Who's at the Gap between Research and Implementation? The Places and Spaces of Encounter between Scientists and Local People in Madidi, Bolivia

Anne Helen Toomey

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ABSTRACT

Increasing attention in the conservation sciences is being paid to the existence of a 'gap' between research and action. Although much research has implications for management, rarely does it have real impact on the problems it seeks to address. As a result researchers are increasingly concerned with demonstrating that the impacts of their research go beyond academia. Recent scholarship has proposed various solutions for 'bridging the gap'. However, missing from the debate is a closer analysis of *who* lies within the gap and what happens in that place: What kinds of encounters and misencounters occur between scientists and non-scientists during the practice of doing scientific research, especially in situations that include 'everyday' activities and communication (i.e. fieldwork)? This thesis approaches the issue by enacting a Participatory Action Research methodology in the Amazonian region of Madidi National Park in Bolivia, that includes a quantitative analysis of past research, semi-structured and unstructured interviews (n = 137), and workshops and focus groups (n = 12) with local inhabitants, scientists and park guards. The study demonstrates the significance of currently unacknowledged or undervalued components of the research-action gap, such as power, respect and recognition. It explains how and why within spaces of encounter and misencounter between scientists and local people, knowledge can be exchanged or hidden away, worldviews can be expanded or further entrenched, and scientific research can be welcomed or rejected. It reconceptualises the gap as a crucial, productive space within which asymmetrical relations of power between scientists and local people have the potential to be transformed. In additional, the thesis discusses the implications of these spaces for the future of conservation science and practice in postcolonial contexts, with an explicit call to action for researchers to reprioritize the *who* at the gap between research and action.

Hope is the feathered thing
that perches in the soul
and sings the tune without the words
and never stops at all.
-Emily Dickenson

This thesis is dedicated to my parents, who above all, taught me to hope.

FOREWORD AND ACKNOWLEDGEMENTS

This thesis is based on my own critical hope that conservation science and practice has an important role to play in improving ecological and social justice on the planet. These two words together – critical hope – might seem to some to be an oxymoron, especially for those who equate hope with positivity and optimism, and critique with negativity and cynicism. But understanding the difference between hope and optimism, as well as between critique and cynicism, is essential to engaging in any work for change (Jensen 2001).

Critical is the first part of the equation. A friend once told me, "all criticism is good," a comment to which I initially reacted with feelings of discomfort. Because criticism is so often associated with negativity, its potential for driving change is often ignored, or even forgotten. But when criticism is viewed as a lens of curiosity through which to see old situations in a new light, its true power can be grasped. Criticism can help us to better understand the roots of the problems that we seek to overcome, and to come to terms with our complicity in such situations. Over the past four years I have come to appreciate critique as a kind of double-beam flashlight that illuminates within at the same time that it shines outward. I see it as the well-oiled spring that gives my work its tension and strength.

However, criticism is nothing more than criticism if there is no belief that things can be changed. As Chatterton writes, "let's save our pessimism for better times" (2008, 426). Such hope for change is not about being optimistic. In an essay entitled, 'Hope required when growing roses from concrete', Duncan-Andrade writes that optimism is often based on a kind of 'hokey hope', one that believes that things are going to improve in the face of overwhelming evidence to the contrary (2009). Hope is not about looking for a silver lining. It is not something that is 'in spite of'. Rather, it is 'because of'. Hope is not the flower that grows out of the gaps in the concrete – it is the gap itself, it is the dirt and the mud, it is the act of growing. Hope is the 'feathered thing' that sings, no matter how dark and small the cage, because to cease is to give up.

> The courage to pursue the painful path of bursting through those jagged cracks in the concrete is what I call Socratic hope. The solidarity to share in others' suffering, to sacrifice self so that other roses may bloom, to collectively struggle to replace the

> concrete completely with a rose garden is what I call audacious hope (Duncan-Andrade 2009, 5).

So critical hope is not about choosing a certain perception of the world – it is not about telling people to 'look on the bright side', or alternately adopting a cynical attitude to change. Rather, it starts from a place of discomfort that sees the incredible amount of problems in the world – economic inequality, climate change, loss of species, cultural extinctions, environmental injustice, poverty, war, exorbitant wealth, ignorance, corruption, racial privilege, human trafficking – and instead of moving away from that place, it digs deeper to unearth the pain there. It shies away from no horrible thing; it is blind to no atrocity. Rather, it finds its strength in the belief that the joy is found in the pain of struggle (Jensen 2001); or as Rumi puts it, "the wound is the place where the Light enters you."

> The joy is in the struggle, but not just because in struggle one connects to decent people. The joy is also in the pain of struggle. Joy is multilayered -- one key aspect of it is discovery, and one way we discover things about ourselves and others is through pain. Struggle confronts pain, and confronting pain is part of joy. The pain is there, in all our lives; there is no human life without pain. Pain can become part of joy when it is confronted. Struggle confronts pain. Struggle produces joy. The joy is in the struggle. The struggle is not just the struggle against illegitimate structures of authority in the abstract. The struggles are in each of us -- struggles to find the facts, to analyze clearly, to imagine solutions, to join with others in collective action for justice, and struggles to understand ourselves in relation to each other and ourselves as we engage in all these activities (Jensen 2001, p. 6).

As a guiding force for the work described in this thesis, critical hope has meant understanding the importance of facing the music, of recognizing my own responsibility in the areas I have sought to explore and critique. It has meant questioning my position of privilege as a western researcher in Bolivia and connecting that position with the painful legacies of colonialism and imperialism. However it has also meant having faith in myself, and being grateful for the faith that others have had in me. For this faith and for many other reasons, I wish to acknowledge the following people who have helped me along this often painful, yet joyful path of completing a PhD.

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CHAPTER 1

Introduction

1.1 Overview

This thesis is concerned with the gap between research and action in the field of conservation. It approaches the issue with the use of critical social theory and empirical evidence from Bolivian Amazonia, based on quantitative and qualitative social science methods. The thesis makes claims to both inter- and trans-disciplinarity, based on the understanding that these terms are defined through the production of knowledge that is not just about what we know, but also about how we communicate it (Klein 2004; Nielsen and D'haen 2014). In this sense it is interdisciplinary because it addresses a debate mainly held among conservation scientists from natural science backgrounds and attempts to frame its findings for those audiences, and transdisciplinary because it seeks to communicate beyond academia to non-scientific publics implicated in these issues. Thus, this thesis is also about the production of knowledge for society and its ultimate uses, and takes a normative stance towards 'socially robust' knowledge, a term used to describe research that is done in close interaction with broader society through a transparent process about how information is generated (Oberg 2011; Nowotny et al. 2003, 2006). This is important because "the public authority of science and the legitimation it provides is in decline, while the search for a newly defined legitimatory role is on" (Nowotny 1999, 12).

In this thesis I refer to the gap between research and action in the conservation sciences, often referred to as the 'knowing-doing' or the 'research-implementation' gap (Arlettaz et al. 2010; Braunisch et al. 2012; Boreux and Born 2009; Cook et al. 2013; Gossa et al. 2014; Griffiths and Dos Santos 2012; Habel et al. 2013; Hulme 2014; Knight et al. 2008; Lauber et al. 2011; Milner-Gulland et al. 2012; Sunderland et al. 2009). Hulme (2014) has described this gap as a "mismatch… between the ecological knowledge generated by researchers and that applied by practitioners," and Matzek et al. (2013) referred to it as a process by which "scientific information accumulates, but is not incorporated into management actions" (p. 208). However, despite increasingly frequent mention of the gap within the conservation science

community, some have begun to express frustration that there needs to be more than a token recognition of the issue, but rather a paradigm shift in the direction the discipline is currently travelling in (Cowling et al. 2004; Whitten et al. 2001; Balmford and Cowling 2006; Arlettaz et al. 2010). For example Knight et al. (2008) write "bridging the research– implementation gap requires that we as a scientific community acknowledge and agree we generally are not conducting research of societal relevance and move beyond simply noting the existence of the research–implementation gap to implementing tangible changes to correct it" (p. 614). This thesis will take these critiques as a point of departure from which to look more in depth at what happens within the gap and actually attempting ways through the research itself to bridge it. It does this by focusing attention on *who* is at the gap between research and action, rather than simply what kind of information is needed or how that information can be best communicated, as previous studies have sought to do (Flaspohler et al. 2000; Walsh et al. 2014). It argues that by looking more closely at the *who*, we can see different perceptions of attitudes and behaviours around conservation and natural resources management, as well as the relations and collaborations between different peoples and groups and how they negotiate different understandings and interests. It raises such questions as who produces knowledge, who is that knowledge for, and who is affected by the practices of research and action in conservation. It reenvisions the 'gap' as a potentially productive space within which many things can happen and in which the central aims of conservation can be addressed, and it delves into that space to the micropolitics within.

This thesis was written with a feeling of passion and a sense of urgency with regards to the 'gulf' between conservation scientists and social science critics to which other authors have previously referred (Adams and Hutton 2007; Brosius 2006; Mascia et al. 2003; Campbell 2005; Redford 2010; Redford et al. 2006; Sandbrook et al. 2013). As a researcher-practitioner in the areas of environmental conservation and community development, I have been greatly concerned at the lack of references in conservation biology journals to decades of research on the relationship between knowledge and power as carried out in development studies, anthropology, human geography, and science and technology studies, among other critical disciplines. The more that I have read of these literatures, the more it has seemed to me that there exist two separate conversations about precisely the same issue but in entirely different

languages[1]. Thus, this is a thesis that sits rather stubbornly between the two camps of understanding: the first, mainly consisting of conservation scientists and practitioners who are concerned about what the gap between research and action means for the preservation of the world's biodiversity, and the second, made of up primarily of critical social scientists who see the gap as an inevitable consequence of the way in which the relationship between conservation science and practice is conceived in the first place. Although I am interested in contributing to the way these debates are framed in social science fields such as human geography, my main academic audience are researchers working in the conservation sciences. Balmford and Cowling (2006) declare that the future of conservation biology depends upon such a move towards greater inter- and trans-disciplinarity:

> Given that nearly all conservation researchers to date have been trained in a single discipline, there are significant barriers between us (even within the natural or the social sciences) in terms of having different values and divergent views about what constitutes a useful answer to a problem… We will need to train genuinely transdisciplinary thinkers (Max-Neef 2005), which in turn will require us to break down traditional divisions within tertiary education. Above all, we will have to disperse from our familiar academic habitats into new and unfamiliar ones (p. 694).

This is a thesis that attempts to address this call by seeking to break down existing divides through a process of 'conscientization'. Torre defines this as "a process wherein people develop critical consciousness through collective inquiry, reflection, and action on the economic, political, and social contradictions they are embedded in" (2014, 3). In this sense I argue that the first task of inter- or trans-disciplinary research needs to inspire in the researcher a process of reflection towards one's own position in relation to their object of inquiry, with the hopes of inspiring such reflections in others (Toomey et al. 2015; Klein 2004). In this sense this thesis also represents a challenge to other critical social scientists to engage more closely with the objects of their critique in constructive ways (see also Redford 2010). While there is value in research done 'on' as opposed to 'for' conservation (Sandbrook et al. 2013), the reality of time constraints and difficulty in understanding unfamiliar language means that very few conservation scientists actively engage with such literatures, leaving them in a niche to grow in relative disciplinary isolation. Thus studies that seek to communicate across divides are essential, especially if such insights can go beyond

[1] Notable exceptions to this include scholarship by William Adams, Chris Sandbrook, Melissa Leach, Fikret Berkes, among others. For example, see Adams 2014.

academia and peer-reviewed publications to communicate with 'the real world' through participatory methods and creative forms of dissemination. To this aim, this thesis is additionally driven by a Participatory Action Research methodology that has incorporated alternative forms of producing and sharing knowledge with the people I have identified to be 'within the gap' in the Madidi region of Bolivia, where the fieldwork for this research was carried out. Through this approach (to be discussed more in depth in Chapter 3) I have aimed not only to provide practical recommendations for bridging the gap in theory, but also to attempt ways in which to bridge it in practice within the confines of this project.

A few things this thesis is not. It is not an ethnographic study of a specific group of scientists, park guards or local people, though many of its findings are supported by literatures based on ethnography as method. While these kinds of studies are very important for going into detail and depth on a particular case study and the complex relations within specific situations, I decided to engage in a more regional approach in order to capture the scope, scale and diversity of the challenges around the research-action gap as they play out across different contexts and cases. This in part was done to show how these issues are not specific to mistakes made by any one specific group or community, but replay again and again in different contexts, negotiations and relationships between scientific researchers, the organizations they work with and the non-scientific stakeholders they seek to engage with and ultimately influence. This has meant working with many different groups and people across a large region, rather than focusing on a specific community or case study, and thus has had implications for the methods chosen and the way in which the data is presented. Nor is this thesis a critical piece on the historical drive to impact in science since the days of the Enlightenment and a normative analysis of how this trend is currently influencing the practice of conservation science. I identify with the aim of conservation scientists in their mission to 'save biodiversity', and while much of the thesis involves a critique about how the way the R-A gap is not achieving that aim, I do not directly critique the mission itself. Thus, my engagement with literatures from the history and social studies of science remains relatively limited for the purposes set out in this thesis.

1.2 Research questions

The thesis is centred on one main question: *Who* is at the gap between research and action in the field of conservation, and why is thinking more carefully about this *who* important for bridging the gap? Within that question are several more questions specific to the research context, as follows:

1. What is the extent of the research-action gap in Madidi, and why does it exist?
2. What spaces are found within the gap, and what happens in these spaces?
3. What kinds of relationships between people and organizations exist in these spaces?
4. What kinds of knowledge, values and interests are perceived to be helpful for bridging the gap, and which are omitted as irrelevant or unhelpful?
5. What is the role of place in these debates? How does knowledge circulate between different places, and what does this mean for the gap?

1.3 Summary of study location and methodology

This thesis is based on 15 months of research carried out between 2012 and 2014 in Madidi National Park and Natural Area of Integrated Management (NP/NAIM) and the surrounding region, located in the northwest department of La Paz in Bolivia. Madidi NP/NAIM encompasses over 19,000 km^2 of land of immense biological and cultural importance that stretches across the Andes-Amazonia of South America. More on this landscape and the people living and working within it will be discussed in Chapters 3 and 4. The research was carried out during four key periods in Bolivia, including a reconnaissance visit January-February of 2012 (one month), a preliminary fieldwork period June-December of 2012 (six months), a main fieldwork stage May-December 2013 (6.5 months), and a period of validation of data/preliminary dissemination stage June-August in 2014 (2 months), which included some documentary filming of interviews previously conducted. A final dissemination stage is yet to be carried out, but will take place August-November of 2015 with all of the involved participants/actors mentioned in the research.

I used a Participatory Action Research (PAR) approach to better understand local perceptions of the past, present and future of scientific research in the region, which relied on research with three stakeholder groups – scientific researchers working in the region (mainly from the biodiversity/conservation sciences),

indigenous community members and leaders, and protected area staff. PAR refers to a process of inquiry that is "defined both by participation and a determination to produce knowledge in the interest of social change. While often regarded as simply a method, PAR is actually an epistemological stance that values knowledge produced from lived experience as equal to that produced in the academy and, in so doing, expands traditional notions of expertise" (Torre 2014, 1). Qualitative methods included interviews, workshops, and participant observation with all stakeholder groups, and additionally a quantitative analysis was done of previous scientific research from the ecological and biological sciences carried out in Madidi NP/NAIM. The PAR approach and these methods will be discussed in further detail in Chapter 3.

1.4 Thesis outline

This thesis has an alternative format as compared to a traditional thesis by incorporating three articles for peer-review (one currently under review, two pending submission), in addition to a reflective essay that has also undergone peer-review, as the main body of work. These papers have been or will be submitted to interdisciplinary journals read by conservation scientists and ecologists, as they represent the main academic audience for whom this thesis was intended. These are supported by an introductory chapter, a 'setting the scene' chapter that summarizes the literature around the research-action gap, a methodology chapter as per standards for social science theses, (which require more than a justification and explanation of methods, but also a deep reflection on the positionality of the researcher within the research), and finally a conclusion chapter. Additional supporting information is provided in the appendices, including additional details on ethical procedures, a sample interview schedule, abstracts of other research carried out and/or published during the PhD, examples of information handed back to stakeholders in Bolivia, and a list of presentations given relating to the thesis. The following outlines the content of the chapters:

Chapter 2 will 'set the scene' by reviewing the literature on the research-action gap in the conservation science, and place those discussions within larger debates about the importance of impact in academia. I will present current critiques to the way that the research-action gap is currently discussed in the conservation sciences, and show how

the debate can benefit from an insertion of dimensions of place, space and power, as written about in critical social theory.

In **Chapter 3** I will justify the personal and academic decisions I have made in choosing my methodology, present the research 'paradigm' in which I situate myself that has to do with my personal beliefs regarding what I believe research is for. The choice of what we choose to research and how we choose to do it becomes one of greater meaning – emotion, passion, sense of existence – essentially, what we understand 'truth' to be. In this chapter I will discuss these struggles – personal and theoretical – along with the guiding theory and practice of Participatory Action Research. This includes literature from decolonizing research methodologies that explore the power relationships between the researcher and the researched.

Chapter 4, "The making of a conservation landscape: Towards a theory of interdependence," is a paper pending submission to the open-access journal *Conservation and Society*. This paper documents how various groups – indigenous communities, conservation scientists, and government officials – have worked both against and with each other through processes of tensions, frictions and synergies as part of the creation of the Madidi landscape. It uses the concept of 'interdependence' as a lens through which to examine the histories of encounter in the making of a conservation landscape, seeking out 'spaces of hope' that point to new kinds of relationships between these different groups. Its contribution to the thesis is twofold. First, it introduces the reader to the rich cultural and political history of the Madidi landscape, and places the legacy of conservation science and practice within that history. Secondly, it explores the interpersonal relations and inter-organizational collaborations that occur through the creation of conservation landscapes in tropical regions, which is an essential part of the debate around the research-action gap.

Chapter 5 is a paper currently under second review at *Ecology and Society*, "Who is at the gap between knowledge and practice? Spaces of encounter and misencounter between environmental scientists and local people." This paper focuses on encounters that occur between scientists and non-scientists during the practice of doing scientific research, especially in situations that include 'everyday' roles of labour and styles of communication (i.e. fieldwork). It builds on theories of contact that have examined

encounters and relations between different groups and cultures in diverse settings, in order to demonstrate the significance of currently unacknowledged or undervalued components of the research-action gap, such as power, respect and recognition. Its main contribution to the thesis is that it relocates the research-action gap away from the 'end' of the research process to the places and spaces in which the knowledge is produced, and additionally emphasizes typically unrecognized roles of non-scientific actors in these processes.

Chapter 6, "A question of dissemination: Assessing the practices and implications of research in tropical landscapes", is a paper that is in preparation for submission to the journal *Conservation Biology*.[2] This paper was devised, written and led by myself, with comments and suggestions made to the text and structure by three co-authors. This paper's contribution is that it focuses on dissemination as an additional space within the research-action gap in order to argue for a paradigm shift that prioritizes local, non-academic forms of dissemination. It uses quantitative and qualitative data to explore the extent to which researchers in Madidi diffused, disseminated and implemented the findings of their research, and discusses four common problems that can develop from inadequate or unintentional dissemination activities.

Chapter 7, "Writing history in the present: The makings of 'Bolivian Science' and its implications for a postcolonial world", is based on an essay that I presented at the Science and Culture in Latin America: Transmission, Circulation and Exchange Symposium at Oxford University on 18 April, 2015, and discusses how the colonial and postcolonial history of scientific research on flora and fauna in the Amazon have led to an explicitly nationalistic stance regarding biodiversity science and management in contemporary Bolivian politics. This paper also shows how research encounters in the so-called scientific 'peripheries' of the world can have implications for the production and use of science that far outstretch the limits of geographical boundaries, which supports the argument in this thesis that we should refocus our attention on the places where scientific information is produced in order to understand how such knowledge is perceived to be useful (or irrelevant) for natural resources management and policy. In this sense it explains the national cultural context in which this research

[2] This paper was unsuccessfully submitted to the journal *Biological Conservation* in February of 2015.

project was carried out, locating the research-action gap described within this thesis in a very specific place. I additionally argue that this is important because my immersion in 'Bolivian Science' has greatly influenced how I chose to present my findings – some of which will be published in in alternative formats with the direct collaboration of Bolivian scientists, park guards, and local communities, and some of which that will not be published at all in order not to harm certain individuals or projects (Laird et al. 2002).

This leads into **Chapter 8**, where I conclude with a discussion of the main implications of this thesis for better understanding the research-action gap and potential solutions towards bridging it. Overall, the thesis demonstrates that the gap does not primarily exist due to a lack of reliable information, and thus cannot be resolved with the existing methodological tools held by most conservation scientists. Rather, the thesis delves into the various spaces and places that exist within the gap in order to argue for solutions based on a radical rethinking of whom the production of knowledge is for and how such spaces and places can be transformed through the creation of new relations, actors and arguments. I link this argument to a wider discussion with regards to the debates around 'impact' across academia, and argue for a rethinking of impact as based on the ethical norms of responsibility, reciprocity and humility.

CHAPTER 2

Setting the Scene

> Conservation biology, as defined in the 1980s by the founders of the society and as ex- pressed in the words of the society's first president, Michael Soulé (1986), is an openly "mission-oriented, crisis discipline." Its mission is to save as much as possible of the earth's biodiversity. We consider ourselves physicians to nature. In other words, our objectives more closely resemble those of medicine than those of the biological fields that most conservation biologists were trained in: ecology, physiology, behavior, genetics, evolution, and systematics. Developing the frontiers of knowledge by contributing to the world's theoretical and practical understanding of biology is exciting and is necessary for tenure and promotion for those of us who are academics, but our real mission is to save the life of the planet (Ehrenfeld 2000, 106).

2.1 A Gap

Three decades ago, conservation biology had just come into its own, laden with the promise of representing a new kind of science that would seek to engage directly with 'the Real World' (Soulé 1986). However, its founders were clear that such potential had to come with a warning, cautioning that the new 'mission-driven' discipline could also fall into the typical "business as usual, blinders in place" tendencies of academia if its disciples did not make explicit efforts to act differently (Ehrenfeld 1992): "If conservation biology becomes isolated in the mental world of academia, it will be of little use" (Soulé 1986, p. 5). As an emerging field it was 'controversy rich', full of old and new tensions due to its claimed interdisciplinarity, its global outlook, and its explicitly value-laden goals (Elrenfeld 2000; Meine 2010). Meine et al. (2006) present a historical account of conservation biology that emerged from scientific, philosophical and cultural breakthroughs in the 18th, 19th and 20th centuries, which they preface with a quote by Aldo Leopold, a wildlife ecologist well-known for his role establishment of wildlife management as an ecological science:

> Our job is to harmonize the increasing kit of scientific tools and the increasing recklessness in using them with the shrinking biotas to which they are applied. In the nature of things we are mediators and moderators, and unless we can help rewrite the objectives of science we are predestined to failure (Leopold 1992(1940), 276-277).

Perhaps it was due to this longer history that some saw the new discipline as a 'passing fad', though such dissent was ultimately ineffective in stemming the tide that helped conservation biology to grow and gain in credibility, and increasing numbers of scientists began to view conservation biology as a kind of banner under which they

could unite and organize (Jensen and Krausman 1993). Yet perhaps the biggest challenge that has faced the discipline stemmed from a contradiction within conservation biology that was present at its birth: that while conservation biologists themselves could (and should) be motivated by ethical concerns, their work had to be rooted in a 'firm scientific basis' (Ehrenfeld 1970):

> Success in the practice of biodiversity conservation was measured by on-the-ground impact, yet the science of conservation biology was obliged (as are all sciences) to undertake rigorous research and to define uncertainty (Noss 2000). Conservation biology was a "value-laden" field adhering to explicit ethical norms, yet sought to advance conservation through careful scientific analysis (Meine 2010, 16).

Thirty years later, these origins have evolved into what some have called a "vigorous debate" about the gap between research and practice in the conservation sciences, and some have questioned whether the field has lost sight of its 'mission', or even if the discipline has become a 'displacement' field for academics (Whitten et al. 2001; Barry and Oelschlaeger 1996). Proposed solutions abound, including calls for a public or conservation impact factor so as to incentivize scientists to prioritize impacts beyond the publishing of scientific papers (Arlettaz et al. 2010; Milner-Gulland et al. 2009), and greater engagement with local stakeholders through various forms of participatory research, such as citizen science, participatory monitoring and adaptive management (Berkes et al. 2000; Shackleton et al. 2009; Sheil and Lawrence 2004; Shirk et al. 2012; Salafky et al. 2002; Danielsen et al. 2005, 2007, 2009, 2010a, 2010b; Mulder and Coppolillo 2005; Rijsoort and Jinfeng 2005).

However, there is still great concern that although steps are being taken in the right direction, conservation research continues to prioritize the collection of scientific data over the implementation of conservation actions on the ground (Biggs et al. 2011). Thus, even as the environmental crisis to be faced has gained a heightened sense of imminence due to the new language of the 'Anthropocene' (Dirzo et al. 2014; Ehrlich and Pringle 2008; Steffen et al. 2007), the idea that more and better information produced by scientists would lead to actual conservation outcomes is increasingly being questioned (Gossa et al. 2014; Lach et al. 2003; Srivastava and Vellend 2005; Whitten et al. 2001). As Oberg puts it,

> The belief that more information will always render better decisions is still held by a majority of issue experts, although studies in science policy have shown repeatedly that reality is far more complex(...) If you aspire to conduct studies in support of

> decision-making, it is crucial that you understand why it is impossible to solve value conflicts with more information (Oberg 2011, 50).

The above quote points to a central dilemma in the way that the research-action gap debates are written about in the conservation sciences, which is based on a long-held assumption of a linear model of problem-solving, as expressed in the quote below from an introductory book on conservation biology:

> Mission-oriented crisis disciplines such as conservation biology (…) are like a shuttle bus going back and forth, with a cargo of ideas, guidelines, and empirical results in one direction, and a cargo of issues, problems, criticism, constraints, and changed conditions in the other (Soulé 1986, p.3).

In this reading the problems go one way and the solutions travel in another, emphasizing the role of scientists as the experts to provide the solutions. The job of conservation scientists is focused on the production of information, with emphasis on empirical results in the form of graphs and numbers that will then be 'translated' into applied solutions and management implementations (Rudd 2011). In the present-day this understanding is epitomized by the current passion for evidence-based conservation that is based on an even-greater argument for the value of scientific information in decision-making (Pullin and Knight 2005, 2009; Pullin et al. 2003; Sutherland et al. 2004, 2011; Walsh et al. 2014).

However, there are some problems to this way of framing the gap between research and practice, which this thesis attempts to address through examining in detail three central critiques:

1. It conceives of impact as being linear and one-way

The research-action gap debates described above are enmeshed in larger discussions within academia about its responsibilities to society, often referred to as the 'impact agenda' (Pain et al. 2012; Slater 2011; Nowotny et al. 2006; Williams 2013). This is particularly the case in the UK where 'societal impact' was a new criterion for assessment in the 2014 Research Excellence Framework auditing of UK universities. Such trends are pushing scholarship of all types, not just in the conservation sciences, to have greater relevance to society, and the role of academia is being re-evaluated (Fuller 1999). A 2013 Special issue in Nature features the headline, "IMPACT: The

Search for the Science that Matters", declaring that, "Every government and organization that funds research wants to support science that makes a difference – by opening up new academic vistas, stimulating innovation, influencing public policies or directly improving people's lives." This understanding of scientific impact on society as 'stimulating, influencing, improving' is widely held; for example, the Research Council of the United Kingdom states, "impact is the demonstrable contribution that excellent research makes to society and the economy. Impact embraces all the extremely diverse ways in which research-related knowledge and skills benefit individuals, organisations and nations" (Piatt et al. 2012: 10).

Scholars in the social sciences have critiqued these kinds of definitions as limiting themselves to a uni-directional linear notion of impact, where the focus is on the 'products' of research, and where impact is graded on a scale in relation to the level of power held by the 'user' of the information, where bigger equals better (Pain et al. 2011; Pain 2014; MacPherson et al. 2014; Rogers et al. 2014; Williams 2013). They point to what Du Toit (2012) calls a "narrow and technocentrist understanding of what is involved in policy-making" (p. 8), that sees knowledge as a 'thing' to be transferred, in which "researchers and users usually occupy separate spaces and activities" (Pain et al. 2011, 9; see also Roux et al. 2006; Williams 2013). This gives the impression of there being an Impactor and an Impactee, where it is the responsibility of the former to provide knowledge of relevance and use for the latter (see Figure 1.1).

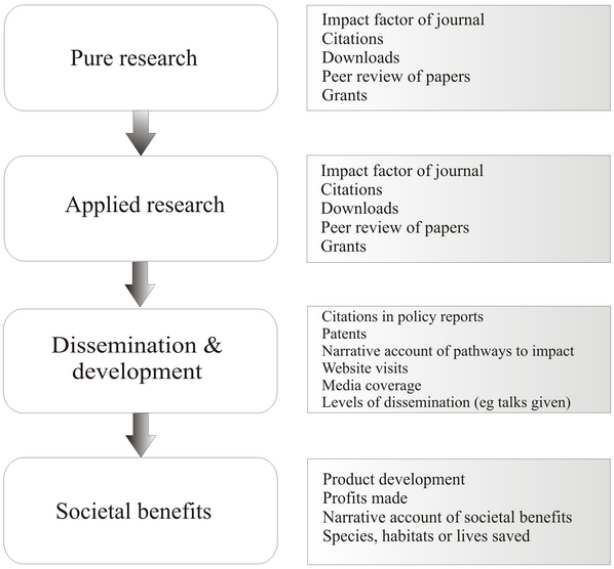

Figure 1.1: The Linear Model of Impact

Sutherland et al. 2011

Critics argue that this approach "implies that it is possible to determine which interventions cause particular outcomes, and thus tune policy to maximize effectiveness" (Adams and Sandbrook 2014; Rudd 2011). It presents the gap as being due to a deficit-model of communication, in which the world presents the problems to be solved by a select group of experts (Bensaude-Vincent 2001; Turnhout et al. 2012). Such critics caution that current calls to impact need to incorporate a deeper analysis of the power relations involved in the production of scientific knowledge, otherwise they risk reinforcing existing inequalities between academics and wider society (Pain 2014).

> Rather than the simple and linear notion of 'impact' (a word which according to the Concise Oxford Dictionary means 'striking', 'collision', 'influence', 'effect' - a single significant blow, limited in time), what takes place in effective knowledge co-production is a more diverse and porous series of smaller transformative actions that arise through changed understanding among all of those involved (Pain et al. 2011, 11).

Envisioning impact as something that happens not just at the 'end' stages of research, but throughout the process, requires a different way of thinking not just about what impact is, but how, where and when it occurs (Pickerill 2014; Rogers et al. 2014; see also Fine 2012). Shapin, a historian of science, once noted that a remarkable feature of the way we think about present-day science is that we think we know with certainty "where science ends and where other forms of culture begin" (1990, 990). Indeed, to imagine such an interaction invokes a kind of one-dimensionality, two lines that meet on a flat plane. But the notion of space challenges this visualization, claims the existence of depth and context – rather than superficial meeting-points – where there is room for interaction and exchange. And where room is made, where multiple dimensions suddenly emerge out of one, other things that had previously been hidden can step into the light. Nowotny (1993) writes:

> Rather than forming two fixed and immutable points on an imaginary linear transmission line, science and the public are instead linked by a complex web of interactions which take place in what constitutes a manifold public space in which scientific and technological knowledge becomes increasingly distributed throughout society (p. 308).

In this sense the thesis aims to explore the spaces within the research-action gap in order to better understand the complex web of interactions to which Nowotny refers.

In some cases it delves into history, echoing Foucault's claim that "the history of powers would at one and the same time amount to a history written of spaces" (Philo 1992, 149). This includes an additional exploration of the importance of place in order to better understand how knowledge and ideas circulate (Raghuram et al. 2009; Massey 1994, 2004; Escobar 2001): "It is not so much a question of seeing how knowledge transcends the local circumstances of its production but instead of seeing how every local situation has within it connections with and possibilities for interaction with other settings" (Secord 2004, 664). In this sense it sees both science and nature as having particular geographies, embodied in place but capable of extension beyond the local 'peripheries' to influence the global 'core' of scientific knowledge production (Massey 1994; Walsh 2012, Philo 2005, Rodríguez 2013; Livingstone 1995; Worster 1994; Powell 2007; Willems-Braun 1997; Verran 2002). Here I refer to Livingstone's (2003) notions of space and place with regards to the production of scientific knowledge:

> Space is not simply the stage on which the real action takes place. Rather, it is itself constitutive of systems of human interaction. At every scale from the international to the domestic, we inhabit locations that at once enable and constrain routine social relations. These sites dictate what we can say and do in particular social circumstances and - just as important - what we can't (p. 7).
>
> Place is essential to the generation of knowledge. It is no less significant in its consumption. Ideas and images travel from place to place as they move from person to person, from culture to culture. But migration is not the same as replication. As ideas circulate, they undergo translation and transformation because people encounter representations differently in different circumstances (p. 11).

By refocusing our attentions to spaces and places within the gap we can take a closer look at the particular histories and institutional relations that shape the production of knowledge in a given society, thus making subtleties of power relations, ethics and cultural worldviews explicit (Leach and Fairhead 2002; Lawrence 2010). To this aim the next several chapters will engage with theoretical contributions to the importance of space and place and their relationships to power and participation (Pain and Kindon 2007; Pain 2004; Gaventa 2006; Gaventa and Cornwall 2008). In particular, it will make use of the concepts of contact and encounter, such as pioneered by Gordon Allport, Mary Louise Pratt, and María Torre, among others. These scholars have been extremely important for theorizing how encounters within such spaces can determine whether power relations between groups will be further entrenched or can be

transformed. In this sense they see spaces of encounter as the stage upon which change has the potential to occur.

2. It sees the production of scientific information as the only thing conservation biologists do, and conceives of the gap between knowing and doing as the place where science ends and the 'extra' tasks of conservationists begin

Another problem with the way that the research-action gap debates are currently conceived has to do with viewing the gap as a simple dissemination problem that is based on a deficit model of communication, as mentioned earlier (Whittle 2011). This is based on the idea that the (only) role of conservation scientists is to produce and then communicate knowledge for the public (see Figure 1.2).

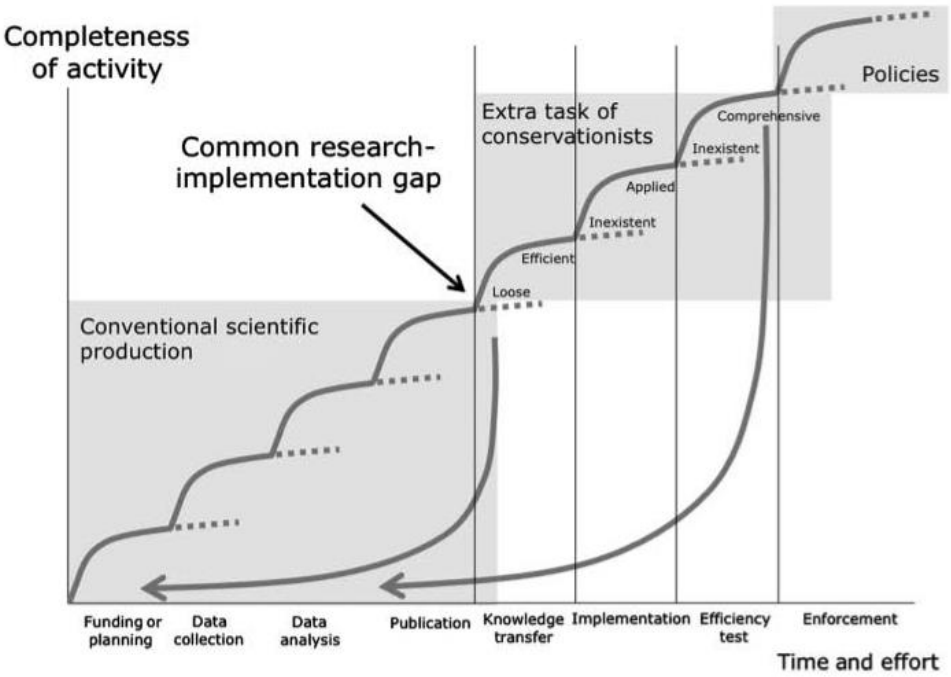

Figure 1.2: The various steps of the research-action continuum, copied from Arlettaz et al. 2010

Whitten et al. (2001) suggests that this begs the question of the purpose of conservation biology:

> Is it merely another scientific discipline, safely nestled within the confines of academia? Or, is it a mission concerned with conservation in the context of judicial reform, political economy, other peoples' spatial planning, community participation, poverty alleviation, human and institutional capacity, consumption, population growth, and agricultural production? At times we seem to be documenting paths to

> extinction, telling ourselves that we need to do more research, developing theoretical models with insufficient consideration of their practical application, and giving each other advice on what others should be doing. If that is the limit of our expectations, then conservation biology is succeeding as a field. But if we are intent on holding back the forces driving extinction, then we are failing in a major way (p. 2-3).

Rather, what some scholars are beginning to suggest is that the role of conservation scientists needs to go beyond the production and communication of scientific knowledge to engage more with what Erlich and Pringle refer to as 'the grittier work': "many of the most useful things that we can do for biodiversity—like talking to kindergartners—are not at the cutting edge of science" (2008, 11583). However, such 'muddy boots' conservation science is not often acknowledged in these debates; indeed, the insistence on a gap between researchers and practitioners draws attention away from the complexities of how individual scientists often carry out their own kinds of 'boundary work' (Hoppe 2010; Waterton 2005).

This thesis seeks to challenge these ideas by taking a wider look at what 'impact' in conservation science is about. In order to do this it explores the motivations, concerns, reflections and actions of scientists and researchers, not just the gaps or links between the information that their science provides and subsequent management recommendations or implementation. In this sense it echoes Possingham's (2009) indignant questioning of a Nature editorial (2007) that referred to a 'great divide' between conservation biologists "sitting as it were in their armchairs" and the "actual efforts to save species" in practice:

> What evidence do Pimm, the editor of Nature, and others have that conservation researchers achieve nothing on the ground? I know several well-published Australian academics who undertake several of the following actions regarding real and current conservation issues: write letters to newspapers and popular magazines; lobby federal, state, local and regional governments; sit on advisory boards of local, regional and national non-government organisations; regularly deliver press releases and consensus statements; appear in the print, radio and television media; talk to ministers, premiers, MPs, prime ministers and their advisors; work closely with public servants who make policy and allocate funds; talk to local community groups; weed and plant trees; stop developments that threaten habitat; lobby to save their local biodiversity hotspot; and the list goes on. Indeed I can think of at least a couple of people that will undertake all of these activities almost every year. Very few conservation wins in Australia, if any, do not involve an 'armchair' conservation academic (p. 2).

