the workshop facilitator, I addressed the

CATWOE mnemonic with the participant's input. This input was later transformed into diagrams to provide structure to explore essential themes in the rich picture.

3.3.5.1.3 Using the model to stimulate thinking about organizational change

The models built in the previous stage presented a learning opportunity for everyone participating in the workshop. It ended at the point where the perceptions provided strong insight into the problematic situation (Flood & Carson, 1993). Then a comparison of the models began where a debate was facilitated with the participants about possible alternatives to alleviate the problematic situation. In this work, there were two pivotal moments: (1) identification of three critical issues confronted by the corridor, and (2) four contextually possible and systematically desirable opportunities. This scope was limited and carefully crafted in the agenda, and the interviews showed that the members of the Local Committee in charge of the ASBC were suffering from institutional fatigue. They were participating on voluntarily basis with too many objectives and activities to tackle and little resources. A lengthy list of opportunities for improvement would represent more stress. The discussion involved two levels—the organization and the corridor. This was done because the organization managing the corridor could have separate challenges from those of the corridor (management strategy). Connected yet independent, issues with the organization might not impact the corridor, and problems confronted by the corridor might not affect the operation of the organization. Traditional institutional change approaches needed to be adapted to these two levels in the structure of workshop agenda, activities and discussions.

3.3.5.2 Mode 1: Theory Building

The approach of the analysis is inductive and guided by grounded theory—the primary method used to explore, values, beliefs, and constructions by institutional theorists (Suddaby, 2006; Thornton & Ocasio, 2008). This implies that the tools and techniques proposed for the research will follow two major vital concepts, "constant comparison in which data are collected and analyzed simultaneously and theoretical sampling, in which decisions about which data should be collected next are determined by the theory that is being constructed" (Suddaby, 2006, p. 634). Because this is my first attempt at qualitative

research, I will follow the logical structure of Isabella (1990) regarded by Suddaby (2006) as an exemplary grounded theory methodology.

The analytical methods reported in this section were designed to identify how institutional complexity within the ASBC organizational field impacts the successful implementation of the biological corridor. Data analysis was my primary concern during the research. I had never undertaken formal qualitative research and as a professional as my original paradigm is quantitative. Furthermore, Suddaby's (2006) article "What Grounded Theory is Not" brought more worries as he recognized how grounded theory was very challenging for inexperienced researchers. I was also concerned about my previous life experiences. As a conservationist working in Costa Rica, I am inevitably influenced by specific types of logics, and my earlier experiences of problem-solving with communities could come to bias my analysis. Fortunately, the SSM workshop helped me to put my bias forward in front of research participants. They acted as a focus group that could help my critical thinking about the analysis. This is valuable information for the reader as my bias will continuously creep in, yet the research design was intended to account for this fact. My main predisposition comes from my education as a natural scientist in which the scientific paradigm compels me to continuously generate hypothesis and think in a deductive way. My secondary predisposition comes from my love of nature, as a conservationist, and in some cases I can undermine social and economic dynamics.

Grounded theory involves a somewhat messy iteration from theory to data collection and analysis (Suddaby, 2006). In my case, the process of evolving theory, summarized by Isabella (1990), started with the design of the interview and continued during data collection. The specific conditions of the intervention and the data gathering reduced the opportunities to expand the cycle further. During the first round of 22 interviews, I produced analytical and reflective memos. With the memos and the results from the interviews, I generated information that was presented at the workshop. This was the first cycle of theory-data iterations, which I then expanded to 32 interview participants. This new data extended the evolving theory process. Nonetheless, it is important to note that full analytical processing of the data was not possible in the field given the tight time constraints of the researcher and those participating.

After each interview I would expand the condensed notes into a summary that included the facts gathered and interpretation and reflections. Emerging categories and possible codes, such as

organizational prescriptions, conflicting demands or tensions between organizations, and impacts on output were recorded.

Later I developed first-order descriptive codes, identifying and labelling relevant categories of data concretely. Units of meaning were identified, assigned to initial categories, redefined and reorganized (Berg, 1998). These tasks continuously overlap in the process. The first order codes include two levels of analysis, the organization and the organizational field. Codes steadily emerged, consolidated, changed, and reshaped as analysis moved forward. Based on the advice from Isabella (1990) and Suddaby (2006), I decided to review relevant literature at this stage. According to them, this can help the emerging theory to start from a substantive one, and avoid generating already existing theory. Furthermore, my initial contact with institutional theory discussed in Chapter 2 could bias my analysis. Reflective memos kept during the analytical process served as audits for my benefit.

Having reached saturation in the first level coding, the category and code emergence phase was finished as at this point data became repetitive. The frequency of descriptive code emergence was very important for stopping the interview process when interview data started becoming repetitive after the 24th interview. Then, the second level coding started after all the transcripts were reviewed and meaning units were successfully divided and classified. This patterned coding aimed to identify emergent themes, patterns and explanations for the research question, grouping first level codes into a smaller number of overarching themes or constructs (Miles & Huberman, 1984).

4. RESULTS AND DISCUSSION

Traditional environmental management approaches for biological corridors have focused on the physical and natural environment, placing most of the attention in the object of management, rather than the organization in charge of this management, and the context in which management takes place. In reality, biological corridor management is based on continuous negotiations between organizational actors. In such a case, an institutional theory perspective operationalized using SSM provides an alternative thinking mode. This mode pays attention to the worldviews within the organizational field, the participating actors, their relationships and their negotiations. In the words of one participant: "*Traditional consultants that have worked with us only think about frogs and trees, this work has gotten to the root of the problem, and the great thing is that frogs and trees are in there too*" (Coffee producer member of Asocuenca).

The SSM action research intervention explored the problematic situation with the ASBC to uncover four relevant issues within the corridor and within the LC. One issue—uncontrolled land use change and urbanization within the corridor—had gone unnoticed for the organization. It was identified as central to the problematic situation and a significant preoccupation for all the participants. Previously, this systemic issue was overshadowed by what I term **idiosyncratic issues**, which are individual issues that are very important to specific values and worldviews, but in the big picture might only be small threats to the overall stability of the ecosystem in question.

Discussions within the workshop also generated three central desirable and feasible actions for improvement, which were unanimously constructed based on the identified issues. The intervention power came from the shift in perspectives and clarification of roles. The participants undertook a learning cycle that allowed them to gain a broader perspective on the issue owners, the victims, and the actors that could have agency in the situation. But most importantly, it allowed them to minimize the need to uphold their own mental framework, and to enable other alternative views of reality that might approach the problematic situation better. This **logic moderation** was only possible because of the SSM intervention. For example, conservationists attacking farming practices would reconsider their approach after seeing land use as a systemic issue and farmers as victims of a global scale phenomenon.

The results also expand theory on the link between institutional complexity and environmental problem-solving. The analysis identified ideal types of logics within the ASBC, the diverse ways that these logics created problem-solving approaches, and investigated the interplay to claim the legitimacy of specific problem-solving approaches. It revealed multiple incompatibilities and synergies that changed the way the local council responded to EPS challenges. The results to be discussed in this section show that institutional complexity configuration within the corridor has emergent conditions and precursory conditions. This context of institutional complexity produces impacts to the organization in charge of managing the corridor. The effects can be mitigating or aggravating by either reducing the experience of complexity within the organization, or making it worse. It also impacts EPS output where the interplay of organizations characterized by a rhetoric use of logics and an emphasis on idiosyncratic issues over systemic ones generated inactivity, project blockage, and simplistic EPS outputs.

In the first part of this chapter, results from the workshop are presented and discussed in depth by first narrating how problematic situations were identified during the workshop. Then the section explains how three purposeful human activity models were built for the Alexander Skutch Biological Corridor. After this, the section moves to a debate where these three models were used to guide the selection of alternatives for improvement on the previously identified problematic situations. The analysis section then finishes with the theoretical exploration of the impacts that institutional complexity has on the output of the Alexander Skutch Biological Corridor.

4.1 THE INTERVIEW

As mentioned in Chapter 3, a partial section of the interviews generated the baseline information for workshop discussions. The relevant results presented at the workshop are exhibited in this section. The interviews significantly reduced the time needed from those involved in the intervention. This substantially avoided the fatigue that many participants were showing during the interviews. The promise of anonymity in the interviews created a one on one space where participants could speak more freely, allowing for the information of less prominent voices to be expressed during the workshop.

In the interviews, the question *what is the purpose of the corridor* was designed to uncover strategic issues, institutional visions, and in turn, vision misalignments. These answers were arranged into themes

based on their similarities. The central themes were: forest connectivity, improvement of economic wealth of the inhabitants and the maintenance of healthy sustainable rural lifestyles (Fig. 4).
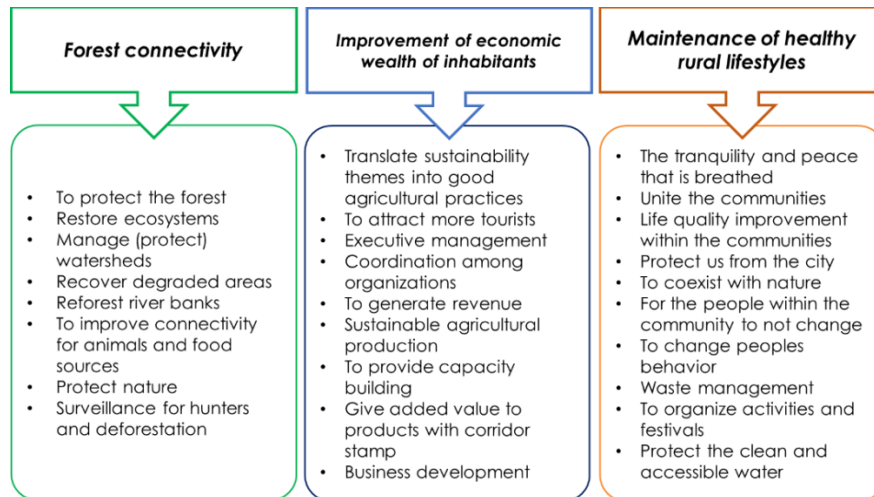
Figure 4: Main themes in answer to the question "What is the purpose of the corridor?"

Furthermore, during interviews specific topics were recurrent, such as continuous reference to the access to clean water, or the importance of biodiversity for the people within the ASBC. These topics are integral to the previously mentioned themes within the corridor. Participants primarily highlighted the topics in Table 3 when asked, *what are the main things that make this area work, what makes this a wonderful place?* Most participants considered biodiversity and rural lifestyles as critical aspects of the ASBC. The topic of rural livelihoods was mentioned by 83% of the participants (Table 3).

Table 3: Most relevant topics within the ASBC interview results. The table shows the importance of themes for interviewees. These present the quantification of the answer to the question "What should be the purpose of the corridor?"

Theme	Responses	Total	%
Water	15	30	**50**
Biodiversity	18	30	**60**
Rural Livelihood	25	30	**83**
Land Management Planning	17	30	**57**

To understand the organizational priorities, participants were asked to arrange the strategic objectives included in the management plan from higher importance to lesser importance. A score of 5 was very important, and 1 was less important. As seen on table 4, the strategic objective, promotion of sustainable economic opportunities, accounted for 67% of the highest scores in importance (score 5), while the protection of natural capital had none of the highest importance scores. Similarly, the economic objective obtained 43% of all the 5, and 4 scores in the survey, while the environmental goal obtained only 7% of those (Table 5). These results are quite telling. The corridor is seen primarily as an economic solution, rather than an environmental one—at least according to how these managers prioritize the objectives. Participants were also asked to reference the organizations within the corridor that were more and less active at participating in the development of each of those strategic objectives. The organizations that accounted for the most mentions are shown in table 6. Participants enumerated at least 46 different organizations that should be included in the work of the ASBC.

Table 4: Strategic objective prioritization for the ASBC. The table shows percentages of participant response per score.

| Objectives | Priority Scores per objective | | | | | Total (%) |
	1 (low)	2	3	4	5 (high)	
Protection of Natural Capital	20%	27%	40%	13%	0%	100
Promotion of Scientific Research	33%	33%	26,7%	6,7%	0%	100
Promotion of Sustainable Economic Activities	7%	6,7%	0%	20%	67%	100
Education and Communication	20%	27	13,3	33	6,7	100
Administrative Management of the Corridor	20%	6,7%	20%	27%	27%	100

Table 5: Strategic objective prioritization for the ASBC. The table shows the percentage of the highest scores.

| Objectives | Frequency of Scores | | | Percentage |
	4	5	Total	
Protection of Natural Capital	2	0	2	**7%**
Promotion of Scientific Research	1	0	1	3%
Promotion of Sustainable Economic Activities	3	10	13	**43%**
Education and Communication	5	1	6	20%
Administrative Management of the Corridor	4	4	8	27%
Total			30	100%

Table 6: Organizational participation per strategic objective in the ASBC. This table shows the answer to the questions: Which organizations work the objective more actively? Which organizations work in this objective less actively? The organizations in the table are those who accounted most of the answers.

Objective	More actively	Less Actively
Protection of Natural Capital	York University SINAC ASADAS CCT	ADIS SINAC
Promotion of Scientific Research	York University UNA	SINAC Comunidades
Promotion of Sustainable Economic Activities	MAG Asocuenca	Coopeagri ADIS
Education and Communication	York University UNA	ADIS Municipalidad
Administrative Management of the Corridor	CCT York University	ADIS Municipalidad

The organizational survey was the closing result to be presented during the workshop. The information shared with participants is encapsulated in Table 7. From the table, the critical insight from the resources dimension is that the members of the LC considered that they did not have the resources, tools and technology to fulfill their functions (9.1%). This could be a symptom of a misaligned vision. Without a clear direction it is impossible to know which resources are necessary, and it can be perceived that they are never enough. In the case of processes, the survey answers suggest that the local council is highly active, open, and participative. Nonetheless, when it comes to articulating work between organizations within the committee, some complications can generate duplications, gridlock, and work in silos. Interviews support this claim: *"there is a conflict of visions,"* *"people don't understand the importance of the corridor"* and *"depending on who is present at the meeting decisions change. We go back on them so many times."* In the *people* dimension, the answers imply that within the organization there is a climate of respect for everyone's opinions (100% "I have no restriction to propose projects and ideas"). They have the necessary training opportunities to fulfill organizational goals. The low scores in motivation can reflect the frustration of not achieving economic objectives and the lack of a clear organizational direction. *"If the*

corridor does not bring development to people there is no participation; there is not something that motivates" - Farmer. Finally, in the structure dimension, there is a strong shared conscious of the importance to work for the ASBC (81% of positive answers). It is an integral part of the organizational culture. This is evidence that such a strong commitment, without the means, resources, and structure to transform it into action, leads to frustration and a perception of not fulfilling the purpose. This may explain why the statement *people within the organization are highly motivated* only elicited 36.4% positive answers.

Table 7: Organizational Climate Survey results presented during the SSM workshop.

Dimension	Affirmation	Percentages	
Resources	The ASBC/local committee has the necessary resources, equipment and technology to fulfil its goals	9,1%	
	We capture all the necessary information to understand how to improve the corridor and generate new opportunities	45,5%	34,1%
	We have the necessary infrastructure in the corridor	36,4%	
	We use resources and tools effectively to reach our objectives	45,5%	
Processes	In the corridor, we integrate the work amongst organizations	27,3%	
	We are very good at team work	36,4%	45,5%
	Frequently the comments of organizations/communities' lead to actions	27,3%	
	Problems are confronted, not ignored	90,9%	
People	Within the corridor there are enough opportunities for capacity building	72,7%	
	I have few restrictions to make decisions or propose projects/ideas	100,0%	63,6%
	We have the necessary people to fulfill the objectives	45,5%	
	People within the organization are highly motivated to fulfill their roles	36,4%	
Structure	Teams formed by different organizations are usually very effective	45,5%	
	There are no organizational barriers that frequently interfere with our ability to accomplish our objectives	63,6%	63,6%
	We emphasize the importance of working for the corridor	81,8%	
	The team I directly work with functions adequately	63,6%	

4.2 THE WORKSHOP

Participants were invited two months before the workshop and nine people attended. These were all active members of the local committee in charge of managing the ASBC, which represented over 70% of its members. Participants were very diverse, comprised of farmers, professionals, biologists, homemakers, academics and local business owners. All of them are local leaders representing six of the

organizations working in the corridor. Only the government sector was absent. This representation gap was closed by the information generated during interviews. Based on the workshop dynamic I witnessed, I considered that the organizations and people present successfully represented the majority of worldviews and logics interacting within the ASBC. Nonetheless, bias representation was countered by emphasizing missing views in the design of the workshop.