This thesis challenges this simplistic way of looking at the practice of conservation science as merely being about the production of information by taking into account collaborative actions being carried out by conservation researchers and local people

on the ground (Redford et al. 2006). In this sense I present examples of conservation research and practice that has origins and import in indigenous ways of living and in reflecting the dreams and desires of people living in the so-called 'peripheries' of the scientific world, such as Bolivia. The point to drive home is that conservation researchers come in many shapes and sizes, and it is precisely because conservation is made up of so many modes of acting that it can represent a challenge to the status quo of extractivist development in many places (Redford 2010; Centellas 2010; Librado 2009).

3. It doesn't take into account other voices and other ways of 'knowing' that are not scientific

Perhaps the biggest problem with the way the research-action gap is currently framed is the lack of inclusion of non-scientific voices in this debate. Although it is increasingly common for 'practitioners', such as managers or policy-makers, to be given spaces in conservation journals (Gordon et al. 2014; Milner-Gulland et al. 2012; Sutherland et al. 2012), only very rarely are the voices, ideas, perspectives, and concerns of non-practitioner stakeholders (such as farmers, indigenous communities, park guards, heads of households, teachers) taken into account, yet local people are largely considered to be extremely important to conservation aims (Cowling 2005; Rhoades and Nazarea 2007; Knight et al. 2006; Kainer 2009; Smith et al. 2009; Rao et al. 2003). This omission is not new and indeed, has a long legacy in the history of conservation (Adams and Mulligan 2003; Adams 2004; Sundberg 1999; Brockington et al. 2008). However, as Balmford and Cowling write:

> If we want to move beyond documenting losses or identifying specific causes of decline to understanding their underlying drivers and implementing interventions on anything other than a piecemeal basis, we need to undergo what one of us describes as "an epiphany for . . . natural scientists" (Cowling 2005): the realization that conservation is primarily not about biology but about people and the choices they make (Balmford and Cowling 2006, 692).

In response to this call this thesis brings to the fore the least-heard of the voices in the research-action gap debates – those of local people affected by conservation research and practice – with a particular focus on inequalities of power and privilege in these processes. In this sense it questions the privileged status of western science over local

and traditional non-scientific valuations of the natural world (Alexiades 2009; Fortmann 2008; Anthony et al. 2011; Blaser 2009; Castleden et al. 2009; Leach et al. 2005; Nepal 2002; Peterson et al. 2008; Sable et al. 2009; Thomas 2009; Agrawal 1995, Bohensky and Maru 2011; Shackeroff and Campbell 2007; Sillitoe 2007; Vermeylen et al. 2008; Berkes 1999; Berkes et al. 2000; Harding 2006; Haverkort et al. 2013). As Adams (2004) argues:

> Natural science must be seen as just one among several ways of understanding nature. The views of scientists among conservation matter, but not uniquely so. There is a need to broaden the community of those whose views about nature are taken seriously (p. 233).

It's not just about what information is needed, but who decides? Who is affected? Who is included, excluded? Pretty writes, "Cognition is not a representation, but the continual act of bringing forth a world" (2002, p. 67). In this sense it is a thesis that is deeply concerned with the ethical implications of conservation research, and challenges readers to reflect on their own practice throughout (Alexaides and Laird 2002; Barbour and Schlesinger 2012; Johnson and Murton 2007; Smith 1999). *Who* is at the gap between research and action, and why do they matter?

The next chapter will discuss how I have explored these issues through a social science methodology rooted in the tenants of Participatory Action Research.

CHAPTER 3

Decolonizing the research-action gap by inhabiting a 'third space' between theory and practice

> "Go back?" he thought. "No good at all! Go sideways? Impossible! Go forward? Only thing to do! On we go!" So up he got, and trotted along with his little sword held in front of him and one hand feeling the wall, and his heart all of a patter and a pitter.
> (Tolkien, The Hobbit)

3.1 Introduction

It is said that stories connect the giver and the receiver not through the mind, but through the heart, so I have written this chapter as a series of stories of the last four years of my life. It seems to me that often what matters most is not the laid-out 'facts' of what has happened, but the feelings and dreams that have accompanied their making – the values and imagination that drove them into being. How this belief has shaped my methodology will be clear in the pages that follow.

I came back into academia after more than a decade of working with development and environmental grassroots organizations in Latin America and the United States, based on a belief in the power of inquiry for inspiring change. This also resonates with a position of postcolonial scholars that "research, and the knowledge produced from research, sets things in motion; it has effects in the world, and is part of the world from its very first iterations" (Jazeel and McFarlane 2009, 110; see also Said 1983). However, in my heart I have always been a 'doer' more than a 'thinker'. I have always felt that there is simply too much wrong with the world to sit around philosophizing about it – one needs to get out and try to make a difference, even if such attempts are full of mistakes, frustrations and setbacks. In the words of Samuel Beckett: "Ever tried. Ever failed. No matter. Try again. Fail again. Fail better."

Creswell (2009) writes "although philosophical ideas remain largely hidden in research, they still influence the practice of research and need to be identified" (5). He describes four main 'philosophical worldviews', also called 'research paradigms' by other scholars (Chilisa 2012; Mertens 1998): Postpositivist, Social constructivist,

Pragmatic, and Advocacy-participatory. The Postpositivist worldview is closely associated with the scientific method, where there is a need to identify cause-effect relationships, often through quantitative and controlled methods. The emphasis is on testing and verifying "laws and theories that govern the world" through objective, empirically-based analyses. This paradigm is the guiding principal for most natural science methods and also for much social science research publishing in conservation journals, which use quantitative questionnaires as a means of harnessing peoples' perceptions and values. While such surveys can have 'external validity' in that the results have statistical power and aim to be reproducible and universal within the bounds of scientific contexts, it can be argued that they often lack a kind of 'internal validity', which refers to the extent that the results of a study shows what it claims to (Drury et al. 2011). In social science, this latter measure depends upon awareness of the specific historical, sociocultural and political issues that shape peoples' perceptions and values (ibid.), which makes up the Social constructivist worldview. The main goal of research carried out in this worldview is to gain a better understanding of how research subjects view the situation being studied, and to interpret the ways in which those subjects understand the world, as "truth lies within the human experience" (Chilisa 2012, 33). A third worldview is called Pragmatic, as it is mainly concerned with research that comes up with solutions to real world problems, and uses all methods available in order to achieve that aim: "The pragmatic researchers look to the *what* and *how* to research, based on the intended consequences – where they want to go with it" (Creswell 2009, 11). Finally, there is the Advocacy/Participatory worldview, which is aimed at meeting the needs and concerns of the people implicated in the research, thus intertwining research with issues of power and politics. Chilisa (2012) calls this the 'transformative paradigm', and writes:

> On the question of what is truth, the researchers within this paradigm maintain that knowledge is true if it can be turned into practice that empowers and transforms the lives of the people.... True knowledge in this context lies in the collective meaning making by the people that can inform individual and group action that improves the lives of the people. Knowledge is constructed from the participants' frame of reference (p. 36).

Reflecting on my own way of seeing the world as a result of my professional and academic experiences prior to my PhD, while I draw from all three paradigms I

mainly situate my research within the Pragmatic and Advocacy/Transformative worldviews. Thus, while I envision my research as addressing a practical problem to which I aim to find applied solutions, I am also committed to the principals of Participatory Action Research (PAR), which falls under the Transformative paradigm. PAR has a long and marginalised history in the social sciences and is based on a theory of change, which means that one investigates not by simply observing from what is happening in a place, but by explicitly engaging in activities that confront issues encountered in the research (Fals Borda 1979; Greenwood and Levin 1998; Herr and Anderson 2005; Tuck 2009). In addition, PAR is also concerned with thinking about who has the right to do research by expanding notions of what counts as 'legitimate knowledge' (Torre 2014; Appadurai 2006). Evans et al. (2009) describe PAR as follows:

> At its core, PAR is premised on a set of principles and related practices that promote a commitment to action and social justice, specifically with the goal of exposing and changing relations of power (Fals Borda, 1987; Fischer, 1997; Maguire, 1987). PAR emphasizes a collective process where previously considered participants (or subjects) are (re)constructed as collaborators or coresearchers. People's lived experience of marginalization is shifted to the center (Hall, 1992) and the tools of research are placed in the hands of disenfranchised and oppressed people so that they can transform their lives themselves (Varcoe, 2006). Thus, PAR frameworks involve three key features: first, a commitment to social transformation; second, a commitment to honoring the lived experience and knowledge of the participants and community involved; and, third, a commitment to collaboration and power sharing in the research (Reason, 1994) (p.4).

A fourth PAR framework deals with the constant self-reflection of the researcher throughout the entire process (Torre 2010; Pain 2004). Although there is no one right way to do PAR, these frameworks point to commitments one needs to make throughout the process (Torre et al. 2012). The remainder of this chapter will explore how I have attempted, often through making mistakes, to uphold best practices as established within the frameworks mentioned above.

3.2 The privilege of choice

I was first drawn to Madidi the year before starting my PhD, when I had a research idea but had not yet determined where I would carry it out. Bolivia had attracted me for many years, ever since I first read about the indigenous rights struggles there as a graduate student in the United States. In 2011 I typed the words 'biodiversity' and 'Bolivia' into the google search bar and landed upon a place totally unknown to me:

Madidi. What was it, Madidi? On the web it looked exciting, exotic. Smith writes of the imperialism of western research on indigenous peoples, where (often well-meaning) foreigners travel to exotic lands and seek to represent the voices and ideas of local people. For the white, western-born and educated researcher, our ability to fly to places and to want to study them is based on a certain kind of power and privilege that is in great part undeserved and is based on legacies of colonialism, imperialism and slavery. Katz writes of this as representing a kind of 'arrogance' of the researcher:

> I speak of choosing, deciding, wanting, traveling, reasoning, finding compelling, and being intrigued. My career in the balance, the object of my study was people's lives, lived in real time and space (1994, 70).

As students we are rarely taught this and it is often when confronted with images of ourselves in the places to whence we travel that we first begin to question our own positioning. When I first began doing research in Latin America in 2006, my advisors at the time gave me one main piece of advice – "just remember the first tenant of research: do no harm." What does this mean, 'do no harm'? Over the last several years I've reflected again and again on this statement and have come to realize that 'do no harm' is not only useless advice, it is naively deceptive. It pretends that our presence can be invisible and harmless, that our mere ability to buy plane tickets, obtain visas and travel are not based on very specific types of privilege; that we won't bring those positions with us when we interact with people, based on the premise that we are floating in on the politically-neutral ground of scientific research. Pratt (1992) makes note of assertions of neutrality and guiltlessness in writings of early naturalists with regards to their own scientific endeavours in Africa and South America:

> (In Africa), the naturalist will find a vast field for his observations, and there he will discover objects capable, by their immense variety, of satisfying all his tastes… Penetrated by such sentiments, and greatly excited by the perspective of a land whose products are unknown to us, I left England with the resolution to satisfy a curiosity which, if it is not seen as useful to society, is at least innocent (excerpt from William Paterson, p. 56 in Pratt).

In the following I will attempt to explain and justify the choices I have made with my research in Bolivia, but I do not claim to feel completely easy with them. I will argue that my research has explicitly sought to 'have an impact' throughout the research process, yet I cannot myself claim that it has had the impact(s) that I imagine.

3.3 2011 – Beginnings

I wrote my original PhD research proposal from a desk in a New York City apartment, in which I envisioned 'citizen science' as a potential bridge between different ways of 'knowing' and different ways of 'doing' in the field of conservation. At the same time that I searched for my field location on Google, I wrote a convincing argument for my idea:

> *In settings where traditional communities still live closely connected to the land, citizen science can additionally serve as an alternative to conventional scientific knowledge, offering promise as a bridge between holders of traditional ecological knowledge and conservation biologists. However, although many conservation research projects have incorporated the use of citizen science, it has been little studied on its own to understand if indeed it lives up to its claims, and if so, how and why. Does the incorporation of citizen science in conservation research empower local communities by enabling the exchange of knowledge, and spark ideas for areas of future research and collaboration? Does it serve as a catalyst for attitudinal and behavioral changes relating to nature and conservation? Most importantly, does it harbor the potential to inspire local communities to be more actively engaged in conservation practice and the protection of biodiversity?*

My original research proposal for Bolivia laid out a three-stage methodology based on the creation of a participatory research project that would 'invite' local communities to participate as citizen scientists to document the biodiversity of the region. The first stage was designed to identify communities and individuals interested in participating in the research, the second stage was centered on carrying out the biodiversity research as citizen science, and the third stage was aimed at collaborative data analysis and a follow-up survey to assess community-wide patterns with regards to changed conservation values and behaviors.

During my first year in Lancaster I refined this original proposal somewhat, especially after a one-month reconnaissance to Bolivia in January of 2012 in order to incorporate an additional stage of evaluation of previous and current participatory monitoring projects in the region, such as carried out by the park rangers in Madidi. But the main objective of creating a citizen science project from scratch remained the main goal.

3.4 2012 – Into the field

In June of 2012, I arrived in Bolivia for a period of six months in order to carry out the first stage of my planned research – finding interested groups and communities in the Madidi region with whom to work. Madidi NP/NAIM is one of the most biodiverse

of all protected areas on the planet, home to 11% of the world's bird species and an estimated 12,000 plant species, as well as many endangered mammals such as the white-lipped peccary, vicuña, Andean bear, and the giant otter, among others (Friedman-Ru 2012; McStravick 2012). It encompasses five life zones in which several Amazonian and Andean indigenous groups reside, and is additionally at risk of local and global threats to biodiversity such as the exploitation of gas and oil, deforestation, tourism, climate change, and the invasion of non-native species (WCS 2010).

The protected area encompasses 1,895,750 hectares, and is split into two national parks and one Natural Area of Integrated Management (Figure 3.1). To the west lies the Peruvian border and Bahuaja Sonene National Park, to the north and east are the Takana indigenous territories, to the southwest is the Apolobamba Natural Area of Integrated Management, and to the southeast is the Pilón Lajas Biosphere Reserve and Tsimane'-Mosetén indigenous territory (BR/IT). There are three additional indigenous territories that overlap the protected area either entirely or partially: San José de Uchupiamonas, the Lecos of Apolo, and the Lecos of Larecaja. In Madidi the land claims of indigenous groups cover approximately one-third of the park's area and 24,588 people live in Madidi's area of influence, of which 3,741 reside within the boundaries of the protected area in 31 communities (SERNAP 2006). There are also unconfirmed reports of a non-contacted indigenous tribe within Madidi, referred to by locals as the Toromonas. More details on the Madidi landscape will be presented in Chapter 4.

The first three months of my field season in 2012 were mainly spent obtaining necessary visas, permits and other official permissions in La Paz and the urban centre of Rurrenabaque in the Madidi region, but this 'waiting stage' also provided me with the time needed to get to know some of the key actors in the region. During most of these interactions I would explain my project as clearly as possible, often providing stakeholders with written summaries of my main research questions, objectives and methods, and ask them if and how they saw the research as being something 'useful and relevant' for their community or institution. But within the first few weeks I began to be aware of a kind of contradiction in how I was received.

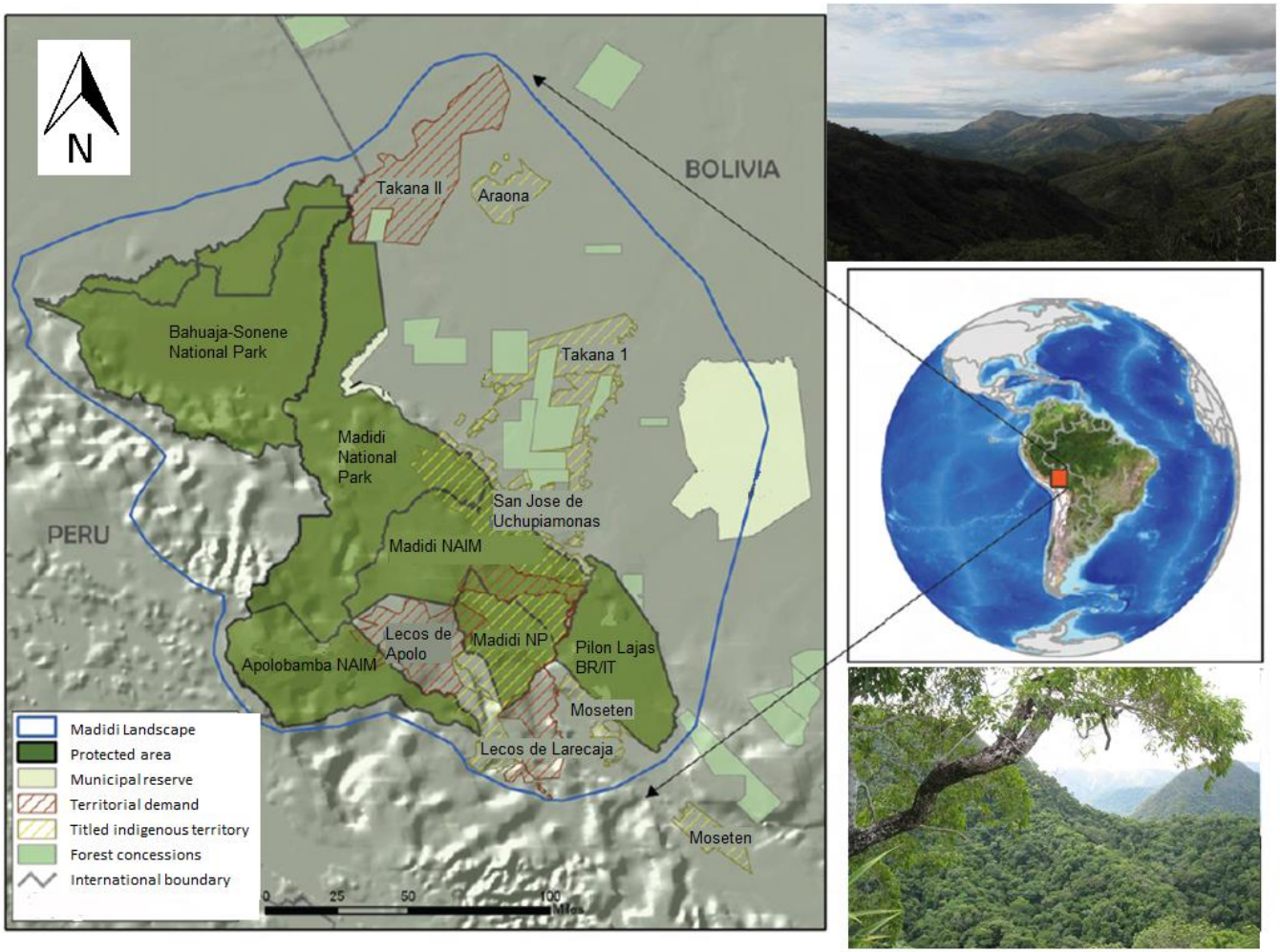

Figure 3.1 Map and images of Madidi landscape

Map copyright WCS, photos copyright Anne Toomey

On the one hand, people were welcoming and accommodating – they took time to talk with me and help me. The Madidi NP/NAIM Director provided me with a desk space in the park headquarters in San Buenaventura, and the two coordinators of the monitoring programme invited me to move in with them a couple of months into my stay. This close access to the park staff also allowed me to come along on several short fieldtrips, where I lodged with the rangers and was able to get a sense of some of the major issues faced in the protection of Madidi, including issues related to the co-management of the protected area. My new flatmates shared their challenges in designing and implementing the monitoring programme, and occasionally asked me for my input relating to the social and cultural aspects of their work.

During this time period I also established relationships with several research organizations in La Paz. The Wildlife Conservation Society (WCS) was supportive of my work and after many meetings with various staff members, the director of the organization agreed to sign a research agreement that would give me access to their extensive library, as well as to their human resources. As a direct result of that agreement, I was invited to go on two trips with WCS staff to Takana communities along the Beni river, where hunters and fishers had participated in the past in a 'self-monitoring' project to record their catches with the assistance of biologists (see Appendix VI), and where an annual harvest of caimans (*Caiman yacare*) takes place. I also obtained permission during this time to do research in several indigenous territories, including in San José de Uchupiamonas, which is entirely superimposed by Madidi, and the Takana 1 territory, which buffers Madidi to the east. The (newly instated) Takana leadership council (CIPTA) took me along on a trip to visit communities along the Beni River, which enabled me to carry out planned interviews of people who had participated in the hunter-fisher self-monitoring project. The many hours spent during this time with the various groups led to me establishing friendships with many different people, and helped me to feel that I was welcome.

However, even as I was going on trips and being invited to peoples' homes I began to be aware of a general lack of understanding about and interest in my research topic. Smith writes that the problem with research isn't about whether or not the researcher is 'liked', but rather that "research was talked about both in terms of its absolute worthlessness to us, the indigenous world, and its absolute usefulness to those who wielded it as an instrument. It told us things already known, suggested things that would not work, and made careers for people who already had jobs" (1999,

3). The longer that I was in Madidi, the more I realized that my research project was unfeasible because of a lack of shared understanding about the very concept of scientific research. For many of the local people I spoke with, even as they were friendly to me, I realized that research – even the kind of 'participatory' research that I had hoped to carry out – was often likened to an extractive activity that had very little benefit locally. On one of my trips down the Beni River, the previous president of the Takana indigenous council said, "so many researchers – and it's always interviews…" Similarly, on my first visit to the Takana-Quechua community of San José de Uchupiamonas, one of the communities where I'd hoped to carry out my citizen science project, I was told of the previous 'volunteers' who were always asking questions and interested in visiting the family *chaco* (farm), pointing to a history with many outsiders, many of whom had been researchers like myself.

Figure 3.2 2012 Fieldwork – participant observation
(From top left, splashing around with Takana hunters and WCS scientists in the Beni River; travelling with Leco leaders and Madidi park staff to co-management workshop; travelling with Takana leadership council; Takana hunters weighing their catch as part caiman hunt)

But perhaps the most striking instance of the 'over-researched' nature of the region was on a trip to Asunción del Quiquibey, a Tsimane'-Mosetén community in Pilón Lajas of approximately 20 families, where some people shut their doors to us and others told us of the countless researchers who had come before. This was also clear at an assembly meeting of the Leco leadership in Apolo, where I was accused of being in cahoots with a female anthropologist from the United States, who apparently 'looked just like me and was probably from the same university', 'who had spoken all nice and promised things too but who had left and not left anything behind'!

Smith famously writes that the word 'research' is "probably only of the dirtiest words in the indigenous world's vocabulary. When mentioned in many indigenous contexts, it stirs up silence, it conjures up bad memories, it raises a smile that is knowing and distrustful" (1999, 1). Yet even as I was getting a sense of this at the same time I was approved, even encouraged, to do research in all of these places. The leaders may have cautioned me that I had to return the results, but only in one case was I asked to sign a document (a standard research contract that was created as part of the partnership between WCS and CIPTA), and the newly elected Takana president didn't even read the document when he signed it.

What I was coming to realize during this first field season was just how muddled this word 'research' was – how there was a strange contradiction between the indigenous leaders who told me that "all research is welcome" and the community members who seemed to resist it in both passive and active ways. Some people told me that what I needed to do was to just spend enough time in places so as to get people to trust me. But this didn't feel right somehow. It felt like befriending people under false pretenses – integrating myself so deeply into the life of a community so that people would forget what I was doing there and would share with me pieces of knowledge that I could then theorize about. At times I felt like I was in an impossible situation between a rock and a hard place. How could I do research in a place that was sick of research? Yet wasn't this the kind of place where it would be most important to investigate the research-action gap?

I struggled greatly with this challenge and talked with many people in an endless quest for the 'right' approach. But I kept coming back to the same problem – the problem of research. What was it that the scientists were hoping to achieve? What did local people think about all this presence of research and researchers? Did they believe that they got anything out of the activity? What kinds of relationships

were built out of research, and did they change things in the end? What were the power dynamics involved? And could I go about studying these issues without falling into the same pitfalls that so many others had fallen into before?

So towards the end of my first field season I knew that my research questions and methodology had to change. I either was going to have to leave the region entirely and perhaps even quit my PhD, or I could do 'research on research'. So before leaving Bolivia in 2012, I organized semi-formal meetings with all of the stakeholder groups I had interacted with (indigenous councils, park administration, and scientific institutions) in order to briefly explain what I had learned during the previous months and spoke with them about the idea to do the workshops and focus groups to discuss "the problem of research". My new project seemed to make much more sense to them than what I had originally hoped to do, and during one of these meetings, a leader of San José de Uchupiamonas said that he saw my research as being the 'root' from which future research could grow, by giving the community a space in which to voice their own priorities and desires for the production of knowledge in their territory. In a way then, while my project became less 'participatory' in the traditional sense of the word as it would no longer incorporate participatory processes of data collection and analysis as set out in my original 'citizen science' proposal, I felt that it came to more closely uphold the critically-reflective spirit of PAR by adapting to local circumstances and interests.

3.5 2013 – Main field season

3.5.1 Workshops and focus groups

I returned to Bolivia in May of 2013 to carry out what would be the principal fieldwork season. During the previous months I had redesigned my methodology, which was now explicitly focused on the bridging of the research-implementation gap by discussing the past, present and future of research in the region through workshops. Together with three Bolivian co-researchers (Igor Patzi, an anthropologist, Armando Medinaceli, an ethnobiologist, and Maria Copa, a biologist) I held meetings with the representatives of communities and organizations where the proposed workshops would be held. Through these conversations, the content of each workshop was developed in order to be of mutual benefit, both to my research as well as to the organization or community.

With the park guards I held a total of three workshops – two in Madidi and one in Pilón Lajas – to discuss the past, present and future of research with the park guards. This was done with the help of Armando Medinaceli, one of my co-researchers. We discussed participants' understandings of the term research, and who they believed to be a researcher, and then created a collective timeline of past research in the protected area, which was aided by a presentation of databases that I had created on past research projects (see section below on databases). We additionally discussed which studies they believed to be most useful and relevant to the management of the protected area and to give specific examples. Finally, in the case of Madidi we discussed the potential creation of an official norm to regulate research in the park and what the next steps would be to get it put into SERNAP policy.

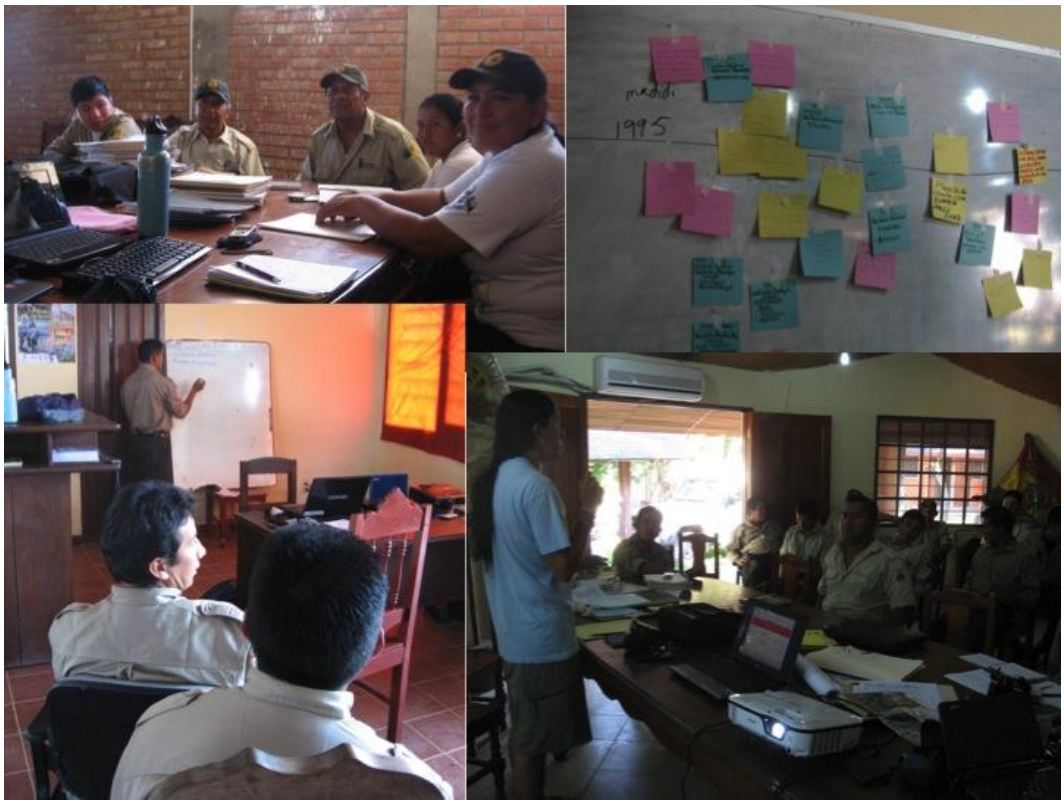

Figure 3.3 Workshops with park guards
(From top-left: Workshop with Pilón Lajas; Timeline of research from workshop with Madidi park guards; Discussing research priorities in Apolo with Madidi park guards; Armando presenting.)

I also carried out two workshops with the National Herbarium, a botanical institution located in La Paz, which were carried out in response to a request for training on communication and dissemination by the director of the institution. These workshops were attended by researchers and students affiliated with the Herbarium (primarily

botanists), many of whom work in Madidi as part of a floristic inventory project in conjunction with the Missouri Botanical Garden in the United States. These workshops included role-play, in which the participants were given different scenarios in which they had to communicate with non-scientists about their work (i.e. to get permission to do research), as well as exercises to encourage self-reflection about their own roles as researchers and the importance of emotion and direct experience in communicating ideas about science and conservation. Two Bolivian co-researchers helped me to carry out these workshops – Gabriel Zeballos and Igor Patzi.

Figure 3.4 Workshops with researchers from the National Herbarium (From top-left clockwise: Role-play exercises; Igor explaining the importance of understanding the concept of 'identity' in communicating science; Group work; Exercise about different ways of 'knowing')

I also organized workshops with two indigenous communities – San Miguel in the Takana territory, and San José de Uchupiamonas. These were structured around the creation of a norm in each community to regulate research on their lands as agreed beforehand with community leaders (see Appendix II). Before the workshops, I would go around the community accompanied by a local guide (see Figure 7), and approach all those I saw to tell them about the workshop. Because of the lack of having a shared language about research, we would start the conservation by

mentioning ‘when outsiders, like me, come and ask lots of questions, when they come to do their thesis, to study things.” Generally people would nod their heads and we would have an opening to briefly chat informally with them about what their experiences had been with ‘researchers’ and then invite them to the community meeting.

Figure 3.5 Workshops with communities (From top left clockwise: Workshop in San Miguel; Hernan Nay, field assistant in San Miguel; developing the community norm; Senón Limaco at workshop in San José de Uchupiamonas; Anastasio Cuqui, leader in San José de Uchupiamonas)

As noted by many scholars, complex power relations are embedded in participatory research processes[3] (Pain 2004; Mohan 2001; Reed 2008), and this research struggled with various issues, especially in the indigenous communities. One of the biggest problems was that of workshop ‘fatigue’ (Mistry et al. 2009), as since the 1990s, the communities in the region have been subject to countless research and development projects. Summed up by the words of a migrant worker I met on a bus: “it used to be that the local people would be focused on producing yucca or rice, but now you see the farmer with his folder, and you wonder what seminar or workshop he’s going to.” Such ‘fatigue’ resulted in limited attendance at the community workshops.

[3] See also Cooke and Kothari 2001 and Hickey and Mohan 2004 for a deeper reader of the ‘tyrannical’ forms that participatory processes have taken in international development.

Another issue was in relation to gender imbalances, which greatly affected who had a voice during the workshops (Guijt and Shah 1998). For example, the community workshop in San José de Uchupiamonas began with just a handful of women and the presence of a park guard from Madidi, in which we were already getting into a dynamic conversation about what research means (as most of the women were unfamiliar with the concept). But thirty minutes into our discussion the (male) leaders of the community showed up, interrupting the dynamic and resulting in the silence from the female participants for the rest of the workshop. Finally, the pace and the control of the research process remained mainly in my hands as the foreign researcher (Pain and Francis 2003). For example, in 2014, I ran out of time and only had two days in which to visit the (difficult to reach) community of San José de Uchupiamonas to present the printed version of the community norm. This wasn't acceptable to the community members that I eventually met with, and we discussed how I should have worked harder to organize the meeting at their convenience as well as my own.

However, despite the many mistakes I made and the difficulties surrounding such research, I found that these spaces were where I felt most honest about my research purpose. The workshops enabled me a space to explain in front of a larger group (not just with leaders or representatives) what the research was about, and to be critiqued collectively. I felt this sense of transparency most keenly in San Miguel, where I was put to the test at a community meeting where I was "put under fire" with questions about who I was, how they could trust me, peppered with stories about how they'd been betrayed by researchers in the past. Again and again they asked me to clarify my purpose, and again and again I had to find different ways to explain myself. These were spaces where we could all learn together, and I felt more comfortable with these short visits because I felt that I wasn't infiltrating myself into the life of a place without true informed consent (see Appendix I for more details on Prior Informed Consent). It was in these spaces of critique and openness where I felt that we were finally beginning to understand one another, and in my own struggles that my research began to take on life and form. In this way I was not only on the outside looking in at how previous researchers had erred, but within a 'third space' between theory and practice through the making of my own mistakes. This will be further explained below.

3.5.2 Interviews

In addition to the workshops I continued to carry out semi-structured and unstructured interviews, but due to my above concerns in 2013 I mainly sought to interview people who would be more able to talk about research due to having worked as guides in the past, or due to leadership roles in the communities (and so were more familiar with the activity of research and so could discuss it more in depth). The main reason for this method of selecting interviewees was that in order to obtain Prior Informed Consent, they needed to understand the questions that I was asking, and if they had little experience with research/researchers it was very difficult to ensure that there was mutual understanding and consent. I and my co-researchers attempted various ways of explaining the research to those unfamiliar with the concept of scientific research, and found that such experiences typically unproductive and uncomfortable for all. This resulted in a bias towards more interviewees who were male and holding positions of relative power, which may have affected the results in that they do not equally incorporate the viewpoints of women and those who have had less experience with research and researchers. In particular I spoke with many indigenous leaders and held meetings with the Takana and Tsimane'-Mosetén indigenous councils (see Table 3.2 for more details on interviews). Informed consent was obtained for all interviews, and in many cases the interviewee requested his or her name to be specified.

Figure 3.6 Andy Limaco, interviewee and young leader from San José de Uchupiamonas

But perhaps the most fruitful and satisfying part of my research was interacting with the park guards of Madidi. They were excellent interviewees because they were originally from the local communities and still had families and connections in those places, but were also more aware of the conservation aims of the park and the interests of researchers and scientists. Many of them had accompanied researchers at one time or another on fieldwork, and additionally they were involved in a participatory monitoring project that was being coordinated by biologists from WCS. I spent a considerable part of each day based at either the Madidi park office in San Buenaventura or the Pilón Lajas office just across the river in San Buenaventura, and the close proximity allowed for the park rangers, who were initially reserved around me, to open up as we shared coffees and lunches together. These relationships facilitated many a non-structured interview and gave me somewhat 'insider' status as I was invited to *parilladas* (after-work barbeques), even as I worked hard to retain my independence as an 'outside' researcher. They also enabled my access to the internal documents at the different offices and even to take part in some staff meetings and workshops.

Figure 3.7 Research with park guards

3.5.3 Databases of past research

In addition to the qualitative methods described above, I created several databases of research carried out in the region. I was interested in how much those in decision-making positions (territorial leaders, park management) knew about the previous research studies. When presented these databases were received with varying levels of interest. For example, the newly instated Takana leadership council seemed uninterested, while the Tsimane'-Mosetén leaders (with more experience with researchers) asked for copies of the database and even sent me emails afterwards requesting additional information. More information about these databases is provided in the table below, and additionally in Chapter 7, which presents results from the quantitative database done in Madidi.

Figure 3.8 Digging through boxes in the Tsimane-Mosetén offices to look for research publications.

Table 3.1 Databases of research

Database	Description	Sample
Madidi NP/NAIM	A quantitative analysis of previous research carried out in Madidi NP/NAIM was done through an exhaustive review of documentation physically located in the Madidi park offices and recording all permit applications and other references related to scientific research (technical reports, publications, etc.) in an Excel database in November of 2013. As there were no organized records available previous to 2004, the analysis was limited to the 10-year period between 2004-2013. For all projects	A total of 88 research projects were identified (excluding the research described in this paper), of which 3 were immediately excluded from analysis because they were determined to be government-led evaluations that did not have research as the primary aim (i.e. hydrological measurement,

	the following information was recorded (to the extent that it was available): principal investigator(s), institution, type of study, years carried out, title of project, subject, geographical location, research objectives and contact information of the PIs. Over a one-year period (between December 2013-November 2014) I then attempted to follow up with the principal investigator(s) listed on each project to verify the information obtained and ask additional questions about the level of local involvement in the project, potential implications for management and extent to which the research results were disseminated and/or published.	monitoring). Contact details for the principal investigators was able to be found for 75 of the projects, who were then contacted either in person, by telephone or via email. Of these contact attempts, 15 went unanswered, one person explicitly refused to answer the questions, 11 responded that the study in question was not carried out in Madidi due to permitting problems or other issues, and nine responded by email but didn't complete the questions.
Pilón Lajas and CRTM	Documentation of all of the books, reports and other literature related to research located in the Pilón Lajas and CRTM offices, and inserted into an Excel spreadsheet. Entries included the author, year and title of publication, institution, research subject, specific location, and contact information of the researcher. Summaries were written up of the main research aims and findings.	63 projects were entered into the database, 16 of which were located in the CRTM offices and the remainder (47) in the Pilón Lajas office.
Takana 1 territory	Documentation of all of the books, reports and other literature related to research located in the CIPTA offices, and inserted into an Excel spreadsheet. Entries included the author, year and title of publication, institution, research subject, specific location, summary of research (when available), and contact information of the researcher.	56 projects were entered into the database.

3.6 The Third Space

Returning to England to analyse and write about things that I had discovered in Bolivia was another challenge that I had to reflect upon through the lens of PAR. This deals with the issue of abstraction, which is theory's main tool. Just as natural scientists remove the objects of their inquiry from the 'world' and into the lab in order to study them (Latour 1999), so do social scientists engage in a distancing of our issues by separating theory from practice in order to point to the wider implications of our findings. But some scholars have expressed concern that this distancing has the unintended consequence of objectifying and de-politicising what our research seeks to understand in the field (Jazeel and McFarlane 2009).

> In the production of theory we are distanced from what Bey (1994) terms immediatism - direct, lived experience. Rather we become engaged in representations of (an)other's reality. As such we are alienated from the lived moment, enmeshed in the theory market, where the production of theory becomes another part of spectacular production, another commodity. This commodification implies that a mediation has occurred, and with every mediation so our alienation from lived

> experience increases. As Mies (1983) notes, we are too frequently engaged in uninvolved spectator knowledge, one separated from active participation. As such research and theory can remain analytical and disembodied. It is not lived (Routledge 1996, p. 400-401).

For me this process of abstraction has felt like one of 'forgetting'. Within a week of leaving Bolivia and 'the field', I would start dreaming in English again. Within a month, my concerns about Bolivian issues – even my Bolivian friends – diminished considerably. In this sense I often felt within a real tension between the way I thought about my research when I was in Bolivia as opposed to when I was in England, which was compounded by an awareness that what mattered to my academic institution in England was very different than what mattered to the organizations and people I worked with in Bolivia. Yet how to satisfy the demands of both places without being completely pulled in two?

Theory from PAR helped me in this sense – it enabled me to place my work in a set of ideas about ethics, responsibility and care, while using it as a way to reflect on my own practice and experiences. Walsh asks, "What happens when not just the mind, but the body, the liver, and the heart enter into theoretical reflections and philosophical contemplations?" (2012, 21). Routledge advocates for a 'third space' between theory and action and writes:

> Certainly no simple opposition exists between academia and activism. Rather, occupying a third space of critical engagement enables research to become a personal and collective project of resistance. Clearly such a space must be one's own, not one prescribed, ordered, expected, enforced (1996, 412).

This enables us to make our research a personal project of resistance, where we also must remain at the centre of our critique through often difficult processes of self-reflection (Rose 1997). In this sense we are not merely attempting to 'do', but also to engage in critical analysis of our own positions of power and privilege as 'doers' (Pain 2004). While in Bolivia I kept a field journal that I wrote notes and reflections in on a daily basis, often reflecting on such dilemmas of power and privilege. This included observations while in the field (from participant observation, interviews and the workshops), reflections on the many field trips and experiences, as well as insights on how what I was learning was connected to what I had previously read in the literature. I also maintained a research blog (http://communitysciencebolivia.blogspot.co.uk/), which enabled me to share some of these insights with my friends and colleagues back home, as well as with some of my research participants while in Bolivia. Both the

journal and the blog helped me to work out the different emotions and ideas connected to what I was experiencing while in the field, and additionally served as a gateway back to remembering those feelings and thoughts when I was back at my desk revisting them in England. Of this place of 'in-betweenness', Katz writes:

> we must position ourselves on the borders between description and analysis; between here and there; between the present, past, and future; between subject positions; between discourses; between us and them; between the exotic and mundane; between the unique and the general. I guess between a rock and a hard place. From traversing these borders and building up spaces in between, we have to speak for ourselves in a way that recognizes both the mutuality between these constructed oppositions and the complicity between the subject and the object of ethnographic inquiry (1992, 505).

For me this has meant on one hand seeing and writing about myself as a certain kind of subject: being aware of my incredible position of privilege and often writing and speaking of how that position has enabled me to do the research I am doing (Routledge 1996). It has meant taking a hard look at my desire to 'have impact' and my frequent naiveté with regards to my own assumptions and ideas. Finally, it has required that I think deeply about how I am representing the Other through my writings and encouraged me to reflect on how I might find ways to enable people to represent themselves (Fine 1994). I will reflect more on these tensions in Chapter 7.

3.7 2014 – Preliminary dissemination and documentary video

In 2014 I returned to Bolivia for a period of two months between June and August with the main aim of presenting preliminary findings of the research to the different groups. This included presenting the community research norms to the communities of San Miguel and San José de Uchupiamonas, and holding meetings with leaders of the Takana and Tsimane-Mosetén councils to discuss some of the preliminary implications of the research. During this time I also offered previous participants the opportunity to be filmed as part of a short documentary on 'indigenous perspectives on research', which I presented at a session at the Royal Geographical Society conference in London and again at Lancaster University in December, which can be accessed online: https://www.youtube.com/watch?v=jCBP7Af-7p0.

Together with María Copa I also held meetings with the Madidi park guards to present a summary of the results from the workshops carried out with the Madidi park guards, with the aim of finalising the research regulation to present to SERNAP, as had been discussed in 2013. During this latter meeting it was discussed that they felt

it was politically unviable at the time to carry the motion forward due to impending presidential elections, and said that their immediate concerns were in relation to the unfair terms of their contracts, and their frustration at their work not being valued fairly by the national government. In response María and I travelled with them for several days to film a short video about their work, which I presented to them (via YouTube and Facebook) as a short 'thank you' video on November 8th in 2014, which is the national day of the park guard in Bolivia (the subtitled version of this video can be accessed here: https://www.youtube.com/watch?v=H-ZuJccV4as).

Figure 3.9 Presenting to staff at the Department of Biodiversity at the Vice-ministry of the Environment in La Paz

Finally, together with Igor and María, I also organized a *conversatorio* at the Museum of Natural History in La Paz to present my research and have a discussion with a multidisciplinary group of scientists from various organizations (including WCS, the National Herbarium, and the Institute of Ecology). Out of this meeting came a larger discussion about the role of researchers, and we began drawing up a document of best practices for research (led by María Copa). These efforts are still ongoing as part of the Rufford Small Grant project, and will continue after the life of this PhD, to be discussed further below.

Table 3.2 Summary of qualitative methods used

Qualitative methods	Description	Sample
Participant observation and field journal – 2012-2014	Participant observation of work and daily activities of protected area staff, researchers, and local community members. Particular focus was directed at two different areas: 1) the ranger-based integral monitoring programme, run by the National Service of Protected Areas with technical support from the WCS in Bolivia; and 2) interactions in the field through wider projects between conservation science / biological research institutions and leadership councils and communities of indigenous territories in region (Takana, Lecos de Apolo, San José de Uchupiamonas and Tsimane'-Mosetén). I kept a record of my observations with a journal that I wrote in everyday in the field.	Accompanying park guards on patrols and to measure various indicators, and in the Apolo and San Buenaventura offices of Madidi NP/NAIM, and the Pilón Lajas office; also participation in 'co-management' workshops. Trips with researchers (social and natural scientists) to observe interactions with local people; trips to local communities in protected areas and bufferzone.
Unstructured and semi-structured interviews – 2012-2014	Focused on understanding the main issues involved with scientific research and the management of natural resources in the Madidi region, specifically regarding experiences with park management, main concerns of community regarding conservation activities in the region, and awareness of existing scientific research and monitoring. Questions focused on how decisions about natural resources use are made at local, regional and national levels, the role of scientific research in those decisions, micro and macro-level politics and encounters around the production and dissemination of scientific research. See Appendix III. Most interviews lasted between 20-40 minutes, with a few key informants selected for more in-depth discussions throughout the research period. Other interviews were conducted very briefly (15 minutes) to ask about a person's specific perception of a given situation or project.	24 were conducted with researchers, 42 with local people (leaders and community members), 27 with park guards and administrators, nine with staff of government ministries and/or other NGOs. An additional 35 shorter interviews were conducted in 2012 in the Takana 1 indigenous territory with local people who had been involved in the hunter/fisher self-monitoring project with WCS.
Workshops on communication / dissemination with scientists - 2013	The workshops with scientists were designed in response to a request for training on improving communication and dissemination with local stakeholders, and incorporated role-playing exercises in which they acted out different kinds of interactions between with local people in the process of conducting research. All participants signed up ahead of time – the workshops were open to those affiliated with the National Herbarium at the Institute of Ecology at the Universidad Mayor de San Andres.	Two half-day workshops with botanists (mix of experienced researchers and students in training) at National Herbarium (20 and 16 participants, respectively)
Workshops with park guards and staff	In the case of the park guards, the workshops were structured in part around the systematic analysis of past research conducted in the protected area (further described below). The main aim was to discuss what had been done previously and to what extent those studies had been disseminated/ implemented for management, and in the case of Madidi, to develop a specific regulation for research in the protected area.	Two workshops with Madidi park guards (eight participants in Apolo office, 22 participants in San Buenaventura office – this was scheduled on the Bolivian 'National Day of the Park Guard', per the request of the Madidi staff)
Participatory workshops to develop 'research norms'	In the case of the indigenous communities, the workshops were organized around the proposal to create a community norm to negotiate their relations with researchers in the future (i.e. ethical protocols). These norms have been created and being used by the communities, but will be reviewed and revised in	San Miguel – meeting held with community in 2013 (35 present), workshop in 2014 with 12 participants San José de Uchupiamonas

	2015.	(workshop in 2013 – 16 participants, follow-up meeting in 2014 – 6 participants)
Feedback sessions – 2013 and 2014	Between December of 2012 and August of 2014 feedback sessions were held with: Madidi NP/NAIM, a group of Bolivian researchers from various institutions, and the Takana, San José de Uchupiamonas, and Tsimane'-Mosetén indigenous councils. Additional meetings to hand over reports were held with the Wildlife Conservation Society, Pilón Lajas BR/IT, SERNAP, and the Vice-Ministry of the Environment's Department of Biodiversity. See Appendix VIII for a sample report.	Leadership councils of indigenous territories (Takana, San José de Uchupiamonas, Tsimane'-Mosetén) – between 2-6 persons present at meetings Meetings with park staff (various) Seminar with researchers from multi-disciplinary backgrounds (n = 9)
Filmed interviews - 2014	Aim was to produce a short documentary about 'indigenous perspectives on research' to screen at the 'Fuller Geographies' panel of the 2014 Royal Geographical Society conference in London. Additional filming was done of the integral monitoring programme of the Madidi park guards.	Interviews from 2013 repeated with key informants – 2 indigenous leaders (Takana and Tsimane'-Mosetén), 1 staff of indigenous council, 7 Madidi NP/NAIM park guards

3.8 Language and data analysis

All interviews, meetings and workshops were carried out by myself in Spanish, with the exception of a few interviews with English-speaking scientists, and two interviews done in the Apolo region of Madidi that were carried out in a mix of Spanish and Quechua, with an accompanying park guard translating and clarifying when I did not understand. Prior informed consent was obtained orally in all circumstances, and interviews and workshops were either audio/video recorded with consent from the participants, or in other cases notes were taken and a more in-depth summary was written up afterwards (see Appendix A). I translated and transcribed all of the data – often calling or emailing interviewees afterwards for clarification on certain terms used and my interpretation of their statements – and then coded it with the assistance of the qualitative data analysis software Atlas.ti. version 7.1.8 (2014).

Inhabiting the 'third space' I mentioned earlier has also meant taking specific decisions with regards to my research process and outputs. I have tried to avoid the use of jargon when possible, which Mary Louise Pratt refers to as one of the 'worst sins of academe' (1996). I also concur with Tsing when she states that "there are lots of things that I will not research or write about. I do not mean that I have white-washed my account, but rather that I have made choices about the kinds of research topics that seem appropriate, and indeed, useful to building a public culture of international respect and collaboration" (2004, xii). Finally, I have made a conscious

decision to avoid what Eve Tuck refers to as 'damage-centred research', which refers to tendencies in the social sciences to focus on problems rather than solutions (Cahill 2013). This relates to the concept of 'appreciative inquiry', and the choice I made to work with, rather than separate from, the conservation science organizations and protected area staff operating in the Madidi region (Boyd and Bright 2007). It has been through the personal and professional relationships I have made with scientists that I have been able to identify 'spaces of encounter' that go beyond certain critical perspectives about conservation, scientific research and the history of colonialism.

3.9 2015 Plans – Bolivian Science

Even as I submit this thesis to be judged academically in England, I feel that my biggest test awaits me in Bolivia, where I will be disseminating my findings to all those who have helped me over the past three years. I am still attempting to learn from and work through the issues described in this thesis, and one way I am doing this is through the creation of a documentary film about my research process, including critical reflections on process, being narrated in Spanish, to be shown in the communities and with separate viewings for the women's groups in these communities in 2015.

As Jazeel et al. 2009 write, "Research itself, when disseminated, is never just a mirror held up to a world out there" (112). This project aims to lay this problem on the line through a willingness to put forth in various written and visual creations of the research to the "world out there". In this way, as a researcher I will give the people I have thought and written about the chance to critique what I have said, how I have come to say it, and to provide spaces for critical reflection. What have I gotten right? What have I gotten wrong? What is interesting about this perspective? What does it mean for research to be significant? Why? According to whom? It is important for the researcher to be vulnerable because it enables a more relational approach by which to look at the "boundaries that distance 'self' from 'others'" (Findlay 2005; 433). Putting one's research out there, on a bigger stage, places the researcher in an extremely vulnerable position. This is especially important in a country like Bolivia, which is currently undergoing an explicit process of 'decolonization' at various levels of state and public policy. In this sense this project additionally takes up this challenge of decolonization as a point of departure through which research dissemination is seen not only as an end 'product', but the beginning of a process

through by which the question of 'who owns research' can be brought sharply into focus. Rather than something to be determined ahead of time, I see this as a process of negotiation that will take place once I return to the field.[4] It is not in *knowing*, but in *not knowing* that we walk along the road to action and change.

Chilisea writes at the beginning of her book *Indigenous Research Methodologies* that doing research with indigenous communities is a lifelong commitment: "if contacted by the community, even many years after the completion of a research project, the research team must be prepared to assist the community with their requests" (2012, 225). When I first read these lines in 2013 I resisted them, but over the last two years I have come to see their wisdom and truth. This project has changed me – I have benefited in countless ways from my ability to go to Bolivia and do research in Madidi. I have perhaps built a career for myself out of it. What I will give back will in part be the dissemination of my research findings, but as Smith writes, "sharing knowledge is also a long-term commitment." How I will uphold my part of the bargain is yet to be seen.

Wayfarer, the only way
Is your footprints and no other.
Wayfarer, there is no way.
Make your way by going farther.
By going farther, make your way
Till looking back at where you've wandered,
You look back on that path you may
Not set foot on from now onward.
Wayfarer, there is no way;
Only wake-trails on the waters.[5]

[4]Although I have had to make specific decisions regarding coauthorship for the practical nature of submitting my thesis on time. I only include one coauthored paper in this work due to the difficulty in co-writing across distance and languages, but I am planning to write papers in Spanish for Bolivian journals upon my return, as well as continuing to do filmwork, which I have found to be the most accessible format to communicate with the park guards and local communities in Madidi.

[5] From the translated poem by Antonio Machado 'Caminante no hay Camino' (1912).

CHAPTER 4:

The making of a conservation landscape: Interdependence as a theory and an ethic to guide collaborations between indigenous peoples, conservationists and protected areas

Abstract: The current debates around conservation, particularly with regards to protected area systems in tropical regions of high biological and cultural diversity, are peppered with competing voices between social and natural scientists, indigenous communities and activists, and national governments. One area of frequent mention in the literature deals with the specific relationships between different social groups in protected areas, such as conservation organizations and local communities. However, while there has been much focus on conflicts between these groups, there has been less attention paid to collaborations that go beyond superficial discussions around co-management to look at the relational accountability between these groups. This paper uses the lens of interdependence to take a fresh look at histories of encounter and relation in the making of a conservation landscape in Bolivia, seeking out 'spatialities' that offer something different for the local people involved, rather than simply re-enacting longheld and drastically unequal relations of power. In this paper I build on these ideas to create a theory of interdependence in a conservation context, in which the spaces of contact and friction become so complex that the existence of one group is seemingly impossible without the active engagement of another. I argue that interdependence is a useful theory through which to understand that even minor actions can have unexpected consequences, and to see the nuances in the stories that are told and what they mean for the future of tropical conservation.

4.1 Introduction

> Many critical scholars have given up on conservationists' interest in indigenous people, categorizing it only as a repetition of metropolitan fantasies and imperial histories. Anthropologists make fun of activists' stereotypes about other cultures; literary critics trace these stereotypes back through a literary legacy (Ellen 1986; Slater 1995). Political ecologists show the disciplines conservationists impose on rural people and connect these to the history of colonialism (Li 2003b; Neumann 1998). These are crucial critical perspectives. Yet, taken together, they offer a historical metanarrative of imperial modernization in which nothing can happen - good or bad - but more of the same. Familiar heroes and villains are again arrayed on the same battlefield. It is difficult to see how new actors and arguments might ever emerge (Tsing 2005, 161).

The current debates around conservation, particularly with regards to protected area systems in tropical regions of high biological and cultural diversity, are peppered with competing voices. Among the loudest three are those in the conservationist camp, including biologists and NGO practitioners whose moral footing is landed on an unprecedented extinction crisis (Dirzo et al. 2014; Terborgh 1999); the local communities and their academic/activist allies, whose rights to land and resources have alternately been infringed upon and/or supported by the various forms that the conservation movement has undertaken over the last hundred years (Sundberg 1999; Brockington et al. 2008; Dowie 2009); and the national governments of economically-developing countries in the Global South, who above all, seek autonomy of their own development processes (Bebbington 2009; McNeish 2013; Brosius 1999). In some readings of the key issues at hand – protected areas and indigenous people, neoliberal conservation trends, poverty alleviation and biodiversity protection – these three voices seem at loggerheads, with their various positions in stark opposition to the others (Brockington et al. 2008; Escobar 1998; Fletcher 2010). One well-known example of this is the ‘parks in peril’ versus ‘people in parks’ debate, at the heart of which lies the question of who wins and who loses in biodiversity conservation (Adams and Hutton 2007; Peres and Zimmerman 2001).

However, in other interpretations, exemplified by recent synthesis reports and protocols published under international accords such as the Convention on Biological Diversity, there seem to be places and spaces for reconciliation, where the diversity of voices is found capable of striking harmonious notes (SCBD 2014).

> At the World Parks Congress in 2003, the Durban Accord stated that, "our strongest commitments will fail if we neglect to maintain avenues for open communication ... in a climate of humility, credibility and trust". In the face of biodiversity decline, fragmentation of landscapes, climate instability and an ever greater gap between rich and poor, we must work cooperatively as a human family to address the drivers of threats to the fabric of life and promote intercultural, intergenerational and equitable dialogue (IUCN, 2014, 1).

Such declarations point not only to the potential of collaboration and dialogue brokering existing differences, but additionally to the vested interests that all of these different groups have in the discussions around the global conservation of biodiversity and natural resources (Brosius 2004; Kothari et al. 2012; Jonas et al. 2012; Shoreman-Ouimet and Kopnina 2015). One area of frequent mention in the literature deals with the specific relationships between different social groups in protected areas, such as conservation organizations and local communities (Allendorf et al. 2007; Brockington 2004; Brockington et al. 2008; Adams 2004; Brosius 1999; Sundberg 1999; Cepek 2011; Ross et al. 2011; Liu et al. 2010; Magome and Murombedzi 2003). In their book, *Nature Unbound,* Brockington et al. (2008) detail conflicts and contests between local people and conservationists in order to demonstrate the problematic and complex notion of 'compatibility' between western conservation and indigenous peoples. However, they also briefly point to contexts in which effective collaborations can be found – namely those in which power relations between the different groups are enacted on a somewhat more balanced, if not symmetrical, footing. This is an important area for further inquiry, because as Tsing writes, "collaboration is not necessarily good for all parties; to study it is not to pretend that easy solutions abound. Collaboration does, however, draw attention to the formation of new cultural and political configurations that change the arena of conflict, rather than just repeating old contests" (2005, 161).

This is a paper that documents how various groups – indigenous communities, conservation scientists, and government officials – have worked both against and with each other through processes of tensions, frictions and synergies to 'create' one of the most biologically and culturally diverse conservation landscapes in the world. It

evokes a theory of interdependence as a lens through which to better understand the significance of both micro-level encounters between individual representatives of these various groups as well as paradigm-shifting manoeuvres. By 'interdependence', I refer to the increased acknowledgement of shared vulnerabilities and responsibilities between two groups, which I will explain in more detail in the next section. This is an important contribution to current debates on conservationist-community collaborations and partnerships, which are often discussed in somewhat superficial terms of co-management successes or attitudes towards conservation but lack deeper analyses of the relational processes involved (i.e. Low et al. 2009; Mehta and Heinen 2001; Holmes 2003).

Karl Zimmerer suggests that there may be new 'spaces of hope' for conservation: "new spatialities that can lead to benefits for a broad base of local people, especially the currently less powerful, as well as the potential to help sustain the health of environments" (2006, 71). In this spirit I use the concept of interdependence to take a fresh look at histories of encounter and relation in the making of a conservation landscape, seeking out 'spatialities' that offer something different for the local people involved, rather than simply re-enacting longheld and drastically unequal relations of power. However, this does not mean that such interdependency can be seen as 'cosy', as pointed out by Raghuram et al., but in taking place in an explicitly postcolonial setting, can be viewed as "contested, complicated and productively unsettling" (2009, 10-11). I argue that interdependence is a useful lens through which to understand that even minor actions can have unexpected consequences, and to see the nuances in the stories that are told and what they mean for the future of tropical conservation.

The material for this paper comes from fieldwork carried out between 2012-2014 in the Madidi region of Bolivia with three main sets of actors: the park staff of Madidi National Park and the neighbouring Pilón Lajas Biosphere Reserve; researchers and practitioners at conservation science institutions operating in Bolivia (including the La Paz branches of the Wildlife Conservation Society and Conservation International); and the leaders and members of various lowland indigenous communities in the Madidi region (including those located in the Takana 1, Tsimane'-Mosetén, and San José de Uchupiamonas indigenous territories). I base my arguments on findings gleaned from semi-structured interviews, workshops and participant

observation carried out with these different groups, and specify the sources of quotes and observations when applicable.[6]

The structure of the paper is as follows: first, I begin with a discussion of the concept of interdependence, outlining the various ways it has been used in both academic and political settings and demonstrating why it can serve as a useful lens to examine landscape-making. I then provide a history of the creation of the Madidi landscape as a result of 'independent' and 'dependent' conceptions of nature, as described by those writing about different "geographies of nature" (Castree 2013; Arnold 1996; Hinchliffe 2003, 2007; Massey 2006; Raffles 2002), and how more recent understandings of natures that are 'co-produced' by both social and ecological forces can benefit from the concept of interdependence. Finally, I present four examples of how interdependence has played out between different actors in the region to contribute to its creation as one of the most biologically and culturally diverse places on the planet.

4.2 Theoretical Framework – Towards a theory of interdependence

The quote by Anna Tsing at the start of this paper begs several questions: What would new actors and arguments look like in the context of biodiversity conservation? What could they mean for the future of conservation research and practice? And finally, how does one write about them? Tsing uses the metaphor of friction to explore how "heterogeneous and unequal encounters can lead to new arrangements of culture and power" (5), which is similar to the notion of 'contact zones' as used by postcolonial theorists that seek to emphasize the textured ways in which subjects are constituted in and by their relations to each other, thus going beyond binary understandings of colonist-colonized or oppressor-oppressed (Pratt 1992, 1996; Torre et al. 2008; Bhabha 1994; Clifford 1997; Soja 1996; Memmi 1957). The main aim of these different concepts is to harness the space in between different groups and peoples where new things might be possible, "emphasizing interconnections as well as conflict, and destabilising overly simplistic representations of bounded geographical worlds" (Askins and Pain 2011, 805).

These images and metaphors are extremely important for rethinking how people and groups can be changed through their interactions with one another,

[6] See Chapter 3 in this thesis.

whether through *spaces of misencounter* that highlight great differences of perceptions and power between the different parties, or through *spaces of encounter* that attempt to transform old ideas and relationships (Toomey, In Review). In this paper I build on these ideas to create a theory of interdependence in a conservation context, in which the spaces of contact and friction become so complex that the existence of one group is seemingly impossible without the active engagement of another.

The concept of interdependence has a long and varied history across academia and the political world. Writing about the 'geographies of interdependence', Smith (2015) locates the term in various contexts over the last century, making note of its 'promiscuity' as well of its potential utility in finding new ways to think about the complexities inherent in the constantly evolving relationships brought about by global environmental change and geopolitics. For example, in writing about interdependence in the context of environmental governance, Paavola (2007) describes it as the main cause of resource-use conflicts, evoking zero-sum type scenarios in which when one actor wins, the other loses, but also as a key driver of the need for distributive justice, what Gibson-Graham and Roelvink refer to as an "economic ethics of the Anthropocene" (2010, 321). In this reading, interdependence is both the problem and the solution, making it difficult to pin down as a helpful (and hopeful) concept. However, it can also be seen as a kind of recognition of the position of the other and of one's own vulnerability and responsibility in relation to that position.

> To acknowledge that we live in an interdependent world does not tell anyone how to behave, but it can make them much more sensitive to the wide range of relationships that they are influenced by and in turn can influence. Hence this is a powerful intellectual tool for anyone that wants not only to understand the world, but also to change it for the better (Smith 2015, 4).

As such, the power of the concept of interdependence is also an acknowledgement of the importance of relationships – with self, interpersonal relationships, and relationships with the world around us – and an understanding that "if we want to shift power, we have to shift relationships" (Reeler 2005, 6). This coincides with ways it is defined in other disciplines, such as in psychology, where the notion of interdependence is used to distinguish relationships with others that have important qualities of interpersonal commitment and the fulfilling of needs (Davis et al. 2009), or in organizational theory, where interdependence is described as a "lived experience among the group members and an acquired group skill to live through the tensions of

the core social dilemmas: individual–group, leading–following, openness–withdrawal" (Bouwen and Taillieu 2004, 148).

In the context of conservation landscapes, interdependence can be a particularly useful metaphor for examining relationships that occur in the protection of biodiversity due to its use across and applicability for both the natural and social sciences. In the biological sciences, for example, the notion of interdependence is one of the foundational pillars of the field of ecology, and it still holds great importance for understanding pathogenic relationships, community ecologies and food webs (Elton 2000 (1958); Hatcher et al. 2012). Human geographers and other critical social scientists, in turn, have increasingly been using 'relational' ways of thinking in writing about power dynamics in human-nature settings to challenge linear models of interaction between different actors (Haraway 2008; Barnett and Land 2007; Massey 2004; Whatmore 1997). This takes on special meaning in postcolonial contexts through the incorporation of indigenous ontologies based on notions of interbeing and reciprocal accountability (Country et al. 2014; Chilisa 2012).

> So rather than just thinking about an 'I' over here who impacts on a 'you' over there, relational thought prompts us to think more deeply about how these 'entities' became what they are – and how they are still 'becoming' (Massey 2004). Acknowledging that every individual, every place, every community has come about through relations of give and take with other individuals or places or communities points towards a degree of interdependence that in many ways defies measurement (Smith et al. 2007, 350).

However, even if it cannot be measured, the concept of interdependence can be put to use by specifically looking at instances of reliance between groups – where such mutual support, even if laden with conflicts and tensions, is necessary for the success or even the survival of each. In other words, to seek out spaces in which there is increasing awareness of the strength in numbers and a resulting determination to work together despite existing differences. According to Smith, one way to do this is to "radically review notions of responsibility and vulnerability, and ideas about who and what counts in ethics and politics" (2015, 8). If we can accept Philo's definition of vulnerability –"exposure to being attacked or harmed, either physically or emotionally" – means that not only that we are vulnerable to the same things, but that we are complicit in the vulnerability of the other (2005, 441). In a similar way, this relates to a kind of responsibility that is attuned to history: "we are responsible for the past not because of what we as individuals have done, but because of what we are"

(Gatens and Lloyd, 1999, p. 81, in Massey 2004). Defining interdependence in this way – as an enhanced sense of shared vulnerability and responsibility – allows us not only to look at the social relations within a conservation landscape in a new light, but also to reassess the history of those relations by asking certain questions. Who was vulnerable? Who is responsible? How have things changed over time? The concept of interdependence can also point to new configurations of power, which can go beyond debates of governmentality versus micropolitical struggles to understand how even the lowest-power individual can hold influence over a global institution (Cepek 2011).

Much of the discussions above can also gain considerably from situating their arguments in a specific 'place' (Massey 1994, 2004; Escobar 2001; Casey 1996). As argued by Raghuram et al., "in the end, it is what people do in place, day-to-day, that makes places what they are, and it is the interactions between people as agents in and across different places that constitutes those places" (2009, 8). In addition, by turning our gaze towards contemporary place-making in postcolonial settings, and the role of non-western agents in those processes, we find new sources of inspiration in retheorizing landscapes (Arnold 1996; Escobar 2001). To this end, I will now direct the focus of this paper to the happenings in a very real 'place' that represents many different things to many different people. By doing this, it will shed light not only on past vulnerabilities and responsibilities based on historical exploitations, but additionally on how those vulnerabilities and responsibilities are playing out in the present (Raghuram et al. 2009).

4.3 The making of the Madidi

Conservation science organizations operating in the northwest region of the Bolivian Department of La Paz refer to a Madidi landscape, which is part of a protected area block that stretches across 19,000 km² in the tropical Andes, in both Bolivia and Peru. It is also part of the Vilcabamba-Amboró conservation corridor, which makes up 16 protected areas and is considered the most biodiverse in the world (Surkin et al. 2010). The vision for this conservation landscape is described by the Wildlife Conservation Society: "that its rich biological and cultural diversity, its mosaic of forests and savannahs, and its iconic species thrive from the high Andes to the Amazon lowlands through the active stewardship of the region's local communities and government authorities." This statement appears to recognize the Madidi landscape as one that has

been (and is still in the process of becoming) jointly produced by both nature and society, where species thrive and local people act as stewards. This brings to mind an additional kind of interdependence, one in which humans and non-humans co-evolve, co-construct, and co-exist. But this envisioning of an 'interdependent' landscape in many ways breaks with previous conceptions of nature being separate from or moulded by society as have been explored in geographical literatures around nature (Hinchcliffe 2007; Pretty 2002). In the next section I will make use of these different ways of 'spatialising' nature in order to explore the historical making of the Madidi landscape, with emphasis on the vulnerabilities experienced and responsibilities held by its key architects – namely, conservation scientists, indigenous communities and the Bolivian state.

4.4 Dependent and independent natures

The story of how Madidi became a conservation landscape is one with many possible beginnings depending on who is doing the telling, but here I will begin with one of the most defining happenings in its long (and mostly unknown) history – one that set in rapid motion a string of events that was to play a large role in how Madidi is imagined across the world today. In 1990, Conservation International, a US-based NGO dedicated to the protection of nature, hired a team of world-renowned scientists as part of a 'Rapid Assessment Program' (RAP) with the aim of discovering (and ultimately protecting) one of the great biological treasures of the planet in a matter of a few weeks.

> The expedition ran from May 18 – June 15, 1990, and produced amazing results – 403 bird species, nine of which were new for Bolivia and 52 for the department of La Paz, and high plant diversity (204 species in 0.1 hectare)… The official launch of the report was held in La Paz, Bolivia, and President Sánchez de Lozada was so taken with it that he took the report's recommendation that Madidi be set aside as a national park very seriously. Indeed, within a year of the RAP survey, the Bolivian government and the World Bank both ranked Madidi as one of six high-priority sites to receive significant funding and, in 1995, President Sánchez de Lozada declared Madidi as a 1.8 million hectare national park, making it one of the largest then in existence (Alonso et al. 2011; 10-11). [7]

The RAP was unique and novel in many ways – it brought the world's experts in ornithology, mammalogy and plant taxonomy to a remote region to essentially prove

[7] In part this was due to the personal interest of the President's daughter, Alexandra Sanchez, who was a biologist and the director of biodiversity conservation at the National ministry of the Environment at the time.

the biological value of the region for conservation (Chicchon 2010). As noted in the quote above, less than five years after the expedition, the conclusions and recommendations produced from the RAP were the main evidence used to justify the creation of a protected area roughly the size of Denmark. There was incredible power in this specific instance of scientifically-based landscape-making. Also, it was based on a very specific notion of nature – a 'pristine' nature that was 'out there', "something that is distinct from, absolutely separate to, the social world" (Hinchliffe 2007, 8; see also Castree 2013). In this 'independent' state, not only is nature separate from society, but it is additionally threatened by invasion from that world – in other words, it is vulnerable and so in need of protection, which has in many cases been a dangerous and powerful metaphor for justifying the displacement of people across the world in the name of protected area conservation (Arnold 1996; Guha 1997; Cronon 1995; Fairhead and Leach 1995; Pretty 2002; Librado 2009). In the setting up of Madidi, there was no direct displacement of the 31 indigenous and peasant communities that were located within its newly-drawn boundaries[8], but neither had there been much consultation with those communities in its establishment[9]. Remberto Chihuapuri, a park guard who has worked in Madidi since the beginning, describes the early days:

> I was just finishing military service when they put the call out for 'park guards' in the region. A lot of people signed up for the exam, but the truth is, we didn't know what a national park was, we had never heard of things like 'conservation' or 'the environment'… In the beginning our role was to visit the communities in the Apolo region and inform them that two years before, the region had been declared as a protected area. Because the people didn't know. Not in any moment had anyone consulted them to ask whether or not they wanted to be part of a protected area or not. In other words, the government grabbed a map, saw what the region had to offer, and declared it to be protected. It was all done by legislators in offices in the city. The local people had no idea.[10]

[8] Nine communities were located within the area designated as strictly protected National Park, the remaining 22 communities within the Natural Area of Integrated Management (SERNAP 2006).

[9] One notable exception to this is the Takana-Quechua community of San José of Uchupiamonas, which had been receiving assistance from Conservation International to set up a luxury ecotourism project since 1995.

[10] This account directly contradicts much grey literature about the creation of Madidi, which often states that there had been a process of consultation headed by a Bolivian biologist, Rosa María Ruiz. In a National Geographic article published in 2000, she is presented as a local hero, who "had travelled for months on foot, mule, and balsa raft to ask the indigenous communities in the Madidi area to support a park. It was the first time anyone from outside had asked their opinion, so they considered her an ally and looked forward to her rare visits" (Kemper 2000, 7). However, during the two years I spent doing research in the Madidi region, I found that she was widely criticized for having lied to communities in the region, cheating them out of both money and land on multiple occasions. While it may be true that Ms. Ruiz did carry out some process of consultation in some communities (she was the person hired to take care of the 'social side of things' in establishing the creation of Madidi), Remberto's account was

This type of landscape-making 'from above' was by no means, however, breaking with past treatment of the region. Even before colonial times, the highland Aymaras referred to the region to the northeast of Lake Titicaca, where Madidi National park now lies, as 'Umasuyo', which was meant to conjure inferior 'feminine' qualities of humidity, floridity and darkness, and was in contrast to the superior, dry, sun-filled 'Urcosuyo', where the 'men' lived (Silva et al. 2002; VAIO 2000). During the Inca Empire, this perception helped to justify various military excursions into the region and fortresses and roads that were built with the purpose of exploring and occupying the area (Silva et al. 2002). These intrusions continued with the Spanish colonizers, who additionally sought promises of gold and riches as part of a hunt for the legendary golden city of El Dorado (Lehm et al. 2002). When the budding nation obtained its independence from Spain, the provinces that encompassed Madidi were seen as the 'wild west' of Bolivia and policies were put into place to encourage an 'opening' of the lands and the exploitation of the natural resources found there to those that would seek them out (Soux 1991; Silva et al. 2002; Lehm et al. 2002). These policies led to the first resource 'booms' in the Bolivian lowlands, fuelled by the exploitation of natural resources – first quinine, then rubber, then large-scale agriculture through the establishment of patron-owned haciendas, and finally the fur-skin trade of the 1970s and the timber boom that began in the 80s and is still happening today, albeit mostly in the indigenous territories buffering the park (Forrest et al. 2008).

The perception of nature guiding many of these explorations and exploitations was of another kind – a dependent nature – one that man could shape to his own imaginings (Hinchliffe 2007; Macnaughten and Urry 1998). Seeing nature in this way can justify a different kind of action towards resources and people – for example, it can provide explanations for 'undeveloped' lands and thus rationalize the need to bring other (more 'industrious') peoples to inhabit those lands (Nygren 2000). In the Madidi region, this image was increasingly important towards the end of the 20th century as the government encouraged a "March to the north of La Paz" in the 1970s, which promoted colonization into the northern La Paz region, the establishment of a

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corroborated in the vast majority of interviews I carried out with locals, who stated that they had no idea that they were living in a protected area until after the fact.

large sugarcane processing factory, and the building of a dam that would flood lands currently occupied by Takana, Tsimane' and Mosetén communities. This process, which continued into the 1980s, advanced intensive exploitation of natural resources as the basis for gaining a land title (Bottazzi 2008).

By the time of the Madidi RAP, many outside forces were indeed threatening the biological (and cultural) diversity of the region. Within what was to be the national park, more than 40 timber companies were operating, the vast majority of which were run by outsiders to the region.[11] It seemed that nature was in fact something to be fought over – whether by protecting it from the rest of society, as the early conservationists sought to do, or by developing it as an exciting new frontier for development and economic opportunity in the form of dams, petroleum, and mahogany. Madidi in the 1990s was a place of very high stakes.

However, there was a third agent operating in a very active way at this time, indeed, one that had been alternately resisting against and engaging with the state throughout the entirety of the history described above – the people native to the region. Much of this resistance has been buried underneath a long-held rhetoric that disregarded the Amazonian peoples in Bolivia as a nuisance that retarded the growth of the budding nation – a view that justified those in power to deal with them through varying degrees of exploitation and political exclusion (Healy 2001). But both oral histories and recent writings from the region increasingly acknowledge the independence asserted through either self-imposed isolation or violent resistance of the indigenous peoples in dealing with their increasing vulnerability to outside forces, tactics that are still present in some forms today (Cingolani et al. 2009). Under Spanish rule, another strategy involved accepting a state of dependence on their aggressors through joining settlements and Catholic missions:

> In many cases Indians maintained a relation with the state, insisting on paying tribute in order to continue the colonial contract (Platt 1982). When the state attempted to abrogate Indians' rights, the latter appealed to maintain the colonial contract - not because they were conservative or because they were incapable of participating in a liberal state, but because the colonial documents they possessed were the only ones they could use in their defence (Baud 2009, 25; in Canessa 2012, 202).