The workshop began with purpose and process, giving participants a clear scope for the day's work. A short seminar such as this needed to be time-effective. After a group building icebreaker, the facilitator presented a list of projects that were very successful and a list of projects that faced many challenges derived from the interviews. The intent was to create an appreciation of the strengths of the participants and the organizations. Here participants shared stories of success and frustration. These stories provided the first glimpse of problematic situations without disregarding the motivation generated by telling proud stories of success. As the list was reviewed, prominent voices were concentrated on particular idiosyncratic issues, namely the health impacts from the seasonal burning of sugar cane by the farmers, the creation of added value for coffee production, and the fight against hydroelectric companies that threatened to dam the rivers within the corridor previously.

It is important to remark, that the appreciative approach to organizational change (Kinni, 2003) was weaved into the workshop design and the interviews. Interviews targeted positive stories, dreams, hopes and desires. The workshop included motivational phrases from the interviews, and created moments to recognize strengths within the organization. As a result, workshop participants embraced a proactive mindset. Despite how harsh the results presented to them were they managed to recover quickly to tackle the issues.

The next moment in the workshop went deeper within the organization. I decided to present information on the vision of the organization first. The identified purposes for the ASBC shown in Figure 4 were presented to the participants. A lengthy discussion and validation followed in which contrasts in different implications from the three purposes became a negotiation over idiosyncratic issues and personal interests. First, participants recognized that these three visions, also referred to as purposes, might not be compatible at all times. For example, they mentioned how hydroelectric companies fulfill the purpose of economic growth for inhabitants, but at the expense of watershed ecosystems and rural

lifestyles. And second, if one purpose was pursued over the other, a mismatch and conflict would appear in the local committee and management of the corridor. The exercise became the first indication that these three purposeful activities informed by specific worldviews (logics) were integral for the corridor, and the trade-off between them would generate conflict within the organization. The multiple formulations of the corridor's purpose allowed participants to uncover a problematic situation within the organization: the **miss-alignment between the stated vision of the corridor** (in management plans) **and the implicit vision in the day to day operations** of the organization.

The discussion was characterized by rearrangement, challenging, and validation of the elements within the identified purposes (Fig. 4). At that moment, the previous idiosyncratic issues and interest greatly cherished by some organizations started to moderate allowing for shared understandings to be more central. The moderation suggested that the motivations and goals of those participating were effectively summarized by the visions, as there was no expressed need to defend them further. For example, organizations benefiting from ecotourism moderated their highly critical approach to farmers only when realizing that farmers were integral to the maintenance of a rural lifestyle—one of the shared visions identified previously.

Participants decided to focus on the maintenance of sustainable, healthy rural lifestyles as the motivation that would encompass all the individual worldviews of those present. They felt that they all identified with this theme, which is characterized by happiness and tranquillity of the farmer's life, surrounded by good neighbours and nature. It became the central root definition to be developed later in the workshop. Regardless of this important realization, in this part of the workshop there was no mental connection between farmers abandoning their land and the urban development surge that threatened healthy rural lifestyles and the corridor's stability. Currently, the corridor is facing significant pressure from urban development. A focus on idiosyncratic issues like hunting and waste management would distract from this connection.

Given this, as the facilitator of the workshop I expanded the discussion with questions intended to probe for systemic issues over idiosyncratic ones. In the interviews the theme of asphalting the main road in the corridor, currently a gravel road, was significantly contested. Some people would consider it to be very damaging for wildlife, while others would see it as the road to economic development. For all of them

the road would increase urban development. I asked: is the corridor ready to have an asphalted road that will bring even more pressure on the land use and urban development? Those participating defended the need for an asphalted road fiercely and disregarded the possibility of the road impacting the corridor. This is important to remark, as with the development of the rich picture themes like this experienced a shift in perspective and priority.
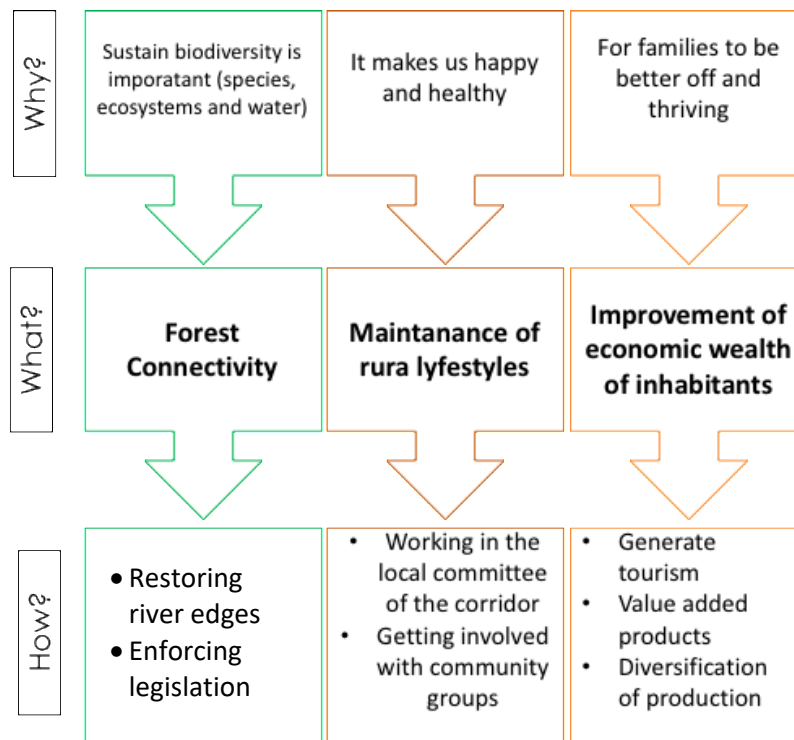
Figure 5: PQR results for the Alexander Skutch Biological Corridor

    The workshop then moved to the modelling of human activity systems. First by doing a P (what?) Q (how?) R (why?) formula for each of the purposes (see results on Fig. 5). Then the CATWOE technique expanded the formula into root definitions. Participants developed the elements of CATWOE for each root definition, including customer/victim, actor, transformation, owner and environmental limitation, and will be discussed in the following section. This moment generated real insight about the role of the organization and its scope by understanding actors, owners, transformations and environmental limitations. Suddenly, they (the local committee) did not have sole responsibility for every action within the corridor.

The root definitions helped touch on a discussion about the scope of the organization. Their overreach, borne in the multiple enacted purposes, has produced inactivity and institutional saturation as not having a clear and aligned vision impairs prioritizing. Participants in the workshop saw the LC as the owner of everything happening within the corridor. The organizational scope was so unclear that they would invariably ask: *"are we a biological corridor or a business developer?"* Regardless, the results show the organization had prioritized objectives implicitly. The author presented the findings of the prioritized strategic objectives from the current management plan (see Table 4 and Table 5). The low prioritization for the environmental objective, and the high prioritization for the economic objective shook the participants, and further pointed to a vision misalignment.

The many very different expectations about the corridor and the lack of clarity on its purpose could explain some of the frustration with the current state of the corridor. Only 61% of the interviewees (n=30) said the ASBC was fulfilling its purpose, with an average satisfaction level of 3.82 (1-very unsatisfied, 5, very satisfied). Apparently, this led people to use "personal gain" as the primary measurement of success. During interviews, it was more likely for people to consider that the corridor achieved its purpose if they perceived a personal benefit. Without recognizing a personal gain, the overall fulfilment of the corridors goals and purpose were deemed a failure in most cases.

To finish, the organizational discussion results from the climate survey were presented to the workshop participants. By this point, members of the local committee considered that a misaligned vision was problematic. The results from the climate survey worked as a reaffirmation of this conclusion (Table 7). At the end of the exercise, participants validated the information, acknowledging it as a faithful representation of issues within the organization.

Having passed the organizational level the next moment involved the creation of a rich picture. During the activity, the author presented a canvas painting. This formed the basis of what would become a rich picture of the ASBC. The image was a direct result of the questions: *can you describe the area before the existence of the corridor*, and *what has changed?* The result of the exercise was a shared, recognized and agreed-on representation of the current situation within the ASBC.

Figure 6: Rich picture seminal canvas being enriched by participants

Figure 7: Alexander Skutch Biological Corridor's rich picture.

Figure 8: Example of relevant themes in the rich picture. On the top, some of the impacts from the creation of the ASBC, like the recovery of secondary forest the increased perception of more stringent environmental legislation and the creation of multiple community organizations with close ties to the corridor. In the lower part, some of the most relevant processes that occurred with the decrease of agricultural production in the ASBC, coffee plantations are abandoned and sold for other less environmentally friendly product like pineapple or urbanization.

The rich picture immediately engaged participants, motivated by locating and placing the elements and feedback loops that were most familiar to them, like their house and productive activities (Fig. 6). More complex themes developed as conversations unravelled, asking questions like "who?" and "why?" The rich picture uncovered three main problematic situations at the organizational level, and reaffirmed the one identified for the organization (discussed further in the following section):

1. Un-planned land use change and increasing urbanization

2. The reduced productive capacity of farmers

3. The low level of Inclusion of inhabitants in integral development strategies

4. Lack of a clear, shared vision for the organization and the corridor

Additionally, the rich picture clarified and set boundaries for the roles of actors within the ASBC. The interviews gathered 46 organizations that were thought needed to participate in the corridor's management. The rich picture clarified the role that these organizations had with respect to these issues, and pointed to the local government as a principal actor that needed to engage as the owner of the land use planning system.

With the problematic situation identified and root definitions built, it was time to use this information for discussion about generating human activity system models and opportunities for improvement. For this we addressed the question: *What can we do for improving this situation?* After the debate, four feasible strategies for improvement were identified.

4.3 EXPRESSING THE PROBLEMATIC SITUATION

Having narrated how the workshop was executed, I will now introduce the results that helped identify the problematic situations in the corridor and the managing organization it. As mentioned in the methods section these two levels of analysis were addressed using different techniques.

4.3.1 RICH PICTURE

4.3.1.1 Un-planned land use change and increasing urbanization

According to the exercise, the central systemic issue to be confronted in the ASBC is the **uncontrolled urbanization and lack of land use planning for the corridor**. For the participants this issue is mostly rooted in the **reduced productive capacity of farmers** where mainly coffee growers have been forced to sell their land. It was revealed that within the corridor new roads were emerging rapidly with more cars and more houses, including big urbanization projects. This is a situation that if continued, would risk the inhabitants' rural and peaceful life and the existence of the corridor as a rural landscape infused with nature. However, it was also visualized how this situation has brought some desirable gains. The shift of the agricultural economy helped the recovery of forest in abandoned lands, and there has been the development of an emerging service industry based in ecotourism (Fig. 7). Evidence supports this conclusion from the rich picture as over 11 years the total urban area in the corridor went from 1.3%

to 4.6%, and it is likely to increase even further (Acuña Prado et al., 2017). According to workshop participants, people applying for building permits in the corridor are now asked to provide a certification of water availability, something that had never happened in the ASBC.

Besides urbanization, an overall lack of land planning within the corridor was revealed. The unplanned land use changes influenced immigration and emigration, waste generation, water consumption, and increased use of agrochemicals. Visualizing these high-level processes within the rich picture started changing perspectives within the LC. For example, during the rich picture development the question was asked again, *is the corridor ready to have a paved road*? Contrary to the first occasion in which participants adamantly responded they needed the road immediately, this time they remained contemplative. They agreed that the creation of a paved road would surge the urbanization processes they saw on the rich picture, increasing the immigration influx, the demand for drinking water, and the pressure on ecosystems.

4.3.1.2 The reduced productive capacity of farmers

The reduced productive capacity of farmers appeared as a root cause of the problematic situation within the corridor. The traditional coffee agro-economy is shifting towards a service one. Both the representatives from the Ministry of Agriculture and the local coffee producer cooperative Coopeagri dwelt deeply in this issue during their interviews. Diseases like coffee rust, low market prices, high costs and climate change have taken a significant toll on coffee production. Farmers have been impoverished and forced to abandon their land, or intensify their output by using more agrochemicals or cultivating more land (Daugherty, 2005). Some have captured opportunities to diversify production with organic crops and more products like cacao or pepper.

In general terms, the region has seen a shift where money held by farmers is now moving to those working in tourism (Fig. 7). This shift from farming to services generated additional tension between sectors, where producers can seem resentful to those enjoying the touristic benefits of the corridor. An exemplary quote from a farmer member of the local committee reveals this: *"for me to work in the corridor is really hard, every hour I am not in the field I don't eat, yet professionals are paid to do it (participate in the corridor), they don't see harm from this work."* It was uncovered during the rich picture that these

impacts on farmers' economy could explain a lot of the forest recovery in the ASBC documented by Acuña Prado et al. (2017). In the rich picture, participants mapped this recovery mostly in abandoned cow fields, coffee plantations and sugar cane areas away from connectivity routes. Even though desirable, untargeted forest recovery that comes from farmers abandoning their land, instead of purposeful restoration plans, is not seen as a successful result of the corridor. Ironically, the primary rationale for the creation of the ASBC was the development of a sustainable coffee production economy with a more biodiversity-friendly landscape (Daugherty, 2005). This promise has not been fulfilled, yet its overarching logic remains intact. The corridor's eldest see the value added by certified coffee as a memorable goal.

The above can explain why 39 % of the interviewees did not consider that the corridor fulfilled its purpose. This may be because, first, the purpose is mainly economic in nature, as demonstrated by the prioritized management objectives. Second, because the forest recovery is not happening in the vital connectivity areas. And third, the original promise for sustainable coffee production was not fulfilled. In interviews, many of them would say *"fulfilling its purpose? More or less, yes there is more forest, but we do not perceive the benefits, and riversides (key connectivity route) are still degraded"*.

4.3.1.3 Inclusion in integral development strategies

The inclusion of inhabitants in development strategies was determined as a critical issue in the ASBC for those who perceive fewer benefits. We discussed how young people and women had fewer opportunities for economic production and how communities within the core of the corridor were capturing the benefits better than those on the periphery. *"May it benefit all the communities"* was a recurrent theme in interviews and discussions generated by the rich picture. This referred to the impending need of the corridor to become an integrated development strategy beyond the conservation of nature. The rich picture made clear that even though it was desirable to obtain "integral development," its implications can vary depending on the three visions determined by the participants. For example, it was demonstrated that economic improvement that erodes environmental gains, as with the establishment of hydroelectric dams, the cultivation of pineapple, or the establishment of mega-hotels, was considered problematic.

As a summary, the rich picture highlighted that ecosystems are in better condition 18 years after the creation of the corridor with real forest recovery. This is something that could suggest the ASBC is

fulfilling its purpose. Nonetheless, participants see this recovery as a consequence of a systemic issue with undesirable outcomes, namely the abandonment of farmer fields and a weakened agricultural economy. Many are unsatisfied with the progress of the corridor and are frustrated over not reaching their economic goals from the ASBC. This exposes how the corridor is expected to produce results far broader than the conservation of nature.

4.3.2 THE ORGANIZATION: ALEXANDER SKUTCH BIOLOGICAL CORRIDOR LOCAL COMMITTEE

The identified central problematic issue at the organizational level is the **lack of a clear, shared vision for the organization and the corridor**. This uncertain situation was traced to its origins 18 years ago and became increasingly problematic as time went by. There is a commonality between the multiple management plans that have been created for the corridor: the vision of the organization is unclear and offers little guidance for decision making that avoids institutional gridlock. The management plans designed and continuously replicated a vision and a purpose for the corridor that is broad, undefined, multidimensional, and only loosely connected with the capabilities given by existing legislation. This ambiguity has allowed for the formulation of multiple implicit visions for the organizations. The interviews reflect this confusing ambiguity, with phrases such as *"what did you want, a biological corridor or a touristic developed?"* (Local Coffee producer citing one of the corridors architects).

In the first plan, the vision was built summarizing multiple desired outcomes rather than an idea for the organization (Centro Científico Tropical & ASOCUENCA, 2016). It comprised eight desired impacts including; protecting water springs, promoting sustainable agricultural production, supporting waste management, developing forest connectivity, conserving archeological heritage and promoting the sustainable economic development of families, among others. Beyond the difficulty to prioritize between these tasks, it is clear that a biological corridor intended to protect biodiversity might fall short as a viable strategy for pursuing all of these priorities. This broad organizational scope would require an organizational size and complexity like that of a national ministry. However, in reality, the LC is a private organization that works on a voluntary basis and has no public attributes.

The research suggests that this broad scope is an attempt to encompass all possible interests within the corridor. But this has mainly occurred by adding more tasks, objectives, views and values, instead of identifying one existing vision that is shared among many. As pointed out by one of the participants *"decisions are made based on the members currently present, sometimes decisions are backtracked based on individual interests"*, which shows an apparent consequence of an undefined vision.

A recurrent theme during the workshop and the survey was the perception of the LC not having enough resources to accomplish their goals. Which raises the question, what are the necessary resources? This can only be answered if goals and purpose are sharp. Without a clear direction it is impossible to know what the essential resources are. During the workshop, it was recognized that instead of a "lack of resources", it might be the case that there are no overarching agreements that can mobilize available resources within the corridor.

To summarize, the lack of a clear vision impacts the capacity for prioritizing. When the vision is so broad, everything can be a valid proposal worthy of pursuit. This is potentially causing the organization to feel saturated, locked and inactive.   According to participants, such is the case for the ASBC local committee.

4.4 DEVELOPING MODELS OF RELEVANT HUMAN ACTIVITY SYSTEMS

In a variation of the traditional SSM techniques, the time constraints and the specific conditions of this research led the participants and me to develop the human activity systems (HAS) based on workshop discussions. This diverged from traditional action-verb oriented conceptual models of SSM (Checkland, 2000). In this alternative HAS modelling process we discussed the actors' actions in the land of the ASBC environment. Each discussion was guided by one of the root definitions shown in Figure 9. The results from the examination of the root definitions lead to debate over feasible and desirable change, which is the next stage of SSM methodology. Three models, representing each of the identified worldviews within the organization, were discussed.
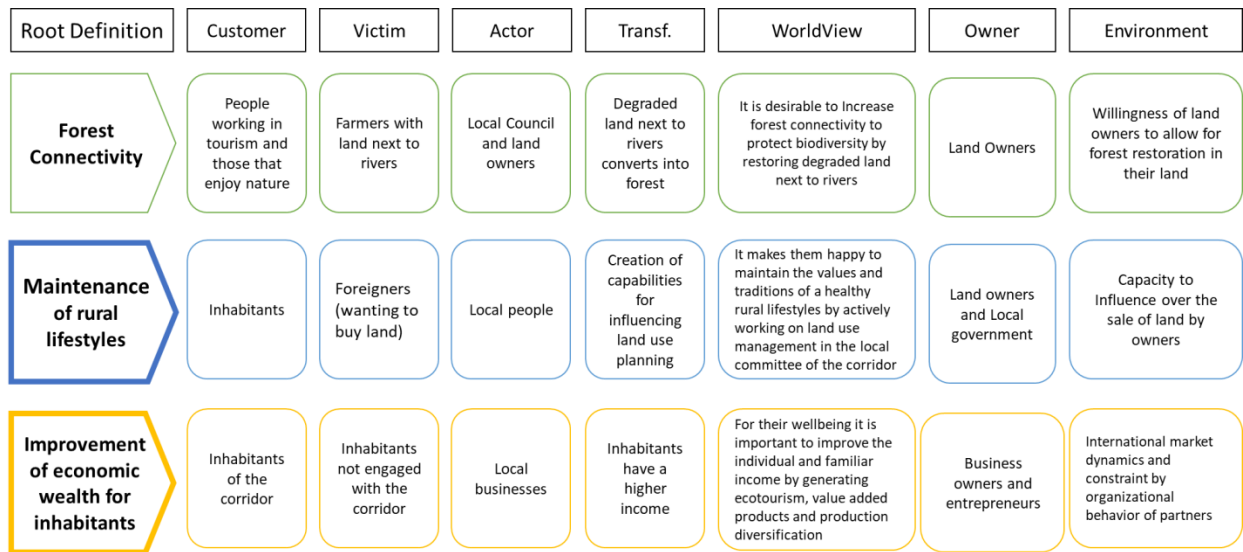
Root Definition	Customer	Victim	Actor	Transf.	WorldView	Owner	Environment
Forest Connectivity	People working in tourism and those that enjoy nature	Farmers with land next to rivers	Local Council and land owners	Degraded land next to rivers converts into forest	It is desirable to increase forest connectivity to protect biodiversity by restoring degraded land next to rivers	Land Owners	Willingness of land owners to allow for forest restoration in their land
Maintenance of rural lifestyles	Inhabitants	Foreigners (wanting to buy land)	Local people	Creation of capabilities for influencing land use planning	It makes them happy to maintain the values and traditions of a healthy rural lifestyles by actively working on land use management in the local committee of the corridor	Land owners and Local government	Capacity to influence over the sale of land by owners
Improvement of economic wealth for inhabitants	Inhabitants of the corridor	Inhabitants not engaged with the corridor	Local businesses	Inhabitants have a higher income	For their wellbeing it is important to improve the individual and familiar income by generating ecotourism, value added products and production diversification	Business owners and entrepreneurs	International market dynamics and constraint by organizational behavior of partners

Figure 9: CATWOE results for root definitions built for the discussion of human activity systems in the Alexander Skutch Biological Corridor

4.4.1 Forest connectivity

The privately-owned system promoted by the local council and stakeholders converts degraded land adjacent to rivers into forest for the benefit of nature-oriented people and those working in eco-tourism. It also seeks to restore river edges and enforce environmental legislation in order to generate habitat connectivity and sustain important biodiversity within the corridor, with constraints due to the willingness of landowners to allow forest recovery on their lands. This was the most commonly referred to human activity system. The origins of this model can be traced to the creation of the corridor and the logic of conservationism. As one of its architects reflected during interviews, "*at the time the corridor was created, the Mesoamerican biological corridor was the guide; we were all thinking about protected areas and creating connectivity, it was the natural thing to do.*"

Those purposefully working towards ecosystem connectivity in the ASBC strive for the restoration of land in the critical connectivity routes that focus on the Peñas Blancas River. The main environmental limitation in the model is the willingness of landowners to allow for the recovery of these areas. The perceived victim of this system, "farmers with land next to the rivers," was identified after a discussion on the origins of the watershed deforestation. During the 1970s, when there were no aqueducts, farmers built next to rivers so they would avoid funnelling the water uphill. Also, government policies at that time

would demand forest to be cut if the land were to be titled to owners. Many of these traditional owners were there long before the corridor was created and generated these impacts legally and legitimately. This historical insight shared during the workshop allowed many members of the LC to understand some farmers as victims of this system instead of culprits. Forest recovery would represent a trade-off of agriculturally usable land for forest that does not necessarily benefit farmers. With the consequence of decreasing agricultural land availability, it does not matter how much farmers love nature as they are forced to intensify their agricultural production to remain competitive. Indeed, evidence shows that reforestation efforts in the corridor have been spearheaded by big landowners like RISE, York University, and Vistas del Chirripó, whose business models allow them to benefit from reforestation. This reframing will greatly inform future connectivity efforts as owners needs must be addressed to generate the "will" to allow land to be recovered, instead of focusing on disorganized reforestation.

4.4.2 Improvement of Economic Wealth of Inhabitants

This next system is an entrepreneurial, privately owned and managed system that improves the wellbeing of local people by increasing individual and family incomes of the corridor's inhabitants. The improvement in economic well-being is accomplished through the generation of ecotourism, added value products, and economic diversification. This is a system that is in accordance with the needs of local families, and is constraint by international market dynamics and the organizational behaviour of partners.

As deduced from the rich picture, this purposeful human activity system is fueled by macroeconomic processes that have affected agro-economies in the corridor. This represents feedback for this system that seeks to balance the losses. The original rationale for the ASBC, as stated by Daugherty (2005), was informed by the loss of agricultural productivity and the need to generate economic wealth using green consumerism and value-added production. The conception that the ASBC crafted an environmental narrative based on economic logic was recognized during the workshop as a means to an end. This narrative created a strong taken-for-granted belief that if economic alternatives are generated by the corridor, the motivation to protect the environment will come too.

Those seeking to improve economic wealth were focusing in the creation of added valued products and touristic business to capitalize on the existence of the corridor. Yet, Table 6 shows how those

working more actively on economic objectives are traditional agricultural organizations with a different focus from that of business development or tourism. This suggests the core competencies to chase these goals might be underdeveloped within the LC. These core competencies need to be developed within the corridor in order to surpass the main identified limitations, which are international market dynamics and the behaviour of organizational partners. International market forces have profoundly affected producers in the corridor and make markets challenging to access. On the other hand, the organizational behaviour of partner organizations has impacted the capacity to sustain new businesses. A central reason for the coffee initiative's failure was changes in managers and the buy-out of the original international coffee buyer. Based on this, the participants identified the need for market intelligence as the primary opportunity for the development of business alternatives.

The most significant implication from this modelling was the recognition of scope. The ASBC by tradition or need is demanded to be a business developer. This demand for business development dramatically increases the scope of the organization that is already overwhelmed by its environmental priorities.

4.4.3 Maintenance of rural lifestyles

This system is owned by landowners and the local government, in which local people seek to influence land use management within the corridor by working with local communities and the ASBC corridor administration. This is in order to sustain the values, natural conditions, and traditions necessary for the continued existence of the healthy rural lifestyle. It is limited by the capacity of the LC to influence the owners land sales.

The LC unanimously selected this as the primary HAS within the biological corridor. It was mentioned by 83% of the interviewees (Table 3), and people would continually refer to the privileged access to water, the healthy lifestyle of the rural communities, the warmth of the people living in the corridor, the significant relationships with neighbours, the passion for cultivating the land and the joy of closeness to nature. As said by a participant *"this vision encompasses the improvement of forest connectivity and the improvement of economic wealth for inhabitants, if we chase it, we chase the other two simultaneously."* This exercise accomplished the conciliation of different worldviews that coexist

within the ASBC. Farmers were not seen as the sole culprits of environmental degradation anymore but as an integral part of the desired rural lifestyle.

The exercise produced something beneficial in that the LC would be able to do scoping of their organizational reach. By understanding environmental limitations and adequately identifying the owner of the system, they could channel their efforts to more impactful actions. The environmental restriction of the system is the asserted influenced by the committee over those selling their lands for urbanization. The owner of the land use planning system is the local government of San Isidro, an actor considered essential but previously not seen as a priority by the local committee. Remarkably, the participation of the LC in land use planning is one of the most explicit objectives given by the legislation, yet before this exercise, it remained unnoticed within the operations of the corridor.

4.5 USING THE MODELS TO STIMULATE THINKING ABOUT ORGANIZATIONAL CHANGE

The HAS defined as the maintenance of healthy rural lifestyles was chosen as the focus by the workshop participants as this system significantly resonated with them. The system connected the pursuit of ecosystem connectivity and the improvement of economic wellbeing for inhabitants. After all, without forest or sustainable livelihoods, this system would not exist. Participants would cheerfully repeat continuously *"healthy sustainable rural lifestyles, this is what we have always wanted."*

The rich picture was analyzed from this particular HAS model's perspective. The model helped to bring greater clarity to information from the rich picture by examining aspects that would affect the system, such as water, biodiversity, forest recovery, and above all, land use change. However, the rich picture also retro-fed the model by helping to clarify its transformation. When we began exploring the healthy rural lifestyles HAS model, it was hard for participants to explain the transformation. But with the use of the rich picture and CATWOE techniques together, the transformation narrowed to developing capabilities to influence land use management. In the initial parts of the discussion, the group mostly expressed a desire for the LC to generate economic opportunities that would help farmers avoid the sale of their land. Within this system, the local committee currently had little stake in preventing the sale of land. Then they identified a reasonable opportunity to change the way landowners and local government were involved in land use planning. This narrowing identified the first two opportunities for improvement:

1. **To actively engage in land use planning**: by designing a primary strategy for engagement with the local government and advocating for land use planning in the corridor area. The first step of the policy would be to ask the local government to explain the current state of the Perez Zeledón Land Use Plan, something currently unknown to the participants.

2. **To create a LC policy that identifies the critical relevant actors** to be included in the management of the corridor, focusing on the Local Government as a strategic actor.

This purposeful HAS model was also applied to the organizational discussion, and all the results from the organizational survey and data were debated from this perspective. Let us remember that the problematic situation within the organization was the lack of a clear, aligned, and shared vision. This issue had consequences on the way the LC operated on a daily basis, complicating the selection of strategies, the identification of the necessary resources to implement strategies, and a decoupling of integration between participating organizations.

The comparison of the HAS model with the organizational climate survey "x-ray," made participants recognize that the organization has a tremendously broad scope—much broader than their actual organizational capacities and resources. Over 18 years of work by the LC without a clear vision, the coming and going of members and organizations caused this scope to increase continuously. Both the committee and the people within the communities expected the organization to engage in scientific research, business development, agricultural promotion, marathon organizing, festival development, ecosystem restoration, archaeological preservation and capacity building. The one essential strategy, land use planning, was absent from the organizational radar. When the LC was seen from a shared, purposeful activity model with a shared understanding, it became apparent that the LC was overburdened. This did not only explain the institutional fatigue and frustration about the organization, but helped to create the following two strategies for improvement:

1. **Clarifying the vision, mission and values of the organization based on the three identified purposes.** These were forest connectivity, the growth of economic wealth for inhabitants, and the maintenance of healthy rural lifestyles.

2. R**eduction of the scope of the organization** by prioritizing tasks to match the resources available, and focus on the four identified issues for the corridor with a new vision for the

organization. With the identification of systemic problems, like absent land use planning, the scope of the organization could be sharpened to match current needs, the time and resources available.

With 22 interviews and a four-hour workshop, the SSM intervention identified four relevant problematic situations—three for the ASBC and one for the Local Committee. The intervention was a space that allowed participants to present their views and contrast them with those of their peers. This was done in a positive environment that reduced the influence of particular worldviews, and helped participants accept the views of others. The organization went from having no interest or explicit preoccupation with land use management to define it as a current priority. The LC successfully moved from a loose and disconnected vision, which generated gridlock and inaction, to a shared, agreed upon and simplified one. With this vision, they will narrow their focus towards strategies and goals that match their existing resources before looking to expand their means. This discussion has implications beyond the ASBC as it implies a substantial refocusing of the work traditionally pursued within biological corridors. Corridors usually are designed with big "integral" and lengthy 5-year plans. This research suggests that in the current governance arrangement for biological corridors, this approach needs to change towards manageable workloads and condensed initiatives.