Even after the national Agrarian reform of 1952 helped to give indigenous people back a certain measure of control over their own lands, the official cultural policies

[11] From interviews with Carlos Espinoza and Ebelio Romay, November 2013.

encouraged 'mestizaje' rather than 'indigeneity', which was meant to spread the Western concepts of civilization and progress throughout the nation (Albro 2006; Rivera Cusicanqui 2004; Healy 2001). As such, the intensified processes of colonization and natural resources extractivism in the latter half of the 20th century had a direct effect on lowland indigenous groups in the region who saw their lands being invaded by outsiders, removing their natural resources in exchange for low paid day labour. But in the 1980s things started to change. Internationally, a discourse about the value of indigenous worldviews and knowledge began gaining traction, connected to certain beliefs that the descendants of the original inhabitants of a country should have privileged rights to its land and resources over those of more recently immigrated groups (Kuper 2003, 390). Connected with this, communities that had been part of farming unions since the 50s began changing self-identities from '*campesino*' to indigenous and linking up with biologists and ecologists that were also adopting pro-indigenous rhetoric as part of their mobilizations to prevent the destruction of the rainforests (Brosius 1999; da Cunha and de Almeida 2000). In 1990 this synergy supported the first march for territory and dignity, in which 600 indigenous people marched almost 1500km from the lowlands to La Paz to protest encroachment on and exploitation of their lands and resources (Healy 2001).

So at the same time that Madidi was becoming a protected area, it was also becoming a hotspot of indigeneity.[12] Alongside the consolidation of the protected area system, the decade marked the beginning of an ongoing process of indigenous groups in the region obtaining titles to their lands. After the march in 1990, leadership councils for several of the indigenous groups in the region began to emerge.[13] Several new institutions and laws were also set up at this time, including the National Institute of Agrarian Reform (INRA) law in 1996, which created the legal designation of 'Tierra Comunitaria de Origen' (TCO)[14] for indigenous peoples across the country. But as Madidi became a landscape overlapped by both protected areas and indigenous territories, it was no longer possible to view the particular nature located there as

[12] See Fontana 2010 and 2014 for a deeper reading of this in Madidi, and Kuper 2003 for a discussion on the global complexity of indigeneity.

[13] The Consejo Regional Tsimane-Mosetén (CRTM) was established in 1991, the Consejo Indigena del Pueblo Takana (CIPTA), in 1992, and San José de Uchupiamonas, which was originally part of CIPTA, in 2002. See Herrera 2005 for a more in-depth exploration of these processes.

[14] All Tierras Comunitarias de Origen (Peasant Indigenous Territories) were officially converted to TIOCs (Territorio Indígena Originario Campesino - Original Peasant Indigenous Territory) according to Article 293 of the Bolivian Constitution, 2009. But in practice the denomination TCO still applies.

simply either independent or dependent. It was becoming something else – something that needed to be defined not only as co-produced by its human and non-human inhabitants, but additionally as a space that could be characterised by the interdependencies between different groups operating in the region.

Indeed, the social-natural characterization of the Madidi region was not a coincidence, but was based on different ideas about who belonged in the landscape in relation to whom the landscape belonged, and what those ideas meant for how people interacted with that landscape. In the next section, I will use the theory of interdependence to better understand different types of collaborations between conservation NGOs, indigenous groups and protected area staff. While such relationships remain complex and often laden with conflict, I argue that they have indeed been effective in supporting the mutual advancement of the involved groups.

4.5 Interdependence in landscape-making: Changing vulnerabilities and responsibilities

> "So in Pilón Lajas the territory is also almost 100% overlapped by the indigenous territory as well, what do you think about that?"
>
> "Well that's Bolivia. That's the way it was designed."
>
> "Do you think that's compatible with conservation?"
>
> "Sure. Everybody does."
>
> (From interview with biologist who worked in the Madidi region in 1990s, December 2013)

Reflective of global trends of the time, in the Madidi region the notion of compatibility between conservation and the use of natural resources by indigenous communities developed in the 1980s and became firmly established in organization rhetoric and decision-making in the 1990s. In part this was based on the low densities of lowlands indigenous peoples, which the conservation scientists saw as a necessary condition for the maintenance of biological diversity (Robinson and Bennett 2000). But it was also due to the persistence of the popular global image of the 'noble savage' as the stalwart steward of the natural environment, which in Bolivia was supported through discussions of the 'conservation ethic' of lowland indigenous groups (Wentzel 1989; Lehm 2010; Costas 2010).

In truth there was a great deal of overlap among goals held by the leadership

councils of the indigenous groups and the conservation science organizations operating in the region, such as the ousting of outsider-owned logging companies and the protection of indigenous lands from increased colonization by peoples of Andean descent. However, what was less recognized at the time was that the interests and values that supported these goals were very different. As Chicchón states clearly in a paper on indigenous-conservationist collaborations in Latin America, "the WCS does not have the welfare of local people as a primary goal" (2009, p. 18).[15] Rather, for the conservation science organizations, the focus was primarily on the protection of biodiversity, particularly endangered, charismatic species, such as the jaguar or the Andean bear. In that sense, the alliances with indigenous communities was a means to an ends, a sentiment that was reciprocated by the indigenous leadership councils, who above all sought control over their lands to advance their own notions of development (Wentzel 2009; Herrera 2005). They saw the conservation organizations (and the international power that they represented) as a vehicle to assist them in soliciting political recognition by national and regional government, as the trend towards 'indigenous chic' that was happening outside of the nation's borders increased the disposition of government officials to listen to what people had to say when they walked through the door (Healy 2001).

As a result, the alliances were built on unsteady ground, but they emerged because each party felt it had something to gain. It was necessary for the conservation NGOs to team up with indigenous groups – it made sense not just politically and socially, but ecologically as well, as the shift in the conservation science debates began to favour the importance of landscape-level conservation and work in buffer zones, rather than the protected-area discourse that had occupied the spotlight in the 1970s and 80s (Franklin 1993; Turner et al. 2001). These alliances equally suited the budding indigenous leadership councils that were being formed out of a 'created necessity' due to the arrival of highland migrant groups who began to get what they wanted from national government and local municipalities simply because they were organized[16]. The lowland indigenous councils additionally benefited from technical

[15] The Wildlife Conservation Society was originally created in the early 1900s for ex-situ conservation. Their first statement of purpose declared that "no civilized nation should allow its wild animals to be exterminated without at least making an attempt to preserve living representatives of all species that can be kept alive in confinement" (Goddard 1995, 43).

[16] These highland groups are often referred to as 'colonos', or colonists, though this has recently been deemed politically incorrect, and in most reports they are called 'interculturales', meaning 'of mixed culture'.

assistance from conservation biologists and geographers in order to obtain legal rights to their territories under the 1996 INRA law, as one of the conditions for obtaining such rights was to demonstrate historical land use and current 'efficient' appropriation of land and resources (Bottazzi 2008; Salgado 2010). This did not mean that the ensuing relationships were equal, as Torre reminds us, "differences in power and privilege do not wait patiently at the door, they are a part of, and inform, all aspects of living – our histories, language, analyses, interactions, imaginations, and so forth" (2010, 82). However, it is in these relations of asymmetrical reciprocity where there is the potential for new ways of interacting and ethical forms of place-making can find their origins (Young 1997; Barnett and Land 2007). This is vital to understand because it points to the 'spaces of hope' in which new actors and arguments can emerge, as suggested by Tsing and Zimmerer in the introduction.

4.5.1 Changing responsibilities

The end of the century marked additional political changes in Bolivia with regards to citizenship. In 1994, a new law of 'popular participation' was passed and put into place, which greatly altered the way that participation was organized in indigenous communities (Lema 2001). This created a 'new scenario' in municipalities and indigenous territories, in which a created obligation to operate in non-traditional spaces generated new practices of allocating and exercising power that led to a certain type of development (Herrera 2005, 20). Some scholars have argued that this new scenario was as much related to global trends towards neoliberalism as to claims for increased citizenship (whether by indigenous people or otherwise) from within Bolivia (Albro 2006). Nancy Postero uses the term 'responsible participation' to describe the new demands on indigenous groups in the face of both State and international pressure for engaged citizenship:

> Indigenous groups had to organize their own villages to make diagnoses of their needs, to attend meetings where budgets were discussed, to make arguments backed by rational arguments, and to speak a particular kind of bureaucratic jargon defined by the new law. Because these skills were not held by the majority of the supposed beneficiaries of the law, the state and municipalities relied heavily on NGOs, often funded by international organizations, to carry out the widespread training necessary to 'educate' citizens about how to access their new rights (Postero 2007, 167-168).

Indeed, it was within this context that conservation NGOs quickly became aware of 'technical' deficits, which some perceived as a clear entry into influencing the

conservation and development of the landscape. One of the clearest examples of this has been the alliances held between the Wildlife Conservation Society (WCS) and the leadership councils of the various indigenous groups in the Madidi region (the Takanas (CIPTA), the Lecos de Apolo (CIPLA) and the Tsimane'-Mosetén (CRTM)), in which WCS has helped to support new and previous claims to land titles and management over those lands with both legal and technical assistance (Painter et al. 2011; Muiba et al. 2011).[17] These partnerships also fit into the wider strategies of the national lowland indigenous organization (CIDOB) towards 'indigenous autonomy' of management of natural resources. The rationale behind these partnerships was based on the legal need to demonstrate to the Bolivian State that these indigenous groups were fully capable of managing their own territories in a manner that was economically viable, environmentally sustainable and additionally able to protect the traditional livelihoods, cultures and beliefs of their peoples.

As discussed earlier, these relations are far from unproblematic, with one of the biggest concerns dealing with the way in which the strategic plans of the various indigenous councils often line up neatly with the conservation aims held by the NGOs that provided technical assistance for their development. This is connected to questions about cultural identity and autonomy and the level of influence held by certain groups over others. However, while the extent to which the conservation NGOs have succeeded in the 'remaking' of the indigenous councils to fit their own agendas is a question up for debate (Cepek 2011; Agrawal 2005), here I am primarily interested in the changing notion of responsibility, as suggested at in the quote below:

> The indigenous organizations have a major challenge to face. Because on one hand they have to respond to a modern context where they need to present and manage the technical information with regards to their management plans, because these are the instruments required for them to defend their access to resources and land… Not just in Bolivia, but at an international level. Because these are things that are being defined by entities outside of the country – the World Bank, the IMF – that have the power to completely change the panorama within a region. And they are completely technocrat – they operate based on data. So the indigenous organizations have to learn how to participate, using this language, because if they don't, they are fried. But on the other hand, they have to maintain these cultural characteristics that the world requires they should be conserving… So there is a need to maintain a balance

[17] Between 2001 and 2014, the various organizations coordinated to carry out various management plans and natural resources monitoring (CIPTA 2002; CIPTA 2007; CIPTA 2008; CIPTA 2010a; CIPTA 2010b; CPILAP 2009). WCS has enacted similar alliances with indigenous groups in other parts of Bolivia, including the Izoceno peoples of the Bolivian Chaco (Noss and Cuellar 2001; Noss et al. 2004, 2005).

> between cultural pride, traditional decision-making structures, and the types of language used to talk about these issues.[18]

In a piece entitled the 'geographies of responsibility', Massey writes of the importance of seeing responsibility as something that is intrinsically relational, embodied in places and things, and capable of extension beyond the local (2004, 9). The new 'citizenships' developing in the Madidi region suggest this understanding of responsibility as that which emerges as something more-than-individual, something shared and experienced in-between different people and groups. What is interesting here then goes beyond the *why* of these reciprocal responsibilities, and looks into the question of what kind of relations they end up producing. To understand this further, however, we need to bring the notion of vulnerability into the equation.

4.5.2 Shared vulnerabilities

After the turn of the millennium, the neoliberal, open-market policies that had espoused the 1990s had come into sharp conflict with the majority indigenous population, erupting most notably in the early 2000s during protests around water and gas privatization. Indigenous leadership at the frontline of those conflicts was quickly gaining political ground, and in 2005 Bolivia elected for the first time an indigenous president, Evo Morales, bringing into power the socialist political party known as Movimiento Hacia el Socialismo (MAS). Much of President Morales's political message was centred on increasing resistance to the colonial legacy through a continuation of imperialist economic policies under previous administrations, and towards a new 'plurinational state' and the nationalising of the nation's natural resources (Bebbington 2009; Hindery 2013). Much to the dismay of many conservationists in Bolivia, this has included a revaluation of the legal status of protected areas across Bolivia, which have been perceived by some as representing an imperialist kind of conservation since their establishment in the 1990s (McNeish 2013; Rodríguez et al. 2007).

In 2006, one of Evo's first acts as president was to visit a remote village in Madidi and declare the nationalizing of Bolivia's protected areas: "We are here to reclaim sovereignty over our lands, to begin to defend our national territory, dignity and natural resources" (Telesur 2006). This position (and the reactions against it) has

[18] From interview with Lilian Painter, December 2013.

been most clearly evidenced in the divisive debate over the construction of a highway through the middle of one of Bolivia's largest protected areas (known as TIPNIS), which is also the legal territory of the lowland Tsimane' indigenous group (McNeish 2013). Despite having signed a law pledging not to build the road after a march led by indigenous and environmental activists in 2011, President Morales passed a new law in 2012 that overturned the previous one. While those opposing Evo often point to the TIPNIS conflict as evidence that the government is neither as pro-Mother Earth or pro-indigenous as it pretends to be, such neo-extractivist policies (which also have included renewed emphasis on industrial 'mega-projects' such as oil drilling, the construction of hydroelectric dams and large-scale mining) can also be seen as a kind of resistance to a more modern, greener type of imperialism promoted by conservation scientists and indigenous leaders in the lowland regions of the country (Rodriguez et al. 2007).

This situation has made the status of NGOs operating in the country – particularly conservation NGOs with ties to the United States –increasingly precarious. Much of Evo's anti-imperialist rhetoric criticizes the role of such institutions, and in 2013 this moved beyond mere discourse to the ousting of USAID and cancelling of all associated projects, as was threatened in the comment below made by Evo Morales two years earlier:

> I hope that these NGOs are not financing the opposition of our integrative policies in Bolivia, because the day we find out that they are, we will find the way to put a stop to these kinds of NGO-based conspiracies. We know that USAID is always (in the TIPNIS region), and we are going to be looking into this (Pagina Siete 2011; my translation).

One way in which conservation NGOs have dealt with this new vulnerability is, unsurprisingly, to strengthen existing alliances with indigenous groups while toning down conservation rhetoric that could be perceived as political / anti-government. Many of the new agreements focus on small-scale economic development projects, such as sustainable harvesting projects (i.e. castaña, caiman, ornamental fish)[19]. In interviews with staff from various conservation-based NGOs, there was a commonly-held acknowledgement of the need to work on local peoples' terms, and this had led to changes at higher levels. For example, the Director of Conservation International in

[19] See Buscher et al. 2012 for a wider critique of such neoliberal conservation trends.

Bolivia pointed out that while they still consider their organization to be science-based, in recent years they have changed the focus of their work accordingly:

> In CI we took the decision about two years ago to work much more on the organizational support of indigenous and peasant communities… We see that the support of a municipality or a protected area is through the capacity of local actors, who provide their knowledge and interest, depending on the situation. This changes the focus of our work, and it is related to how CI works globally. Five years ago we changed our mission from, in basic terms, 'the conservation of biodiversity' to 'nature is essential for people to live better,' – or, 'Living Well', if we are in Bolivia.

At the same time, neither is the status of existing indigenous territories – particularly those in the lowlands – safe from incursion by other groups, and the 'revision' of the existing INRA law is considered to be a pending issue, one that is neither entirely off or on the table[20]. As such, lowland indigenous councils are perhaps more eager than ever to find ways to mitigate their own vulnerabilities by establishing alliances where they can. This is perhaps the kind of 'shared vulnerability' that Findlay describes when he writes that "while some social processes draw lines between 'self' and 'other', producing new vulnerabilities, there are also social processes that connect across cultures and polities when people face the shared fragility of human existence" (2005, 436).

One example of this in the Madidi region is the Pilón Lajas Biosphere Reserve, which is almost entirely superimposed by the Tsimane'-Mosetén indigenous territory (CRTM 2009)[21]. During the early days of the Reserve the indigenous communities perceived the role of park guards to be one of aggression, as they came "to show the local people how to take care of their own lands" (Costas 2010, 147). But both groups quickly realized that they had a common cause in ousting the large timber companies that were steadily encroaching on their territory, which was having major impacts on animal populations – a very important issue for the Tsimane'-Mosetén people, who greatly rely on bushmeat as a central source of protein (Copa and Townsend 2004; Gutierrez 2005). In the mid-2000s, these relations resulted in the park guards and the CRTM to work together to successfully resist attempts by highland migrants to use resources in ways that were not acceptable to the indigenous inhabitants. When Evo 'nationalised' the park system and replaced all of the personnel in various protected areas, including Madidi, the Pilón Lajas staff were able to stay on because the CRTM

[20] From interview with Carlos Espinoza, November 2013.

[21] 86% superimposed.

came to their defence.[22]

> More than just a conservationist logic imposed from past times, the alliance has been based on the necessity of protecting both the territory and traditional customs – an effort that has taken more than a decade (Costas 2010, 158).

4.5.3 Embodied interdependencies

A third way of looking at interdependence in landscape-making is through the "seemingly mundane" micropolitics of personal-emotional encounters between different types of people living and working in the region (Staeheli et al. 2012, 630). Recent scholarship in relational geographies have focused on quotidian activities and small actions that are part of bigger movements for change (Horton and Kraftl 2009; Askins 2014). This is especially relevant in Latin America, where the interpersonal holds great importance – it is not just what occurs, but the face behind the action that often determines its meaning (Martín-Baró 1994).

One example of this is a story told by Marcos Uzquiano, the head of the park guards in the Apolo region, and originally of Takana heritage and from San Buenaventura, on the other side of the park. In 2005, the social conflicts in the Apolo region had reached new heights and the park guards were frequent targets of insults on the part of the federation leaders[23]. Feeling increasingly uncomfortable living and working in this context, one day Marcos saw one of the leaders and ran up to him, wrapping his arms around the man in a bear hug and refusing to let go until the leader finally cracked a smile. While this simple act did not drastically improve relations between the park and the communities, it set the tone for how the park guards were to find their own strategies for dealing with an increasingly difficult situation. As noted earlier, the park guards of the protected areas in the Madidi region are from the local communities, and as such are aware not only of the problems faced by the local people, but of how they think about their situation in life. On the Apolo side of the park, where dozens of Quechua-speaking farming communities lie both inside of Madidi's boundaries and in the buffer zone, most of the guards speak Quechua and have family in the communities; some still have land that they occasionally work on their days off. They have a personal connection to the history of the Madidi

[22] From interview with Andres Martinez, October 2013.

[23] This was a very complex land struggle that involved conflicts between communities that had decided to declare themselves indigenous (of the lowland 'Leco' ethnicity), and those that opted to maintain their Quechua *campesino* identity. See Fontana 2014 and Sotomayor Cuéllar 2009.

landscape, in which the socioeconomic structure of the majority of communities was previously organized around racist and exploitative serf-patron relations where the peasants worked the land or mines to benefit the *latifundistas*. In this sense, they have an embodied understanding that "people don't just make a living around protected areas, they make a life" (Luciano 2011).

Describing social relations in a context of interdependence, Bouwen and Taillieu write, "actors no longer want to 'solve' social dilemmas but are able and willing to live with imbalances and inequalities in a flexible and evolving way of giving and taking, towards lasting and sustainable interactions patterns" (2004, 148). The state of co-evolution that this description evokes helps to create a more dynamic understanding of the complex relations between the park guards and community members in the Apolo region, and additionally debunks common assertions that government officials "disparage local peoples and know little about their lives and hopes" (Redford and Sanderson 2006, 380). The park guards know that without the tolerance, if not support, of the local inhabitants, their job as 'Madidi's protectors', is meaningless. This was made clear in 2008, when Federation leaders and their supporters took over the park offices for more than a year, during which time the region was drastically deforested due to uncontrolled logging. The vast majority of the local inhabitants saw little of the profit in the timber trade, as in keeping with the history of economic booms in the region, the wealth generated was concentrated in the hand of a powerful few. [24] Having learned from this experience, the communities have become more favourable to the presence of the park guards, and in some cases directly reach out via radio to the ranger station to ask for direct assistance in removing outsiders from their lands (Patzi 2012). Under the leadership of Marcos and others, there is regular contact between the park guards and the local communities, many of whom do not speak Spanish and are illiterate, in order to assist them with the documentation required in order to obtain environmental licenses needed to carry out small to medium scale economic activities on their lands. However, these facilitator roles undertaken by the park guards are not always supported by SERNAP, where the zoning regulations and legal statutes determine the fate of such applications in very black-and-white terms, rather than the nuanced areas of grey that the park guards operate under on a daily basis. But the fact that these 'small actions' continue to be

[24] From interviews with Madidi park staff, 2013.

carried out, can point to the kind of creative responsibility that stems from an ethic of interdependence (Jazeel and McFarlane 2009).

4.5.4 Natural-social interdependencies

A final way to view the Madidi landscape as an interdependent one takes its lead from post-humanist trends in the critical social sciences, that argue that nature is not simply a passive thing, dependent nor independent on human imaginings to be acted upon, but an agent involved in its own making (Hinchliffe 2007). This is an important aspect of landscape-making because it incorporates a different kind of agency – one that could be said to be understood in two ways that have the potential of bridging western-indigenous understandings of nature.

One of those ways is through a better understanding of indigenous Amazonian cosmologies that deal with nature-human relations, as written about in anthropological literatures (Viveiros de Castro 1998; High 2014; see also Alexiades and Peluso 2009). Such ecological worldviews are often founded in part upon knowledge systems in which 'everything is connected', which depicts a way of perceiving and living in the world in which all things are closely aligned and reliant upon one another (Castleden et al. 2009). With reference to 'nature', there is often no definitive boundary between what is natural and what is social – it is not something 'out there', either separate to or dependent on people, but has powers of its own. This can go beyond the material world into the spiritual realm, from where life emerges and returns to according to the desires of an entity that is beyond the reach of the seen (Anthony et al. 2011; Maass 2008; Slater 2002).

Among lowland indigenous groups such as the Takana and Tsimane'-Mosetén peoples in Bolivia persist strong beliefs in gods, spirits and 'amos' (masters) of animals and plants that have traditionally played an important role in dictating responsibilities (and determining vulnerabilities) in relations between human and non-human actors (Lara 2003; Ellis 1996). These 'amos' have the power to reward and cure, but also to punish, sicken or even kill human beings if the norms of reciprocity and respect are not abided (Lara 2003; Cárdenas 2004). Such relational understandings of nature are useful for understanding the importance of certain spiritual sites established across such co-produced landscapes as Madidi. One example of this was a coordinated effort in 2005 between indigenous communities and park guards to force migrant loggers out of the Laguna Azul, a spiritual site for the

Tsimane' people of Pilón Lajas (Costas 2010). Such an act demonstrates various types of interdependencies as we have described them thus far, as well as their power for landscape-making.

The second way of describing interdependence in Madidi in terms of ecological-social co-production can make use of ideas discussed previously in 'emotional' writings on nature, for example as in literatures on deep ecology or in geographies of affect. In this sense, nature expresses itself through the felt emotions of people living and working in its midst. Several park guards were effusive in discussing their 'love' of nature – how observation of certain animals had made them come to want to protect and care for the protected areas.

> It's incredible because one can see through how observing (nature) it is related to humanity. For example, the siringero has various songs, each one with a specific objective. He sings when he is angry because he didn't catch his prey; he sings when he is looking for a mate – that is the funniest song because he has to be as loud as possible for his best chances. And other birds are so admirable – for example the parental style of the Psittacoidea. They take such care of their young and they are so loyal – this I love because it really connects to how humans can be… It's incredible – and this is what inspires me.[25]

This finding is supported by research in environmental psychology that has found that people who perceive a sense of interdependence with the natural world around them are more likely to engage in behaviours that support the health of that environment (Davis et al. 2009). Milton writes, "They had come to love nature in the process of learning about nature, by discovering what nature is like" (2002, 64). This is true as well of many natural scientists working in the region, for whom their research was not merely a rational activity of measuring and counting, but laden with the kind of affective emotion and appreciation that Lorimer (2007) describes as non-human charisma.

> Listening to country, observing its interconnected changes and being called into action to produce mutual benefit—these are ethical practices of a more-than-human community economy… recognizing the ethics of interdependence that, despite colonial settlement, is still active in the landscape (Gibson-Graham and Roelvink 2010, 337).

In this way nature can be also imagined to be protecting itself simply through the enactment of its own mysterious workings. Conservation scientists operating in the

[25] From interview with Sandra Vaca Cubo Yuly, park guard from Pilón Lajas, November 2013.

region have referred to an increase in the number of jaguars in the Tuichi region, making it one of the highest densities of the species. Here the jaguars are re-staking their claim of a landscape where only 20 years ago they would have been shot on sight by loggers, and their re-emergence signifies something specific for the landscape as park guards and biologists document it through transect surveys and camera trapping. GIS-based studies on land cover change have demonstrated relatively low rates of deforestation in the region and increases in forest cover in officially protected lands, especially in comparison with estimates from the 1980s (Forrest et al. 2008). Here it is important to emphasize the potential to describe nature as "an agent in its own right" (Massey 2005, 356).

> They may look secure, but landscapes are always in motion, always in process. In Igarape Guariba, the energy of the non-human is so excessive that it forces recognition. The river will not allow you to ignore it. The land shifts of its own accord. The banks crumble, the fields flood, the orchards float off to the horizon (Raffles 2002, 34-35).

If Madidi is in fact proven to be 'the most biologically-diverse place on earth', as recent claims have argued it to be, the mere fact of its nature may be enough in itself to define it as a certain kind of landscape, protecting it in a way other protected areas, such as TIPNIS, have not been able to achieve.

4.6 The future of the Madidi landscape

In this paper I have used various examples emerging from different intellectual traditions in order to make the case of the interdependent nature of landscape-making in the Madidi region of Bolivia. Each of the cases mentioned above could be discussed in a much greater amount of depth, and additionally there are other types of interdependencies that have not been dealt with here due to lack of space (such as the relationship between the Bolivian state and the highland migrants), which additionally shape the past, present and future of the Madidi landscape. It is also important to note where some groups have not been incorporated into effective interdependencies and so continue to be entirely marginalised – such as the nomadic Esse Ejja indigenous people who have lost access to land due to the protected areas and the surrounding indigenous territories. So the importance of interdependence can be understood not only in the spaces where it plays out, but also in those where its absence is keenly felt.

In a similar vein it is important to be clear in the constantly evolving nature of interdependencies – they are non-static, always changing and becoming reconfigured.

Perhaps however, one of the most important aspects of looking at a landscape through the lens of interdependence is to see how the relationships intertwining in this location can have consequences for 'the global'. For example, to what extent do the interdependencies described above affect rhetoric, laws and action enacted on bigger stages? Although it is not always possible to trace paradigm-shifting movements to seemingly-small happenings, the notion of interdependence can help us to see how and why a conversation between a local indigenous leader and a respected scientist might very well shift the way a debate happens later in a New York City board room (Gibson-Graham and Roelvink 2010). In that sense one of the aims of this paper was to give the sense that while there is great riskiness in collaborations as they allow for unpredictable things to happen, there is something hopeful in the idea that "it is in relations of asymmetrical reciprocity that ethical relationships find their feet" (Barnett and Land 2007, 1072). As Smith writes, "geographies of interdependence may not provide a fix, but they do serve to sketch out relationships and consequences in ways that respect complexities. In so doing they ensure that actions are taken with a more sensitive awareness of vulnerabilities, responsibilities and the sources of and potential for change" (2015, 11).

However, if we are to realize this true potential for change, there are two areas for further growth that emerge from an ethic of interdependence. The first is related to humility and the value of failure (Knight 2009). This is especially directed towards the conservation organizations and state institutions that tend to push mistakes made under the rug, ignoring or even denying their existence. But as Knight writes, "if we cannot admit our failures, we forsake our vulnerability as individuals and hence abandon our opportunities for professional (and personal) improvement. It is in the acknowledgment of our own and others' vulnerability that trust is nurtured, (which) provides the fertile ground for nurturing the relationships on which social learning and adaptive management depend" (2006, 1313).

The second area for growth has to do with the notion of desire – a longing for *that which could be* in the turning of one's gaze to the *potential of that which is*. This is a message to critical social scientists, whose sharp-tongued writings often push those who are out in the field, doing, trying and often failing, to put their backs up against the wall (Mason et al. 2013). This is an echo of Eve Tuck's call to move away

from damage-centred research and towards desire-centred research, to recognize the people behind the movements who are not only making livings, but full lives with pasts, presents and futures (Cahill 2013). This is not about wearing rose-coloured glasses, but about removing the armour that separates 'us' from 'them', and our 'rights' from their 'wrongs'. It is the notion of desire as "the song about walking through the storm, a song that recognizes rather than denies that pain doubtlessly lies ahead" (Tuck 2009, 419). The Madidi landscape will never be a 'finalized' one – this paper demonstrates that it is emerging, evolving and interdependent entity made of thousands of voices and moments and lives.

CHAPTER 5:

Who is at the gap between knowledge and practice? Spaces of encounter and misencounter between environmental scientists and local people

Abstract: Researchers studying processes of global environmental change are increasingly concerned that their work has impacts that go beyond academia to influence policy and management. Recent scholarship in the conservation sciences has pointed to the existence of a 'research-action' gap and has proposed various solutions for overcoming it. However, most of these studies have been limited to the spaces and places of dissemination, where the science has already been 'done' and is then to be passed over to 'users' of the information. Much less attention has been paid to encounters that occur between scientists and non-scientists during the practice of doing scientific research, especially in situations that include 'everyday' roles of labour and styles of communication (i.e. fieldwork). This paper builds on theories of contact that have examined encounters and relations between different groups and cultures in diverse settings. It uses quantitative and qualitative evidence from Madidi National Park, Bolivia, including an analysis of past research in the protected area, as well as interviews (n = 137) and workshops and focus groups (n = 12) with local inhabitants, scientists and park guards. The study demonstrates the significance of currently unacknowledged or undervalued components of the research-action gap, such as power, respect and recognition, in order to develop a relational and reciprocal notion of impact. It explains how and why within such spaces of encounter and misencounter between scientists and local people, knowledge can be exchanged or hidden away, worldviews can be expanded or further entrenched, and scientific research can be welcomed or rejected.

5.1 Minding the 'gaps' in conservation science

Recent trends in academia incentivize science to have greater relevance to society, and the engagement of scientists with the public (and vice-versa) is becoming a common occurrence (Backstrand 2003; Pain et al. 2011; Whitmarsh et al. 2011). This is particularly pertinent in the conservation sciences where the idea that science should provide practical knowledge to be acted upon spurred the creation of the 'mission-driven' discipline of conservation biology in the 1980s, which has expanded to include sustainability science, citizen science, transdisciplinarity and boundary work as ways to achieve this 'mission' (Boreux and Born 2009; Clark and Dickson 2003; Heland et al. 2014; Lang et al. 2012; Meine 2010; Shirk et al. 2012; Soulé 1985). Scholarship in this field has pointed to the existence of a 'research-action' or 'research-implementation' gap, which points out that although much conservation research has implications for management, often it has little direct impact on the environmental problems it seeks to address (Arlettaz et al. 2010; Knight et al. 2008; Gossa et al. 2013; Walsh et al. 2014). Some have suggested that there are several gaps or boundaries between knowing and doing (Cook et al. 2013). For example, Habel et al. (2013) highlights a communication gap between scientists and local stakeholders, a thematic gap that reflects differences in research needs and interests, and a disciplinary gap between the pure and applied sciences.

However, in much of this literature there has been a tendency to focus on the spaces and places of dissemination that are limited to places of exchange where the science is already 'done' and is then passed over to would-be 'users' of research information (Pullin and Knight 2009; Milner-Gulland et al. 2009; Sutherland et al. 2004; Walsh et al. 2014; Weichselgartner and Kasperson 2010). For example, Arlettaz et al. (2010) present a diagram in which they clearly show the research-implementation gap as something that happens at the end of conventional scientific production, before the "extra tasks of conservationists" begin (p. 840).

In a wider critique of the tendency toward uni-directional definitions of impact in academia, Pain et al. (2011) argue that they "assume that the results and outputs of research are the only, or at least primary, means by which research has impacts on wider society. In this model, 'research' and 'impact' are separated in time, and researchers and users usually occupy separate spaces and activities" (p. 9). Instead, some scholars are beginning to point not just to the 'exchange' of knowledge, but to envision spaces of knowledge interfacing, requiring "a shift from a view of knowledge

as a ‘thing’ that can be transferred, to one of a ‘process of relating’ that involves careful negotiation of meaning among partners” (Roux et al. 2011).

At the heart of these critiques is the need to explore the multiple spaces where the practice of ‘impacting’ takes place and to look more deeply at who inhabits them and what happens within them (Pain 2014; Whittle et al. 2011). Hulme (2014) argues that “current recommendations as to how to facilitate such knowledge exchange ignore the complexity of translating different types of knowledge and the constraints that might limit partnerships,” and makes note of four kinds of ‘knowing’ necessary for researchers – ‘know-who’, ‘know-what’, ‘know-how’ and ‘know-when’ (pg. 1132). While the latter three terms have been much discussed in the literatures on evidence-based conservation, use-inspired research and knowledge-exchange (Cook et al. 2013; Pullin and Knight 2009; Sutherland et al. 2004), the issue of *who* is found at the gap between knowing and doing has been less explored.

Here much can be learned from the fields of anthropology and science studies, which have often focused on the scientific observers themselves, whether in laboratory settings or in ‘the field’, where researchers go to observe, experiment, discover and theorize (though not always in that order) about ideas and things to later be written up in a non-field location (Kohler 2002; Latour and Woolgar 1979; Latour 1987, 1999; Livingstone 1995, 2003; Lorimer 2008; Lowe 2004; Shapin 1990; Waterton et al. 2013). While scientific knowledge is often thought of as something specialized, technical and done apart from the rest of society (in laboratories and universities), these literatures present a more diverse picture of how and where that knowledge is produced (Livingstone 2003). In the field people are needed to carry equipment, cut trials, guide and cook. Wherever it is done, scientific research requires certain kinds of permissions attained at different levels of society – from official research visas to oral acceptance from a village chief. And, even if it is not always recognized as doing so, western science incorporates (or actively ignores) many different kinds of knowledge. Thus, what happens in these spaces of encounter or misencounter between scientists and others implicated in the process of scientific knowledge production can have direct implications for how the research itself is perceived, especially in places of high biological and cultural diversity such as the Amazon basin, which attracts the interest of many western scientists.

This paper uses evidence from Bolivia based on interviews and workshops with park guards, indigenous communities and scientists to explore the following

questions: What kinds of 'spaces of (mis)encounter' exist when scientists carry out fieldwork? What types of power relationships occur in these spaces? And what are the implications of such spaces for scientists looking to bridge the research-action gap? As some of these questions have been previously addressed in the social science literatures, it is the intention of this paper to make use of previous insights to shed new light on the debates specifically occurring in the conservation sciences. In this sense the paper is written for a multidisciplinary audience, but especially for natural scientists who may be unfamiliar with how these issues have been discussed by social scientists over the last several decades. It will do this by introducing the reader to theoretical concepts of contact and encounter, and by supporting those theories with detailed examples of how scientists and local people interact based on fifteen months of fieldwork carried out in the Madidi region of Bolivian Amazonia. This is an important contribution because there is an increasing recognition among conservation scientists of the need to incorporate different social theoretical frameworks and methodologies into the environmental sciences, but unfamiliarity with different epistemologies often means that these perspectives are ignored (Moon and Blackman 2014; Nielsen and D'haen 2014).

5.2 Theories of contact

The term 'contact zone' is attributed to scholarship by Mary Louise Pratt who first used it to describe "the space of imperial encounters" in which peoples on different sides of the colonial equation, such as naturalist explorers and indigenous groups in South America, "come into contact with each other and establish ongoing relations, usually involving conditions of coercion, radical inequality, and intractable conflict" (1992: 8). Highlighted in Pratt's work, as well as that of subsequent scholars of 'contact zones', is an understanding that such spaces are never neutral but laden with power, and as such what happens within them cannot always be anticipated and/or controlled (Cornwall 2004; Lefebvre 1991; Gaventa 2006; Clifford 1997). Indeed, what is interesting about contact zones is that despite the highly unequal relationships of power that they often contain, their resulting influences are far from one-sided. As Donna Haraway writes, "contact zones change the subject - all the subjects - in surprising ways" (2008, 219). And while such encounters may be "fraught with contestation and conflict," they also contain within them the potential for "connection, empathy and contract" (Sundberg 2006, 239, see also Joséph et al. 1998).

This reading of contact and encounter contains two important insights for rethinking the research-implementation gap debates. First, the idea that such spaces contain the potential for mutual transformation brings to mind the notions of reciprocal and relational impact mentioned earlier in this paper (Pain et al. 2011). And secondly, it points to the possibility of encounters causing shifts in perception and creating new opportunities, even in the context of unequal relations (Torre 2010). However, there is a necessary warning that must accompany the 'potentiality' and 'possibility' inherent in such spaces based on the premise that all depends upon "*the nature of the contact*" (Allport 1954, 262). In this sense this paper conceptualizes a continuum, rather than a binary, between *spaces of encounter* and *spaces of misencounter* in order to attempt to draw attention to the complexity of encounter as both a force for positive transformation and as a space for examining how inequalities between different groups can be reproduced through the practice of scientific research. While this paper does not attempt to determine where specific encounters lie upon this spectrum, its use as a conceptual tool can help us to be aware of the pervasiveness of power within any given encounter and raise additional questions about the extent to which such power is visible or hidden away.