4.6 THEORY BUILDING

Following the grounded theory approach, the exploration required constant comparison between data and theory through data collection and analysis (Isabella, 1990). The qualitative analysis was done using Nvivo Software. First, the interviews were separated into two groups; (1) local committee members that have access to privileged information and (2) local stakeholders. Then the author developed descriptive codes, such as rhetorical use of logic, conservationist purpose for the corridor, economic shift, duplication of initiatives and adjustment in decision making. These first-level codes organized the data and were used to develop more consolidated codes. The descriptive codes focused on two levels of analysis: the field level and the organizational level (local committee). I then separated these codes into two broad themes: (1) Logics and environmental problem solving, and (2) Institutional complexity and environmental problem-solving output.

During data collection research codes and categories started to emerge, influenced by my own experience and background. The literature had revealed that environmental problem solving was the ground floor of ideological war, and my own firsthand experience allowed me to visualize and conceptualize this war between logics in a complex changing field. Based on this, I developed my previously mentioned themes. The first theme categorized codes that had to do with logics, values, expected results, obtained results, and the logic-specific purpose for the corridor. It also included information on their incompatibility and conflicts. The second theme included codes regarding institutional complexity, its sources, and consequences to the environmental problem-solving output. Inevitably, theory informed some of the categories that were developed, suggesting that complexity emerged not only from the availability of incompatible logics in the field, but also from field level processes (Greenwood et al. 2011). Therefore, codes with labels such as changes in centrality and field referents appeared. Nonetheless, I remained focused on my research question. My primary interest was to understand the link between complexity and environmental problem-solving output. This interest means that during analysis I needed to separate myself from the authors that were employing organizational perspectives.

By assuming a perspective from the environmental problem-solving process, subcategories like *emergent sources of complexity*, *mitigating impacts on the organization* and *impacts on environmental problem-solving output* started to emerge. During analysis, codes continually appeared, were categorized and re-categorized, moving from one theme to another and redefining as more information was available. Furthermore, the SSM workshop provided initial codes and categories from the discussions with participants. This allowed for validation of some categories, and codes to emerge during data collection. I found this modification to the traditional grounded theory approach to be very valuable as participants' validation provided support to coding by the researcher.

After all the data was coded all interview segments were recoded, with the interviews of the members of the LC first and then those with the stakeholders. From this final coding categories were constructed. In the final coding categories, such as *conservationism – desired evidence of purpose achievement*, transformed to *conservationism expected results*, and *conflict between organizations* transformed into *competition for leadership* and *competition for resources*. During this process, axial codes like, *precursory sources* and *aggravating impacts to the orga*nization were formulated.

After coding, I examined the categories and their relationships to each other; establishing patterns and themes that would account for the frequency, strength and presence or absence of any category (Isabella, 1990). The results and discussion of these findings are presented below. The first results displayed in Table 8 made use of ideal types to depict the logics present in the field and their connection to the biological corridor. Then, Table 9 uses these ideal types to explore how logics construct and sustain alternative formulations of problem-solving initiatives. Themes and relationships between institutional complexity and environmental problem-solving output were created using conceptual models. Figure 9 shows how, and in what way institutional complexity affects environmental problem-solving output. This conceptual map was built from the categories indicated in the table in Appendix 2. In sum, the research process and writing resulted in a number of propositions that explain the link between institutional complexity and environmental problem-solving output.

Table 8: Logic ideal types and their alignment with the multiple purposes created for the corridor.

Purpose			Characteristics	Values	Incompatibilities	Access to resources	Rhetorical Use	Data Examples
Protecting communities and their lifestyle	Biodiversity conservation and ecosystem connectivity	Conservationism	Informed by academia and non-profits, it sees Alexander Skutch as hero and symbol of the corridor and is concerned with issues that damage the integrity of the environment like pollution, agrochemicals, deforestation, and fragmentation. It has used the productive logic to push environmental narratives, and the state logic to give the idea of increased environmental restrictions. Sublogic: Neoliberal conservationism that sees market-based solutions as the alternative to push the environmental agenda by developing ecosystem services	Corridor as coordinator, Convincing local people, keeping ecological integrity, asset-based management (focusing on critical elements like specific forest types, species or rivers), Information-based decision making with a strong preference for indicators, systemic thinking	**Mild with productive:** Protection of river banks can be incompatible with economic activities in the area; mainly agriculture, infrastructure development and energy production. This logic sees ecotourism as preferred to obtain objectives instead of traditional agriculture.	Infrastructure Professional Human Resources Information Land Economic Resources Political Influence Markets Equipment Capacity Building	1.Community 2.Productive 3. Restriction	*"We aim for the transition from sun-grown coffee to more ecologically sound production as a means toward stabilizing hydrological resources, enriching the soil, reducing soil erosion, and increasing biodiversity, particularly of resident tropical birds and Neotropical migrants and of the arthropod fauna essential for soil structure."* *"Of course, if we don't have jaguars there is a problem in the ecosystem. We can't see a jaguar here this is a big problem."* *"Alexander is a national and international symbol for ornithologist and amateur birders; he is the main feature of the corridor."* *"It gives me the rhetorical resource to protect the corridor from the river destruction. It has been very important, to be able to say this is a biological corridor. It gives me legal weight."*
		Restriction	Informed by the tradition of protected area creation and establishment, it is the restriction in the use of resources. It is associated with the state and the role of the Environmental Ministry. This logic is implied in the corridor as the corridor is seen as a protected area that has coercive restrictions on the use of natural resources. Members from different groups enact coercive logics as needed. Sublogics: State Conservationism - devoted to the restriction of natural resources and creation of protected lands State Agricultural - centred on the promotion of production and the agricultural use of land	Corridor organization as a guardian, following legislation, neutrality in participation, pleasing managers, community independence from government participation, restriction of activities, work is done by someone else (consultants)	**Strong with the community**: with incompatibility over means and process. Extraction of resources like hunting is punished with restriction if its seen as selfish or in detriment of the overall environment. Members from the community use restrictive logic to punish their neighbours. **Mild with productive:** mostly the tension is towards the economic production of outsiders, like hydroelectric companies, pineapple or small development projects generated by people from other parts of the country. In general, it restricts projects that visibly damage what "belongs to everyone."	Authority Information Land Professional Human Resources Capacity Building	1.Conservationism 2.Productive 3. Community	*"The corridor is a weapon for conservation."* *"I was threatened by a man; he told me this was a biological corridor and that I couldn't grow anything here or cut trees. I say, let them come, they can't do that!"* *"There is a misconception of power and authority, some people think this is a national park ... and some people will manipulate with the idea this is a national park."*

Sustainable Economic Development		Description	Corridor view	Relationships	Capitals	Priorities	Quotes
	Community	Inevitably this logic is informed by agricultural coffee production, the Asociaciones de Desarrollo and cooperatives. Farmers and their values have formed this logic for a long time. It is the oldest logic in the corridor. And it has multiple sub-units, each of the communities within the corridor can represent this logic. Each community is a unit that can collide with other groups in competition but informed by the similar values and behaviours. It has used restriction and conservationism rhetorically to protect resources and position economic production alternatives. Sublogics: There is one logic unit per community mainly in Quizarrá and Santa Elena. They antagonize in idiosyncratic issue but agree when systemic threads are shared, like hydroelectric companies.	Corridor as an executive organization, participation, distribution of benefits, connection to the land, access to water, enjoyment of nature, peaceful rural life, security, the permanence of neighbours, cooperative philosophy, idiosyncratic thinking	**Strong with economic:** showing resistance to commercial projects that monopolize the benefits and compete for water or space, including pineapple plantations, hydroelectric companies and big hotels. There is very strong incompatibility with economic production that affects "common resources belonging to the community" like forest or the river. **Strong with restriction logic:** antagonism towards initiatives that protect the forest to the detriment of farmers. The incompatibility is stronger when restrictions are unpredictable or whimsical. Communities value restriction when it does not affect them directly. **Strong to conservationism:** antagonism when goals only represent nature or conservation assets, without focusing on community wellbeing and economic production as the priority.	Wide fragmented constituency Land	1.Restriction 2.Productive 3.Conservationism	*"Yes, I don't like for there to be just one landowner, I like that everyone has their own little farm."* *"A value of safety. Why? Because coffee growing cultures are very conservative, it is what allows them to survive, as coffee works seasonally, they have to be very conservative in the use of resources and in their decision making... it's their culture; any little change will be carefully thought thru."* *"I want for the cow fields to produce milk, to have horse tours, that all the kids can go to study and that they can return to practice what they have learned, that there is something economical that can make them come back."* *"A conservationist can't come here to tell me to only look at leaves and animals. When you think about these things, you must visualize people too, how do they bring rice and beans to the table?"* *"They cut the forest, they damaged the river, without any permits, just because they are woman?... no, we weren't going to allow it we called the authorities."* *"I prefer to have access to water and the river then having electricity."*
	Productive	Informed by market-based solutions It sees economic production as the means to achieve successful protection of the natural environment in the area. Working on economic growth to benefit the communities, to convince about the social and economic benefits of the corridor and to convince about the need to protect the environment. It has experienced a shift from agricultural logic to ecotourism logic, with different values, means and behaviours. It has used conservationist logic to pursue economic goals. Sublogics: Economic Agricultural - informed by cooperative philosophy and coffee production it sees farmers, with hard work and cooperation, as the primary producers in the corridor and has gender tensions with production by a woman Economic touristic: focused on service, cleanness and beauty of the area to attract more clients. Woman participate as the leading developers.	Corridor as an executive org., organizational structure, the creation of benefits that convince about the corridor, perceiving benefits leads to conservation, Innovation	**Strong with conservationism:** over priorities on desired means, economic development must be achieved first. Corridor themes like roads, agrochemical usage, infrastructure development, water usage and reforestation of riversides are strong incompatibilities that are seen as necessities for economic production. **Mild Incompatibility with community:** over the distribution of capital, this incompatibility is a consequence of economic development instead of a goal.	Infrastructure Land Economic Resources Professional Human Resources Markets Political Influence Equipment	1.Community 2.Conservationism	*"The corridor helps us to generate strategies for conservation, in our case, it helps us to generate strategies for rural ecotourism."* *"This thing about planting the river shores is nice and all, but when they say it… what I think is, how am I going to get the coffee production out if there is the only forest in the river shore?"* *"Look the dream about the corridor was to work with the coffee producers. To have a brand that would be worth double the price of the commercial coffee; for the producers to be more environmentally friendly."* *"If you are going to bring ecotourism, look at those forest patches it is not about them looking pretty, it is about if they are going to make money."* *"If I improve the economic capital, it benefits natural capital."* *"You don't do things for love. If you are doing conservation, you required investment, and that should come from the area. It can be accomplished by having added value products. To also see the corridor as an option for ecotourism, that the corridor becomes a source of income."*

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2   Table 9: Environmental problem-solving construction within the ASBC by informing logics.
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Log.	Problematic Situation	Preferred Means for Purpose	Expected Result	Obtained Result	Satisf.	Exemplary data
Conservationism	Deforestation, urban land use and mono-cultivation has fragmented the landscape putting biodiversity at risk	Reforestation of river banks Adjustment to sustainable agricultural practices Following environmental legislation Buying land for conservation	The river banks are restored as a continuous connectivity line There are sustainable agricultural practices developed in farms There is an increase in wildlife abundance and biodiversity	Unstructured ecosystems recovery in areas different from the connectivity line with an increased abundance of species in the corridor	Satisfied	"The biodiversity we have. Despite the pressures faced by the cultivation of sugar cane, there is still some connectivity in the Peñas Blancas river. Despite everything, we have some biodiversity." "If we don't achieve connectivity we have no corridor." "If we go to the beginning, the corridor was thought for environmental conservation, meaning? those who created were thinking about national corridors, about relic forest, about Alexander's farm... about the evergreen forest."
Restriction	Little application of environmental legislation has caused ecological degradation; where communities are conformist and depended on the State to achieve development	Filing environmental complaints Creation of an institutional structure Participation in planning meetings Execution of work by someone else, mainly outside consultants	The continued existence of the biological corridor for the benefit of the local communities and the environment	Corridor still exists after 18 years with reduced participation from communities. The state is still expected to play a determinant role	Very satisfied	"sometimes the corridor is not measured by the achievements or the tasks accomplished, but for the existence, the perseverance to keep working. The corridor exists … other corridors are just created in paper; they exist only as a name" "For me yes (it fulfills its purpose), because since it was created, we haven't had the problems we use to fight against (deforestation, hunting, etc.)" "it fulfils its purpose in the sense that in the mind of many people it creates some restrictions, even though that is not clear. For example, the people know there is a protected area and that they can't cut forest. And not because the law commands it like that, but because it looks like that, then people don't do it." "Well you could say, that if you see that there are meetings, participation, many activities, pictures are taken, people create reports of what is happening, there are meeting summaries, you could say that maybe the purpose it's not fulfilling as a purpose, but that there is work happening towards it" "How can we do a plan? It is a consultant who does it."
Community	Environmental degradation, urbanization and a decreased economy is endangering the families' lifestyle in the area	Development of community infrastructure Creation of organizations to agglutinate people and provide needed services Community engagement and communication of benefits and results Cultural activities like festivals	Unity between the communities to protect the environment and sharing of the economic benefits generated by the corridor	Communities are more connected but still divided, environmental degradation has been slowed down or reverted, and the corridor has caused unsatisfactory economic benefits that have been localized in 2 of the seven communities within the corridor	Somewhat unsatisfied	"If I see that people are still throwing trash, that they still burn garbage next to their house, burning toilet papers, then, it is not fulfilling its purpose." "People still have no guaranteed quality of life. I see that happening; many people are selling their land." "If the authorities were protecting and people were more aware, if they could leave 10 meters of forest next to the rivers, we could reforest them." "Yes, we have fulfilled the purpose, but not 100% of it. Currently, in the last two years, we have had a noticeable economic and social growth, at least in two of the communities in the corridor." "Let us remember that the purpose for creating the corridor is for communities to be able to participate." "Then biological corridors appears creating a platform for coordinating and the establishment of territorial plans. A corridor

					is a territory. And for me, the added value that corridors provide to the sectors is, that. Is a structure of coordinated intention under an agreed plan."
Productive	A decreased rural economy has endangered local livelihoods	Sustainable agricultural production with an added value Diversification of agricultural products Development of ecotourism	The creation of many Eco touristic businesses and the positioning of a Corridor Brand that generates added value for the corridor's products	The creation of some localized Eco touristic businesses that don't reach most of the people in the corridor. No products with added value exist or any benefits from producing within the corridor.	Unsatisfied	*"What did you wanted, a corridor or a touristic developer?"* *"We are working towards selling real state without any success. We need more advertising about the attractiveness of the corridor."* *"The idea was to sell coffee in Canada with the corridor's brand to support the biological corridor. Everything was going well, we sold some coffee, then the person connecting the market died and no other leader managed to understand or embrace the idea, and with him dead, the project died."* *"We realized that many people have means to become touristic products, but they lack the infrastructure to engage in tourism."* *"We need to be organized, In Santa Elena, there are many tourists coming, many families receiving students, but they are not organized. There needs to be an organization that organizes and that thinks about what we are going to offer to people. To avoid doing what farmers do, there needs to be planning to offer different products."*

4.6.1 *THE LOGIC'S CONSTRUCTION OF ENVIRONMENTAL PROBLEM-SOLVING IN THE ALEXANDER SKUTCH BIOLOGICAL CORRIDOR*

The data from this research shows that the construction of environmental problem solving evolves over time, and is mostly shaped by institutional forces. These forces modified and expanded the initial scope of the ASBC to include values, means and strategies that are aligned with specific logics. The diverse organizations partaking in the creation of the biological corridor, informed by their logics, construct different objectives with preferred means to solve problems, and with different expected results. This was evident in the construction of the multiple purposes for the corridor.

The shaping of the corridor's purpose gives initial evidence to show that the corridor, as an environmental solution, experienced a process of construction in which actors and their logics informed desired and specific problem-solving configurations. The four main logics within the ASBC shown in Table 8 expanded the scope of the corridor to embrace the three implicitly constructed purposes identified in the SSM intervention. Evidence of this shaping is found during the creation of the ASBC when both productive and conservationism logics formed its purpose. After the creation of the corridor, the community logic and the community constituency played a remarkable role in expanding these purposes to the protection of local lifestyles. Interviews revealed that during the initial stages of the corridor communities organized themselves to expand its geographic range from including two communities to seven, and pushed for the creation of a second plan that would be more inclusive:

> *"My co-worker had to return the original plan. It had no participation from the communities; there was no consultation. This is where they started to involve the communities, at that moment the organization that participated the most in the process was Asocuenca"* (Representative from the Environment Ministry).

> *"I got into the corridor for economic interests. But how was it possible that they were going to leave us outside? I started fighting with them, on the first day I told them "I have not been invited, but I will come to all the meetings." Because, how was it possible that they were going to leave my community outside of the corridor! And I managed to make them include my community in the corridor"* (Member of Asocuenca).

A differentiated alignment between the logics and the purposes is displayed in Table 8, and can be explained by incompatibilities. The purposes are not necessarily incompatible in their goals. For example, to protect the communities' healthy lifestyles, it is necessary to have biodiversity protection given the close link these communities have with the land. Nevertheless, the data shows they can be incompatible in the desired means to fulfill these objectives (Table 8), generating a differentiated alignment with the purposes based on means preferences. It implies that the interplay of logics in the ASBC is characterized by incompatibilities and synergy.

Interview and workshop data gave evidence that the incompatibilities between logics have a direction (can be one way or reciprocal) and are not absolute. First, the direction as seen in Table 8 demonstrates incompatibilities between logics that are not fully reciprocal. For example, those enacting a community logic have incompatibilities with conservationism logic, but not the other way around. Farmers continuously refer to conservationists as barriers while conservationists consider farmers as people with whom they need to influence and cooperate. Second, Table 8 also shows there are strong and mild incompatibilities between logics, suggesting that incompatibilities are not absolute. These are similar finding to that of Greenwood et al. (2011) and Raynard (2016), which suggest that logics have varying degrees of incompatibility. For example, the restriction logic is strongly incompatible with the community logic. The first involves limitation of natural resources use and the strict application of legislation, while the second consists of the distribution of benefits and access to resources (Table 8). The same happens between productive and conservationism logic. For these, strong incompatibility arises from how preferred means are prioritized. For the productive logic, the development of small business needs to be achieved first as means to convince others of the importance to protect biodiversity.

Returning to the alignment of logics and purposes, the degree of incompatibility and the direction of these incompatibilities explains how this process happens. The productive logic, strongly incompatible with conservationism and mildly incompatible with the community logic, shares the common interest of producing economic growth and protecting the community and their lifestyles. This will mean the productive logic and the community logic will align better with these two purposes. On the other hand, the conservationism and restrictive logic align better with the purpose

of environmental connectivity based on their mutual synergies and several incompatibilities with other logics (Table 8).

The community logic is quite telling as this logic is strongly incompatible with conservationism, productive, and restriction logics, yet it is aligned with all the purposes for the corridor. Those enacting this logic position themselves in the middle regardless of the incompatibilities with other logics. By aligning with all the purposes, community organizations that struggle to access resources will gain different degrees of benefits. More evidence for this claim comes from the *access to resources* section in Table 8, which shows that those enacting a community logic have less capacity to access resources than those enacting other logics. The community logic mostly has the power to mobilize the local constituency towards putting pressure on other actors. With this alignment, community members can access different resources, such as markets, information, capacity building, and even authority. For example, community members have aligned with biodiversity conservation and connectivity purpose of the ASBC to access sustainable markets: *"When they were creating the corridor, I came here to be able to sell my coffee, then I realized conservation was important"* (Coffee producer). They have aligned with the purpose of sustainable economic growth to improve their lifestyles, which has given them access to capacity building in business development: *"The corridor gives me opportunities, to train the people in the organization to create ecotourism business"* (Member of woman's group).

The logic directionality, the alignment of different logics with the purposes of the corridor, and the distance of the logics from each other suggest that to fully understand the impacts of the organizational interplay within the ASBC, it is not only important to look at incompatibilities between logics, but to the synergies among them. "A systematic appreciation of how logics variously converge—in both conflicting and synergistic ways—to shape institutional and organizational landscapes" (Raynard, 2016 p. 2) is reflected on how the logics distance themselves from others, and how certain organizational actors with different logics can synergistically work together on one of the corridors' purposes. According to some authors, synergies and incompatibilities between logics such as this are a characteristic of institutional complexity (Raynard, 2016). Institutional complexity has been linked to fragmentation of the organizational social space, in which the multiple

logics available are not coordinated and prioritized by strong referents on the field (Concklin, 2005; Greenwood et al., 2011).

4.6.2 LOGIC FRAGMENTATION AND RHETORICAL USE OF LOGICS

Besides the previous evidence of multiple logics available with no prioritization, the data shows two phenomena that have not been intensely discussed in the literature. First, logics themselves become fragmented, and second, logics become disconnected from their organizational representatives to become strategic resources to be used in negotiations.

4.6.2.1 Logic Fragmentation

As seen on the "characteristics" section of Table 8, logics within the corridor have competing sublogics. Conservationism is a notable example as there are organizations that enact a pure conservationist logic focused on diversity, environmental integrity, and ecosystem recovery. Their preferred means are reforestation and research. But there are also those who have been influenced by the productive logic, and now enact the *neo-liberal conservationist* sub logic. This logic prefers means that have to do with economic production and the market, selecting market-based solutions like ecosystem services to pursue objectives of the corridor. This sub logic was moulded by the rhetorical use of market-based approaches to pursue environmental goals when the ASBC was first created. I have found that each of the logics within the corridor is fragmented, and this fragmentation is most likely a factor that increases institutional complexity (see Table 8).

In addition to this fragmentation, the data shows that these logics have remained stable over time. All existed before the corridor, yet the creation of the ASBC institutionalized some of these logics, giving them more centrality in the field. The interviews demonstrated that people living in the corridor shared a community logic before the existence of the ASBC that was characterized by farming values, cooperative philosophy, and community living. The restriction logic had also existed since the 70's when the country started reducing deforestation and creating protected land. The conservationism logic was introduced by the arrival of the famous ornithologist Alexander Skutch who established his farm for research. According to interviews people used to call him *"an alien that*

brought ideas of conservation." Finally, the productive logic has existed since the beginning of coffee production, experiencing a recent fragmentation with the arrival of ecotourism and the well-documented decline in coffee production. The creation of the corridor institutionalized the restriction, productive and conservationism logics, giving these logics central roles in the social field and their representative's influence and benefits. As the ASBC evolved, these logics changed in their significance due to contests and shifts in field centrality. For example, the community logic has strengthened over time, as seen from the results of the SSM workshop.

4.6.2.2 Rhetorical use of logics

The fragmentation of logics and the rhetorical use of logics are not unexpected, as after 18 years of competition and interaction it is inevitable that actors will take elements from each of the logics to enrich their own. Which brings us to the second phenomena, which is logics have become strategic resources for the actors participating in the corridor (shown in Table 8 under *rhetorical use*). Other studies suggest that organizations can use logics as a strategic means to push their objectives forward (Venkataraman et al., 2016). Actors enacting one main logic can draw on elements from other logics to pursue their goals, but this use is mostly rhetorical as in most cases these actors don't have the institutional capacities to deliver on promises born this way. Two examples are quite telling: the productive logic's use of conservationism to push forward economic objectives; and the conservationism logic's use of the restriction logic to promote environmental goals. In the first case, organizations see the corridor as means to create projects and to access funding. After all, the precedent for this practice was set when the corridor was first created by using added value coffee production to promote connectivity:

> *"The corridor helps us to generate strategies for conservation, in our case, it helps us to generate strategies for ecotourism"* (Member of Amacobas).

> *"Look the dream about the corridor was to work with coffee producers. To have a brand that would double the market price for coffee producers, so they can be motivated to be environmentally friendly"* (Coffee producer).

Actors interested in conservation have rhetorically used the restrictive logic to push environmental protection. Using the imprecise idea of the corridor as a protected area to imply that there is more stringent environmental legislation in place. In reality, biological corridors in Costa

Rica do not bring additional protection to biodiversity in the form of increased legislation. All conservation activities outside the corridor can be applied within the ASBC. In this case, the use of a restriction logic can be effective to push environmental objectives:

> *"It (the corridor) gives me rhetorical resources to protect the corridor from the destruction around the river. It has been very important to be able to say, this is a biological corridor. It gives me legal weight"* (University member).

> *"The corridor is a weapon for conservation"* (Community member).

> *"There is a misconception of power and authority; some people think this is a national park… and some people will manipulate with the idea this is a national park"* (University member).

It is important to clarify, as shown in Table 8, that the logics themselves don't rhetorically enact other logics, but that the institutional actors and people within the corridor do. The column in Table 8 reflects the preferential subsidiary use of logics by actors enacting one particular logic. For example, actors enacting a community logic as their main logic, tend to enact the restriction, productive and conservationism logics subsidiarily, in that order of preference. The SSM workshop provided valuable insight into this process as the discussions showed how actors would use the logics differently, depending on the people present and the theme discussed. More research needs to be done about this strategic use of logics, but I believe this happens as a response to the increased institutional complexity within this context. Negotiations are so contested that after so many years of experiencing the same dynamic, actors have learned how to use other actors' logic during the negotiations. By doing this, they can legitimize their actions without having to conform to other actor's expectations.

My findings match those of (Blicharska & Van Herzele, 2015) that demonstrated actors use their own and other's rhetorical discourse as strategic resources when engaging in environmental problem-solving. However, the ASBC study can provide evidence of the impacts of this dynamic to the environmental problem-solving process. It suggests the rhetorical use of discourse will affect the perception of success and satisfaction with the EPS outcome.

The shade grown coffee initiative, in particular, is quite enlightening when it comes to the rhetorical use of logics. When the corridor was first engineered, three actors, an environmental non-profit, a coffee farmer cooperative and a university, centred on a plan to produce certified shade-

grown coffee as means to create habitat connectivity. This initiative was so powerful that 18 years later there are attempts at revitalization. The original effort came to fruition and coffee was sold to Canada under a corridor brand, yet abruptly came to an end. According to interviewees, the primary cause of failure was the disconnection between the product and the market. The coffee did not have the expected quality for the market, and the multiple changes in the administration of the buyer reduced interest of the project. Rhetorically, the creators of the initiative used a market logic to push environmental objectives, but none of them had or developed the core competencies to sustain the results. None were certifying companies, and none were international coffee traders. Indeed, they could not guarantee access to the coffee market or the creation of a certification for the corridor's products. Regardless, the ASBC was created through this initiative and environmental objectives were accomplished.

This certainly does not imply that the actors were aware of this rhetorical use, or that they intentionally used an economic logic to push an environmental solution without having the competencies to deliver results. Probably, this was done with the best of intentions in mind. In the process of doing so, they created a hybrid purpose for the corridor and only accomplished one part of that hybrid purpose. This has had significant implications for the perception of the corridor's accomplishment. In the corridor, actors enacting a conservationist and restriction logic are mostly satisfied with the outcomes of the ASBC. Actors enacting community and productive logics are primarily unsatisfied (see Table 9). Despite the corridor having protected ecosystems and contributing to habitat recovery, the producers are unsatisfied with the corridor's results given that currently there is no value-added coffee being sold to the Canadian market. This suggests that when problem-solving, rhetorical use of logics can generate hybrid purposes and push environmental objectives. But if the conditions to deliver those results are not met, the overall purpose is deemed unsatisfactory despite having achieved environmental gains. In the words of one of the local leaders "*no, the corridor is not fulfilling its purpose It has failed, we have no value-added production.*"

In summary, this strategy can help to increase the acceptability of environmental solutions at the expense of the subsequent perception of success from the unsatisfied expectations that were created. Which leads to the following proposition:

Proposition 1: the strategic use of different logics by organizational actors leads to the validation of problem-solving approaches that are more concerned with legitimizing idiosyncratic solutions rather than solving systemic issues

Actors within the corridor are using logics as strategic resources to pursue their most cherished objectives. This situation was clear during the SSM workshop when actors would focus mainly in idiosyncratic issues that would significantly align with their own logics and would defend these issues using other logics strategically as need be.

4.7 INSTITUTIONAL COMPLEXITY AND EPS IN THE ASBC

Results from the Alexander Skutch Biological Corridor suggest that when a solution to an environmental problem is built, each of the logics participating on the field will create their own problematic situation, desired means for solving the problem, and desired expected results. Table 9 summarizes this, and it also shows the results that were obtained after 18 years of the ASBC. This information demonstrates how one solution, which was assumed to be clear and shared, can be constructed in very different ways by those partaking in the process.

Throughout the corridors implementation, the interplay and negotiations of organizational actors generated shifts when distinct actors gained influence. Such as when communities managed to expand the ASBC from two to seven communities, or the change in priorities from the initial focus in agricultural production to the more recent focus on ecotourism. This is exemplified in the following transcript:

> *"when everything started; there was a tension between the touristic and agricultural sector. I remember that at some point we wanted to develop tourism, but the local council said: "Our priority is to develop agriculture." And tourism was left behind, put to a second priority, and now, it's backwards, the corridor has developed tourism more"* (Consultant and Local Leader).

These shifts are not accidental. In the first case the community contested non-profits, in the second case the emergence and participation of many local ecotourist associations challenged the agricultural groups. These shifts are a result of interplays and negotiations that happen within a cloud of institutional complexity. Paraphrasing Hoffman, this is a war of logics and legitimacies (Hoffman, 2009; Raynard, 2016). In the ASBC it seems that relationships between actors are a better predictor of behaviour and outputs than efficiency or logical thinking.

Organizations working within the biological corridor experience institutional complexity, including the lead organization. The data shows that within the corridor there are field level dynamics and structures that are linked to complexity. Mainly, the multiple available logics with different degrees of incompatibility (Table 8), and a fragmented field with changes in centrality (Appendix 2: Emergent conditions, changes in field centrality) (Concklin, 2005; Greenwood et al., 2011; Oberthür & Stokke, 2011). The SSM workshop, characterized by these dynamics provided vast empirical evidence for this assumption.

According to Raynard (2016), three components characterize the pattern of institutional complexity: the extent to which the prescription of logics are incompatible; whether there is a settled or widely accepted prioritization of the logics within the field; and the degree to which the jurisdictional claims overlap. Within the corridor, logic incompatibilities mostly come in the form of means, or in other words, the way in which the organization is to achieve its goal. Proof of this is that their incompatibilities and synergies create competitive and cooperative interactions that align differently with the multiple purposes of the corridor (Table 8) (Raynard, 2016). Actors mostly agree on the goals, and the existence of the ASBC is the overarching goal. Most of the interviews of local committee members included phrases such as: "*We all shared the commitment with the corridor. The environment is always the most important thing. We all share it. This is what we have in common*" (Member of environmental non-profit).

Besides this, there is evidence to suggest that within this organizational field there is a relatively settled prioritization of logics. Two things point to this conclusion, first, when people were asked *what the corridor's purpose is*, the usual immediate answer was biodiversity protection and connectivity. Only when inspected further did they expand this purpose towards things they value

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more, like access to water or creation of value-added production. This means that the conservationism logic has been given the priority in the field. The second comes to the prioritization of strategies to achieve this goal, with the means of the productive logic becoming more critical than others. As seen in Table 4 and Table 5, the current priority in the corridor is the promotion of sustainable economic activities. Remarkably, the protection of natural capital is one of the least important. This suggests that while conservationism and productive logics have been defined as the dominant logics, when it comes to goals the first one informs the most, and when it comes to means, it is the second that takes center stage.