The power inherent in the process of carrying out scientific research has been written about by many scholars in the critical social sciences from various disciplinary perspectives (Agrawal 1995, 2002, 2005; Anderson 2002; Appadurai 2006; Barbour and Schlesinger 2012; Cepek 2011; Chambers and Gillespie 2000; Chilisa 2012; Fairhead and Leach 2003; Habermas 1971; Haraway 1988; Harding 1991, 2006; Lowe 2004; Nielsen and Lund 2012; Radcliffe 2014; Smith 1999; Spivak 1988). While there is no space in this paper to delve into these arguments, two aspects are worth briefly noting. The first is a recognition that all knowledge has power attached to it, and as such, both the production and the dissemination of knowledge in a given society are political and social acts - they are intended to serve a specific purpose, whether consciously intended or otherwise (Foucault 1977; Gaventa 2006; Harding 2006; Radcliffe 2014; Turnbull 1997). The second aspect is based on the extent to which the different actors view their own positions of power relative to the others, as the effects of unequal power relations are influenced by the self-awareness of those wielding the power (Barnes 1996; Gaventa 1980; Gaventa and Cornwall 2008; Lukes 1974). This is especially important when thinking about encounters between researchers and local people because of the subtle, sometimes unconscious forms of

power that are present in these relations (Barnes 1996; Cepek 2011). The idea that such implicit (or hidden) expressions of power should be made explicit (or manifest) in order for change to occur is something that can further enrich discussions of contact and encounter (Gaventa 2006; Caza et al. 2011) and give an additional reason for paying closer attention to the *who* at the gap between research and implementation.

Thus, in studying this further it is vital to move beyond the abstract to the real, or as Foucault might advocate, passing over the "general, the universal and the eternal" in favour of the "particular, the local and the specific" (Hutcheon 1988, 120) in order to see the role of such spaces and what happens within them. In the next section of the paper empirical data is presented to further examine these spaces of encounter and misencounter between scientists and local people in the Madidi region of Bolivia.

5.3 Methodology

5.3.1 Study site

This research was carried out between June of 2012 and August of 2014 in the Madidi region of Bolivia, which incorporates Madidi National Park and Natural Area of Integrated Management (NP/NAIM) and surrounding region, located in the northwest department of La Paz. At the 2012 IUCN Conference in Korea, Madidi NP/NAIM was announced to be "likely the most biodiverse place on the planet", making it a priority area for scientific research, where two-thirds of its biodiversity is yet to be discovered (WCS 2012). Madidi covers approximately 19,000 km² across the tropical Andes and is bordered by three additional protected areas; in Bolivia, the Pilón Lajas Biosphere Reserve and Communal Lands (BR/CL) and Apolobamba Natural Area of Integrated Management, and the Bahuaja-Sonene National Park in Peru (SERNAP 2006). The communities located within and adjacent to Madidi NP/NAIM comprise lowland Amazonian indigenous groups (Takana, Leco, Tsimane', Mosetén), highland Quechua-speaking peasant farmers, and farming communities that self-identify as 'inter-cultural', which are often of mixed Aymara and lowland indigenous heritage. Four indigenous territories overlap the protected area (San José de Uchupiamonas, Takana 1, Lecos de Apolo and Lecos de Larecaja), and two others border Madidi (Tsimane'-Mosetén, Takana II). In total, there are approximately 25000 people living in Madidi's area of influence (ibid.).

5.3.2 Methods

To develop the analysis in the remainder of the paper, I present empirical evidence collected in the Madidi region over the course of 15 months (between 2012-2014), which relied on research with three stakeholder groups – scientific researchers working in the region (mainly from the biodiversity/ conservation sciences), indigenous community members and leaders, and protected area staff (from Madidi and Pilón Lajas). As a white female born in the United States, I am implicated in the spaces of encounter and misencounter I describe in this paper, and reflecting on my own experiences as a foreign researcher working in Bolivia has greatly shaped the way that I have conducted and written about this research.

5.3.2.1 Quantitative assessment of previous research in Madidi

A systematic analysis of research carried out in Madidi NP/NAIM between 2004-2013 was done through an exhaustive review of documentation physically located in the Madidi park offices and recording all permit applications and other references related to scientific research in an Excel database in November of 2013. A total of 88 research projects were identified, for which I attempted to contact the principal investigator(s) listed on each project to verify the information obtained and to ask additional questions about the level of local involvement in the project, potential implications for management and the extent to which the research results were disseminated and/or published. Complete information was gathered for 40 of the projects, and the quantitative data presented below are based on this subsample of projects.

5.3.2.2 Qualitative methods

Qualitative methods included a) semi-structured and unstructured interviews (n = 137), b) workshops and focus groups (n = 12), and c) participant observation. Interviews and workshops were held to understand different perceptions around the practice of scientific research and natural resources management, including interviewees' experiences in the past and suggestions for the future. Of the interviews, 24 were conducted with researchers, 42 with local people (leaders and community members), 27 with park guards and administrators, nine with staff of government ministries and/or other NGOs. An additional 35 interviews were conducted in 2012 in the Takana 1 indigenous territory with local people who had been involved in a hunter/fisher self-monitoring project. In 2013 and 2014 three workshops were held

with park guards from Madidi NP/NAIM and Pilón Lajas BR/CL; two with botanists from the Bolivian National Herbarium; one with the Takana-Quechua community of San José de Uchupiamonas, and one with the Takana community of San Miguel. Additional focus groups (n = 5) were held to share and discuss preliminary results from the research with the various groups. Questions and the discussions (and duration) of all interviews and workshops varied according to the situation and participants, but informed consent was obtained for all interviews and workshops, and in some cases the interviewee requested his or her name to be specified. Data analysis was assisted with the coding software Atlas.ti. version 7.1.8 (2014).

5.3.3 Defining 'scientist' and 'research'

The focus of this paper is on the practice of scientific research in the context of biological conservation, and the examples given in the results section refer to a multitude of research projects studying aspects of flora, fauna, conservation and natural resources use. However, in this discussion I use the terms 'scientist' and 'researcher' somewhat interchangeably, and the term 'research' as a collective activity representing many different disciplinary forms of gathering knowledge in order to make generalizations about the ways in which such activities are perceived by those who are not aware of the often-subtle variations between different types of scientific practice. Smith writes, "criticism of individual researchers and their projects is deflected by the argument that those researchers are different in some really significant 'scientific' way from others. How indigenous communities are supposed to work this out is a mystery" (1999, 71). In addition, this paper sacrifices some depth and detail of the spaces of (mis)encounter discussed below in order to demonstrate the scope and scale of the issues at hand; however, references to more in-depth studies are flagged throughout the manuscript for further reading.

5.4 Spaces of local involvement in research

Field-based scientific research is a largely social activity incorporating the participation and input of many non-scientists. In the Madidi region of Bolivia, in the quantitative analysis of previous research, 78% of researchers (n = 40) stated that they had involved local people in the research process in some way, and 90% of studies were carried out, at least part of the time, within close proximity to local communities. 58% used local people as paid labour (guides, porters or drivers), and 35% actively

incorporated different forms of local knowledge into the research through interviews, surveys or workshops. A smaller number of researchers (10%) additionally involved people in the collection of data by training them in various biological research methods, such as line transects for the surveying of large mammals or studying breeding patterns of endangered bird species. The implications of this proximity/involvement of local people will be explored further in detail below with qualitative data from interviews and focus groups.

5.4.1 The spaces of arriving and getting permission

Scientists may not typically consider themselves to be among the 'powerful'; indeed, they frequently bemoan their relative lack of power in affecting policy and making desired change (Terborgh 2004). However, just because scientists and researchers are not always aware of the power that they hold does not mean that non-scientists that they encounter during their fieldwork are also insensitive to power dynamics. As one indigenous leader who has a great deal of experience working with researchers put it to me, "Scientists often act as if they were in a virgin forest in the middle of nowhere, doing their work as if there weren't people living there".[26] Indeed, in some interviews with scientists – especially informal situations where the recorder was turned off – comments sometimes revealed a kind of frustration or disdain towards local people who impinged upon important research, pointing to somewhat subtle, relatively unnoticed forms of resistance towards the pursuit of science. Because such expressions of power are not seen to be 'rational', they are perceived as uninteresting, a simple hindrance to be dealt with quickly and efficiently, perhaps by buying a sack of a farmer's potatoes to have access to their land, as "after all, all they really want is the money".[27] Such attitudes reveal a great lack of awareness about one's own relative position of power (as an outsider who can 'buy' his way onto the land) and a failure to recognize the historical and cultural reasons for mistrust and concern on the part of the locals.

Indeed, in Madidi, there exists a unique vocabulary around the practice of scientific research that is used by local people to explain certain observations and sentiments they have with regards to the activity and those who carry it out. One

[26] Unstructured interview with indigenous leader, November 2012.

[27] Unstructured interview with scientists working in the Madidi region, December 2013.

word commonly heard is '*susceptibilidad*', which is a more complex concept than the dictionary translation of ''susceptibility' seems to allow. Take the following quote:

> People in these communities have a lot of *susceptibilidad*; when they see a tourist or an outsider they feel taken off-guard. They aren't used to having strangers around – they are very guarded in the communities. If an outsider arrives, in their heads they are always thinking, 'who is this person, why are they here, what are they doing to do, do they have money?' They ask themselves these questions, and that's why it's important (for researchers) to inform them from the beginning about what they are going to be doing.[28]

What is expressed with this word are feelings of sensitivity, vulnerability, uncertainty, where one must be '*misquino*' or 'guarded' with one's knowledge and information, because to do otherwise is to take a risk that will likely not be rewarded, but rather exploited, by someone more powerful than oneself. The Madidi region of Bolivia, like much of Amazonia, has a long history through colonialism and nationalism of natural resource extraction and has been home to many resource 'booms' over the last century (i.e. rubber, quinine and timber), through which the local inhabitants have learned that if outsiders come looking for natural resources, there will be some who benefit and others who lose out (Silva et al. 2002; Lehm et al. 2002). As Valentine writes, "Encounters never take place in a space free from history, material conditions, and power" (2008, 333; also see Cepek 2011; Sharpe 1998). With regards to the practice of scientific research, this kind of 'losing out' has come in the form of experiences with biopiracy and the patenting of traditional knowledge (Laird and Lisinge 2002). Celín Quenevo, a leader of the Takana nation, speaks about the history of indigenous organizations in the region developing research agreements with scientific organizations:

> We began to realize that some of our natural resources were being patented, and that the traditional knowledge of our communities was being taken by researchers. They were patenting the process of elaboration, of how the plant is used by the people for healing and health. So this realization generated a national debate among the indigenous organizations to be able to develop a way to control research in the territories, and to ensure that those who enter do so with the permission of the leadership councils, based on what is being researched and for what purpose.[29]

[28] Semi-structured interview with Cesar Bascope, Madidi park guard, October 2013.

[29] Video interview with Celín Quenevo, ex-president of Takana nation, July 2014.

This combined history of natural resources exploitation and scientific exploration has led to much confusion over the activity of research, and a common complaint among researchers newly arriving to the field to get permission were the demands, often monetary, that local people would make of them. However, researchers are not always aware of the long histories that local people have had with previous researchers who made promises that they neglected to keep – particularly with regards to the basic dissemination of the results of research (Boreux and Born 2009; Shanley and Laird 2002). This feeling of *suceptibilidad* is often linked in discussions about research to the use of another word, *'recelo'*, meaning mistrust or suspicion:

> There is a lot of resistance among the local communities when researchers come. Because generally, researchers explain things very quickly and then they leave without giving back the results. And so (the local people) don't know if there were any benefits accrued on the long term as a result of the research, or if it was only for the researcher who did the work to obtain funds, for his organization, or for himself. Because of this the people have a lot of *recelo* when it comes to research.[30]

Another area of difficultly lies with who grants permission. As Madidi is a highly culturally diverse region as well as being biologically diverse, the practice of scientific research requires not only methodological skills in one's given academic field, but the ability to negotiate across social and cultural divides – with protected area staff (at both the national and the regional/park levels), with authorities in indigenous and peasant farming communities, and occasionally also with municipal government officials. While many indigenous groups have protocols and agreements to negotiate relations with researchers, such as those described by Celín above, such decisions are often made by the leadership councils, based in more urban centres located at a distance from the rural communities where the actual research will take place. Leadership councils often have different reasons for accepting researchers in their territories, which can include, among other considerations, potential alliances and projects with the scientific institutions, the promotion of the needs and concerns of the group on a national/global scale, and personal benefits accruing to the leaders themselves. These reasons for accepting researchers are not always shared by the members of the communities where the fieldwork will take place, but, due to the hierarchal nature of such leadership structures, the option for rejecting researchers in

[30] Video interview with Ebelio Romay, ex-park guard of Madidi NP/NAIM and part of technical team for the Tsimané-Mosetén indigenous council, July 2014.

the communities after they have the 'official' approval from the leaders is not always possible.[31]

5.4.2 Spaces in the field - local labour

The previous section outlines a kind of 'elite capture', which is often written about in development literatures to refer to a process by which projects or initiatives promoted by outside groups, such as development or conservation organizations, "invariably privilege certain actors while marginalizing others" (Sundberg 2006, 259, see also Chambers 1983; Platteau 2004; Nielsen and Lund 2012). As such negotiations often take a great deal of time and flexibility, many researchers take shortcuts when they can, which sometimes means limiting their interactions with local people to those in positions of power over those who have less of a voice in a given community. For example, there are certain characteristics that researchers look for in the local guides that they hire – their knowledge of the forest, their ability to negotiate difficult social/cultural encounters (either within their own community or with other communities), as well as their general level of understanding of the research to be carried out. Oftentimes, researchers allow the community itself to choose who will guide the expedition. All of these factors mean that, more likely than not, those interacting with the researchers are those in the community in higher positions of power – usually men, from the wealthier families. And because of the cumulative educational nature of participating in scientific research (even as a guide), those chosen initially are likely to be chosen again, until researchers often consider them to be 'indispensible' to the team. However, the power relations in this form of labour are clear – the scientist is boss, and the local 'guide' is subordinate. Raffles writes about this in his book, *In Amazonia,* in which he describes how one guide became so skilled (and wilful about the way things should be done) that scientists no longer wished to hire him:

> From the first day the irony begins to unfold. The more successfully he teaches, the faster the visiting scientist learns to be independent. Within a couple of years, the project is established, the team is trained, the area mapped, the replicates in place, and everything has settled into a secure routine. Once indispensable, his skills are no longer needed. And his price, which has risen steadily over the years, is too high (2002, 177).

[31] Unstructured interviews held with members of Mosetén community of Asunción del Quiquibey, October, 2012.

Where the benefits of scientific research are distributed unequally in a community, it can also be expected that perceptions and levels of understanding of scientific practice will be varied. Workshops, meetings and interviews with members of two highly-researched indigenous communities revealed a wide spectrum of different (mis)understandings about scientific research and researchers themselves. Higher power community members (men, leaders, people with outside links) tended to have understandings of research that were more similar to western perceptions, but they were also more likely to complain about the lack of 'results' left behind. On the other hand, lower power community members (women, elders, those with less education) had more varied understandings of research that would be less compatible with scientific definitions. For example, in one workshop the women present said that they understood research to mean 'investigate' in the same sense an authority might investigate a robbery (the Spanish word for research is *investigar*), but that otherwise they had never heard of the term before.[32] Women were also more likely to use terms such as 'volunteers' or 'tourists' when describing those who had come to do research on their lands. Linda Tuhiwai Smith writes of the challenge of trying to glean interpretations of research from colonial-era oral stories, because at the time the indigenous people involved did not 'know' that they were being researched:

> Research could not be disconnected from other European activities. 'Researchers' were also missionaries, amateur botanists, surveyors, officials, traders — any European, in fact, who was able to write or draw pictures (1999, 85).

This challenge is still current today: one major limitation of this research was that many people found it difficult to discuss a concept that they did not understand. During conversations, interviews and meetings with people from local communities, it became clear that many people had difficulty in differentiating what 'research' is, and who 'researchers' are. For example, one young man who had told me repeatedly through the duration of my fieldwork in Madidi about how his indigenous community had a problem with 'researchers' and took me to the community to discuss the issue with his neighbours, asked me almost two years after first meeting him to explain to him in clear terms what 'research' actually meant, and what it was for.[33]

[32] Workshop with community of San José de Uchupiamonas, November 2013.

[33] Informal discussion with Hernan Nay, community member of San Miguel, November 2013.

This points to a variability of understandings that may then generate new hierarchies or divisions within a community, as well as introduce new forms of knowledge to challenge lower-status, vernacular ways of knowing as being 'backward' or unimportant. These issues have been discussed in literatures around decolonizing research and revaluing traditional ways of knowing and doing, and will be discussed further in the next section (see also Smith 1999; Chilsea 2012; Walsh 2012; Radcliffe 2014).

5.4.3 Spaces of knowledge exchange

Even as it is becoming politically-correct in scientific communities, particularly in Latin America, to acknowledge the value of local and traditional knowledge systems, in practice many scientists regard their knowledge as superior to that held by those who live or work in a given region, especially if those people are illiterate (Barbour and Schlesinger 2012; Chilisa 2012; Cozzuol et al. 2014; Verran 2002). Local people are not blind to these superior attitudes, and many people shared with me encounters that they had had with scientists in which their local knowledge was disregarded or laughed at. Taxonomy is one frequent issue of contention, where during fieldwork encounters it is common for different forms of ethnotaxonomy to come into conflict with the Linnaen system, as previous studies have shown (Berkes 1999; Cozzuol et al. 2014). During interviews people often mentioned flora and fauna that was not yet "in the lists", which they often framed as "things that scientists don't believe in". For example, one young man who had worked as a guide for a foreign herpetologist recalled how the scientist would laugh at knowledge held by community members of snake classifications and behaviour, such as a local differentiation between two types of bushmaster (*Lachesis spp.*), one that lives on the ground and is aggressive, and the other that lives in the trees and is harmless.[34]

Sometimes, local people will directly refuse to work with scientists who act disrespectfully towards their beliefs and knowledge, as was made clear by a Takana woman who told me that when an agronomist from the city refused to listen to the ideas of the local farmers, the community asked him to leave.[35] However, the relatively high status level of many scientists was found to be intimidating for many local people, which in Bolivia is emphasized by the common practice of using

[34] Unstructured interview with community member, November 2013.

[35] Feedback session with the Tsimané-Mosetén indigenous council, December 2013.

academic titles when addressing someone, such as *ingeniero* (engineer) or *licenciado* (literally, 'licensed' with a bachelor's degree). In such cases, rather than explicitly rejecting their presence, local people expressed their resistance to the researchers or their work in more passive ways, such as claiming ignorance in response to questions, or deliberately giving misleading information, reflecting a kind of everyday resistance to power relations[36] (also see Scott 1985, 1990). For example, in one community, several inhabitants told me about a 'useless' study in which a scientist was measuring the 'wrong part' of a palm tree in order to record its growth. They admitted to laughing about his mistake behind his back, but said that no one directly questioned him during the length of the study.[37]

However, in other interviews people talked about specific things they had learned as a result of being involved in the research in some way, whether such learning gains were attributed to new techniques for obtaining knowledge or the new knowledge itself. One man who served as a guide for botanists explained that he enjoyed the work because he learned about medicinal plants in the region, "some of which we didn't know about either," and described the experience as one of *conocer*, or 'coming to know'.[38] Another guide said that on an expedition he was amazed to learn that there exist more than twenty species of laurel (*Lauraceae*) in the forest.[39] Related to the process of '*conocer*' is that of knowledge exchange, where both parties can learn from one another. Interviews revealed the importance of this exchange during fieldwork, and oftentimes locals who had served as guides followed up on comments about their own learning gains with affirmations that "we taught them as well", reflecting how scientists and locals can have different knowledge about things of mutual interest.[40] One scientist connected the recognition of local peoples' own knowledge as a way of expressing respect:

> To let them know that we're not just going to teach them what we know, but to express that we know we will learn a great deal from them as well. We need to be clear on how much we need them – as guides, for knowledge – to make feel that they

[36] Video interview with Ebelio Romay, ex-park guard of Madidi NP/NAIM and part of technical team for the Tsimané-Mosetén indigenous council, July 2014.

[37] Unstructured interviews held with members of Mosetén community of Asunción del Quiquibey, October 2012.

[38] Semi-structured interview with Mario Felipe Alvarez Chaves, community member, June 2013.

[39] Semi-structured interview with Honorio Pariamo, local guide, October 2013.

[40] Semi-structured interview with Richard Cuevas and Ramiro Cuevas, local guides, October 2013.

> are very important for the study, that it cannot be done without them. I believe that respect needs to come first and be a constant factor when working with local people.[41]

5.4.4 The spaces of relevance

Key in this discussion is a question of for whom such scientific information is relevant. Interviews revealed the common perception that most research is simply for the '*tesista*' (literally, 'thesis-maker'), and is of no local relevance.[42] Even for research that actively engages with 'participatory' methodologies, local people may have very different reasons for participating that do not reflect shared perceptions of what the research is ultimately for (Blaser 2009; Cepek 2011, Nielsen and Lund 2012). This brings up a discussion of the complexities inherent in research processes that aim towards 'knowledge integration', which raises questions of whether doing so results in the appropriation of such knowledge from its first possessors, due to the power imbalances that exist between western and indigenous systems (Agrawal 1995, 2002; Bohensky and Maru 2011; Heckler 2007; Nadasdy 2003). McGregor (2004) argues that contrary to the Eurocentric view of indigenous knowledge as an epistemological system, aboriginal people view indigenous knowledge as something that should not be studied, because it can only be expressed by doing. Similarly, discussions with local people revealed that scientific or 'new' knowledge could be viewed as being 'complementary' to traditional knowledge to the extent that it could be put into practice (see also Centellas 2010). In the Madidi region, for example, western medicine is combined not only with the use of local plants and animals, but with the help of *curanderos*, who attend to the spiritual side of things, such as removing bad spirits or shadows from the patient.[43] For example, with relation to local theories regarding the origins of biological lifeforms, indigenous peoples maintained certain beliefs about the origin and maintenance of animals in the forest, whose populations are generally governed by 'masters' or 'uncles' who appear as small men with their feet facing backwards, but also referred to concepts of extinction and conservation as being important for guiding decisions about hunting.[44] Additional interviews revealed that scientific knowledge about local ecology was appreciated by

[41] Workshop with botanists from the National Herbarium, August 2013.

[42] Unstructured interviews held with members of Mosetén community of Asunción del Quiquibey, October 2012.

[43] Unstructured interviews with community members of San José de Uchupiamonas, November 2013, July 2014

[44] Semi-structured interviews with hunters and fishers in Takana 1 territory, September 2012.

local communities to the extent that research findings could be interesting to paying tourists, such as where the highest density of jaguars could be found, or regarding the discovery of new species. But the area of most importance, especially for indigenous leaders, was concerned with the extent to which scientific research could be seen as a tool to support self-determination and endogenous development strategies on communal lands. For example, one indigenous leader stated:

> If we don't have the information, how can we protect ourselves? We need to think about how to come up with counterproposals to the government's plans for megaprojects in the region[45].

This points to Davies's reflection that "it is less the case that knowledge is power, than that the use of that knowledge is an expression of power" (1994, 20), and developing relational and ethical modes of scientific practice is not something that is limited to encounters in the field, but is also concerned with how the resulting information will be wielded in academic, professional and policy circles.

5.4.5 Spaces of friendship

Another space of encounter between researchers and local people is that of friendship and relationships of care. Interviews with all of the groups involved brought up the personal impacts that such human interactions had on them; comments invoked feelings such as nostalgia, friendship, disappointment, guilt and responsibility. Although specific experiences were highly varied, one commonality in many of the interviews was the *individualizing* of certain groups – communities became distinct from one another, scientists were not just '*los tecnicos*', but referred to by name; the knowledge and talents of certain guides were remarked upon and differentiated. On one trip to a community with a biologist who had worked there ten years earlier, she broke into tears at seeing familiar faces; that same biologist was remembered fondly by many local people in interviews. She told me that she changed her ideas about conservation and about her role as scientist as a result of spending years working with indigenous hunters and fishers as part of a participatory research project, expressing to

[45] Semi-structured interview with Guido Mamani, president of the San José de Uchupiamonas indigenous territory, November 2012.

me, "you learn to care about the people in communities when you get to know them, when you see how they live".[46]

The value of such 'getting to know' takes on additional importance in looking at how relationships between different groups can develop and strengthen through daily expressions of respect and care. For example, during the period of this research there were particularly strong relationships between the Madidi park guards and the scientific support staff (two young women from La Paz) hired to assist in the implementation of a ranger-based monitoring project. One of the park guards, Juan, made the following comments when asked about the project:

> I think the monitoring is really important. (The scientists) work really hard to help us, sometimes staying up late into the night to answer all of our questions. Sometimes they come with us on our patrols, even in places where it's not easy. There are dangers in the forest – insects, snakes – but even though they're from the city, they don't get tired, as if they were from the country. They patrol with us.[47]

However, it is important to be aware of the power dynamics inherent in these relationships, something previous studies on spaces of friendship have begun to explore (Leeuw et al. 2012; Han 2010; Jones and Ficklin 2012). One aspect refers to the asymmetrical nature of such friendships and personal relationships (Askins and Pain 2011, Askins 2015, Torre 2010). For example, in Bolivia an integral part of society also relates to the practice of naming *padrinos* (godparents) for important events in a person's life – baptism, communion, certain birthdays, marriage; and a community's life – festival days, high school graduations, inaugurations – and it is very common for both foreign and national researchers to be asked to take on this role, which offers the potential for an outsider to be brought further 'inside' the daily workings of a community or family. However, previous scholarship on practices of *padrinazgo* in Andean societies has pointed out the complex social relations and expectations embedded in these relationships, in which godparents are often selected because of the outside power and resources they are imagined to command (Mayer and Bolton 1977). This can lead to unmet expectations and feelings of confusion and hurt on both sides of the relationship, if researcher-*padrinos* are not aware of what is expected of them, something I experienced personally.

[46] Unstructured interview with biologist, María Eugenia Copa Alvaro, August 2014.

[47] Semi-structured interview with Juan Ortiz, Madidi park guard, June 2013.

On the other hand, interpersonal connections are a highly valued aspect of ethical research relationships (Routledge 1996; Torre 2010; Torre et al. 2008). Spaces of friendship have the potential to open up further opportunities for deeper reflection and eventual change, something Allport realized when he wrote about 'possibilities of friendship' for shifting pre-existing biases (Allport 1954: 262). Askins refers to this as a "transformative politics of encounter" (2008, 2015), one that scientists in Bolivia are beginning to become aware of, as expressed in the following quote:

> We see that things are not equal. We go to these places because they've paid us to do so, because we are consultants, because we have to research a certain thing… And sometimes we treat the local people as if they were just employees – that they have to do everything we say. But that is where I think we can change.[48]

So rather than a space of 'equality' in itself, relations of friendship and care could be seen as representing spaces of asymmetrical power relations in which ethical relations can find their feet.

5.4.6 Spaces of analysis and acknowledgement

Much of the frustration and resentment expressed in interviews with local people is related to feelings about who gets credit in the process of research. Official recognition in written form for one's contribution to the research process was something brought up by many local people. At the start of one interview, a man who had served as a guide for many scientists handed me a scientific journal written in English where his name was listed in the acknowledgements of a botanical paper.[49] In another situation, a different man flipped excitedly through a guide of plants that had been produced by scientists he had worked with, and was clearly disappointed when neither his name nor his community were mentioned in the text.[50] One young man in the Takana-Quechua community of San José de Uchupiamonas expressed anger at the lack of recognition extended to his parents, especially his father, who was often approached by researchers due to his vast amount of knowledge about local flora and fauna. He lamented that his father, who had just died at the time of our conversation, was leaving behind no legacy despite having participated in so much research, and

[48] Workshop with botanists from the National Herbarium, August 2013.

[49] Semi-structured interview with Honorio Pariamo, local guide, October 2013.

[50] Semi-structured interview with Mario Felipe Alvarez Chaves, community member, June 2013.

added that this was a common experience among many people in his community.[51] Such experiences reflect writings by indigenous scholars regarding the perspective of 'research as theft' (Robbins 2006; Smith 1999; Walter 2005; Rigney 2001). Another man who had served as a guide for many researchers said that while some scientists always remember to send photographs, letters of acknowledgement and thanks with all of the names of those involved, others leave nothing behind: "they just do it for the fame of working in Madidi," he remarked.[52] This points to different understandings of authorship, especially in terms of local knowledge, an area of complexity when discussing the 'discovery' of new species, or the documenting of traditional knowledge of plants for their medicinal uses. Clemente Caimani, a leader of the Tsimane-Mosetén nation, put it as follows:

> For a researcher or for the writer of a book about traditional knowledge, the author is the indigenous person; it's the community, the interviewed person. The interviewer is only the compiler of the information that he takes away, perhaps for his research, for his own knowledge, for his to teach or share with others, for his degree. But the principal author is the indigenous person or community, because he's taking the information from them.[53]

In another interview, a park guard said that he no longer shares information with scientists because of past experiences with scientists not formally recognizing the fact the park guards and local people provided them with information critical to new discoveries.

> It's because of this that now many park guards who know about species that haven't yet been documented for science don't want to say anything about it. Because they know it will be said that "the biologist so-and-so discovered the species", not the park guard.[54]

However, this study found both scientists and local people beginning to change their roles in this regard. For example, indigenous leaders with more experience working with scientists began to request that they be listed as co-authors on scientific papers, and this study found evidence of scientists of many disciplines putting this into

[51] Unstructured interview with community member, November 2013.

[52] Unstructured interview with indigenous leader, November 2012.

[53] Video interview with Clemente Caimani, ex-president of the Tsimané-Mosetén indigenous council, July 2014.

[54] Semi-structured interview with Remberto Chivapuri, Madidi park guard, October 2013.

practice. Celín Quenevo, quoted earlier, recounted a process of demanding acknowledgement through co-authorship and data analysis:

> We published jointly with the scientific organization and were co-authors, because it was important that they take into account the participation of the indigenous organization, the communities, mention the specific medicinal plants that had been collected, and how they analysed them in the laboratory with regards to each plant that could be useful medicinally, whether or not it was interesting to the pharmaceutical company or not. We went to the laboratory also, because we'd seen how our Tsimane' brothers had been taken advantage of previously, so we knew we needed to follow up on what they did with our leaves, how they processed them and separated the molecules.[55]

Likewise, as indigenous leaders have begun to take control over certain research processes on their lands, scientists are responding accordingly and making adaptations of their own ways of working. This is a very tricky area to negotiate, as it is not simply a question of making research more 'participatory' or 'indigenous', but requires acknowledgement and awareness of the complex power relations at play within these spaces of negotiation (Barbour and Schlesinger 2012; Cooke and Kothari 2001).

5.4.7 The spaces within

Encounters between different groups around the practice of scientific research, such as in the examples given above, are the basis for self-reflection, where people begin to question their own ways of seeing the world and be more open to new ideas and different kinds of people (Barnett and Land 2007). In Madidi, interactions between local people and scientists changed not only the way they thought about one another, but additionally how they viewed their own roles and ways of being. Among conservation scientists there is also growing awareness of this issue; one Bolivian biologist, and the head of a large conservation science organization, told me that in recent years she has come to appreciate the importance of finding ways to support different forms of knowledge and decision-making through their work in the region:

> If you had asked me 15 years ago, 10 years ago – even 5 years ago, I wouldn't have seen things in this way. But as you work with these issues you begin to perceive how

[55] Video interview with Celín Quenevo, ex-president of Takana nation, July 2014.

> some information is valued and how other ways of thinking are devalued, and you realize how fundamental these are to how people manage their own territories.[56]

Some local people told me of how they had come to value their own knowledge in relation to that of the scientists, and once becoming more familiar with the terminology of research and science were able to articulate their own role as 'researchers'. In interviews and workshops local people clearly perceived their 'more practical' knowledge to be equal in value to those of the scientists; as one man put it, "the farmers are the most constant researchers, because they are always in direct contact with the earth, with their crops".[57] Another local hunter commented to me that he was also a *licenciado*, which is a term used in Bolivia to refer to those with university degrees, "You are the biologist of theory, but I am the biologist of the forest".[58]

Many scientists in Bolivia are beginning to change how they see their roles and to question their own positions of authority. This was apparent not only in how they spoke about their responsibilities to local communities, but how they interacted with people while in the field, as is reflected in this quote from botanist from La Paz who spent a year doing ethnobotanical research in an indigenous community in Madidi:

> I think that we have to learn to be much more open. We can't arrive somewhere and just say 'we are scientists'. We have to start to think like they do. We also have to try to get them to ask questions, and put themselves in our place.[59]

5.5 Conclusion

This paper explores different kinds of spaces and encounter and misencounter between scientists and local people in order to show how the seemingly unimportant micro-practices of the research itself can have larger implications for how scientific knowledge is perceived and (mis)understood, especially in non-western settings (Askins and Pain 2011). The presentation of such varied perceptions and understandings are an important contribution to current debates on the research-action

[56] Semi-structured interview with Lilian Painter, director of the Bolivian office for the Wildlife Conservation Society, December 2013.

[57] Workshop with park guards from Pilón Lajas, November 2013.

[58] Semi-structured interview with Eduardo Cavinas, community member of Cachichira, September 2012.

[59] Workshop with botanists from the National Herbarium, August 2013.

gap in the conservation sciences, because they point to forms of scientific 'impact' that are not often anticipated or intended, due to the complex power relations that happen in the field. By taking a closer look at the *who* in the gap between research and implementation, the importance of being aware of the different histories, knowledges, values and worldviews that shape these relationships is brought to light. Such spaces also call for an increased sense of responsible ethics and relational accountability between scientists and other stakeholders during the practice of research, especially in the context of European or North American researchers working in the Global South (Louis 2007, Jazeel and McFarlane 2007). This is no easy task and there is no blueprint model. Rather, perhaps the most important quality to cultivate in researchers is one of self-reflexivity with regards to one's relative position of power, and to translate that awareness into changes not just in attitudes, but in the actual practice of scientific research in and out of the field. In this sense the paper has attempted to shift the debate about the research-action gap away from the dissemination stage and back to the places of scientific knowledge production in order to reflect on wider questions of who owns the research and whom it benefits.

Finally, this paper brings out new ways in which different groups in these spaces are beginning to reflect on their own roles and positioning – and the need to relinquish or demand power in these processes. This is not about blaming, but engages with a critical awareness of the problems found in current practice, and also points out new spaces for hope in which researchers can begin to question and change their own practices. The critiques expressed above are meant to raise awareness about the types of issues scientists are likely to encounter, not to give fixed solutions about how to deal with those issues, which depend on many factors and are perhaps best resolved through processes of negotiation and reflection. This raises a kind of critical hope for the potential of environmental research to serve as a mode of inquiry that is self-questioning, rather than self-referential, which "begins with an individual reflecting on his or her own values and making a decision to act towards positively changing their own behaviour, and/or facilitating others to do the same" (Knight 2013, 389). Critical social scientists have an important role to play in this process, and open access, interdisciplinary journals like Ecology and Society Change can represent a further space of encounter for researchers of different backgrounds to learn from one another, to grow and to change.

CHAPTER 6

A question of dissemination:
Assessing the practices and implications of research in tropical landscapes

Authors:
Anne H. Toomey, Lancaster Environment Centre, Lancaster University, UK
María Eugenia Copa Alvaro, Colección Boliviana de Fauna, La Paz-Bolivia
Oscar Loayza, Wildlife Conservation Society Bolivia
Jos Barlow, Lancaster Environment Centre, Lancaster University, UK

Abstract: Current debates in the conservation sciences argue for better integration between research and practice, often citing the importance of the diffusion, dissemination and implementation of scientific knowledge for environmental management and policy. This paper examines existing definitions of these terms in order to differentiate between passive and active forms of scientific communication. It then focusses on a relatively well-researched protected area (Madidi National Park) in the Bolivian Amazon in order to present different interpretations and understandings of the local relevance and availability of research findings. A systematic analysis of research carried out between 2004-2013 was conducted, whereby all principal investigators (n = 88 projects) were requested to provide information about the implications for management of their research project and the extent to which the research findings were disseminated and/or implemented for management actions. We found that while 78% of researchers stated that their project had implications for the management of natural resources, only 53% had disseminated that research on any level, and only 10% had directly engaged in any form of implementation. We then draw on qualitative data from 102 interviews and 12 focus groups with protected area staff, local inhabitants and researchers working in the region to assess their perceptions of dissemination and implementation of research, revealing four common issues that can develop from inadequate or unintentional dissemination activities: missed opportunities, paying for the sins of others, confusing research results with other benefits, and research that collects dust. We discuss the implications of these for the future of conservation science and practice in tropical landscapes, with an explicit call to action for researchers to reprioritize local dissemination practices.

6.1 Introduction

Conservation science is currently experiencing something of a midlife crisis as we approach the thirty-year mark of the establishment of the Society of Conservation Biology, and many would agree that we have far fewer the same number of years to turn the tide (Meffe et al. 2006; Dirzo et al. 2014). As Balmford and Cowling wrote almost a decade ago, "although we may be winning a few battles, we are still losing the war" (2006, 692). One of the key challenges to be faced is the maintenance of biodiversity and ecosystem functioning in tropical regions, which depends on the degree to which human-modified landscapes can be sustainably managed (Boreux and Born 2009; du Toit et al. 2004; Gardner et al. 2009). However, the widely discussed 'research-action' gap points to the disparity between academic research and conservation action on the ground, which may be compounded by the frequent failure of researchers to communicate the findings of their work with local stakeholders – particularly with people who live in the regions under study (Arlettaz et al. 2010; Boreux and Born 2009; Gossa et al. 2014; Hulme 2014; Knight et al. 2008; Sunderland et al. 2009).

Previous literature suggests the potential for conservation gains created as a result of improving integration of research and management (Walsh et al. 2014; Shackleton et al. 2009; Arlettaz et al. 2010). However, such arguments tend to be put forward with a look at what could be accomplished or what might be improved if researchers were to invest more effort into local dissemination; rarely are the specific negative consequences of *not doing so* expounded upon, except in the abstract (Gossa et al. 2014; Pitman 2007). This paper advances the debate by analysing the different types of diffusion, dissemination and implementation undertaken by conservation scientists in an Amazonian setting and exploring the unintended consequences that result from the lack of prioritization of local dissemination strategies.

First, we present definitions of some of the key terms as written about in the evidence-based medical literatures, as this scholarship has formed much of the bedrock of the research-action gap debates in the conservation sciences. We then present quantitative data gathered from the Madidi region of Bolivia, one of the most biologically and culturally diverse places on the planet, to explore the extent to which scientists have diffused, disseminated and implemented the results of their research from local to global levels. Finally, we use qualitative evidence to show the impacts that low levels of local and regional dissemination have on local peoples' perceptions

of research and researchers, and discuss what this means for the future of tropical landscapes.

6.1.1 Defining dissemination

In the growing literature in the conservation sciences on the gap between research and implementation, the term 'dissemination' is frequently used but is rarely defined (Flaspohler et al. 2000; Sunderland et al. 2009). As much of the current calls for conservation evidence and use-inspired research stems from the evidence-based medical literatures, it is perhaps useful for conservation researchers to be aware of attempts within these literatures to clarify meanings of terms often used interchangeably in discussions about the communication of scientific information for decision-making processes (Kerner and Hall 2009).

In a 1993 special issue in the Annals of the New York Academy of Sciences entitled, *Doing More Good than Harm: The Evaluation of Health Care Interventions*, Jonathan Lomas published an influential paper that distinguished between the concepts of diffusion, dissemination and implementation. According to Lomas, diffusion is a passive process; "light diffuses from a source; it is not targeted; it is haphazard; it is largely unplanned and uncontrolled. Those who receive diffused messages were likely already open to and seeking out the message" (p. 226). According to Kerner and Hall, the "slow and deliberate pace" of research diffusion is valued in science because of assumptions about the importance of validating and replicating data before advocating for its application (2009, 520). On the other hand, dissemination is considered to be a more proactive process, in which the information is directly targeted and tailored to the intended 'users' of the information. The general goal of dissemination is increased awareness, especially among those who wouldn't normally actively seek out the information otherwise. For example, in the medical sciences "if the message is relevant for the physician's practice, there is a good probability that she will be exposed to the message whether she wants such exposure or not" (Lomas 1993; 227).

Finally, implementation goes beyond the informational goals of both diffusion and dissemination to overcome barriers to putting given knowledge into practice. This involves both the explicit stating of the implications of the information as well as the acknowledgement of additional conditions (social, organizational, behavioural) that could put constraints to the application of the information. Lomas stresses that it

is a *local* process of communication "in which appreciation of the research findings is a necessary but not sufficient condition to bring about changes in decision-making that reflect the message from research" (ibid).

6.1.2 Knowledge exchange in the conservation sciences

Previous literature on knowledge exchange in the conservation sciences has addressed the mismatch between the research that scientists produce and the information that practitioners and policy makers need, the difficulty of non-academics to access and understand relevant scientific information, and the tendency for conservation scientists to prioritize publishing in top tier journals over engaging more directly in conservation implementations (Alterraz et al. 2010; Born and Boreux 2009; Gossa et al. 2014; Matzek et al. 2013; Pullin et al. 2003; Pullin and Knight 2005, 2009). However, research papers on these issues have generally been limited to surveys with published academics and/or conservation practitioners, such as NGO staff (Flaspohler et al. 2000; Gossa et al. 2014; Matzek et al. 2013). Rarely have the perspectives of other local actors, such as indigenous communities or park guards, been included in these debates; yet, as noted by Shanley and Laird, these groups "are widely considered key stewards and stakeholders in biodiversity and forest conservation today" (2002, 102).

This paper helps fill this knowledge gap by undertaking a systematic analysis of all of the scientific research carried out during a ten-year period in a relatively well-studied protected area in the Bolivian Amazon to ask the following questions: 1) in what ways was the research done in the region relevant for management, 2) to what extent was it made accessible to those who could use the information; and 3) does this differ depending on whether the principal investigators are based in Bolivian or foreign institutions? We then explore the implications of these results together with qualitative data gathered through interviews and workshops with researchers, indigenous communities and park staff in the region in order to answer a final question: 4) how do local people living and working in the region (indigenous leaders and park guards) perceive different forms of research diffusion, dissemination and implementation? The paper combines these information sources to examine four unintended consequences of inadequate local dissemination and provides recommendations for the reprioritization of locally-focused strategies.

6.2 Study site and methods

6.2.1. Study site

Madidi National Park and Natural Area of Integrated Management (Madidi NP/NAIM) incorporates approximately 19,000 km² across the tropical Andes in the northwest of the La Paz department in Bolivia. It is one of the most biologically diverse protected areas on the planet, where 8244 species of vascular plants, 182 mammal species and 917 species of birds have been formally registered (Salinas and Wallace 2012). The park is also notable for its cultural diversity, and the communities located within and adjacent to Madidi NP/NAIM consist of multi-ethnic groups, including lowland and highland indigenous peoples and rural communities made up of native peasants and colonists. Four indigenous territories (TCOs) overlap the protected area (San José de Uchupiamonas, Takana 1, Lecos de Apolo and Lecos de Larecaja), and two others border Madidi (Takana II and the Tsimane'-Mosetén, located in the neighbouring Pilón Lajas Biosphere Reserve). In total, there are 24588 people living in Madidi's area of influence, of which 3741 reside within the boundaries of the protected area (SERNAP 2006).

6.2.2 Quantitative method

A systematic analysis of research carried out in Madidi NP/NAIM between 2004-2013 was done through an exhaustive review of documentation physically located in the Madidi park offices and recording all permit applications and other references related to scientific research (technical reports, publications, etc.) into an Excel database in November of 2013. A total of 88 research projects were identified (excluding the research described in this paper), and for all projects the following information was recorded (to the extent that it was available): principal investigator(s), institution, type of study, years carried out, title of project, subject, geographical location, research objectives and contact information of the PIs. Over a one-year period (between December 2013-November 2014) the primary author then attempted to follow up with the principal investigator(s) listed on each project to verify the information obtained and ask additional questions about the level of local involvement in the project, potential implications for management and extent to which the research results were disseminated and/or published. Analyses were carried out using lme function in the nlme package from the statistical software program R, version 3.1-113 (R Development Core Team 2013).

6.2.3 Qualitative methods

In addition to the quantitative analysis, we used qualitative data to better understand the implications of the results found. Conservation scientists are increasingly interested in social science research, but they often have difficulty interpreting this research because of the different types of principals and assumptions underlying quantitative and qualitative data collection and analysis (Moon and Blackman 2014; Drury et al. 2011). Anticipating this issue with the readership of this journal, as this is a mixed methods paper, we wish to clarify here that the qualitative data presented in this paper has been analysed in a different manner to the quantitative results, with the aim of adding context and possible explanation. While in quantitative data, especially in the natural sciences, there is an established norm towards objectivity, the 'subjective' plays an important role in qualitative social science research, which seeks to uncover the complex ways that individuals and social groups experience and understand the world. As such, we do not pretend to argue that the opinions presented are objective or even representative of all of the local people living and working in the region; rather we use the insights gathered here to shed light on possible reactions to the lack of local dissemination of research that is demonstrated in the systematic analysis.

The qualitative methods used included the semi-structured and unstructured interviews (n = 102), and workshops and focus groups (n = 12), which were held to discuss perceptions about the importance of scientific research, the extent to which it is locally disseminated, and its relevance for the management of natural resources in the region. Two of these workshops included sharing the database of research projects with park guards and staff at the Madidi park offices during which they discussed which studies they were aware of, which studies they remembered having been locally disseminated, and which they considered to be applicable to the management of the protected area. These questions led to wider discussions about personal experiences with research and about the relevance of research in general, and all workshops were recorded with the informed consent of participants. Of the interviews, 24 were conducted with researchers, 42 with local people (leaders and community members), 27 with park staff, nine with staff of government ministries and/or other NGOs (see Appendix III for more information on interview questions). Questions and the discussions (and duration) varied according to the situation and interviewee, but a sample interview schedule is provided in Appendix III. All interviews were

conducted in Spanish, with the exception of several interviews with English-speaking scientists. Informed consent was obtained for all interviews, and in some cases the interviewee requested his or her name to be specified. All qualitative data was transcribed and analysis was aided with the use of the coding software Atlas.ti. version 7.1.8 (2014).

6.3 Results and discussion

Of the 88 research projects identified in the database, 3 were immediately excluded from analysis because they were determined to be government-led evaluations that did not have research as the primary aim (i.e. hydrological measurement, monitoring). Of the remaining projects, 46% were led by principal investigators based at foreign institutions and 54% were Bolivian-based. Contact details for the principal investigators was able to be found for 75 of the projects, who were then contacted either in person, by telephone or via email. Of these contact attempts, 15 went unanswered, one person explicitly refused to answer the questions, 11 responded that the study in question was not carried out in Madidi due to permitting problems or other issues, and nine responded by email but didn't complete the questions. For the remaining 40 studies, complete information was obtained directly from the principal investigator and the data presented below are based on this subsample of projects. In this analysis we did not differentiate between the different 'types' of research (i.e. pure or applied, NGO-run or university-based, etc.) for the following reasons: 1) more than half of the research projects were run as collaborations between multiple institutions (frequently NGO-university partnerships) and often had multiple aims, making it problematic to distinguish between research projects focused primarily on publications vs. projects with actionable goals in mind; 2) even the purest research can have very relevant, direct and local consequences for the management of a given landscape, and applied research may reveal theoretical insights that are not so directly put into action; and 3) we were interested in local peoples' perspectives of research, and local people do not readily differentiate between different types of research, unless it is clearly communicated to them. Instead of creating such categories, for all of the questions we asked principal investigators to describe in their own words the management implications of their research and forms of dissemination and implementation they carried out, as our survey used open-ended questions instead of presenting discrete choices. This was done in order to generate more informative

answers and to gauge better what the researchers considered to be important. This section is organized around the three research questions outlined earlier in this paper.

With respect to our first question, (*In what ways was the research done in the region relevant for management?*), 31 of 40 projects (78%) stated in the affirmative that their project had implications for management of natural resources / protected area. Interestingly, despite the non-geographical specificity of the question, "Do you believe that your research has implications (implicit or explicit) for management," a greater number of the open-ended responses specified local (community-level or park-level) rather than global or even national implications, explicitly stating how local communities or park staff could make use of the information (see Table 6.1).

Table 6.1: Responses to the question, "Does your research project have implicit or explicit implications for management," and to a follow-up question, "What are they?" Responses in the affirmative were analysed for specific reference to the geographical level to which the management implications were directed (as often multiple levels were identified total percentages added up exceed 100%).

Scale of management implication (local to global)	Number of projects that mentioned	% (*n* = 32)	Examples
Community-level	13	41	Communicating the importance of interspecies dynamics so local communities can better understand impacts of hunting (and develop adaptive strategies such as hunting zones) Informing local people about pathogenic relationships with regards to disease transmission between animals and people Providing new economic opportunities and improving existing strategies for local communities
Specific to local region (Madidi NPNAIM and surrounding municipalities)	28	88	Contributing to park management plans by providing information of species inventories and other biophysical information Understanding local effects of climate change in order to develop adaptation strategies Giving recommendations to park staff for how to improve local peoples' perceptions of the protected area management
National / Regional	17	53	Maintaining connectivity with other protected areas in the region (conservation corridors) for large mammal protection Upholding constitutional commitments to integrated management of forest resources in the context of reciprocity and equality Identifying conservation gaps and proposing changes to the national protected area system to improve conservation of certain threatened taxa
International	3	9	Knowing about the spatial requirements of certain species Demonstrating the impacts of fire and deforestation on certain ecosystems and taxa Providing information for the IUCN global assessments

This focus on the local supports the idea that such communities and groups are considered by researchers to be vital for conservation management, as suggested in the literature. However, the next question regarding the extent of dissemination of the research (*To what extent was it made accessible to those who could use the information?)* revealed that despite the local management implications of much of the research, few studies were disseminated locally. Table 6.2 shows a typology of diffusion, dissemination, and implementation, based on the database. In the questions sent to principal investigators, the term 'dissemination' was left open to interpretation, but as the following question asked specifically about publication, there was the opportunity for respondents to differentiate between different forms of information sharing.

Table 6.2: Combined responses to questions: Were the research results disseminated? (How?) Where the research results published? (Where?) Did the research lead to any management decision or action? The percentages do not add up to 100% as several projects engaged with multiple strategies.

Type of knowledge exchange	Specific strategy	Foreign *n* = 14		Bolivian *n* = 26	
		n	%	*n*	%
None	No dissemination / unsure / left blank	2	14	0	0
None	Research not yet at dissemination stage	1	7	4	15
Diffusion	Publication in international journal / thesis in international	10	71	8	31
Diffusion	Publication in national / regional journal / thesis in national university	2	14	10	38
Diffusion	Presentation in academic conference or seminar – international	2	14	3	16
Diffusion	Presentation in academic conference or seminar – national/regional	0	0	5	19
Dissemination	Grey literature publication (blog, report, press release, etc.) – international	2	14	2	8
Dissemination	Grey literature publication (blog, report, press release, etc.) – national	0	0	8	31
Dissemination	Handed written material over to local actors (park staff, community leaders)	1	7	11	42
Dissemination	Workshops / oral presentations / meetings in Madidi region to disseminate info to local people	0	0	9	35
Implementation	Was included in regional or community management plan	0	0	3	16
Implementation	Directly led to local conservation/mgmt. actions	0	0	1	4

To answer our third research question (*does this differ depending on whether the principal investigators are based in Bolivian or foreign institutions?*), in Figure 11 we highlight the different tendencies of how foreign and Bolivian researchers diffuse, disseminate and implement the results of their research. With regards to diffusion,

statistically more foreign-based researchers published in international journals as compared to those that were Bolivian-based (71% and 31%, respectively; $F_{1,38} = 0.25$, $p = 0.43$); while the inverse was true for national or regional publications, where 38% of Bolivian-based researchers but only 14% of international researchers published. Regarding dissemination, only 1 foreign-based research project (7%) engaged in any form of local, regional or even national knowledge exchange. This represents a statistically significant difference ($F_{1,38} = 0.29$, $p = 0.006$) with Bolivian researchers, of whom 31% published in the national grey literature, 42% handed written materials over to local actors, and 31% presented results in orally through workshops or presentations. With regards to implementing research findings, only 5 projects in total fell into the two categories described here, and all were carried out by researchers based in Bolivian institutions.

These results present a stark contrast between the types of knowledge exchange carried out by foreign as compared to Bolivian-based researchers (see Figure 6.1). Similar findings were found in Pitman et al.'s (2007) review of research carried out in Manu National Park in Peru, which shed light on the different dissemination strategies employed by foreign as compared to Peruvian researchers, as well as the relative lack of non-Peruvian publications consulted for the protected area's management plan.

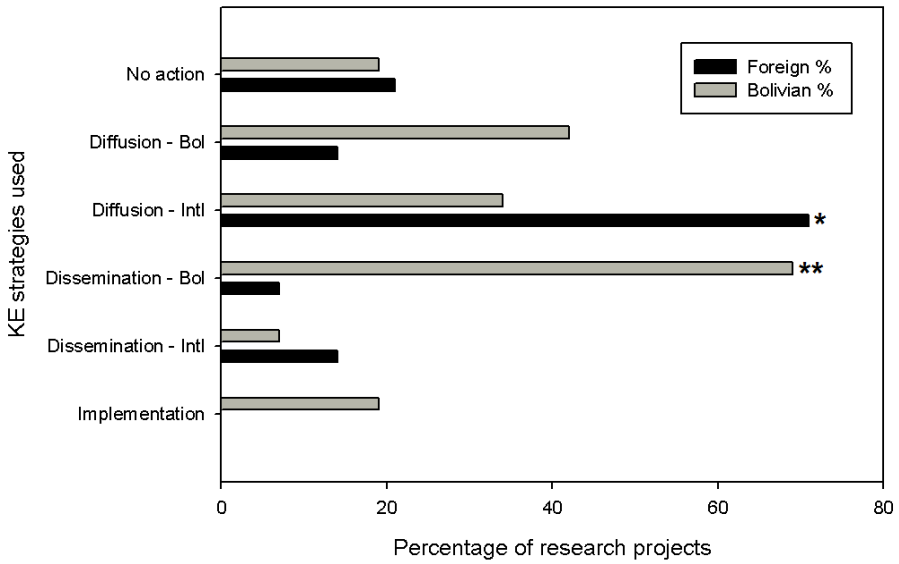

Figure 6.1 Knowledge exchange (KE) strategies of research projects in systematic analysis. Significant differences between foreign and Bolivian strategies is indicated as * $p<0.05$ and ** $p<0.01$

This analysis of ten years of research at a Bolivian national park found on one hand, the potential for the majority of research to provide recommendations/implications for how natural resources are managed; and on the other, low levels of local dissemination and implementation, especially among foreign-based researchers. These results strengthen arguments put forward in previous literature about the lack of prioritization among conservation scientists to actively engage themselves in implementation activities, be it due to lack of institutional rewards or simply low levels of interest or energy for moving outside of academic or disciplinary boundaries (Arlettaz et al. 2010; Ehrlich and Pringle 2008).

To answer our final question (*How do local people living and working in the region (indigenous leaders and park guards) perceive different forms of research diffusion, dissemination and implementation?*), we present qualitative data around four unintended consequences of inadequate local dissemination. As mentioned in the methods section, we use this information to complement the quantitative trends described above with a clear justification for presenting subjective and non-measureable opinions and values.

6.3.1 Missed opportunities

> Nobody knows what the research is for because it doesn't come back to where it is generated. It shouldn't be this way. If research has been done in a certain place, then the results of that research should return to that place. In order to know what it was about, what was done, to take decisions based on the information and to know what science has to offer as far as alternatives and solutions. But we don't know what the research is for.[60]

One common complaint among staff in the protected area (even those in upper levels of management) was related to the lack of basic information about the results of research conducted, or even whether the studies had been completed or were still ongoing. In interviews and workshops many people mentioned the missed opportunities in not knowing about the results of research conducted on their lands, and this was expressed in many ways. Park guards often lamented the lack of such information to be able to make decisions based on relevant research, as expressed in the following quote:

[60] Semi-structured interview with Sixto M. Tito, Madidi park guard, July 2013.

> For example, if a biologist says that there are a certain number of bears, and they find that they are at risk in a certain region because their habitat is being encroached upon there, then we should take some actions based on that information. But generally there aren't these kinds of explanations, so we can't come up with actions.[61]

This research additionally found that presenting the database on the research done in Madidi served as a kind of 'gateway' to discussing important conservation issues in the region and informational gaps. For example, when the park staff learned about previous research done on mercury levels in an important river that runs through the park (the Tuichi), they talked about the importance of sharing this information with local communities where fish is one of the most important sources of protein.[62] Park guards additionally noted the synergy of impact when existing local observations are corroborated with technical information:

> The people realize a negative change in the environment is occurring when they see it for themselves, but when their concerns are corroborated by researchers that come to the communities, their awareness of what is happening increases.[63]

In comparison to the park staff, indigenous community members and leaders were more concerned about the missed opportunities of learning new skills and information with which they could defend their lands. Some of these communities have had very positive experiences in the past with researchers who have helped them to gather data on spatial needs through participatory hunter monitoring programs, which they have used to support their claims to territorial autonomy[64] (Copa and Townsend 2004). However, at the time of writing there are increased threats of petroleum concessions being granted by the government to drill within the protected area and in established indigenous territories, and community leaders lamented the lack of scientific data available to predict the environmental and social consequences of such 'mega projects', which they might be able to use in order to come up with counterproposals. Previous studies have noted the local importance of technical data to assist people living in close proximity to valuable natural resources in negotiations with higher-level companies and government that have vested interests in their lands (Bolton 2007; Shanley and Laird 2002; Shanley 2006).

[61] Semi-structured interview with Remberto Chivapuri, Madidi park guard, October 2013.

[62] Workshop with park guards from Pilón Lajas, October 2013.

[63] Semi-structured interview with Cesar Bascope, Madidi park guard, October 2013.

[64] Semi-structured interview with Clemente Caimani, ex-president of Tsimane'-Mosetén indigenous council, November 2013.

In addition, biological information was of particular interest to local people, as they are concerned with the health of the animals and resources they depend upon for their livelihoods (see also Bodmer and Puertas 2000). For example, one indigenous leader said that he was interested in being informed of the results of a study that had been conducted on his lands about the population of spider monkeys in the territory, as they are popular both as a local food and for paying tourists.[65] Local people were often aware of the fact that research results are published in languages and in literature that is not accessible to them. For example, one community member mentioned a recent study about climate change that had been carried out on his lands, but lamented that the results were only available online.[66] Another indigenous leader said that a certain doctoral project done about land use conflicts in his territory was of great interest to him, but when he requested the final product from the author he was sent an electronic version of a thesis that was written entirely in French.[67]

These local perspectives are essential take into account, as in less economically-developed countries such as Bolivia people living within or in the buffer areas of protected areas are often those who determine how land will be allocated and resources will be managed, due to the lack of implementation of environmental laws created at higher governance levels (Kainer et al. 2009; Shanley and Laird 2002). Thus, it is necessary for conservation researchers working in these contexts to expand their views regarding who are the 'policy-makers', and to develop dissemination strategies that will reach those who could make most use of the information (Duchelle et al. 2009).

6.3.2 Paying for the sins of others

> The people believe that the research that is done is of no local use. Instead, they say that it is for capitalist countries or for gringos, and ask themselves, what are they coming to research about us now? What genetic samples or animal specimens will they be taking away this time?[68]

[65] Unstructured interview with Anastasio Cuqui, community member of San José de Uchupiamonas, July 2013.

[66] Unstructured interview with community member of San José de Uchupiamonas, July 2014.

[67] Semi-structured interview with Clemente Caimani, ex-president of Tsimané-Mosetén indigenous council, November 2012.

[68] Semi-structured interview with Marcos Uzquiano, head of park guards in Apolo region of Madidi, June 2013.

During the research period, the most common perception expressed by local people about research could be summed up as "researchers leave nothing behind." The results above clearly demonstrate the lack of local dissemination, especially from foreign scientists, and researchers working in the area who were interviewed gave examples of communities where they had been refused access, interviews that they had been requested payment for, or even direct threats to their person. Much of this resistance is a direct result of previous experiences of unfulfilled promises, where researchers overstate the local benefits of their work in order to obtain community consent to carry out the work. During a workshop on communication and dissemination at the National Herbarium, one botanist commented that one of the main reasons for this problem is due to the fact that the vast majority of research projects are determined solely on the interest of the researcher, and the concerns of other stakeholders are only thought about after the fact:

> We have our study topic determined ahead of time, and then we go to a place and have to attempt to get the local people interested in what we are doing. So we aren't responding to any concerns that they might have, and this creates conflict as the relationship isn't an equal one.[69]

Of significance here is the ethical notion of reciprocity, which is an essential aspect of many indigenous cultures across the world (Reid and Taylor 2011; Herman 2008). Indigenous scholars such as Linda Tuhiwai Smith and Bagele Chilisa have written ground-breaking books about the extractivist nature of much scientific research carried out, but their voices have often been overpowered by the sheer quantity of scientific information that continues to journey from the so-called peripheries of the world to its academic hubs in the United States and Europe. While ethical review boards now help to prevent the worst of research offences (at least in the social sciences), the simple concept of reciprocity has yet to be officially integrated into these processes. The conservation science community could make its place more explicit in the Society of Conservation Biology's code of ethics, where point 11 currently states: "when working professionally, especially outside their region of residence, interact and collaborate with counterparts, present seminars, confer regularly with appropriate officials, share information, involve colleagues and students in professional activities, contribute to local capacity-building, and equitably

[69] Workshop with botanists from the National Herbarium, August 2013.

share the benefits arising from the use of local knowledge, practices, and genetic resources." Rather than local dissemination being seen as a 'laudable extra', it should be considered a professional obligation under the logic of reciprocity. This is already being made law in Bolivia, where in 2009, a new Political Constitution of the State was put into effect, giving more rights to indigenous communities respecting their control over their land and natural resources.

Things happen in and out of the field, and communities understand that sometimes promises made are not able to be kept. But when the same experience is repeated multiple times, people stop believing, resistance grows, and doors that were once open begin to shut. This is particularly worrying in areas of both high biological and cultural importance, where lack of access to field sites will make it increasingly difficult for research to be conducted.

6.3.3 Confusing research results with other benefits

Another unintended consequence of the lack of adequate dissemination is that most local people have little understanding about the connection between research in the field and resulting information; the practice of collecting data is untied to any kind of 'result' or 'impact'. That being the case, local people attempt to seek 'benefits' in exchange for allowing research to be carried out on their lands in other ways. The most common kind of exchange is of labour, in which researchers hire local guides and/or porters to assist them in the field. This can be a fruitful kind of exchange, as both parties are 'gaining' something from the experience, but is not without complications and power issues (Toomey, In review).

In much of Bolivia, and especially among communities in the lowlands, the traditional practice of *trueque*, or 'exchange', is still common (Lara 2003). Although *trueque* more commonly refers to the bartering of goods (fish for rice, etc.), it can also involve the rendering of services. With regards to scientific research, local stakeholders often spoke not only of actual benefits of research, but of the 'potentiality' inherent in any visitor to their lands. Our study found that people often gave researchers access to their lands not because of any deep interest in the topic of research in itself, but rather because of the potential 'benefit' they might receive through *trueque*. In one meeting with the leaders of the Tsimane'-Mosetén nation, it was mentioned that no researcher is ever rejected, because of the 'contribution' that

they expect from visiting researchers.[70] It was further explained that this contribution is not typically monetary (though it sometimes is), but rather is dependent both on the interests of the researcher and the needs of the community, but neither is it an explicit condition for doing research in a given place. The researcher is not told of this expectation; rather it is hoped that they will find their own way of 'giving back'.

> For example, there was a research project on an endemic bird in a Quechua community where the largest number of individuals of that species could be found, and the project helped to support the construction of a school – they left some sort of infrastructure behind. So the people of that community value the species because there has been a result, something concrete, out of it – increased awareness because they gained something because of the species. On the other hand, a botanical project carried out a great deal of research on the unique species native to the region, but only involved people as day labourers (guides, etc.). Once the results were obtained, nothing more was done in the communities. The people are always looking for something. If in my community there is a species that is found to be very important for science, for biodiversity, for conservation, I would like there to be something out of it – something to remember the project by.[71]

While there is nothing inherently negative in this form of exchange, it adds to existing confusion about what research is for, and in many interviews people spoke about scientific research interchangeably with development projects, as the quote above points to. This kind of misinterpretation of the objectives and outputs of scientific research can lead to misunderstandings and unmet expectations in the future on the park of host communities, and researchers may find themselves increasingly subject to requests and demands that are seemingly unrelated to the research they seek to carry out.

6.3.4 When research collects dust

> After research is done it's necessary to disseminate it. Because what is the good of just having the information just neatly organized in a database? It's necessary to share the results with the local people in order to see how to minimize the impacts of their activities, and to know which actions we should take in order to avoid having a crisis. So on one hand developing preventative actions, and on the other hand providing solutions for how to adapt.[72]

Although the unintended consequences described above refer to tendencies of 'not giving back', it is important to discuss the cases in which research results were in fact

[70] Feedback session with the Tsimané-Mosetén indigenous council, December 2013.

[71] Semi-structured interview with Cesar Bascope, Madidi park guard, October 2013.

[72] Ibid.

handed over as technical reports or publications, as was reported in 30% of the projects in the systematic analysis. Park offices, indigenous council headquarters and government institutions all held libraries full of articles and books that were in many cases the final products of scientific studies. However, many people discussed the relative uselessness of this literature, such of which was written in languages other than Spanish. In a discussion with scientific staff working at the Department of Biodiversity at the Ministry of the Environment one man pointed to the bookshelves in the room and said that the many books and reports sitting upon them had very little practical use, and added that one of the key problems was that researchers only rarely consult with local stakeholders before selecting their research topic and suggested a different approach be taken:

> Researchers need to ask themselves beforehand, 'are resource managers going to be able to take decisions based on this work? Will it really be useful for them, or just for me?' These are the same mistakes that are made over and over again – imposing research without first consulting those who might use it.[73]

In the Madidi region, bookshelves in the protected area and indigenous council offices were coated with dust, and many books were in varying states of disintegration due to termites or mould. In addition, cultural practices of seeing research products such as books and reports as private 'gifts' rather than public property impeded the horizontal exchange of information. An anecdotal observation was that community leaders often kept theses and other research products in their own homes rather than in spaces designed for communal use. Pitman et al. (2007) make note of this issue in their systematic review of research carried out in the Madre de Dios region of Peru, where they explain that books and reports written about the region are rarely available in libraries in Peru, but instead reach individual scientists through gift-giving practices, which results in their only being available in private collections after a number of years.

Local people interviewed as part of this research offered many creative suggestions for how scientists could better communicate the results of their work such as workshops, videos and citizen science type activities. Although suggestions for how to better translate research into action have been discussed elsewhere (Born and Boreux 2009; Cook et al. 2013; Danielsen et al. 2005; Knight and Cowling 2006;

[73] Discussion with Department of Biodiversity at the Vice-ministry of the Environment, August 2013.

Lauber et al. 2011; Milner-Gulland et al. 2012; Pietri et al. 2013; Shackleton et al. 2009), key recommendations identified during this research included: collaboration with local people when choosing a research topic in order to ensure it is of mutual interest (i.e. co-created research agendas), providing opportunities for local participation at different stages of the research (i.e. citizen science; see Conrad and Hilchey 2011), and finding ways to share results that can reach larger segments of the population (i.e. educational videos or presentations at community meetings).

6.4 Conclusion: Developing new priorities

Our systematic analysis of research carried out in Madidi has demonstrated the lack of local dissemination and implementation strategies among researchers in the Madidi region of Bolivia, and further describes the negative consequences of this deficiency for the future of conservation science and practice. What can scientists aiming to bridge the research-action gap learn from this?

First, researchers should keep in mind the differences between the terms diffusion and dissemination, and clarify which strategies are most relevant for the kind of research they are doing, especially if trying to reach those who might not otherwise seek out the information. Secondly, it is vital for all researchers to be aware of the unintended impacts of not locally disseminating results. This study highlights the missed opportunities of not taking steps to communicate and implement relevant research findings. As noted by Arlettaz et al. (2010), we as a conservation community have the power to change things, such as implementing a 'public impact factor' to evaluate the effectiveness of conservation researchers along with the more standard scientific impact factor.

Finally, the wider scientific community could take further steps to integrate the indigenous notion of reciprocity into professional research ethics and norms. Whether studying hive decline with beekeepers in the United Kingdom or evaluating human-elephant conflicts in India, those affected have the right to know about the results of research and too often have been forgotten as higher-level diffusion activities, such as publishing in journals with high impact factors, are given sole priority. It should be the exception, rather than the rule, that research carried out in a given location has little or no relevance for that place and thus should not be expected to be disseminated locally. It may be helpful for those doing research to imagine the legacy of their work on the ground – will they be leaving the lands on which they gathered their data

accessible for future generations of conservation researchers and practitioners, or are their behaviours closing the doors to collaboration and exchange?

CHAPTER 7

Writing history in the present:
The makings of 'Bolivian Science' and its implications for decolonising research

7.1 Introduction

Scientific research practices, in particular in the biological sciences, are currently undergoing a great deal of scrutiny and change due to recent debates in the social sciences about bioprospecting, biopiracy and the co-production of knowledge. Nowhere are these debates more relevant than in countries with high levels of both biological and cultural diversity that have been subject to a history of colonialism, such as South America. Many authors have written critically about these issues – about western science and imperialism, about indigenous valuations of biodiversity, about different forms of knowledge in the context of scientific exploration in colonial and postcolonial worlds (Adams 2003, 2004; Blaser 2009; Escobar 1998; Fairhead and Leach 1995; Hakkenberg 2008; Lowe 2006; Nugent 2006; Peterson et al. 2008; Raffles 2002; Sillitoe 2007; Vermeylen et al. 2008; Verran 2002; Willems-Braun 1997). However, there is less understanding about the links between such histories and the policies, discourses and relationships as occur in scientific practices in these regions of the world today (Harding 1994, 2006; Powell 2007). As noted by Centellas (2010), little notice has been taken of localized creations of scientific practice in non-western settings (i.e. Bolivian science), and even the handful of discussions on distinct forms of nationalized science have tended to leave the implications of these adaptations unsaid, especially in terms of how they shift scientific trends and debates on a global scale.

To echo Anderson's notion of the postcolonial study of science and technology, this essay is thus an attempt to write a 'history of the present', in order to come to terms with "the turbulence and uncertainty of contemporary global flows of knowledge and practice" (2002, 644). To this aim I bring myself into the equation as a kind of living evidence for a process of 'reverse transculturation'. Mary Louise Pratt used the concept of transculturation to describe the way in which groups subjugated to colonialism determined to varying extents the use of and meaning ascribed to materials and symbols imposed on them from dominating cultures (1992, 7). In a 'reverse' process, the absorption of culture and meaning also travels in the

opposite direction, admitting and accepting the kind of power inherent in encounter (ibid.). This kind of exploration can help to challenge unidirectional understandings of postcolonial relations, and to make visible the ways in which the so-called 'peripheries' of the world can disrupt and change cultures of knowledge held in the northern and western 'cores' (Sundberg 2006; Harding 2006; Driver 2004; Rodríguez 2013).

This essay has the following aims. First, it explores the notion of a 'Bolivian Science', as brought forth by Centellas, and will argue that this 'Bolivian Science' does not represent a shared vision of a harmoniously interacting civil society, but rather is a product of friction and encounter between multiple, diverse and conflicting voices and initiatives. Secondly, I will refer to literature on 'Creole' and 'Latin American' science to show how this diversity of positions has in common a shared history, having emerged from both a continuation of and resistance to the extractivist forms of science and natural resource exploitation that were common during the colonial era and that continue to exist in modernized forms today. This article will further illustrate how this plays out in the complex political landscape of the biological sciences in Bolivia, the way that different social groups perceive the role of science and technology in the making of the plurinational state, and some examples of the kinds of projects that are supported / rejected under Bolivian Science. Finally, I will conclude the essay reflecting on my own complicated and shifting gringa-nuevayorkina-chilanga-tica-nicaraguese-paceña-inglesa identity as embodied evidence to show how localized forms of science are not only influencing practice in the so-called 'peripheral' regions of the world, but are shifting debates on the production and use of knowledge in new directions globally.

7.2 A 'Bolivian Science'

> In Bolivia, the rationale for a given scientific project generally emphasizes integrating indigenous knowledge and materials into scientific practice… 'Science' does not reference an alternative epistemology emergent from local traditions and prioritized to contest Western models of knowledge production, though scientific practice here actively integrates indigenous perspectives and concerns. Instead, science is understood as an extraordinarily powerful tool that is modified and deployed to meet national ends.

In her paper, *The Localism of Bolivian Science: Tradition, Policy, and Projects*,

Katherine Centellas describes a unique, localized embedding of scientific practice in Bolivia, which she refers to as Bolivian Science. She uses this notion to challenge what she refers to as a false dichotomy between the indigenous/traditional and modern/developed as often portrayed in international media accounts of Bolivian society, and depicts the practice of science in Bolivia as something carried out by women, indigenous people, and for the good of society. More than an 'indigenous science' or a universalised 'Science in Bolivia', she distinguishes Bolivian Science as unique in its commitment that the ends of its practice be focused on the local, rather than the global.

> What is different is the focus on rooting scientific practice, knowledge, and objects of study exclusively in 'our problems' and 'our conditions.' The criteria for understanding Bolivian science as science overlap with standard measures such as repeatability and transparency of method, but additional categories—among them local applicability, implementation, and technique— matter in Bolivia to a degree that marks its scientific practice as unique. This is innovative because it forges a new model of the relationship between scientific knowledge, peoples, and locations (Centellas 2010, 162).

There is much evidence in Bolivia today for this 'new model' that Centellas mentions. As I write this, Bolivia's first communications satellite, named Tupac Katari for the indigenous leader who organized an anti-colonial rebellion in 1781, is currently undergoing operational testing in space, promising both the modernization and nationalization of communications technologies in the country. The launching of the satellite, in December of 2013, was preceded by a ritualistic ceremony giving thanks to the 'Pachamama', and accompanied by words from Bolivia's president Evo Morales, "This will be our light, after living for so many years in the obscurity, the suffering and the domination of the empires," (21 December 2013, BBC).

As Centellas points out, since Evo's rise to power in 2006, there has been renewed interest in and emphasis on science and technology, particularly with regards to projects that emphasize the revalorization of indigenous knowledges for the sustainable management of the nation's natural resources (Viceministerio de Ciencia y Tecnologia 2012). This emphasis fits neatly into the government's national development plan, which centres on the Andean concept of 'Suma qamaña' ('Living Well' in English), which is being promoted as an alternative to western capitalist forms of development through the revaluing of indigenous livelihoods and belief

systems (Farah and Vasapollo 2011).[74] Increasingly, both private and public academic and research institutions in Bolivia are taking up the discourse of 'Suma qamaña', finding ways to present their work in a format that harmonizes integration between scientific and indigenous knowledge systems. An interview with the director of the postgraduate centre for the Institute of Ecology of the Universidad Mayor de San Andres also sheds light on the new importance of this way of thinking:

> In the postgraduate centre one of the important components, aside from research, is in the Masters course called 'Ecology and Conservation'. We have an entire module around 'Living Well', indigenous ways of thinking and alternative politics. We are very critical of so-called 'sustainable development' and the Green Economy, and we promote alternative ways of thinking.[75]

These alternative ways of thinking are based in the concept of 'endogenous science', which Haverkork et al. define as a practice of knowledge production that 'has emerged from within', and often refers to something that has arisen in a given society or system, but that has been modified and improved through dialogue and co-production with other systems" (2013, 17). Thus, 'lo endogeno' is not something that has developed in complete isolation from 'lo exogeno', but can be understood as a product of many different ways of thinking about the world.

7.3 Creole (Criollo) science – a forgotten legacy…

> We have met the 'other' and they are us.[76]

In some ways, it may be tempting to see the emergence of such forms of localized science as an inevitable product of the recent emphasis on indigenous knowledge systems in both national and international spheres. Indeed, in policy making in Bolivia, as in global institutions such as the United Nations, the insertion of indigenous knowledge into debates on education, the use of natural resources, and economic development, is the general order of the day. Internationally, this is reflected in global forums and agreements on intellectual property rights such as the International Declaration of Indigenous Rights and the Nayoya Protocol supplement to

[74] See also Spedding (2010) for a critical reading of Suma qamaña discourses in Bolivian politics.

[75] Patricia Roncal, October 2013

[76] Susanna Hecht, writing of Euclides da Cunha's vision for the development of Brazil (2013, 430).

the Convention on Biological Diversity. Among academics, this appearance of indigenous knowledge has been called a "long overdue move," (Agrawal 1995, 414), and much has been written over the last three decades both about the real or false dichotomies between Western and traditional knowledge systems, and the necessary or impossible goal of integration (Agrawal 2002; Berkes 1999, 2004; Bohensky and Maru 2011; Born and Boreux 2009; Bradshaw and Bekoff 2001; Drew and Henne 2006; Moller et al. 2004; Nasasdy 2003).