Finally, when it comes to the jurisdictional overlap of logics; in the ASBC there is evidence of jurisdictional competition and disagreements among advocates of different logics. When the corridor was first created, two governance arrangements were fused, forming a jurisdictional conflict between overseers and members. Furthermore, the ASBC as an environmental problem solution and a geographic area, has created a space where a multiplicity of logics have been made contingent upon each other. The results from Table 9 and the results from the workshop show the overlaps that generate antagonistic tensions over "who should define problems, which solutions are appropriate for these problems, and what constitutes appropriate knowledge and training" (Dunn & Jones, 2010 p. 126). Indeed, in their nature biological corridors are complicated jurisdictional overlaps, and the ASBC is no exception. Organizational decisions within it have continued to increase this jurisdictional overlap.

Together, these three components suggest that the current configuration of institutional complexity within the corridor is that of restrained complexity (Raynard, 2016). Compared to the other types, such as volatile, segregated or aligned complexity, the distinguishing feature of this type is the settled prioritization in the field (Fig. 1). Within the corridor, priorities are tacitly accepted by actors, but there is a remaining incompatibility of logics and jurisdictional overlap. This implies that organizations in the corridor will experience a more simplified complexity as competing demands were worked out at a higher level, either by negotiation or enforcement of compliance (Raynard, 2016). Let us remember that complexity is not a static condition as it evolves and changes over time (Greenwood et al., 2011).

I propose that in the case of the corridor three types of conditions partly influence how this complexity evolves: EPS wickedness, precursory and emergent conditions (See Fig. 9)[1]. Also, organizational responses, aggravating or mitigating will affect this evolution as well.
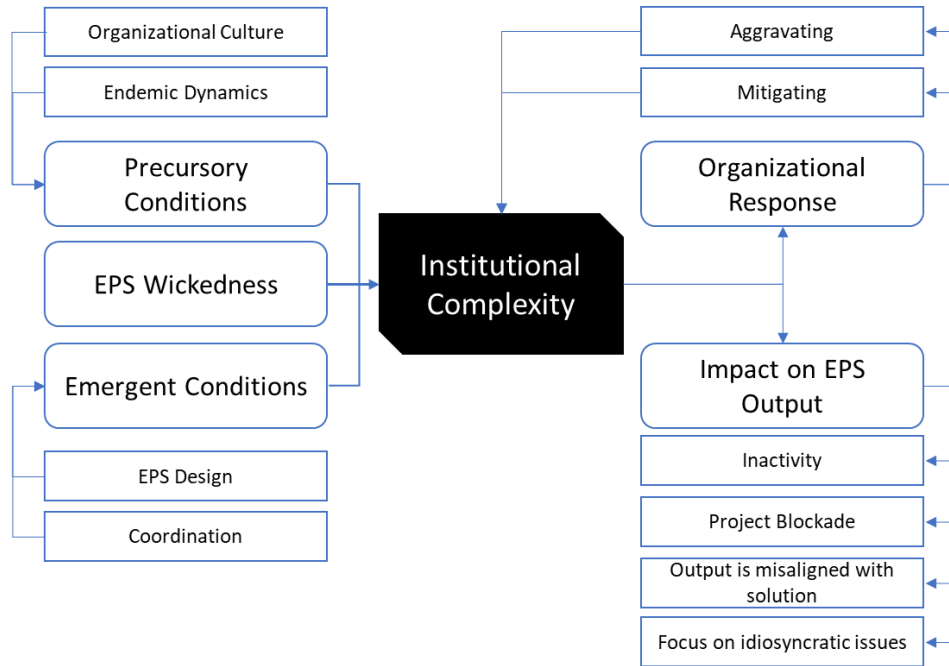

Figure 10: Institutional complexity in the ASBC emerging conceptual map.

EPS wickedness: The sole fact of engaging in the creation of a corridor will create a multiplicity of possibilities, and there will be no one valid and unique configuration. The definition and formulation of issues differ according to the appreciation of the social actors (Bardwell, 1991; Checkland, 2000). Problem wickedness is a force of fragmentation of the social space (Concklin, 2005). The nature of wicked problems, involving multiple stakeholders tainted by appreciation, and closely related to peoples' perceptions and values, will directly contribute to creating jurisdictional overlaps, logic incompatibility, and unsettled priorities.

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[1] The data and final categories to create this conceptual map are included in appendix 2 for readers to be able to understand the data that generated the conceptual map. The scope of this research project limits the possibilities of addressing this finding. The table shows diverse sources that increase institutional complexity and the impacts of complexity on EPS. These sources have origins, relationships, and feedback loops that are beyond the scope of this research. Investigating the causality and connection between these, are opportunities for future efforts. Henceforth, this will be a high-level discussion.

I propose that when it comes to environmental problem solving it is important to separate between precursory and emergent conditions for institutional complexity. If precursory causes can be identified, the EPS design can take them into account. On the other hand, the knowledge about emergent conditions implies that during the implementation of solutions, these conditions can be avoided or mitigated. For example, the members of the corridor could have prevented the merger of governance arrangements.

Precursory conditions: these are defined as conditions that exist long before a problem-solving initiative was formulated. Before the corridor, there was a pre-existing organizational culture and endemic dynamics that will directly determine how complexity is configurated, which are explained below:

- Organizational culture: the overseer for the corridor, the local council and many of the participating organizations are weakened institutions. In many cases, they have yet to develop the most basic of organizational structures. Their organizational cultures will inevitably affect the way these organizations come together to create a new institution to manage the corridor. Institutional weakness has been associated with ideological conflicts in environmental problem solving by Barrett et al. (2001). Overall institutional weakness will make organizations in the ASBC susceptible to experience high degrees of institutional complexity, and in turn, difficult capacity to respond.

- Endemic dynamics: before the creation of the corridor an economic shift was happening. This brought a new logic to the field and with it a different set of priorities and incompatibilities (Appendix 2: economic shift). Also, there were pre-existing conflicts between communities that created a fragmented social space. When put together to work within the corridor, they started competing for jurisdiction. Another endemic circumstance is the increased influx of logics within the field with the arrival of students, universities, biologist, consultants and many organizations. A rapid and diverse influx of logics increased the complexity.

Emergent conditions: these are situations that emerged as the corridor was managed. They respond to the design of the ASBC, the decision making by the local committee and the field level processes (see detail in Appendix 2). They are detailed below:

- Misaligned vision: This generates an overall lack of a clear guidance that can help prioritize logics, or that can reduce incompatibilities. Instead, the previously discussed ambiguity in the management plans feeds incompatibilities over the legitimate means to be deployed. If there is no clear guiding north, then there is much space for competition among the diverse available logics. As one participant put it, "*there is a clash of visions.*"

- Governance arrangements: Governance overlap and regime interplay have been linked to institutional complexity by the work of Oberthür & Stokke (2011). The fusion of two or three governance arrangements has set multiple conflicting logics in a jurisdictional overlap. The most apparent case is the conflict between various overseers, where the leadership of both the Ministry of Environment and the Ministry of Agriculture are in conflict and challenged.

- Changes in field centrality: this is well covered by Greenwood et al. (2011) and responds to fragmentation of the field. In the corridor, central actors have shifted continuously. First, the CCT and Coopeagri acted as the actors coordinating action. When the field became more complex, and with more expectations from different constituents, central actors changed. Then, the Ministry of Environment and the Ministry of Agriculture became centralized due to their role in the management of national parks and development of farms. The current field dynamics makes it hard for one actor to be central. In fact, no one wanted to assume the central role mainly because, for organizations, some leaders are not legitimate as they lack the core competencies to manage logic-specific objectives, such as the development of value-added products.

Going back to the evolving process of complexity in the corridor; the continuous changes in centrality within the corridor, the contest during its creation, and the multiple reconfigurations that the purpose of the ASBC experienced suggests that there have been changes in the complexity within the corridor. The field has moved from restrained complexity to volatile and to restrained again. When the corridor was first created, there was a restraint complexity phase as priorities were settled (Fig. 10). As it progressed, these priorities were contested mainly by community members and newly formed or arriving organizations within the field. A form of volatile complexity emerged, characterized by the incompatibility and unsettled prioritization of logics with jurisdictional overlaps

(Raynard, 2016). This happened at a point in time close to when the coffee production initiative failed. The initiative that joined many actors in agreements was gone, and a contest of priorities emerged, and other emerging conditions reinforced this shift (Appendix 2). Here is where the idiosyncratic issues became more engraved in the local council dynamic. According to Raynard (2016), the lack of field level coherence allows the organizations to adopt strategies aligned with their particular strategic interests.
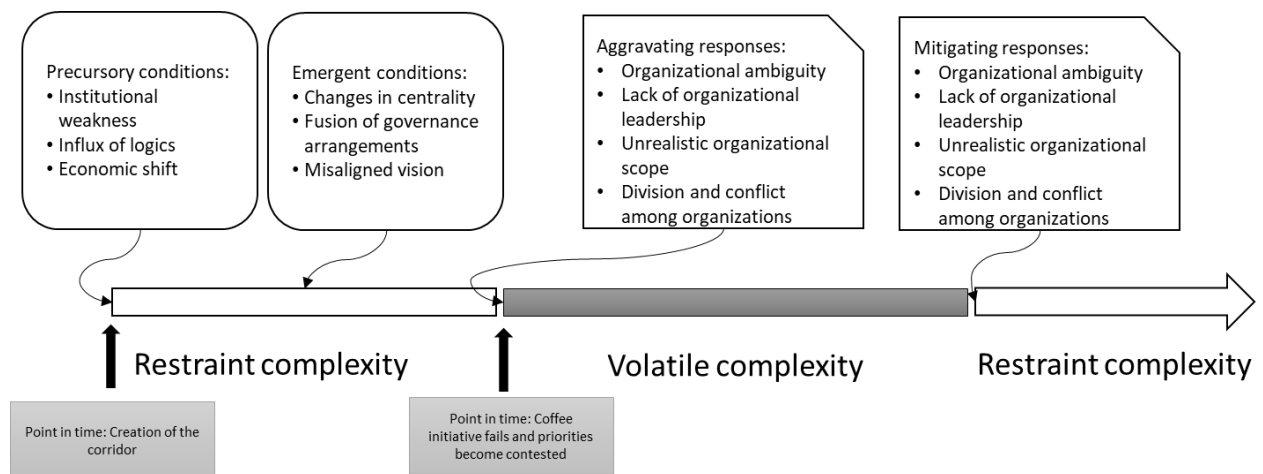

Figure 11: Conceptual evolution of the institutional complexity phases in the ASBC corridor. Based on the work by Raynard (2016).

As time passed mitigating strategies (responses) developed within the organization, like the constant redefinition of purpose, the creation of silos within the organization and the adjustments in decision making (Fig. 9, Appendix 2). These strategies allowed for a tacit prioritization of logics, returning to a state of restrained complexity.

Mitigating responses: the LC's decisions helped prioritize and reduce overlaps between logics. The mitigating responses included: duplication of initiatives; the cyclical redefinition of purpose; work in silos; increased emergence of new organizations and organizational structure; disconnection of the LC's activities from the management plan, adjustment in decision-making processes; and working opportunistically (Details are in Appendix 2). In general, the strategies allowed for synergistic logic interaction for organizations to work together on issues that are shared

by them. For example, the work in silos reduced conflict between members. In the climate survey, members were pleased with the work accomplished in silos (committees), and were displeased by the overall articulation of the organization (Table 7). When this fails, and negotiations between members are too conflictive, the decision making is adjusted towards simple majority. In fact, the overall work of the organization in many cases is opportunistic without following management plans: *"We work based on who is there; decisions are made based on who is there and their interest, we just want to move forward"* (Member of a woman local group).

Aggravating: these responses worsened the experience of complexity. These conditions acted as feedback loops that increased complexity within the field. I present them in Appendix 2, and they include: organizational ambiguity; lack of organizational leadership; the organizational scope is unrealistic; division and conflict amongst organizations competing for resources and competing for leadership; and the most complicated of all, organizational fatigue. These categories emerged from field level processes and the overall experience of complexity. Field level processes changed the centrality and reduced the original coordination from when the corridor was created. Oddly, no organization wanted to lead such a complicated field, yet many of them competed for leadership of the corridor and access to resources. To pacify these conflicts, the organization started changing the purpose and vision of the corridor in a way that would include more idiosyncratic themes. This expansion brought institutional fatigue and actors were saturated, tired and lacked time.

The aggravating responses helped to explain the move from the first restrained complexity phase to the volatile phase. This happened when the coffee initiative failed, and the original creators of the corridor lost or relinquished centrality, and the delayed effects of the fusion of governance arrangements started to appear (Fig. 10). After this, the mitigating measures probably developed as a response to the volatile complexity. What is clear is that most of the mitigating strategies help to prioritize and arbitrate among the competing institutional demands. The LC shows great openness over how they respond to this demands as they do not face pressure from institutional audiences to maintain jurisdictional boundaries (Raynard, 2016).

In other words, when the corridor was maturing the centrality of the actors that created the ASBC became less prominent. With it, there was an increase in complexity and conflict over

prioritized demands. The organizational response became discretional, and the mitigating strategies emerged as coping mechanisms that would allow them to, as a member of the Ministry of environment put it, *"get something done."* To ease the experience of complexity, the local council went from a board of directors structure to one of a simple majority; and focused on task-related structures by creating committees formed by organizations with synergies between them. This allowed them to ease the experience of complexity by adopting task-based structures characterized by semi-autonomous, decentralized units or teams that more flexibly invoke or combine multiple logics (Raynard, 2016).

4.7.1 *HOW DOES COMPLEXITY IMPACT EPS IN THE CORRIDOR?*

Based on the interviews, the grounded theory analysis, and the SSM intervention there is data to suggest that institutional complexity mainly increased the polarization of issues and reduced coordination among members of the ASBC (Hoffman & Jennings, 2015). Let us remember that the local council is an organization assembled by representatives of different organizations. These representatives must articulate the efforts of the corridor while remaining bound to their constituencies and their logics. In this case, any lack of coordination within the field will be directly reflected in the local council dynamics.

Complexity has created a context in which the actors are prone to embracing their idiosyncratic structures, interests, issues and means. From this, coordination was impaired and issues became polarized. During the workshop, actors' synergies and incompatibilities were reflected in contests between the organization becoming an administrative organization or a coordinator one, between working into buying land for conservation or working towards generating connectivity using farmland, between having a paved road or not having one, or even between ecotourism as a priority or agricultural production. This dramatically impacts the environmental problem-solving capacity within the corridor as the embracing of idiosyncratic issues impaired the possibility to visualize creative solutions and systemic issues. Garbage, hunting and sugar cane burning are environmentally damaging practices, but they don't represent the same level of threat to biodiversity as urbanization, and land use change. This was a part of the SSM workshop that demonstrated

how this idiosyncratic fixation was affecting the possibility to solve systemic issues affecting the corridor. Based on the previous discussion I propose:

Proposition 2: institutional complexity creates reinforces actors to embrace idiosyncratic issues over systemic ones.

Besides the focus on idiosyncratic issues, institutional complexity has other impacts on the environmental problem-solving output. The constant experience of complexity has led to inactivity, project blockade and for the output of the corridor to be misaligned with the environmental solutions. Inactivity is one of the worst consequences to EPS output. Within the organization there is a perception of overall gridlock ("entrabado" for the people in the corridor), important projects have become inactive. Actors have traditionally blamed this situation on a lack of resources, as evident in Table 7 that shows the *resources* dimension having the worst scoring. This became striking, as contrary to other geographic areas, the corridor has privileged access to resources and people. If the capacity to coordinate action is considered, it becomes clear that inactivity might not be born in the lack of resources, but in the lack of overarching agreements that can help mobilize resources. Striking evidence comes from the execution of the environmental festivals. According to interviews, this is the only activity with overall agreement: *"when it comes to the festival is the only thing we all agree upon, everyone gives something, resources are mobilized, even if it is just a bag or rice"* (Member of Woman's Association).

The category "project blockade" shows something similar (Fig 9, Appendix 2). In a context in which coordination is lost, and issues are polarized, competition between actors and their logics becomes increased. Within the corridor, projects are blocked by organizational actors if they don't fit their prescriptions and values, regardless of the technical aspects of the project and the positive impact it might have on EPS output. As one woman in the local council put it, *"at the moment I bring a new idea to the council, one that is being promoted by my organization. At that moment, there is resistance generated against us. Therefore, we need the council to be restructured"*. This shows that inactivity comes from lack of coordination, but it also comes from the intense contest between organizational members. Based on this discussion I propose:

Proposition 3: institutional complexity affects environmental problem-solving output by impairing the capacity to generate overall agreements that can mobilize resources creating inactivity and project blockade.

Finally, it comes down to EPS output. It is not the interest of this research to define what a suitable output is for the corridor but to initially explore how complexity affects the capacity to obtain the desired outputs determined by those managing the ASBC. The main take from the data is that besides breaking down the coordination needed to execute strategies; complexity makes the output to be misaligned with feasible and viable solutions. In the experience of complexity, actors have embraced mitigating strategies that, among other things, have defined the acceptable output of the EPS solution as "*the corridor still exists*" (Member of the Local Committee) (Details on appendix 2). In such a contested ideological ground as the biological corridor, the simplest of outcomes is valued as a satisfactory result. Indeed, actors within the corridor are mostly pleased with the existence of the ASBC regardless of whether the corridor solves the environmental problems that initially motivated its creation. Within this context of complexity, actors see the possibility to chase their interests and use logics rhetorically in a way that can help them pursue idiosyncratic themes and gains.

Proposition 4: in a context of institutional complexity the focus on idiosyncratic issues and the rhetorical use of logics made the environmental problem-solving output simplistic and misaligned with viable solutions.

In sum, this study shows how within the ASBC the institutional context of complexity has evolved by the specific pattern of emergence of institutional complexity conditions and organizational responses. It suggests that institutional complexity associated with the ASBC has produced grave impacts on the environmental problem-solving capacity within the corridor. Furthermore, it has impaired the problem-solving capacity by reducing coordination and polarizing issues. The result is a situation that leads to simplistic EPS that is not aligned with viable and effective solutions to the problems that motivated the creation of the corridor.

5. CONCLUSIONS

Traditional environmental management approaches for biological corridors have focused on the physical and natural environment. Often this is a mechanistic asset-based approach that places almost all the attention on the object of management, rather than the organization in charge of management and the context in which management takes place. Adopting an innovative institutional theory perspective operationalized using SSM methodologies, I was able to provide an alternative thinking mode that demonstrated that biological corridor management was constructed by continuous negotiations between organizational actors, and not by the dire needs of the natural environment. In the words of one of the participants: "*Traditional consultants that have worked with us only think about frogs and trees, this work has gotten to the root of the problem, and the great thing is that frogs and trees are there too!*" (Coffee producer member of ASOCUENCA).

With the Alexander Skutch Biological Corridor, the work found four problematic situations: un-planned land use change and increasing urbanization; the reduced productive capacity of farmers; the low level of inhabitants inclusion in integral development strategies; and the lack of a clear, shared vision for the organization and the corridor. During the workshop, we managed to delineate macroeconomic shifts that endangered the livelihood of local coffee producers. This generated rapid land use change and urbanization that threatens the corridor. Within the ASBC, a possible collapse of local rural communities might be beginning. Young people are migrating to cities, the land is being transformed from its traditional agricultural use to urban areas, and local people are afraid of having to abandon their land. The discussions and information generated in this research suggest that if the process continues, it might significantly affect the social and ecological stability of the corridor. This is evidence to support previous recognition in the interrelationships between the global loss of nature and the collapse of rural communities (Beeton & Lynch, 2012).

This brings to the moment of answering the applied version of the research question: *Can the application of Soft Systems Methodologies informed by Institutional Logics Theory improve the implementation of the Alexander Skutch Biological Corridor management plan?* The results from the SSM workshop are a positive sign that the identified opportunities for improvement if applied can

advance the implementation of the corridors management plans. The research managed to find a new shared vision among the people leading the corridor and four feasible and desirable opportunities for improvement for the LC and in turn, the corridor. The strategies include: (1) clarifying the vision for the organization based on the existing purposes for the corridor; (2) reducing the organizational scope with task prioritization; (3) creating a plan for prioritization and engagement of relevant stakeholders; and (4) actively engaging in land use planning.

5.1 ON THE ASBC

The central recommendation is for the newly identified shared vision of protecting healthy sustainable rural lifestyles to be included as the organizational vision within the new management plan. During the workshop, this vision forged novel shared meanings and understandings among organizational members. These new understandings can improve the coordination capacity of the organization to move it past the perceived gridlock. As quoted during the workshop: "*this is the first time that someone has got to the real issues of the organization, we need to take this information into the design of the new management plan*" (Coffee producer).

This was only achieved by the successful logic moderation generated using SSM methodologies. In the corridor, the strategic use of different logics by organizational actors leads to the validation of problem-solving approaches that are more concerned with legitimizing idiosyncratic solutions rather than solving systemic issues. This fixation on idiosyncratic issues and logic-specific environmental constructions was overcome once worldviews were openly shared, issues were clarified, and intentions were exposed in the open. The successful identification of a shared vision that encapsulated all the main individual motivations reduced organizational barriers, which let participants work together on a shared objective. The SSM intervention facilitated information and discussions that placed the attention in shared systemic issues, successfully moving pass the incompatibilities and fixations.

The SSM intervention also managed to re-signify local actors by clarifying the role and stakes that actors genuinely have on specific issues, instead of the taken for granted ones. The farmers referred to as *campesinos* in Costa Rica, previously perceived as enemies could now be seen as

victims. An honest discussion allowed for the possibility of the emergence of mutual understandings and the reduction of gridlock between actors.

Furthermore, the research suggests corridor management needs to expand its focus, going beyond the object of management towards the organizational dynamics of the managers. It also demonstrated that lengthy complicated environmentalist-oriented management plans are likely to produce institutional fatigue, demotivation, and gridlock. The opportunities for improvement for biological corridor management lie in the creation of management structures that increase the coordination between actors. Essential suggestions to take into account are the reduction of the biological corridor's scope, the careful design of governance arrangements, and the identification of locally shared meanings that can mobilize resources towards implementing coordinated action.

5.2 LIMITATIONS

It must be said that creating a shared, tightly packed purpose for a multi-actor system as broad as a biological corridor is a challenging task with much room for failure. It is not my intention to suggest the work undertaken by multiple consultants and professionals in the creation of the corridors is inadequate—it is far from that. I aim to acknowledge how this process is inherently difficult given the organizational complexity in which it is immersed, recognizing that loose definitions, broad, diverse goals, and conflicting interest in many occasions might be unviable to reconcile. Identifying this aspect of environmental problem solving within biological corridors could give us a massive opportunity for improvement. A desired and feasible shared vision is a determinant aspect of increasing problem-solving output quality, by providing an inclusive guiding compass that can reduce the institutional complexity and the incompatibilities between goals, to successively reduce the contest between participating actors.

5.3 ON SSM METHODOLOGY

The research also provides insight into the appropriateness of use of the SSM methodology in combination with the institutional theory framework. For SSM practitioners I recommend including

well-tailored interviews that can generate baseline information in preparation for the SSM workshops, and to critically evaluate if the research strategy is heavily weighted in problematic situations.

The use of initial qualitative interviews was most valuable to expand the toolset of SSM. The interviews created valuable baseline information that significantly guided discussion and reduced the workshop duration. This allowed for participants to spend less time and feel less fatigue with the work. The work of this research expanded the problem-centred approach of SSM. It is my appreciation that this methodology is biased towards problematic situations, and towards taking reality as problematic. In specific settings, like those of communities facing difficulties tackling complex environmental problems, consultants, professionals and academics continuously ask about problems and things that need fixing. In such a context, an approach solely centered in problematic situations can unintentionally transform people into victims that need help. Appreciative enquiry principles (Kinni, 2003) employed in this work helped to reduce this bias. An appreciative approach changes the focus towards probing an organization's best attributes, dreams, desires, and successes (Kinni, 2003). It helped to create a positive environment that made participants more resilient in tackling complex issues.

5.4 ON INSTITUTIONAL COMPLEXITY AND SSM

It is now possible to answer the central theoretical question on this study: *How, and with what effects, has institutional complexity influenced the Alexander Skutch Biological Corridor implementation?* Institutional complexity has affected the organizational capacity to generate shared agreements that can mobilize the available resources to execute tasks related to the management of the corridor. It has created positive feedback loops for actors to embrace idiosyncratic issues over systemic ones. This is a process that has reduced coordination and increased the polarization of issues, and inevitably impairing the capacity to generate overall agreements that can mobilize resources. It has created inactivity and project blockade. In such a context, the focus on idiosyncratic issues and the rhetorical use of logics made the environmental problem-solving output simplistic and possibly misaligned with effective environmental solutions.

With institutional complexity theory, this research provided evidence on the evolution of institutional complexity within an organizational field, as previously suggested by Raynard (2016). Within the corridor, the experience of institutional complexity went from an initial restrained phase to a phase of volatile complexity and then again to a phase of restrained complexity. This evolution was influenced by the specific conditions and organizational responses within the ASBC organizational field. I proposed that within this field three conditions that increase institutional complexity were identified: the inherent wickedness of environmental problem solving; precursory conditions; and emergent conditions. The first two conditions generated an initial experience of restrained complexity when the participating logics managed to create original agreements with the sustainable coffee initiative that achieved a prioritization of logics within the field. As new conditions emerged, this prioritization of logics was lost, and the organization went into a phase of volatile complexity.

Finally, impacts from the experience of complexity within the organization generated both mitigating and aggravating responses. The aggravating responses acted as feedback loops to increase the experience of complexity, and the mitigating ones helped the organization cope with the strains from complexity. Eventually, the mitigating responses by the LC and its members successfully prioritized the logics within the field. The environmentalism logic became the priority when defining goals for the corridor, and the productive logic was the priority when selecting means to accomplish the corridor's goals.

As a final thought, this research represented the first case study to operate the institutional theory framework in a real-world case using SSM. With the use of institutional theory as an anchoring theoretical framework, SSM was well suited to explore situations in which worldviews collide. This combination of theory and methodology helped expand understanding of the institutional dynamics that generate and maintain these conflicts between worldviews. When the institutional processes that sustain clashes between worldviews are illuminated, the SSM intervention becomes more productive, efficient and effective. I hope that my work will open the path for those using SSM methodology to include institutional theory as a valuable anchoring framework.

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7. APENDIX

Apendix 1. Interview guideline.

Name	**Phone**	**Ethics**	Written/Oral/No
Community	**Phone 2**	**Photo**	Yes/no
Occupation	**Organization**	**Age**	
Address	**Email**		
Interview Date	**Time**		

1. After the statement, respond if you fully agree, agree, don't agree or disagree, disagree or fully disagree with the statement.

Dimension	Question	I Fully agree	I Agree	I Don't Agree or Disagree	I disagree	I fully disagree
Resources/ equipment	The ASBC/local committee has the necessary resources, equipment and technology to achieve its goals					
	We capture all the necessary information to understand how to improve the corridor and generate new opportunities					
	We have the necessary infrastructure in the corridor					
	We use resources and tool effectively to reach our objectives					
Process	In the corridor, organizations work ins integrated together					
	We are very good working in teams					
	With frequency, feedback from communities/stakeholders brings actions					
	Problems are confronted instead of ignores					
Personas	Within the corridor, there are training options that help us fulfill the objectives of the corridor					
	I don't confront many restrictions when taking decisions or proposing new projects/ideas					
	We have the necessary human resources to fulfill the objectives					
	The actors in the corridor are highly motivated to participate					
Structure	Teams formed by different organizations are usually very effective					
	There are no frequent organizational barriers that interfere with achieving our objectives					
	We are committed to working for the corridor					
	The team I **directly** work with functions adequately					

RAPPORT

1. How long have you lived in the area/ worked in this organization?
2. Do you like where you live? Would you like to go to another place?
3. What are the main things that make this area work, what makes this a wonderful place?
4. Can you describe the area before the corridor (2005)?
5. Imagine this place in 5 or 10 years, just as you would like it to be. What makes it flourish? What makes it a nice place? What changed? What remained the same? How did you contribute to that future?

PURPOSE AND EXPECTED RESULTS OF THE ASBC

6. Describe your participation/ involvement in the creation of the corridor? If the answer is "none," describe the creation of the corridor.
7. What is (ought to be) the purpose of ASBC? Who is (ought to be) ASBC intended for?
8. Currently, Is the purpose being fulfilled?
9. What of the things mentioned in question 8 is not happening right now?
10. What are the things preventing facilitating the corridor from fulfilling its purpose (or statements mentioned in question 6)? Things mentioned in question 9.
11. What does (ought to) demonstrate that Biological Corridor is fulfilling this purpose?
12. What is the mechanism in place to ensure the corridor is fulfilling its purpose?
13. In your role as (Example: farmer) what is your main interest in the corridor?
14. What is your organizations/sector main interest? Why is the corridor important to you?
15. What is the barrier (rock in the show) to pursue that interest?
16. On what level is your organization/sector satisfied with the results of the ASBC? Were one is very unsatisfied, and five is very satisfied.
17. Have you perceived any personal benefit from the existence of the corridor?

ORGANIZATIONAL/SECTOR RELATIONS WITHIN THE CORRIDOR

18. When thinking about issues relating to the corridor, how is decision making done, who is (ought to be) the decision-maker? Give an example.
19. What components (resources and constraints) are (ought to be) controlled by the decision-maker?
20. What is (ought to be) out of the control of the decision-maker?
21. Who is (ought to be) involved in planning the management of ASBC? Who is not and should be?
22. Who is (ought to be) considered to be affected by ASBC?
23. Which organizations do you regularly meet with, and what for?

Relationships		Frequency		
Actor	Description and motives	Annual	Monthly	Weekly

CURRENT OPERATIONS AND PROJECTS

24. From 1 to 5, where 1 is the less important actions to pursue in the ASCB and 5 is the most important, classify the following:

	Priority	Which organizations participate more active with this action?	Which organizations participate less active in this action?
Protection of natural capital (example to elaborate a community vigilance plan, design an environmental restoration plan)			
Promotion of Scientific research (Example, to create an information management system, to create an informational newsletter)			
Promotion of sustainable economic activities (example, designing new touristic opportunities, participating in international fairs, to create a plan for the investment in economic activities like fincas integrates, to create an ASBC brand)			
Education and communication (example: to create a web page for the ASBC, to elaborate an educational plan)			
Administrative management of the corridor (example: to create a management unit, to coordinate with the ministry of environment, to train members of the local council in management issues)			

25. What other important action would you add?
26. Describe a successful project in the corridor? (A project you remember that was very successful). Why do you think it was a hit? What made it successful?
27. Describe a project that confronted major challenges in the corridor? (A project you remember that was very disappointing) What were the challenges? What could have been done to make it better?
28. Without being humble, what is the thing you value the most about the corridor? About the LC?

Appendix 2. Categories, characteristics and exemplary data used for the construction of fig. 9 conceptual maps.