However, often what is less talked about in these debates is that they are not as new as they may appear. Discussions and activities that emphasized the co-production of knowledge have existed since the advent of the scientification of knowledge in Europe during the Enlightenment period, and took on new meaning as European naturalists first encountered other ways of knowing as held by native cultures in places of colonialism. So-called 'Creole'[77] scientists in North and South America were among the first in the endeavours to think of using science as a means to achieving the development of a modern culture in the colonies that had its roots in the traditions native to the new lands (Lafuente 2000). In some cases, this included the valuation of indigenous knowledge alongside European scientific knowledge[78] (Pastrana 1993; Lafuente 2000), but mainly the emphasis was on the 'nationalization' of the practice of science in their own lands, which was viewed by both colonizer and colonized as providing a "mechanism for increased colonial autonomy and self-sufficiency" (Chambers and Gillespie 2000, 226).

Although science developed itself differently on different soils, there are several elements in common in the various manifestations of 'Creole science'. One was that it was understood by both the Empire and the colony that the growth of science promoted autonomy and self-sufficiency (ibid.). Secondly, there was a kind of pride in and ownership of the biological riches that their birthlands offered to the

[77] Cushman proposes narrowing usage of the term 'Creole science' to "refer to a specific geopolitical context in which systematic knowledge of the natural world provided a basis for Americans of European and mixed ethnicity to assert their own authority and dominance over regional environments and their residents while living under colonial rule. This distinguishes it historically from systematic forms of knowledge primarily intended to legitimate imperial rule or to strengthen the controllers of centralized postcolonial states—phenomena better referred to as imperial science or national science, respectively" (2011, 23).

[78] Also note findings by Tsing (2005) regarding how early interactions between botany naturalists and indigenous knowledge often led the former to publish respectful accounts of the latter, which was seen by European scholars as 'hostile' to European systems of ordering: "discussions among Europeans refused to acknowledge this global sharing of knowledge. Instead, they focused on the formation of a universal system of classification" (p. 93).

Creole scientists. And finally, science was very much seen as a force for the good of society and independence – not something to be shipped back to Europe. All of these elements together resulted in the creation of unique forms of scientific practice – not simply mirrored distortions of a single, universalised 'Science' – but rather localized evolutions of the same.

Alongside this historical discussion of Creole science, postcolonial and science studies scholars have frequently referred to the notion of 'cultural hybridity' (Garcia Canclini 1995), which I argue emerges from a mixture of two juxtaposing components of any process of transculturation: mimicry and active rebellion. Bhabha (1984) writes of the 'mimic man' as a kind of subversive being whose very existence can challenge and undermine the authenticity and originality of the colonizer. This is similar to the concept of transculturation explained earlier, which can be seen as an act of discerning between that which is desirable and that which can be rejected. When combined with endogenous, native ways of knowing the world, this 'mimic' can transform into something less recognizable by the colonizer, perhaps something that is 'not quite' right:

> In any process of globalization of science the receiver, far from being merely passive, selects fragments of the transmitter's broadcast and adapts them to its own circumstances. From the point of view of the transmitter, the reception is an incomplete and/or mediocre copy of what was broadcast. But seen from the point of view of the receiver, the phenomenon is much more complex: a pre-existing cultural base has been enriched (and deformed) by something different and external. This means that a tradition must be 'invented' in such a way that it can interface with a new element. Only through this interactive model of mutual renewal can novelty be accepted and – most of all – used to advantage (Lafuente 2000, 156-157).

The existence of these alternative models directly challenges the western epistemological ideal of the 'universal', of which the west has been accused of 'confiscating' to further promote its own superiority over the rest of the world (Garaudi 1987; Prasad 1997). In this western-dominated universal model of science, first promoted by George Basalla, the research subject was always Europe, while elsewhere remained the object, and the flow of knowledge was one-directional – from north to south, west to east, with the latter regions simply serving to provide the data that would support theories already constructed by 'more advanced' civilizations (and minds) (Chakrabarty 1992).

There have been many challenges to this linear model of technoscientific diffusion, and scholars such as Arturo Escobar and Gilbert Joseph have come up with

different forms of modernity that draw the eye to specific spaces of contact and encounter. Anderson (2002) writes that there is a need to redraw the old map of technoscience in order to discern new categories (see also Driver 2004 and Rodríguez 2013). As Aymara scholar Rivera Cusicanqui writes:

> Ideas run, like rivers, from the south to the north and are transformed into tributaries in major waves of thought. But just as in the global market for material goods, ideas leave the country converted into raw material, which become regurgitated and jumbled in the final product. Thus, a canon is formed for a new field of social scientific discourse, postcolonial thinking. This canon makes visible certain themes and sources but leaves others in the shadows (2012, 104).

In this sense and others, 'core-periphery' patterns appear to hold strong. The highest-rated science institutions and scientific journals with the most impact are generally found in Europe and North America,[79] and the so-called universal language of science is English (Kaplan 1993; Strevens 1992; Sunderland et al. 2009; Stocks et al. 2008). Funding for scientific research in former colonial nations tends to flow from north to south, while specimens collected in those nations travel in the opposite direction for genetic analysis and taxonomic classification (Latour 1987; Neimark 2012; Parry 2000, 2004; Waterton et al. 2013; Ellis 2009). So it remains necessary not only to theorize about alternative technoscientific cultures and movements, but also to study and attempt to understand how by through *the doing of* science in different localized contexts it can be possible to decolonize it.

In this sense the Bolivian science model, like the forgotten manifestations of Creole science that came before, challenges traditional models of modernity in new ways. To understand this further, it is first necessary to explore how Bolivian science has emerged out of a long history of colonial science and resource exploitation, and how this history has come to see not only what has been and what is, but to lay the foundation for what could be. This calls for a new way of seeking knowledge, "from a praxis that is committed to the people... This done, truth will not have to be a simple reflection of data, but can become a task at hand: not an account of what has been done, but of what needs to be done" (Martín-Baró 1994, 23).

[79] See university ranking websites, such as http://www.timeshighereducation.co.uk/world-university-rankings/2012-13/world-ranking; see also journal rating websites, such as http://thomsonreuters.com/journal-citation-reports/

7.4 Histories of biological science in Bolivia

> Nowhere do nature and the savage combine to make exploration work so difficult and so risky as in the remote corners of this continent. (Percy Fawcett, presenting to the Royal Geographical Society in 1911 the results of an expedition along the Heath River, Bolivia.)

Bolivia was among the last of the South American countries whose biological and botanical mysteries were explored by Europeans. It was located in the interior of South America, much of its geography was set at a forbidding altitude, and its lower regions were populated by native peoples resistant to outsiders. Because of its remoteness, scientific exploration in Bolivia for all purposes began after independence from Spain, in 1825. This was after the lifting of the so-called 'Green Curtain' that the Spanish Empire had draped across South America, in an attempt to hide its riches from the rest of Europe. It was also as a result of the Enlightenment, which encouraged educated young men from Europe – among them, Darwin, Bates, and Wallace – to follow in the footsteps of von Humboldt and others to seek out the answers to the mysteries of the natural world on little-explored shores (Hagen 1945; Safier 2008; VonHagen 1951).[80]

As noted in previous works, this activity was very much one of extraction (Latour 1987; Parry 2000, 2004). Collectors gathered interesting specimens of flora and fauna, often with the paid or volunteer assistance of local people, to be shipped back to the collector's homeland, or to the country of those financing the expedition. In Bolivia, this pattern continued well into the latter part of the 20th century; even as late as the 1990s more than 90% of 37,000 zoological specimens from Bolivia were in collections around the world (Anderson 1997; Tarifa 2005). The few national botanists or biologists considered themselves to have a unique form of sovereignty over the natural delights that Bolivia could provide.

> The best prize I have received for my scientific work does not constitute the medals I've received but rather my position, indisputable and unenvied, of being a naturalist

[80] There is a very interesting history here that begins with the famous expedition to Ecuador by the Academie des Sciences in 1735, which had the aim of testing Newtonian theories on the shape and size of the earth. This expedition was a key event in the history of the Enlightenment, and was also said to mark the beginning of the history of scientific research in South America (Ferreiro 2013; VonHagen 1951). See also Anker (2001) for a historical account of ecology, who argues that "the history of ecology is best understood as a product of north-south relations, which took local research as models for an emerging global reasoning" (4).

> that is the absolute owner of all the wild nature in one of the most inaccessible and desired countries for its geobotanical exoticism.[81]

Unlike countries like Mexico and Argentina, where national institutions for the production of science emerged in the 18th century, with a couple of temporary exceptions, such institutions in Bolivia were only created in the second half of the 20th century. Even those institutions were largely founded and financed by foreigners, particularly with the biosciences. The Institute of Ecology at the UMSA, for example, was established in 1978 by three German biologists and was funded initially by the German government. As recalled by one of the founders, Dr. Stefan Beck,

> Back then there was no biology. For example, among the professors in the department, one was a dentist. There was nothing in the collections. I remember very well arriving the first time to the main building and asking, "where are the plants?" And they pointed to a corner where there were a bunch of plant collections in a pile. That was how it was.[82]

For the first ten years of ecology in Bolivia, the work was primarily focused on discovery and the development of a national inventory of flora and fauna, which was still much driven by foreign researchers. But even in the early days of the 1980s, the so-called 'new pioneers'[83] of biological science in Bolivia developed their methods and skills largely in isolation from their foreign counterparts (Ibisch et al. 2003). There is evidence to suggest that the interests that drove national biologists – such as human-wildlife conflicts and diseases in domesticated camelid species – were different than those of foreign researchers, who were more concerned with the conservation needs of charismatic species like primates and felines (ibid.). "Few of these new pioneers were adopted as disciples by foreign researchers; the majority trained themselves, eventually becoming the 'big brothers' of the third generation of national researchers that emerged in the mid-1990s" (Tarifa 2005, 126). Thus, from the beginning of the formation of the biological sciences in Bolivia, there was a divide in priorities and concerns between those who came from afar to do research on foreign territory, and those who did research on their own soil.

[81] Martin Cardenas, the 'lone Bolivian botanist', as quoted in Rodriguez, 2005, p. 26.

[82] Interview with Dr. Stephan Beck, October 2013.

[83] The first wave of Bolivian pioneers in mastozoology was in the 1960s and 70s, but the focus was more on using biological research to better understand epidemiological problems, rather than an interest on flora and fauna for its own sake (Tarifa 2005).

7.5 The projects of Bolivian Science

> So we must oppose whatever is foreign because it is colonial, and instead revalue what is ours… But what is ours? (Lozada 2011, 22)

In 2009, a new Political Constitution of the State was put into effect, giving more rights to indigenous communities respecting their control over their land and natural resources, specifically through the development of laws that guarantee that these resources are controlled by Bolivians and not by foreigners. Science and technology are given their own section in the new constitution, and of note is the guarantee of the creation of a state system of science and technology, as well as it being the declared responsibility of "the state, universities, small businesses and services in the private and public sectors, and the indigenous nations and native peasant communities, to develop and coordinate processes of research, innovation, promotion, application and transfer in science and technology to strengthen productive industries and foment the integral development of society in accordance with the law." [84] In order to achieve these aims, the new structures put into place have developed what is referred to as a 'Bolivian System of Innovation', through which it will be possible "to break the structure of dependence on technology and knowledge that for centuries has sustained the colonial model" (Viceministerio de Ciencia y Tecnologia 2012, 7).

This explicit politicizing of science – especially in the biological sciences – has provided support and funding for certain types of research Bolivia, while at the same time it has made other types infeasible. One example is the International Barcode of Life project, which was rejected by the Bolivian Vice-Ministry of the Environment's Biodiversity Department in 2013. This project has the explicit intention of identifying the micro-genome for every species on the planet in order to be able to identify and classify it into a global library of 'DNA barcodes', guided by a technoscientific vision that Paul Herbert, the initial 'inventor' of the project describe as *one gene = all species = all life* (Waterton et al. 2013). This means that the creators of the project have been inspired by, and seek to inspire others, with the idea that through the mapping of all of the unique genetic codes of life on earth, humanity will learn to more greatly appreciate nature in all of its vast yet connected diversity.

In the specific case of Bolivia, due to the lack of genetic laboratories, the

[84] Bolivian constitution, 2009, Title II, Chapter VII, Section IV, Article III

International Barcode of Life project required sending thousands of samples of materials of Bolivian flora and fauna out of the country to be 'coded' in better-equipped labs across North and South America. Although the project was initially approved, there were increasing concerns among the scientific staff at the Vice-Ministry of Biodiversity regarding the "leakage of national heritage" that the project appeared to be authorizing, and in 2013 the decision was taken to revoke the permission to export genetic samples under the project. With regards to the decision, one scientist involved in the process said:

> I wouldn't call it a rejection of imperialism but rather 'love of our own', and this is my interpretation of the few who had the power of decision in this case. The reality is that other countries are much more (scientifically) advanced as compared to Bolivia, but we Bolivians have our own rhythm, perhaps slower, but we will get there, making use of the tools that external research institutions and international collaborations can provide us with. Sometimes there is a great deal of pressure from these external entities but in the end the decision is a local one.[85]

The rejection of the project demonstrates the still keenly-felt link between such modern-day attempts to classify and organize nature through foreign-led projects, and the long history of taxonomic extractivism that classified much of Bolivia's biological and botanical history, as described earlier. This points to the increasing determination of the different ministries within the Bolivian government to question the arguments of science for the global good, and to rewrite the mantra as science for the national good. As the quote above points out, as the project objective should be local, so should the decision. It also points towards a critical glance of the supposed inherent value in the western drive to classify and organize with a newly expressed scepticism that says, simply, "this isn't for us." Thus, this begs the question implied at the beginning of this section – what is ours?

7.6 Bolivian Science as cacophony

> As a subcontinental region, we are on a path towards articulating a concept that integrates science and technology, advanced education and innovation as pillars of knowledge-based societies. These are fundamental tools for changing the pattern of being primary exporters through the transformation of our natural resources… All this must been seen with a prospective gaze towards the formation of a Bolivian System in a few years, which will be made up of our scientists, our producers, our innovators, our native peasant and indigenous communities, our politics and society,

[85] From personal communication received via email in March, 2015 with anonymous scientist.

> working together as a community to resolve those problems whose cause is science and technology. [86]

Part of the answer to the question of "what is ours" requires a better understanding of the rhetoric around science in Bolivia. As shown above, the government is deliberately politicizing the production and use of knowledge in Bolivia in a very explicit way, creating a context in which science is seen as both the problem and the solution. Two questions are both posed and answered with a swipe of the pen – whose knowledge counts (everybody's), and to what end does that knowledge serve (the good of the Bolivian nation). However, perhaps what is most important to understand about this process of 'remaking' science in the Bolivian context is that it does not manifest in a single unified 'nationalized' science. This is essential to understand, because otherwise there is a danger in giving the impression that Bolivian science represents one shared discourse, moving forward towards an indigenous-modern future, with Bolivian Science as the driving force behind a 'Suma qamaña'-oriented progress. But to do this would be to mask the existence of many 'faces' of Bolivian science, faces that have emerged out of tensions, frictions and synergies between different worlds in Bolivia.

Take, for example, a speech given in 2012 by the first indigenous president of Bolivia in the wake of student protests supporting public health workers (El Nuevo Diario, April 26, 2012). "What are these rectors and professors teaching? They teach (their students) to do harm to the peasants. Is this what they study at university with the money of the Bolivian people? That freedom is about putting down the peasants and throwing stones at the unions? I can't understand it, and because of that I'm very glad I never went to university."

This last sentence was circulated widely in the Bolivian press, occasionally paired with a confession made by Evo a year later that he doesn't like to read.[87] These comments were broadly interpreted in some academic circles as more evidence for the anti-western education stance of the indigenous government.

[86] Pedro Crespo Alvizuri, Viceminister of Science and Technology, my translation, in Viceministerio de Ciencia y Tecnologia 2012, p. 10.

[87] But what was often left out was the context of these quotations. With respect to the comment directed towards the protesting students, making reference to protests organized by the students, who had previously committed acts of vandalism against the coca growers union, public institutions, and Evo's political party, Movimiento al Socialismo.

> I have the impression that with regards to the environment, the ones in power in this government don't want professionals. It's clear they don't want them because they let them work for one or two years, and then kick them out. They don't want them to know too much… They say that we don't need doctors, we don't need diplomas – we already know everything. This is the official discourse. And this is the failure. I think local knowledge is very important – there is so much knowledge in the communities – great, wonderful! But it has to be incorporated. There needs to be structure; there is work to be done. Such good, lovely ideas… Living Well, yes. But what is really being done?[88]

Juxtaposed in this way, the two quotes above seem to represent two different worlds – two positions on opposite ends of a political spectrum. One of these worlds is what Bolivians would refer to as 'lo tecnico' and the other is 'lo indigena'. Just as the 'developed' cannot exist without the 'undeveloped', or the North without a South, 'lo indigena' and 'lo tecnico' are dependent upon one another for mere existence. And just as depictions of a 'developed' world in the North often present themselves as representations of reality – some evidence conjured up to make one a believer, so are 'lo indigena' and 'lo tecnico' less worlds in themselves and more expressions of those worlds that are easily recognizable to society.

On the surface, 'lo tecnico' might look like written words, reports, numbers. It might conjure images of file cabinets, computers, project directors and indicators. It may suggest scientific laboratories, new technologies, excel spreadsheets. And of 'lo indigena', one might picture llamas and brightly coloured clothing; rituals to native gods; hunters and gatherers; fields of milpa tended by hand. But in fact, the distinction between 'lo indigena' and 'lo tecnico' does not reflect so much a binary as a diversity of positions – a cacophony that has emerged from a legacy of colonialism that gives those positions their power and their voice. It is a complex multisided battle of rhetoric among perceptions of western science as a double-edged sword, yet one that the fight against western images of modernity cannot be fought without, and cries of direct rebellion under the banner of Suma qamaña. It is a question of who can more quickly throw off the yoke of imperialism – those who have the ability to free their minds from 'internal colonialism' rife in Latin American political structures. It is the encounter between Bhabha's mimic man and an Aymara revolutionary and all of society that lies in-between. As one of these voices angrily declares:

> Bolivian elites are a caricature of the West. In speaking of them, I refer not only to the political class and the state bureaucracy but also to the intelligentsia that strikes

[88] Interview with Dr. Stephan Beck, October 2013.

> postmodern and even postcolonial poses, and to the US academy and its followers who built pyramidal structures of power and symbolic capital—baseless pyramids that vertically bind certain Latin American universities—and form clientalist networks with indigenous and black intellectuals (Rivera Cusicanqui 2012, 97).

And here it is key to understanding the importance of the fuzzy line between dependence and independence, the space where concepts such as 'science' can be re-examined not to be simply tossed out, but to be questioned and eventually remade. This calls for more than just a rethinking of the role of science in society – it calls for an entirely new way of thinking about what science is:

> Universities – think about it – what do they do? Science. But really what this means is that universities are preparing people to maintain the project of modernity. They are in the production line of the capitalist system, ensuring there are people to maintain its dominance and visibility. So even though it is said that science is neutral, it's not. Science has objectives, it has philosophical leanings, it responds to economic interests as well. This way of thinking that's categorized as 'the only way of thinking' – it's supporting this project of modernity. What results do we get with this? People who are intellectually constructed for 'sameness', or in other words, to reproduce the capitalist system. This is what science is – to reproduce eternal and irrefutable 'truths'. And because it's 'science' that's telling you what to think, you can't argue with 'science'.[89]

The above quote suggests a need for the kind of 'ethno-education' that Walsh and García have written about as a 'casa adentro' (or 'in-house') process of learning that is based on questioning, self-reflection and belonging: "The struggle is to return *this* form of knowledge, and in this way understand life, understand our own knowledges and insert in the educational process *our* vision of history and *our* vision of knowledge" (Walsh and García 2002, 323). In some respects, this reflects writings from liberation pedagogies, most famously promoted by the Brazilian educator Paulo Freire (1970, 1973). However, it differs from Freirean approaches in that it goes beyond the self-determination of the individual by certain privileged 'change-makers' to refocus attention on the community and empowerment that emerges from within (Bowers 2005; Esteva et al. 2005).

Thus, some have suggested that the solution is not to decolonize science by rejecting it outright, but rather by finding a multiplicity of forums through which to reimagine it through the very process of carrying it out. Currently there are many projects, organizations and academic institutions dedicated to finding such new ways of doing, among them the Program of Strategic Research in Bolivia (PIEB in

[89] Interview with Patricia Roncal, October 2013.

Spanish), which in 2012 presented four of its research projects that were funded as part of research series under the heading 'Alternative uses of nature as a strategy for development and conservation'. The funded projects involved collaborations between international, national and local organizations, including the Wildlife Conservation Society, the Association for the Conservation in the Bolivian (ACA), and the Takana and Lecos de Apolo indigenous leadership councils. All projects involved a process of scientific research into the threats and economic opportunities regarding the local exploitation of natural resources from the Amazon, such as non-timber forest products and native fish species.[90]

Across Bolivia such projects are increasingly common, and additional seemingly small gestures can point to other ways in which science in Bolivia is emerging. For example, a report written in 2007 by botanists at the National Herbarium for its international partner, the Missouri Botanical Garden, starts out with a description of an indigenous ritual they carried out with their driver at the top of a mountain chain:

> We stopped in the highest pass called "Paso Sanchez" (4800 m above sea level), the pass is considered a sacred place and the appropriate place to make an altar or offering called "q´oa" in Quichua (fig 4). Our driver performed the ritual which offers candy, alcoholic beverages, coca leaves, and incense (resin from a new species of Clusia), to the Andean deities like Pachamama (Mother earth) and Achachilas (guardian and spirit of the mountains), and to the Virgin María. We all participated in this ceremony, first we gathered t´ola to build a fire (Baccharis spp., Asteraceae) in which the offerings are burned and we asked Pachamama for good health and successes in our endeavors (MOBOT 2007, p. 2-3).

While the remainder of the report focuses on the species collected for the overall aim of the project – a taxonomic inventory of the floristic species in the Madidi region – what is interesting is the insistence that the international funders be made aware of the non-western types of knowledge and living involved in the process of carrying out the research. The report discusses in detail not only the mountaintop ritual, but also lists the names of the local guides, porters and cooks who participated in the expedition, along with photographs in which these people appear, and additionally describes the process of obtaining permission and assistance from the communities located in close proximity to the research site.

Conversations with scientists and policy makers in Bolivia point to a deep sense

[90] More information on these projects can be found by accessing the webpage: http://www.pieb.com.bo/serv_eco.php?id=1

of living in a moment of apparent contradiction about the importance of science in society, which is demonstrated in the diverse positions described in this essay. But they also reflect a growing perception of the importance of dialogue, negotiation, and above-all, rethinking in all of this. Perhaps the point is that the conflicting positions, ideas and rhetoric around the place of western ideas and indigenous cosmologies are not impeding the development of a 'Bolivian Science', rather they are the distinct voices responsible for its very creation. This dialogue is part of a larger ongoing debate within the Global South about 'internal colonialism' and the need for a 'decolonisation' of minds as a first step on an alternative path of modernity (Gonzalez Casanovas 1969; Fanon 2008; Rivera Cusicanqui 2012). In describing the importance of this process for the plurinational state, the first Vice-minister of Decolonization, Felix Cardenas, was quoted as saying:

> It's not sufficient to go somewhere and say 'I declare you decolonized!' and that's it, they're decolonized. No. It's a question of changing mentality, behavior, of life philosophy, and to do this at an individual level, or at a communitarian level, a national level, we have an obligation to first ask 'what is Bolivia?' If we don't clearly understand what Bolivia is, then we don't know what needs to be done.[91]

Others have gone further to argue that "there can be no discourse of decolonization, no theory of decolonization, without a decolonizing practice" (Rivera Cusicanqui 2012, 100).

To summarize, some themes are worth repeating. The first, that the production of knowledge is an explicitly political subject in the plurinational nation; secondly, that western approaches to science are linked with capitalism, modernity, and imperialism; and finally, that there is an active search for alternatives in the making. These issues are very complex ones as they directly question not only the role of western science in the remaking of the Bolivian nation (and in other places in the Global South), but also the very presence of foreign researchers on indigenous soil. The above discussion gives a distinct feeling that, with regards to how science is understood and talked about in Bolivia, 'something new is happening'.

7.7 The proof is in the person

Perhaps the most important lesson emerging from the notion of Bolivian science is a

[91] From interview by reporter Benjamin Dangl, cited in Counterpunch, March 2015.

simple understanding that 'extractivist science', in any form, is becoming increasingly unacceptable in Bolivia, as in other places. It points to how science is being used as a tool to express resistance to foreign-imposed politics of knowledge, and it additionally calls upon those who cross into Bolivia's borders to do things differently. For myself, this has meant changing the main topic and methodology of my research to align it more closely with the interests of the communities, organizations and individuals who I aimed to do my research with in Madidi. It has meant questioning and reflecting on my assumptions and priorities, and identifying where they come from. Having done my research in Bolivia means something also very specific about what I will do with the 'products' of my work. I will be returning to Bolivia after I am finished with the responsibilities I have to my British institution in order to fulfil the Bolivian-based responsibilities. Specifically this means translating my entire thesis into Spanish, developing a printed and online guide for future research in the region (with specific recommendations and ethical protocols for each protected area and indigenous territory), and presenting the quantitative data to the relevant government ministries to inform official norms currently being developed to regulate the way in which research is conducted on Bolivian territory.

This project also takes up this challenge of decolonization as a point of departure through which research dissemination is seen not only as an end 'product', but the beginning of a process through by which the question of 'who owns research' can be brought sharply into focus. In this way I will create and share a documentary video, entitled 'Yo Soy Investigadora' (I am a Researcher), with indigenous communities and schools in order to increase understanding among local people about what research is and how it is abstracted in outside of the field through processes of data analysis and writing. This is something that needs a great deal more attention by postcolonial scholars born and/or educated in the Global North.

At the beginning of this essay I made the somewhat grand claim of having an identity built out of the multiple places I have lived and worked – places that cross complicated cultural, social and political divides. I made this claim not because I feel that by adopting such a hybrid identity I will somehow become exempt from holding a position of privilege, or because I will cease to hold responsibility for the implications of my North American-European heritage. Rather, it is because the alternative, to be a Latin Americanista, or a Bolivianista, is to imply that I simply stand outside and apart from my object of inquiry – that I am not impacted by it in turn. It is also to give

recognition and credit to the places, peoples and cultures that have shaped the development of my mind and mode of acting. It acknowledges that the education I have received in the homes and on the lands of sugarcane farmers, indigenous leaders, fruit harvesters, caiman hunters and park rangers in Bolivia, Mexico, Nicaragua and Costa Rica has had at least as much influence over the researcher I have become as my more 'formal' instruction in American and British-based academic institutions.

I first came to Bolivia as a researcher seeking to be inspired by the indigenous movements for land and rights, and also with the aim of seeing how natural science methodologies and ideas could support such efforts. I had ideas for what I thought could work, ideas that changed through an often uncomfortable process of learning to be wrong, a slow awakening into the arrogance of my own assumptions. Bolivian science changed not only the subject, methods and implications of the research I conducted there, but it ensured that the work I do in the future will be forever impacted by my encounters with it. In this sense, I am a living, breathing product of Bolivian science, continuously engaged in the transmission of this 'new breed of science' to transform the way things are done back in the lands where I was born and to whence I return.

CHAPTER 8

Conclusion: Rethinking the nature of impact

> We cannot ignore people... In fact, the survival of many natural biological communities is going to require the creative cooperation of biologists, social scientists, and politicians, especially in the tropics. It won't be long before many conservation biologists are spending more time at community meetings than in the field or laboratory (Soulé 1986, p. 11).

8.1 Introduction

This thesis is centred on a question that originated with the birth of the discipline of conservation biology itself – how the science of conservation can achieve its ultimate mission to "save the life of the planet", as explicitly stated in an essay by David Ehrenfeld, the first editor of the journal *Conservation Biology* (2000, 106). It perceives at the heart of the research-action gap a contradiction between the rhetoric in opinion pieces, essays and editorials in the conservation science journals that argue for the importance of breaking down disciplinary barriers, the integration of local, traditional and indigenous knowledge systems, and 'extra-academic' activities, and the prevailing dominance of positivist, quantitative science and linear notions of scientific impact that still determine in large part how conservation research is carried out today. This contradiction points to a problem that goes beyond any scientific understanding of knowledge, and to a solution that requires a radical rethinking of who and what the production of knowledge is for.

To this aim this thesis focuses on the *who* at the gap between research and action in order to explore not only the different ways that research is perceived, understood and used by people on the lands where it is carried out, but also the diverse motivations behind the production of that knowledge. This chapter summarizes the findings and contributions of the thesis in relation to this focus, referring back to the questions laid out in the introduction and pointing to the implications for how the discipline of conservation biology needs to change if the research-action gap is to be bridged.

8.2 Thesis summary

Chapter 2 sets up the research-action gap debates as stemming from the very origins of the discipline of conservation biology, which was founded in part based on the belief in positivist scientific methods to provide the knowledge necessary to halt current trends of climate change, extinctions and pollution across the globe. In this chapter I question three common assumptions inherent in this argument: 1) that impact is linear and that the research-action gap exists due to a deficit-model of communication and lack of scientific information; 2) that the main role of conservation scientists in bridging the research-action gap is about the scientific information they produce, and 3) that other forms of knowledge and other valuations of nature are not equally as valuable as western science imaginings of conservation. In this sense it begins to explore the questions 1) *Who is at the gap between conservation research and practice,* and 2) *What kinds of knowledge, values and interests are perceived to be helpful for bridging the gap, and which are omitted as irrelevant or unhelpful?*

Chapter 3 sets up the participatory action research methodology that I enacted to carry out this research. It is a novel approach in that it invokes the notion of a 'third space' between theory and practice in order to directly situate myself at a place within the research-action gap in conservation. By doing this I explicitly recognize that I can no longer remain distanced from the object of my inquiry, but must become part of it, and thus in this sense I also position myself as part of the *who* to be studied at the research-action gap. This points to a more personal project of critical self-reflexivity as a way to bridge the research-action gap – through a third space that Paul Routledge calls "exhilarating, frustrating, painful, and exhausting… One that recognizes the value-laden content of my positionality, and subverts the notion of observational distance" (1996, 401).

Chapter 4 also shows the *who* at the frontline of the creation of conservation landscapes, and the specific dreams, concerns and desires of the individuals and groups involved, as well as the connections between them. In this sense it addresses the question of *Who is found in the spaces within the gap, and what kinds of relationships between people and organizations exist in these spaces?* It demonstrates what conservation science organizations can offer on the ground to help bridge divides

with other actors, specifically indigenous communities and protected area staff, by demonstrating that such collaborations can be spaces with the potential for transformation. It shows how technical information can be directly valued and used to protect lands – not just national parks, but traditional land holdings of indigenous peoples – and how alliances between different groups, even if based on very different motivations and interests, can lead to new relationships based on an ethic of interdependence. This is in part also about incorporating non-western scientific values and knowledges about resource use; and about supporting traditional ways of managing the lands by creating spaces for their establishment and protection. It shows how the micropractices and seemingly-small actions of conservation can make a big difference to how relations play out in the field, with implications for the future of research and conservation in tropical landscapes.

Chapter 5 takes this argument further to go deeper into the actual practice of scientific knowledge production itself. It directly explores the question of *what spaces are found within the gap, and what happens in these spaces?* It presents spaces of getting permission, spaces of knowledge exchange, spaces of labour, spaces of recognition and the spaces of relevance, to show how the micropractices of scientific research and the interpersonal relations between those involved in the process can greatly affect how the resulting knowledge is perceived and/or incorporated into existing ways of knowing. It sees such spaces as harbouring both the potential for shifts in perception and mutual transformation, as well as further entrenching existing power inequalities if they are not examined throughout the process. In this thesis I often use the word encounter, which in Spanish is translated to the verb '*encontrar*' and means not only to meet, but also to find. Thus, an *encuentro* is not a simple coming together, but invokes possibilities of new discoveries, just as a mis-*encuentro* denotes not simply misunderstanding and miscommunication, but also a lost opportunity in seeing with new eyes.

Chapter 6 explores an additional space at the research-action gap – that of dissemination. It uses quantitative data to demonstrate that while the majority of research projects had implications for management, few had disseminated adequately and even fewer had implemented the knowledge. In this sense it addresses the question, *What is the extent of research-action gap in the protected area, and why*

does it exist? The chapter then uses qualitative information to demonstrate that the issue of dissemination is most conspicuous not in its presence but rather in its absence, and identifies four unintended consequences of inadequate dissemination, which can act to widen the research-action gap on the ground.

Finally, **Chapter 7** shows that the answers to bridging the gap can come not only from Europe and English-speaking researchers and publications, but are emerging in places across the globe. This challenges the core-periphery ideas that knowledge moves in a linear way, from the bigger producers of research in Europe to the so-called peripheries of the postcolonial world. This chapter also demonstrates the importance of not forgetting history through a reflection on long held notions of 'Creole Science' in Latin America, which can stand as a warning that there is the potential to revert to business-as-usual if more care is not taken to attempt to redress the balance of power between different forms of knowledge. The chapter suggests that western researchers can learn a great deal from places like Bolivia, who are incorporating new and exciting ways of thinking about the role of science for society into endogenous forms of development as specified in their new Constitution. In this sense the thesis is also concerned with the specific places of encounter, in order to refocus our attention on the places where scientific information is produced and how knowledge circulates, and to this aim it explores the questions, *What is the role of place in the research-action gap debates? How does knowledge circulate between these places, and what does this mean for the gap?* This essay follows on the Methodology chapter in that it explicitly lays out how Bolivian Science has influenced me as a researcher and led to specific changes in my own practice.

8.3 Contributions of the thesis

8.3.1 The spaces between the gap as laden with power and potential

The most important contribution of this thesis is that it reenvisions the research-action gap as a crucial, productive space within which there is the potential for change. This points to the unpredictability of encounter, where even top-down structures can result in personal and collective transformation (Lawrence 2010, Wainwright 2008). Concepts such as public engagement and community participation are not essential because they always result in shared understanding or more equal relations of power, but rather because they offer the potential for new and unexpected things to happen,

especially if those engaging in these spaces are open to such possibilities (Askins and Pain 2011; Kesby 2007). This element of unpredictability has important implications for the decolonization of research methods.

> Research, like schooling, once the tool of colonization and oppression, is very gradually coming to be seen as a potential means to reclaim languages, histories, and knowledge - to find solutions to the negative impacts of colonialism and to give voice to an alternative way of knowing and being (Smith 1999, 91).

But the gap is not something to be bridged in a blueprint-model, prescriptive way, as the evidence-based conservation papers tend to suggest. Rather, for such spaces to be truly transformative there is a need for deep self-reflection to occur, to rethink our ways of knowing and doing conservation. Indeed, our hope for ensuring that the research-action gap is a stage on which change can occur lies in our awareness of our own positionality within that gap. It can make us question our own assumptions and ideas, and put forward other ways. Specific ways that the field of conservation biology can begin to do this include:

- Making discussions on ecological, environmental and social ethics the centrepiece of what conservation science is about and how it is carried out. This includes incorporating a diversity of understandings about concepts such as fairness, equality and responsibility (which requires better understanding of non-western ontologies such as written about by cultural anthropologists). It also means explicitly making the practice of scientific research about a process of upholding ethical norms in order to encourage knowledge exchange, local support and to avoid the pitfalls described in Chapters 4 and 6 of this thesis (see also Minteer and Collins 2005, 2008).
- Emphasizing the importance of 'grounding' stages and preparatory processes in which researchers use appropriate entry protocols and begin to establish relationships and collaborations with key stakeholders (Ganapin 2002).
- Explicitly thinking 'outside of the box' about how to create more spaces in which more engaged participation from a diversity of voices can occur. But this also requires being aware of the power dynamics present with regards to how these spaces are being created, by whom, and for what purpose, and to be aware that the existence of such spaces does not equal empowerment (Gaventa 2002, 2004; Reed 2008).

- Rethinking dissemination so it can be seen as a productive space of encounter, with local dissemination to be given equal priority to the global diffusion of research through peer-reviewed journals. In practical terms this means that universities and funding bodies need to allow time for an emphasis on process and explicitly incorporate the importance of relationships into research grants. While most grants now require thinking about some of these issues, they are rarely seen as a core part of the activities and there is little recognition if they are done well.

8.3.2 A revisioning of the field of Conservation Biology as more-than-positivism

This thesis also questions the premise that the practice of conservation is and should be rooted in a "firm scientific basis". Instead, it builds upon the notion, much discussed by anthropologists and science and technology studies scholars, that western science should be seen as one among several valuable ways of knowing that can help to inspire interest in and debate about the ethical responsibilities between humans and their natural environment (Maffi 2006; Possey 1999; Descola 1994; Maweu 2011). As others have argued since the birth of the discipline of conservation biology, the continued fixation on positivist modes of knowledge (as currently epitomised in the 'new' evidence-based conservation paradigm) is not overly helpful (Ehrenfeld 2000; Barry and Oelschlaeger 1996). While these linear modes of informing practice have their place in providing technical solutions in very specific conditions (i.e. installing overpasses to reduce bat deaths on roads; reducing fish meal in aquaculture), they can represent a case of thinking that seems to 'miss the forest for the trees'. Ehrenfeld writes:

> Our entire technological civilization is predicated on the assumption that we, the ultimate managers, can isolate all the important variables from the chaotic events now happening, make sense of them, and act accordingly. That this assumption is usually not true occurs to few people… I think that those who have the simplistic and pretentious idea that we can save species and habitats simply by reporting accurately on their status and developing conservation plans are wrong. There are huge forces out there that are sweeping biodiversity away, and these forces are blind and deaf to our science (p. 110).

This quote points to the need to re-embrace the value-laden notions that the discipline of conservation biology was originally founded in, and in doing so accept the non-objectivity and normative stance of the endeavour (Pielke 2007; Shiva 1993; Simmons

1993). In this sense recommendations based on scientific data should be open to as much scrutiny as other posturings, or as Adams and Sandbrook (2014) put it, "scientific procedures do not offer a 'get out of politics free' card" (p. 333). It is not a question of proving with evidence '*what* is right', but rather in negotiating based on human and non-human values and concerns 'what is *right*'. This brings up a larger ethical discussion about what values decisions are based on, who is included or excluded in such decision-making, and how to best represent voices that normally go unheard (such as those of endangered animals in the forest or those of nomadic indigenous groups). It moves the research-action debate away from fixations on 'certainty' and 'relevance' and instead asks *how can we come to know about nature together*, and *what is our responsibility once we do know*?