	Theme	Characteristic	Exemplary data
	Endemic dynamics		
Precursory Sources	Economic Shift	In the last 50 years, the economy in the area has moved from an agricultural economy to a touristic economy, and with this change a new logic emerged with new values, taken for granted behaviours, and rules.	*"When everything started, there was a tension between the touristic and agricultural sector. I remember that at some point we wanted to developed tourism, but the local council said, our priority is to develop agriculture. And tourism was left behind, put to a second level priority, and now, it's backwards, the corridor has developed tourism more."*
	Traditional Conflicts Between Communities	Within the corridor, communities have a history of specific conflicts that reflect onto the organizations that represent them. Further increasing disconnection and reducing coordination.	*"There are seven communities in the corridor, but only two are within the local committee. The ones controlling the corridor are the organizations from those two communities, they control it based on their own interests."* *"I say there is a lot of jealousy. X people don't get along with those from Santa Elena nor with those of San Francisco. And this has been the limiting factor for the integration between communities."*
	Increased logic influx	The corridor has attracted many people in the last 20 years, from students, consultants, foreigners, government officials and many organizations, and with them, a rapid and diverse influx of new logics.	*"The University brought the idea of certifying the producers to fulfill that gap in the market; they wanted that."* *"Now came Rise, a mega project with very new things happening, and people start capturing new ideas."* *"We can say the idea was brought by CCT, at that time there was a boom in the establishment of the biological corridor; there was also the Mesoamerican corridor."* *"Students from Canada come here, they bring many new ideas, and they start making you a conservationist, you can't help it."*
	Organizational Culture		
	Institutional Weakness	Many organizations within the corridor have a weak constitution, and in some cases lack the most basic of organizational structure and processes. This makes them very vulnerable to the influence of many logics.	*"If we were to have someone in charge to execute things, but we don't have the resources. This has been a weakness, not having someone to do things. In the corridor, during meetings, we agree on something, but in the following meeting we realized it wasn't done because there is no one to do it."* *"Just by having a basic administrative structure to manage budget or capture information, that would do so much!"*
	Overseer	The appointed overseer of biological corridors lacks the organizational capacities to engage with the management of biological corridors, making it a slow, mostly absent organization within the ASBC.	*"The ministry of environment is the part in charge of the biological corridor, is an institution in crisis. They have many responsibilities and lack the capacities to attend those responsibilities. Too much to do with too little to do it. If they lead the corridor, they become just an anchor that stops anything from happening."*
	Local Council	The local council has a weak constitution; it lacks the legal conditions that allow for it to manage budgets, hire people or even apply for funding. In general, it is only a representative figure that has little authority or recognition.	*"We need a council that is legally formalized. So, we can define actions, have a president, a secretary, a treasury. A managerial council that can set paths to follow." "The council can't even have a legal constitution to hire someone or apply for funding, it just doesn't manage anything, it can't do anything."*

	Participating Organizations	Except for the field referents, such as Universities and State representatives, the organizations within the corridor are young and lack the most basic organizational structure and process.	*"It's partly because of the organizations; they are not consolidated. They lack organizational capacities and hence commitment… they just don't have the structure to carry on projects."* *"this is the hardest thing. The same happens with the ADI and the ASADA. Every year we must renew the board and the constitution. We have problems because no one wants to participate within the board. They just criticize and criticize, so the problem is to get people together working in the community associations" "Look at him, he represents 5 different community organizations, going from farmer unions to the local council and educational boards."*
	EPS Design		
	Misaligned Vision	Defined as a lack of overall guidance, the corridor has a misaligned vision between the objectives and the organizational strategies. This misaligned vision increases logic competition by not providing clear guidance for the organization.	*"We haven't managed to match what the Ministry wants with what the communities want."* *"There is a clash of visions."* *"even within the establishment of corridors, there were two visions, one wanted to buy land for conservation, and the other one aimed at working with producers to adapt their practices to facilitate wildlife movement."*
	Increased logic Incompatibility	The lack of a clear organizational direction increases the incompatibilities between existing logics. Major incompatibilities happen around the means to accomplish goals, between conservationism and productive logics and between restrictive and community logics.	*"We don't want infrastructure. We want the experience. For people to come here and live a rural life. We don't want the big building; we don't want sophisticated hotels or anything similar. We want rural ecotourism."* *"the people that want conservation need to understand that protecting an area decreases the capacity of families to make a living, to have a farm of their own and produce."* *"There is a problem with this, what we are looking for is a livelihood, I can imagine this nice forest and all, but what am I going to do for a living..."*
	Governance Arrangements		
	Fusion of Governance Arrangements	The biological corridor experienced the merger of 2 or even 3 governance arrangements that produced three separate councils with a different government overseer, and different purposes and goals. This generated contest over means and goals and a lack of clear understanding of the organizational head.	*"There is no legal or administrative clarity within the local committee."* *"We merged the two because in general, the same people participate in both committees. The objectives of the local council, well I don't have them too clear, but they're very similar."* *"What happens is, that when they were creating the corridor they use the Watershed committee as the seed for the local committee, then we end up having dual functions."*
	Changes in Field Centrality		
	Changes in Organizational Managers	Changes in the managers of central actors, such as Universities, NGOs or Government organizations, affected the capacity to articulate or coordinate organizations within the field. New managers came with different logics, priorities or expected results, which usually reconfigured the field.	*"Then there is a change in management within CCT, and they didn't manage to… the leader at the time did not manage to understand the project… with the changes in leadership within UY and CCT, we needed to start fresh almost every year... to start selling these ideas to the new managers."*

Emergent Sources

	There is no organizational leader	The local dynamics made it difficult for one organization to assume leadership. First, because of competition for leadership between organizations, and second, the involvement of state overseers that have alternated leadership in a contested way. Furthermore, some organizational leaders were not recognized as legitimate and lacked core competencies to manage logic-specific objectives, such as the development of value-added products.	*Well, I used to be the coordinator. The thing that happened is that based on the 7779 Bill for the Use, Management and Conservation of Soil, I am the overseer of this committee. But per the Law on Biodiversity protection, it is the Ministry of environment the one to oversee the corridor. Then the coordination was placed on the Ministry of Environment, but for A or B circumstances they did not really participate, then I became the coordinator again."*
Impact on organization	Mitigating		
	Duplication of Initiatives	To cope with complexity and the disagreements that inevitably arise, work is often duplicated. Similar initiatives are held separately given the difficulty for negotiation. This compromises the effective use of resources within the organization.	*"We never progress within the corridor. Because it's like we are separated units within the corridor, not one corridor… for example, we are going to make a festival, and then, one community organizes one festival, and the corridor organizes another one, all because of the conflict between communities."*
	The purpose is redefined in cycles	As logics interact within the corridors, and different organizational actors take centrality, or new actors enter the field, the purpose is redefined by including more elements from different logics.	*"This is what we want with this project from GIZ, to mark a new direction, new expectations or new improvements."* *"At some point, the corridor was conceived for conservation, after that, it was conceived for the people in the community. And after that, it expanded even more, when new people came in. Yes, it has expanded like that, it has also expanded given the evolution of the economy."*
	Work is done in Silos	Within the work of the Local Committee, organizations are articulated based on their shared interests. This created silos to cope with the strains from incompatibilities and constant negotiations.	*From the SSM workshop: participants noted that organizations are articulated based on their interests to reduce the conflict among them, a consequence of the lack of a unified vision for the corridor. Further evidence comes from the Organizational climate survey that has high scores in "the team I directly work with works well," and low scores for "Organizations articulate their work within the corridor."*
	Increased emergence of organizations	New organizations started appearing within the corridor, not only to capture opportunities but to reduce the strains from conflict. Without being part of an organization, actors were not seen as legitimate to take part in problem-solving or to negotiate with other actors.	*"Then I created (org x), I said I couldn't work within the corridor, but I can work with communities."* *"We are stuck, so we decided… the members of the local council, that either they allow us to make a new managerial organization, or we leave."* *"They just couldn't find the right way to organize themselves. They needed the participation of business and government to consolidate the process."*
	Disconnection with a management plan	The management plan reflects the very specific logics of its creators. In many cases, these plans do not satisfy the needs of other logics. Due to this, the actual work of the organization becomes disconnected from the plan given the difficulties of agreements.	*"Yes, it is like the management plan is there. But everyone works on their own, without working with the plan. It is like no one embraced it."*
	Adjustment in decision making	The lack of agreement, organizational competition, and lack of clear leadership produced adjustments in decision making so that negotiations could be avoided, and a decision could be made. This created a simple majority decision-making process where each organization had the same "power."	*"If you see the National Program for Biological Corridors and its structure, you see they are structured like a board of directors. We were a board of directors at some point. What happened? Well, that members of the board were selected and then they didn't care.... we don't want people to monopolize things. This has really helped, everyone has equal participation, even if there is fighting, decisions are made. Things are put forward, and there are arguments, but we try to bring it down, this is what has happened."*

	Work is done opportunistically	As logics interact within the organization and central agents change, priorities constantly shifted based on the interest and needs of those present. The work does not follow the management plan or its priorities but rather was opportunistically based on the interplay of actors and their access to resources.	*"As we see the work through the years, how everything has changed how the vision from the management plans changes, one could say that we fulfill the purpose, but little parts of it. No one single purpose or objective has been fully accomplished."* *"We can say that we had to embrace other people's ideas. That project (an example) was not an initiative within the committee, some people came and proposed it. And in that time, we had issues and problems; there was no coordination."* *"We work based on who is there; decisions are made based on who is there and their interest, we just want to move forward."*
Aggravating			
	Organizational ambiguity	Multiple logics within the corridor have been interacting and competing for so long that the organization does not have a clear identity. Its various identities depend on how specific logics see the corridor.	*"We take decisions, but there is so much ambiguity, there is no logical structure."* *"What did you wanted a biological corridor or a touristic developer?"* *"Some people think we are a Development Association; we are a biological corridor!"*
	No organization wants to lead	Central actors expected to lead within the corridor were avoiding this central role. At the initial stages of the corridor when there were gains to be made from centrality, this wasn't a cause of complexity. After 18 years actors are now avoiding leadership due to the great costs the organization bears in doing so.	*"We told the CCT, but CCT said no because they have experience from another corridor. In the other corridor, everyone was expecting for CCT to carry the investment weight. Amacobas didn't want either, nor ASOCUENCA, they felt it was too risky."* *"Competencies? Yes, there are competencies to manage the corridor, what there is not, is someone that wants to do it. You need to have resources to do this."* *"What happens is, that within the corridor we criticize anyone wanting to do something: people don't do anything and if someone does they get criticized."*
	The organizational scope is unrealistic	The interplay between organizations and their varied expectations for the corridor has led organizations to increase their scope constantly. This provides a means to reduce conflicts by including all the different interests that can be attached to the corridor. Increased scope, however, further complicates the capacity to create overarching shared new meanings, and overburdens the organization with multiple unrealistic tasks and goals.	*"They have expectations that are not attached to what is really going on… they are not realistic, and we need to have a clear scope of what we can do."* *"I think that it does not make sense to "make the cake bigger for everyone" if the tension is about who can gain more. I think that the corridor has tried to monopolize everything that happens here, within the scope of the corridor, and that is limiting the capacity of the corridor to actually do something."*
	Division and conflict amongst organizations	The complexity has impacted organizations capacity to coordinate among participating members. Organizations within the corridor have become disconnected and in conflict. They fight over resources, access to project leadership roles, and the benefits that come from the corridor.	*"There has always been a problem with the management of the local council and these problems are associated with the rivalry between leadership and organizations."* *"This is happening, last year one organization created and proposed a big project, and another organization in the local committee started to make their life impossible because they didn't agree."* *"Take this project for example, if we say "yes we agree with it," the conservationist side of the LC comes to get us, saying we destroy nature. If we disagree with it, then is the community side that comes to say we harm their economic opportunities."*

	Competition for resources	In a limited space with a changing economy, the competition for resources has greatly increased. Informed by different logics, organizations compete to validate their own approach to how the corridor should operate, and the means it should use to solve environmental problems. If successful, organizations access more resources.	*"Within the local council, there are tensions between sectors and communities; there are tensions with woman associations, there are commercial tensions over organizations that sell similar products, there are tensions from competition to access resources."*
	Competition for leadership	State actors competing for jurisdiction have mainly embodied this competition. Nonetheless, other organizations compete for leadership of the Local Council, or for the leadership of specific projects and initiatives that could potentially bring resources.	*"What happens is that I moved to the side (as coordinator), the Environmental Ministry said, "no, this is mine, and we want to be the leading actors."* *"Yes, we were leading for some time, we were the main touristic leader, and we coordinated the corridor. At that moment, some financial resources appeared some money to handle projects. With this, they made a video, and they cut us out of the credits, even after all our input. I decided to step away as coordinator; I felt that this was not appropriate behaviour."*
	Institutional fatigue	All the conditions above bring fatigue to LC members. The states of constant competition between actors, and massive organizational scope are important feedbacks to this fatigue. In summary, the organization's members (LC) are saturated, demotivated and overworked. With fatigue, comes a change in individual actors and with it, new dynamics and new logics that increase complexity even more.	*"You are just worn out, even though you want to work, there is no way. I started in 2008, and there have been so many bumps on the road, one after the other"* *"There is a point when you just think, "why am I going to continue pushing all of these people around. I just want to quit."*
Impact on EPS output	The purpose is manipulatable	The array of logics, their incompatibilities, and the contest between actors allowed the purpose of the corridor to be manipulated based on organizational interests. This, in turn, impacts the capacity to channel resources towards solving the identified environmental problems.	*"There were people interested in economic development, if this were to happen, it would improve the community's livelihood. This allowed us to capture donations to implement other activities that were not included in the economic purposes…. It goes like that, if by A or B we can fulfill another objective that might match those of the corridor or to cover projects and programs that are not within the objectives but will eventually bring benefits, we just do it."*
	Project blockade	The competition between organizations, and the incompatibility between their desired means and goals can lead to blockade of projects that might go against specific logics or values.	*"At the moment I bring a new idea into the local council, one that is being promoted by my organization. At that moment, there is resistance generated against us. Therefore, we need the council to be restructured."* *"For example, the representative from the University comes with his own interest. They have a business; then he comes here to pursue his own benefit. And then the lady from the woman association, she has a business, and she wants to get her own benefits. We need more community consciousness and sharing."*
	Inactivity	The perception within the organization is that there is generalized inactivity born in gridlock and the lack of a shared vision. Important projects become inactive, like the creation of a corridor brand or reforestation initiatives, which lack overall support. There are little overarching agreements that can mobilize different resources for the execution of tasks.	*"We need to do something with the management plan or at least to be able to develop some things that are currently inactive. As my colleague says, "are we going to come here and waste time having coffee and talking during meetings? If at the end we don't reach agreements, and the next meeting, is the same."* *"I think it has to do with the plans... I think it's the academic sector that needs to commit more. Probably they will just say "here comes again another academic with another survey... and nothing happens afterwards."*

	The outcome is misaligned with a solution	The complexity has made environmental problem-solving needs misaligned with the corridors outcome. In such a contested ideological ground, the simplest of outcomes were valued as a suitable result. Indeed, actors in the corridor were pleased with the existence of the corridor regardless if it solved the environmental problems that originally motivated the corridor's creation.	*"What satisfies me the most is to see the corridor still alive, to see that it is making some things. There are corridors in the country that only exists in paper, not ours."* *"it fulfils its purpose in the sense that in the mind of many people it creates some restrictions, even though that is not clear, for example the people know there is a protected area and that they can't cut forest. And not because the law commands it like that, but because it looks like that, then people don't do it."*
	Focus on idiosyncratic issues	Actors are focused on issues that are informed by their logics; producers see the main problem as the lack of value-added products, touristic developers see it as the pollution in the area, and conservationists think that agricultural practices that damage connectivity generates the problem. Upholding of idiosyncratic issues obscures the focus on systemic issues like land use change, climate change or macroeconomic shifts.	*"This is the first time that we don't use plastic; I was the one that promoted and fought for it. This was also the first time that we did something environmental like planting trees."* *"I'm telling you the problem is garbage. This is what I want the most, for people to be aware of picking their trash. I imagine this corridor without a single piece of trash in the street."* *"The problem is burning sugar cane, Alexander Skutch says it on his book, he says it there. That mono-cultivation and burning of sugar cane are killing the biodiversity within the corridor."*