This question emphasises on the one hand the importance of the process of inquiry, but on the other arguing for a kind of knowledge that is based not only on facts, evidence or data, but also on wisdom, experiences, skills and values (Berkes and Turner 2006; Shen et al. 2011; Sillitoe 2000; Ingold 2000). According to western science, 'truth' is imagined to emerge through individualized mental processes of 'reasoning' and 'rationing', but in other knowledge systems truth can be found 'in relations' (Vasquez 2005, 38). Such knowledge does not emerge from the egoic mind of the individual, but is based on a sense of interdependence and of collective wisdom (Roth and Lee 2002). This requires a way of seeing the world that is open to many different paths of inquiry and that acknowledges the strength inherent in such differences (Becker et al. 2003; Thomas 2009; Shackeroff and Campbell 2007; Librado 2009). But in order for this to occur, conservation science needs to be seen as a democratic process of inquiry, not an elite system of exclusion (Carr 2004; Brown 2003). As Harding writes, "Nobody has discovered an Eleventh Commandment handed down from the heavens specifying what may and may not be counted as science" (2006, 38). This requires a kind of multidimensionality, a "transdisciplinary vision,

> which replaces reduction with a new principle of relativity, is transcultural, transnational, and encompasses ethics, spirituality, and creativity. It is not a new discipline or superdiscipline. Nicolescu (1987) calls it the science and art of discovering bridges between different areas of knowledge and different beings. The principal task is elaboration of a new language, logic, and concepts to permit genuine dialogue" (Klein 2004, 516).

Processes of inquiry are also important because when people do not know about something, they are unlikely to care about it (Louv 2008); "Those who know less, recognize less, care less and therefore act less, a cycle of loss and disconnection from nature that Pyle calls 'the extinction of experience'" (Milton 2002, 237). If researchers can begin to see western science as only one kind of knowledge, they can be open to other interesting and beautiful ways of seeing the natural world (Ellis and Waterton 2004; Burnette and DeHose 2008). Tsing writes of the joy in telling stories about biodiversity and presents an ethnotaxonomic list of species because

> it can remind both conservationists and scholars of why we might want to reach out across cultures to understand and advocate the pleasures of biodiversity. Cultural theorists need to know that the variety of nature is an important rural concern, not just an imposition of metropolitan scientists. Conservationists need to know that our knowledge of nature is always cultural knowledge, whether we are scientists or farmers (2005, 169-170).

Some practical recommendations for a more diverse conservation science include:

- Developing academic programs based around environmental issues, rather than traditional disciplinary boundaries, that incorporate different epistemologies, including those belonging to non-western knowledge systems. There are several examples of conservation departments that are attempting to do this, but traditional disciplinary hierarchies still tend to push qualitative, social-constructivist, and advocacy-based approaches to the margins.
- Creating peer-reviewed conservation science journals that present qualitative and mixed-methods studies at least as often as papers based solely on quantitative methods. Also, more efforts should be made to include non-academic voices, especially those of local people at the front lines of conservation.
- Organizing academic conferences that are built upon a diversity of voices. This is not about making spaces within conferences, but rather making the conference itself a productive space in which natural and social scientists, indigenous leaders and policy makers can debate and exchange ideas.
- Encouraging critical social scientists that believe in the importance of upholding the rights of non-human lifeforms, as well as those who are concerned with social problems related to lack of access to clean and affordable natural resources, to get on board. The gulf between epistemologies

> often feels very much like a no man's land that few enter into willingly for fear of getting attacked on both sides (Klein 1990; Marzano et al. 2006). But we need to remember that we are ultimately fighting the same war. Overtures need to come from both camps.

8.3.3 To rethink impact as connection

Finally, this thesis offers an alternative way to think about impact and thus has wider implications for debates on impact in academia. On one hand it questions the assumption that impact is inherently positive: "impact is messy, unpredictable and may also involve risks to the communities and individuals we research, especially if academics are not fully cognisant of the effects of their activities, something particularly of concern in different cultural and political contexts" (Rogers et al. 2014, 4). Because of this, current trends that drive science to have impact for society can have negative consequences, something that is not explored in depth in this thesis but is essential for further work on the research-action gap.

However, as a first step in this direction this thesis makes a strong case for process over products, and in this sense argues for a rethinking of impact that is based on the notion of connection. In this revisioning of impact, connection refers to a two-way relationship concerned about responsibility, reciprocity and humility. Responsibility in this case means being aware of our own position of privilege as a researcher and understanding that all scientific research is entwined to some degree in political processes (Meth and Williams 2010). It means asking questions about who will be affected by the research at hand, specifically: who are we as researchers responsible to and for? This ties into notions of reciprocity, which refers to a relationship of interdependence as expressed in the quote below.

> For us, a recognition of the interdependence of all beings must underpin all aspects of research, or as Martin emphatically states, 'every aspect of every procedure'. This means understanding the ways that researchers do not, and cannot, stand separate from the people they work with, from the families of those people, or from Country. It is beyond connectiveness. It is a matter of co-constitution. People, including researchers, are made through Country, they are part of Country and Country is part of them. We all come into existence through relationships with each other and with the world itself (Country et al. 2014, 6).

In this sense reciprocity also means acknowledging all those who have participated in the production of knowledge – from porters and guides to co-researchers, to farmers

who have allowed us to work on their land in a process of giving back that comes not from a sense of obligation or duty, but from the heart.

Finally, connection-based impact it is about humility and vulnerability. Humility refers to acknowledging that we don't always have the answers and the willingness to question oneself and one's motives. Walters et al. 2009 write of our need for 'cultural humility' – "a life-long commitment to critical self-evaluation regarding multiple, complex, and simultaneous positions of unearned privilege… to redress power imbalances and nurture deeply respectful partnerships with communities" (152). Vulnerability in this sense is important because is enables a more relational approach by which to look at the "boundaries that distance 'self' from 'others'" (Findlay 2005; 433). Putting one's research out there, on a bigger stage, places the researcher in an extremely vulnerable position. By doing so it also puts actual faces, places and spaces by which to discuss some of the most complex discussions in geography today, including the decolonization of research, North-South relations and encounters, and the production of knowledge and science in society. These practices point to the importance of relationships based on mutual respect between different groups, peoples and organizations.

Additional practical recommendations for incorporating this notion of connection-based impact into the research-action gap debates include:

- Encouraging place-based conservation science research in order to ensure that research questions address pressing issues of local concern and engage directly with stakeholders on the ground and regional/national policies.
- Assisting marginalised rural and urban communities and groups to establish research protocols.
- Working with critical social scientists to resist linear, evidence-based models of impact in order to push for new models that prioritize process over products.

8.4 Legacies of this research in Bolivia

The research described in this thesis is part of an ongoing project with my co-researchers in Bolivia to bridge the research-action gap in the Madidi region, the next stage of which will involve the dissemination of this PhD, as discussed in Chapter 7. While the emphasis of this project is very much on 'process' as opposed to 'products', I envision four legacies resulting from this work:

1. Furthering ‘best practices’ for conducting research in Bolivia and elsewhere.

This outcome is directed at researchers and research institutions operating in Bolivia. In addition to running additional communication and dissemination workshops for researchers in Bolivian-based institutions, we will be developing a printed and online guide for future research in the region, with specific recommendations and ethical protocols for each protected area and indigenous territory. In addition, we will publish a forum paper on ‘best research practices’ for the Bolivian scholarly journal *Ecología en Bolivia*, based on a seminar held in 2014 with researchers from various disciplines on the preliminary results of this research.

2. Contribution to official scientific research norms in Bolivian ministries.

Despite statutes in the Bolivian constitution with regards to the dissemination responsibilities of researchers, the research described in Chapter 6 found a lack of local dissemination and implementation strategies among researchers in the Madidi region of Bolivia. I will present this quantitative data to the relevant government ministries to inform official norms currently being developed to regulate the way in which research is conducted on Bolivian territory. In addition, I will assist the National Service of Protected Areas with their request to replicate the methodology described in Chapter 6 for analysing dissemination patterns of scientists for the entire national park system.

3. The decolonization of research through increased understanding among local people about what research is and how it is abstracted in the Global North.

This outcome is based on the sharing of the documentary video, entitled ‘Yo Soy Investigadora’ (I am a Researcher), and ensuing discussions in communities and schools. This video will be an educational tool for the future training of young leaders in indigenous communities, who increasingly have to learn to negotiate rights and responsibilities with different types of social and natural scientists. The video will also be made available to a wider international public on YouTube and Vimeo (with subtitles in English).

4. Increased local pride in the notion of a ‘Bolivian Science’.

Finally, an outcome is to demonstrate respect for and acknowledgement of the way of ‘doing science’ in Bolivia that has shifted the way I think of myself as a researcher

and do research. I will be presenting a Spanish version of the essay in Chapter 7 at various forums in Bolivia, including the Vice-Ministry of Decolonization in La Paz and the Confederation of Indigenous People in Bolivia.

8.5 A new kind of conservation researcher

> A change will be required in the attitude of researchers, who will have to learn a new set of skills for engagement in genuine partnerships that require an open heart and open mind (Allen et al. 2009, 241).

This thesis demonstrates that the research-action gap cannot be bridged by continuing to act as we have done. The question is not if we need to change or even what those changes need to be – the recommendations provided in the pages above are not new, but have been suggested by many others before myself. Rather, the questions to be answered hit closer to home. As researchers we should ask ourselves: what is our role, what is our responsibility to society? Are we willing to admit our mistakes, to reflect and to change? Is it always helpful to be an authority, or should we seek to support rather than to dictate?

One way forward is the notion of service. Robinson (2005) writes that serving requires us to know that our humanity is more powerful than our expertise and that often what is seen to be more professional and scientific is not what can best serve and strengthen the world in which we live. Reenvisioning the research-action gap as an inclusive space in which we can serve, rather than dictate or even 'help', opens up the possibility for others to join us in the struggle for better ways of thinking and living. In this we can take our lead from indigenous groups around the world that are beginning to reclaim research as a space in which they can directly address their own struggles. Of one such space of intellect and imagination among the Maori peoples of New Zealand, called Kaupapa Maori, Smith writes:

> Searching for solutions is very much part of a struggle to survive; it is represented within our own 'traditions' for example, through creation stories, values and practices. The concept of 'searching' is embedded in our world views. Researching in this sense, then, is not something owned by the West, or by an institution or discipline. Research begins as a social, intellectual and imaginative activity. It has become disciplined and institutionalized with certain approaches empowered over others and accorded a legitimacy, but it begins with human curiosity and a desire to solve problems. It is at its core an activity of hope. (1999, 202-203).

It is this critical hope in the power of research that has enabled me to finish this thesis. I believe that roses can grow out of concrete, but I am not waiting for them to emerge. Rather I look to the breaks in the pavement, I remember the soil that lies beneath. I see how the light sneaks in and the rain trickles down. And I have hope.

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APPENDIX I

Details on ethical approval and Prior Informed Consent

Official ethical approval was obtained in June 2012 for this project by the Lancaster University Research Ethics Committee. The following is my original protocol, drafted in May 2012, for obtaining Prior Informed Consent with communities living in and around Madidi National Park, Bolivia**.**

Steps to take prior to research:

1. Official permits obtained

As my research will be carried out in two national parks in Bolivia, both of which border and contain several indigenous territories, I will be seeking official approval from several different institutions. In addition to Bolivia's Servicio Nacional de Areas Protegidas (SERNAP), which has an official permit granting process, I will seek meetings with representatives from the various indigenous councils involved, including those representing the Takana people (CIPTA), the Tsimane-Moseten people (CRTM), and the Leco community (CIPTA), as well as the organization that oversees all of these councils, the Central de Pueblos Indigenas de La Paz (CPILAP). While some of these organizations have an official permitting approval process, others do not have anything formal in place, thus necessitating the creation of an agreement that is acceptable to all parties.

2. Information sought regarding potential sociocultural sensitivities

Prior to meeting with communities, information will be sought from park officials, local NGOs and indigenous organizations to better understand potential areas of social, cultural, political or historical sensitivity, especially with regards to past research in the area. This information will be taken into account in the drafting of the information to be presented to the communities regarding the research project, in order to minimize possible misunderstandings that may arise and communicate more clearly about the intents of the research project.

3. Community meetings held

In all communities where research is to be undertaken, community leaders will be consulted in order to set up a community meeting, at which the objectives, potential risks, expected outcomes, and possible benefits of the research project will be communicated to the villagers in the language(s) spoken in that community. Because there will be different elements of the research carried out in different communities, the content of this explanation will vary accordingly. I will use visual tools when possible to help communicate this information. However, in all communities, the overall objectives of the PhD project will be communicated, as well as information regarding financial sponsorship and official approval from the appropriate government agencies.

4. Community consent obtained

During the community meeting, I will answer any questions regarding the research and explain that the participation of community members (both individually as well as collectively) is completely voluntary and that they have the right to decline to participate in any or all parts of the research. It will be made clear to them that they have the right to deny the researcher access to their community if they chose to do so. However, if they choose to proceed with the research, verbal consent will need to be obtained at both the community and individual level.

5. Consent obtained from individuals

After community consent has been obtained, I will ensure to further communicate information regarding the research project to all individuals who may participate in any way. This information will be communicated verbally in the language of the community member, if need be with the help of a hired local assistant. Before proceeding with any part of the research methodology, verbal consent will be sought. Throughout the research process, informed consent will be sought repeatedly – especially in the case of any changes occurring in the objectives or methodology of the research. It will be made clear to informants that their participation is voluntary, and that even if they agreed before they can change their minds at any stage. Participants will also be given the option of anonymity, to protect their identity with regards to any information that they share, but will also be allowed to have their name recorded with their opinions, if they choose to do so.

APPENDIX II

Research Norm for the community of San Miguel

Antecedentes

Dando continuidad a las actividades de conversación entre la comunidad de San Miguel y la investigadora Anne Toomey, con el fin de conocer las experiencias de la investigación científica en la comunidad, el 19 de julio 2014 las autoridades de San Miguel convocaron a una reunión facilitada por Anne Toomey y María Copa para la elaboración del reglamento de investigación. La presente memoria contiene los comentarios y observaciones de la comunidad en la reunión.

Objetivo de la reunión

Elaborar el reglamento de investigación en la comunidad de San Miguel. Para ello, era necesario iniciar respondiendo algunas preguntas sugeridas:

1. ¿Qué significa investigación?
2. ¿Quién es un investigador?
3. ¿Para qué se hace una investigación?
4. ¿Cuál ha sido la experiencia de la comunidad con las investigaciones?
5. ¿Qué beneficios traen las investigaciones a la comunidad?

Desarrollo de la Reunión

Las respuestas a las preguntas señaladas previamente y discutidas en reunión fueron:

1. ¿Qué significa investigación?

Algunos de los presentes no podían definir el término por lo cual solicitaron que las facilitadoras lo explicaran. Se inició con algunos ejemplos de investigación en la comunidad, los comunarios mencionaron: la investigación del chipi chipi ¿qué especie es? ¿Hasta qué tamaño crece? O también la investigación del lucachi ¿Qué especie es? Y luego de ello se llegó a definir que la investigación como “es el trabajo para responder una pregunta de la cual no se tiene respuesta”.

2. ¿Quién es un investigador?

En esta parte hablamos de los investigadores que vienen de afuera y también de los comunarios que realizan investigaciones de los comunarios en sus trabajos cotidianos, como por ejemplo: un comunario se pregunta diferentes cosas en el chaco, en el uso de las plantas medicinales experimentando que plantas si pueden disminuir ciertos afecciones, que plantas pueden utilizar para envolver al pescado y cocinarlo. Entonces un investigador es aquel que quiere responder una pregunta. Los San Migueleños son también científicos porque tienen muchos conocimientos que transmiten de padres a hijos por varias generaciones.

3. ¿Para qué se hace una investigación?

En principio quedo claro que una investigación es para "saber algo". Continuando con la pregunta se preguntó porque creen que los extraños a la comunidad (bolivianos y de otros países) quieren hacer una investigación ahí en la comunidad. En una breve discusión se llegó a determinar que es por algún beneficio como el título académico, publicación científica, cumplir con un trabajo pagado, obtener conocimientos para generar beneficios comerciales, principalmente. Además, los comunarios concluyeron que otra razón por la que vienen de afuera es porque quieren aprovechar los conocimientos de la gente local, así, es más fácil para el investigador tener datos y aumentar el conocimiento de la ciencia. Por ejemplo: el chipi chipi que los investigadores no conocían, no con fin comercial sino de conocimiento.

4. ¿Cuál ha sido la experiencia de la comunidad con las investigaciones?

Mencionaron que la mayor parte del conocimiento no retorna a la comunidad ni es de beneficio, únicamente un porcentaje bajo (20 %) retorna a la comunidad. A veces si entregan sus informes pero en otro idioma y a veces es difícil de entender. También ocurre que algunas investigaciones dejan en la comunidad más preguntas, como en el caso del chipi chipi, que a los comunarios ahora les interesa saber cuáles son los sitios de reproducción, épocas de reproducción entre otros.

5. ¿Qué beneficios traen las investigaciones a la comunidad?

Información para el turismo, como por ejemplo nombres científicos de plantas, también conocimiento de especies, tipos de bosque para transmitir a los turistas. Se habló igual del beneficio económico como guías a través de jornales.

Pasando al inicio de la construcción del reglamento mencionaron que como comunidad tienen un Reglamento de aprovechamiento de recursos naturales, el Reglamento de usos y costumbres y el Reglamento Agropecuario.

En base a esta discusión se inició la elaboración del Reglamento comunal. Es importante resaltar que el reglamento no es un documento legal, sino una guía de conducta para los investigadores y para la comunidad, y que se puede ir modificando cuando sea necesario.

REGLAMENTO PARA INVESTIGACIONES EN LA COMUNIDAD "SAN MIGUEL DEL BALA"

El presente reglamento se aplica a las investigaciones que se realizaran en la comunidad de San Miguel y únicamente se aplica a los investigadores externos.

Definiciones

Investigación: Es un proceso para responder una pregunta a través de la toma de datos, que en ocasiones incluye la transmisión del conocimiento local, para su posterior análisis y difusión.

Investigador: Una persona que tiene interés en responder una pregunta de investigación.

Requisitos previos para realizar una investigación

Paso 1: En la comunidad

- Carta de solicitud dirigida a la autoridad de la comunidad

- Copia de documento de identificación (Cédula de Identidad o pasaporte)
- Carta de acreditación institucional (Profesión, carrera)
- Propuesta o perfil de investigación: En un máximo de 5 hojas (Antecedentes, objetivos, métodos, resultados esperados, cronograma), además deben describirse los beneficios de la investigación para la comunidad, indicar si necesitará tomar muestras (tipo y cantidad), identificar lugares de trabajo (en lo posible un bosquejo de mapa).

Paso 2: En el Concejo Indígena del Pueblo Tacana - CIPTA

- Carta de autorización del CIPTA después de la autorización de la comunidad.

Responsabilidad del Investigador

- Coordinar con la autoridad para la ejecución de la investigación
- En el caso de necesitar personal eventual contratar a comunarios de San Miguel y no contratar personas ajenas a la comunidad.
- Si el investigador utilizará información del conocimiento de la comunidad como por ejemplo: nombres comunes de plantas, identificación de hábitats de especies raras, identificación de peces, cuento de la comunidad o algún patrimonio de la comunidad, y otros debe reconocer a los responsables de la información como co-autor en las publicaciones que se realicen.
- En el caso de pretender utilizar información de los conocimientos tradicionales el investigador debe declarar el uso final de la investigación y solicitar un permiso específico del uso del conocimiento tradicional, coordinando con la directiva de CIPTA para obtener un apoyo legal y juridico (independiente al permiso nacional).
- Entregar la información de la investigación en el producto final (libro, publicación, tesis u otro) en español y un resumen entendible para los comunarios. También realizar una presentación oral en la comunidad, en español, entendible y breve.

- Cuando el investigador se encuentre en el área de la comunidad debe informar sobre cualquier salida eventual y ser responsable de su seguridad personal (enfermedades, accidentes u otros).

- Respetar las costumbres tradicionales, forma de vida y normas de la comunidad.

- Solicitar permiso para toma de fotografías, videos, grabaciones o entrevistas de modo personal, cuando sea necesario.

Responsabilidades de la comunidad

- La autoridad de la comunidad o persona de contacto de la comunidad debe entregar al investigador una nota de autorización para realizar la investigación.

- La comunidad debe informar oportunamente de cualquier irregularidad que el investigador este realizando.

- Los comunarios deben participar en la reunión final para la presentación de resultados.

- Apoyar y garantizar la estadía del investigador según la coordinación previa.

Sanciones

Para los investigadores

1ª infracción: Llamada de atención por cualquier incumplimiento.
2ª infracción: se llevará al investigador al cepo.
3ª infracción: anulación del convenio, el investigador tendrá que irse definitivamente de la comunidad.

Para la comunidad

Si la comunidad no asiste a la presentación de resultados el investigador podrá entregar el informe sin otra presentación a la autoridad.

APPENDIX III

Sample interview schedule with park guards

Relationships with scientists and researchers:

1. Do many researchers come to the park? What do they do? Do they always come by the central office? Do they ask the park guards for help (if so what kind)?
2. Have you had any experience working with or helping scientists or researchers in the park? What were they doing? What was your role (guide, informant, etc.?)
3. How was the experience for you? What did you learn?

Perceptions of researchers and how researchers act around local people

1. Do the researchers that come involve the local communities in any way? How? (as guides, interpreters, etc.)?
2. How do you think local people perceive researchers?
3. How do researchers treat local people?

Perceptions of what research is for

1. Do you think research is important?
2. Why? What does it provide?
3. Do researchers disseminate locally the results of their work?
4. Do research results help to inform or influence the management of the protected area? If not, why do you think that might be? If yes, how? (Ask for examples)

Processes of disseminating and communicating information in the protected area

1. How is information communicated between the park staff and the local population?
2. If there are results from a research project that would be important for local communities to know about (for example, the environmental impacts of constructing a road through the park), how would that information be communicated? Is there a process in place, or would one need to be created?

3. Do you believe it's important to disseminate technical information to local communities? Why or why not?
4. How do you think local people could be more involved in scientific research?

Ideas for future research

1. What types of research studies are lacking in the region?
2. What information does the park need to improve management and support conservation?
3. How do you think research could further support conservation in the region?
4. What would have to be improved or change in order to achieve that?

APPENDIX IV

Policy brief on inter- and trans-disciplinarity submitted to the 2015 UN GSDR

Citation:

Toomey, A. H., N. Markusson, E. Adams, and B. Brockett. 2015. Inter- and Trans-disciplinary Research: A Critical Perspective. Policy brief submitted to Chapter 7 of the 2015 United Nations Global Sustainable Development Report. Accessed at: https://sustainabledevelopment.un.org/content/documents/612558-Inter-%20and%20Trans-disciplinary%20Research%20-%20A%20Critical%20Perspective.pdf

Introduction

Contemporary sustainable development challenges are complex, and tackling them demands cooperation between specialists with diverse backgrounds in both the natural and social sciences (Sillitoe 2004; Farrell 2011). There is growing recognition that new approaches and different types of expertise are needed to renew science, and among the most cited of these are the concepts of inter- and trans-disciplinarity research. In academic literature and in funding bids it is becoming increasingly common to mention the importance of bridging divides within academia as well as between scientific communities and the rest of society. While the creation of more spaces for science to engage with different publics and vice-versa is a laudable objective in itself, it is essential to take a closer look at what these concepts entail in order to better understand the challenges associated with these types of research.

Defining inter- and trans-disciplinarity

There are many definitions of inter- and trans-disciplinary research, and this can lead to misunderstandings. For example, a common misconception confuses multi-disciplinary and inter-disciplinary approaches. "Multi-disciplinarity draws on knowledge from different disciplines but stays within their boundaries. Inter-disciplinarity analyzes, synthesizes and harmonizes links between disciplines into a coordinated and coherent whole" (Choi, 2006). Inter-disciplinarity is not just research in two or more different disciplines, nor is it adding methodologies from other disciplines to an already discrete project; rather, it is an integrated approach to

answering a question that recognizes the limitations inherent in the compartmentalized system of academic research. While the ultimate aims of inter-disciplinary research can either be theoretical (towards the consilience of knowledge) or practical (providing solutions for society), it is most often connected with applied research that starts with a real-world question and uses different disciplinary ideas and methods not just as guideposts, but rather as tools. As such, this approach can result in novel, unexpected answers to familiar, timeworn questions.

Trans-disciplinary work moves beyond the bridging of divides within academia to engaging directly with the production and use of knowledge outside of the academy. In this approach, societal impact is laid out as a central aim of the research at hand. Solutions that emerge from the research may additionally be put into place through an action-oriented process built on direct collaboration with the groups involved (Klein 2004). This way of doing research has also been referred to as post-normal science, Mode-2 thinking, or co-produced knowledge, and can be linked to theories and methods that were first established by social reformists in the mid-20th century, and that were defined both by participation and a determination to produce knowledge in the interest of social change (Stokols 2006). While both inter- and trans-disciplinary research offers great hope for bringing holistic, out-of-the-box thinking to an increasingly-specialized workforce of experts, it is necessary to outline some of the main concerns for the effective promotion of these approaches in social and environmental research.

A Critical Perspective

The radical roots of inter- and trans-disciplinary approaches are important for understanding that one of the original aims was that of 'conscientization', defined as "a process wherein people develop critical consciousness through collective inquiry, reflection, and action on the economic, political, and social contradictions they are embedded in" (Torre 2014, 3). Whether bridging disciplinary divides between different ways of knowing within academia (inter-disciplinarity), or extending the 'right to do research' to marginalized communities and groups (trans-disciplinarity), a key feature of these processes is that of reflection – both of the world and of one's role in that world.

However, with the increasing use of inter- and trans-disciplinary as buzzwords for leveraging funding bids and to make research seem 'current', these concepts are being co-opted in less thoughtful ways and there is a danger that the terms will lose credibility (and could be used to advance powerful agendas without consideration of the true definitions). Critical scholars have noted that when it comes to evaluating the impact of science on society, more weight is often given to research impact on powerful actors, such as policy or industry, as compared to less powerful groups such as local communities or marginalized populations (Pain et al. 2011). For example, new partnerships between universities and multinational corporations are developing under the banner of trans-disciplinary research – where the science that is produced by experts is mobilized to support existing unequal structures of economic dominance (Leach et al. 2005). As these collaborations may be built around profit motives advanced through the 'greenwashing' of existing practices, this motivation leaves little space for the kind of reflection or concientization that original understandings of trans-disciplinarity seek to inspire in practitioners.

Much of the discussion around inter- and trans-disciplinarity deals with the notion that knowledge is or should be co-produced between academics and other groups. But the whole process of cooperatively creating new ways of thinking and doing are dependent on several aspects that are often left out of the ways inter- and trans-disciplinarity are talked about in the mainstream. For example, projects involving co-produced knowledge should invoke relations that are reciprocal and have high levels of trust between the different groups involved (Marzano et al. 2006). They should foster relations where power differences are accounted for and attempts made to balance them. This is why the process of reflection is so important – to establish awareness early on in the research process about the intergroup dynamics and their potential influences on the (in)equalities in the group. If this is not considered, there is the threat that the inter- and trans-disciplinary research is seen as new kind of imposed 'tyranny' from above, much in the same way 'participation' was appropriated for top-down development by powerful institutions like the World Bank in the 1990s (Cooke and Kothari 2001). Thus, especially in the case of trans-disciplinary research, care should be taken to ensure that the research questions and methods have been developed in collaboration with those social groups who are intended to be 'impacted' by the work at hand.

Another major concern with these new research trends is that they may be used to (re)produce existing disciplinary hierarchies. For example, Castree et al. (2014) critique the partial and selective uptake of social science and humanities into global environmental change science, observing that approaches emphasising human diversity and social inequality are given little room amidst the more dominant perspectives from the physical sciences and mainstream economics. With growing calls from powerful institutions for inter- and trans-disciplinarity research to be enacted, there is a risk that these approaches will decrease rather than increase critical capabilities by displacing crucial disciplinary research, which continues to have important insights into 'real-world' problems (Strengers 2012).

Recommendations

There is a strong case for inter- and trans-disciplinarity in environmental and sustainable development research, alongside existing disciplinary research efforts. However, as discussed above, such research needs to be embraced in a critically reflective manner. To aid this process, we put forward the following recommendations:

1. Funding calls for inter- and trans-disciplinary research should clearly define these terms so as to give better guidance for applicants. Examples of exemplary research should be given as guidance.
2. There is a need to build time and opportunity for reflection into inter- and trans-disciplinary research processes to build trust within the group(s), and to emphasize the importance of the entire process, not just the delivery of measureable outputs.
3. There is a need to ensure that big funding calls for 'scaling-up' projects do not diminish smaller efforts. As both inter- and trans-disciplinarity approaches to research are in their infancy, it makes sense for researchers to start small and learn from those projects before contributing to an 'Inter- / Trans-disciplinary Revolution'.
4. We need to foster critical inter- and trans-disciplinary scholars by questioning entrenched disciplinary structures. Some suggestions: a) allowing submissions to research assessment schemes to be from more than one discipline; b) providing more funding opportunities where project outcomes can be more

flexible / less defined up-front; and c) support early career inter- and trans-disciplinary scholars through support networks and training.

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APPENDIX V

Co-authored papers published during PhD (based on previous research)

1. Toomey, A., Domroese, M. (2013). Does citizen science lead to positive conservation attitudes and behaviors? Human Ecology Review, 20(1): 50-62.

Abstract: Citizen science—the partnering of scientists with members of the public to do research—is increasingly utilized in environmental research, having been credited with enabling studies that would otherwise be cost-prohibitive while promoting scientific literacy and empowering and engaging participants in conservation. Although the value of citizen-generated data for scientific purposes is increasingly accepted, and there is a growing recognition of the role of citizen science in developing science literacy, there has been little investigation of its link to conservation outcomes—particularly in terms of volunteers' further engagement in conservation. This paper reviews the literature on the relationship between participation in citizen science and conservation attitude and behavior changes, and looks at the relevance of theoretical models to shed light on possible drivers of such changes. We discuss two citizen science projects in the New York metropolitan area—the Great Pollinator Project and the Earth- watch Coyote Project—as illustrations of the impact of citizen science on attitudes and behaviors as perceived by participants. We offer recommendations for further research on facilitating conservation outcomes through citizen science.

2. C.M. Nagy, M.E. Weckel, A.H. Toomey, C.E. Burns and J. Peltz (2012). Validation of a citizen science-based model of coyote occupancy with camera traps in suburban and urban New York, USA. *Wildlife Biology in Practice*, *8*(1), 23-35.

Abstract: We evaluated the accuracy of a previously published model of coyote (*Canis latrans*) sightings in suburban Westchester County, New York. This model was originally developed using citizen reports of coyote sightings to predict the probability of a human-coyote interaction based on proximity to habitat features. Because the data were obtained from surveys, researchers could not separate patterns

of site occupancy by coyotes from possible patterns of detection by respondents. Nevertheless, the model could be an indicator of site occupancy within the suburban matrix. We sought to evaluate the predictive power of the human-coyote interaction model with data gathered via a more rigorous method. To build a set of validation sites, we surveyed 11 parks in Westchester County and one park in Bronx County, NY with camera traps between April and October of 2010. The probability of photographing a coyote in a single trap-night was 0.06 ± 0.12 and all sites had >0.9 probability of detecting a coyote at least once given the total trap-nights at each site. During validation, we also added four additional sites that had been surveyed by other researchers with camera traps as additional "present" sites. Predictions of coyote presence or absence based on the human-coyote interaction model for these 16 validation sites were compared to the observed survey results. The model, which contained distances to forest, grassland, and pooled medium and high development performed well in predicting the observed data (kappa = 0.75 ± 0.17, Area-Under-Curve of Receiver-Operator-Characteristic plots = 0.90). The model appears to sufficiently predict coyote occupancy in a suburban-urban landscape and will form the basis of for development of a more comprehensive model of coyote distribution in the New York City metropolitan area. Furthermore, its accuracy illustrates how citizen science can provide reliable estimates of wildlife-habitat patterns in urban areas.

APPENDIX VI

Additional co-authored papers in prep related to PhD research

Toomey, A., Copa, M. (In prep). Does self-monitoring lead to self-determination? An evaluation of a hunter-fisher self-monitoring project in the Bolivian Amazon. (Paper draft currently in Spanish)

(Working) Abstract: Over the last twenty years, a significant amount of research focused on natural resource management has been carried out in the Bolivian Amazon. One popular approach involved enlisting the participation of indigenous communities in 'self-monitoring' projects as part of a learning process to make informed decisions about wildlife management. The objective of these studies was 'self-determination' through the continuous generation of information that could be used for reflection, the communal proposal of management guidelines, and the measurement of the sustainability of traditional extractive activities such as fishing and hunting. This paper analyses the impact of one of these projects, a WCS-funded study conducted with Takana and Moseten hunters and fishers along the Beni River in northwest Bolivia, to achieve such 'self-determination' as perceived by indigenous people participating in the project. Semi-structured interviews were conducted with fifty members and leaders of six communities in the Takana 1 and Tsimane-Moseten indigenous territories in 2013, and participant responses were compared with reports generated by and interviews held with WCS scientists and consultants involved in the project. The results suggest that while the project had positive impacts for social learning and additionally helped to support territorial management through encouraging respect of micro-zonification of participating communities, the principal goal of 'self-determination' was not always kept in sight. As a consequence, the data collected by the indigenous participants was sometimes seen as 'something for the scientists', rather than a tool with which they could support the autonomous management of their traditional livelihood activities.

APPENDIX VII

Selection of talks based on PhD research

2015_ Toomey, A. "Rethinking the nature of impact." Talk given at *TEDx conference* at the Dukes Playhouse in Lancaster, UK.

2015_ Toomey, A. "Writing History in the Present: The Makings of 'Bolivian Science' and its Implications for a Postcolonial World." Paper presented at *Science And Culture In Latin America: Transmission, Circulation, Exchange,* University of Oxford, UK.

2014_ Toomey, A. "The making of Madidi and the nationalizing of the 'most biodiverse' protected area on the planet." Paper presented at *Political Ecology and Development: Resources, Power and Justice Conference*, Lancaster University, UK. (Additionally chaired PhD session at conference).

2014_ Toomey, A. "Bolivian perspectives on scientific research." Documentary presented at the Fuller Geographies panel at the *Royal Geographical Society Annual Conference*, London, UK.

2014_ Toomey, A. "What happens at the gap between research and implementation? Spaces of encounter between biodiversity scientists and communities in Madidi National Park, Bolivia." Talk presented at the "Impact by who, for whom" panel at the *Royal Geographical Society Annual Conference*, London, UK.

2014_ Toomey, A. "Participatory science as a tool for engagement in the co-management of natural resources: Understanding how different ways of knowing can translate into better ways of doing in Madidi National Park, Bolivia." Talk presented at *Resilience 2014*, Montpellier, France.

2014_ Toomey, A. "IMPACT: Understanding the gap between research and implementation in Bolivia." Talk presented at the *Student Conservation Science Conference* at the Cambridge University Zoology Department, Cambridge, UK. Won runner-up for best talk.

2013_ Toomey, A. "Buscando tener un impacto más allá: El papel de la investigación científica en la gestión de los recursos naturales." Talk given to the *Department of Biodiversity Conservation at the Vice-Ministry of the Environment,* La Paz, Bolivia.

APPENDIX VIII

Sample report for Madidi park staff (from 2013)

"La Ciencia Participativa como una Herramienta
para la Cogestión en el PNANMI Madidi"

Resumen

El destino de la Amazonía boliviana se encuentra en un momento crucial debido a las políticas actuales que apoyan el desarrollo económico a gran escala en áreas protegidas y territorios indígenas de tierras bajas. Una zona de conflicto probable es el Parque Nacional Madidi, uno de los lugares con mayor biodiversidad en el planeta, que se sobrepone con los territorios indígenas Tacana, San José de Uchupiamonas y Leco, cuyas demandas territoriales cubren aproximadamente un tercio de la superficie del parque. La administración del parque y los pobladores locales son actores claves en la toma de decisiones en estas tierras de sobreposición, pero a menudo carecen de la información necesaria para su gestión sostenible.

Durante junio-diciembre de 2012, con el apoyo de otros investigadores bolivianos, llevé a cabo trabajo de campo para explorar grados de participación local en la investigación y la gestión del área. Realicé entrevistas semi-estructuradas con personas que viven y trabajan en Madidi, las cuales revelaron una falta de comunicación entre los diferentes actores, especialmente sobre el tema de investigación científica. Sin embargo, también las entrevistas mostraron un reconocimiento creciente (especialmente entre los líderes indígenas) sobre la importancia de investigaciones para proporcionar información técnica sobre sus tierras. Se percibe dicha información como algo importante, ya que tiene el potencial de ayudar a las comunidades en crear alternativas para el manejo sustentable de sus territorios.

Para la continuación de la investigación en 2013 (mayo-diciembre), continuaré explorando el papel de la investigación científica en la gestión y conservación de la región de Madidi, desde la creación del parque en 1995 hasta la actualidad, en los convenios de cogestión que se están desarrollando por los líderes indígenas y el SERNAP. Con este fin, llevaré a cabo una metodología de ciencia social que incluye

entrevistas semi-estructuradas, talleres con los actores sociales, y una revisión sistemática de estudios previos realizados en el parque. Además, esta investigación propone analizar dos proyectos de 'monitoreo participativo' de la región (uno con los guardaparques (el PMI), el otro con los cazadores y pescadores indígenas en la TCO Tacana), con el fin de explorar el potencial de la participación local en la investigación científica como una herramienta para ayudar a cerrar la "brecha conocer-actuar" para la conservación de las áreas protegidas.

Introducción

En la última conferencia de la UICN en Corea del Sur en septiembre de 2012, un informe que fue producido por un consorcio internacional de científicos fue presentado junto con la afirmación de que una remota zona protegida en Bolivia era "probablemente el lugar más biodiverso del planeta", por lo que es un área prioritaria para la investigación científica, donde los "dos tercios de su biodiversidad aún no se ha descubierto" (McStravick 2012). Este "mundo perdido", como fue descrito por National Geographic hace más de una década, es el Parque Nacional Madidi y Área Natural de Manejo Integrado (PN / ANMI), un área protegida en el noroeste de Bolivia, que abarca 1.990.996 ha.

Hogar de 11% de las especies de las aves del mundo y aproximadamente 12.000 especies de plantas, Madidi es "notablemente intacto", por lo que es un paraíso para los científicos naturales (Friedman-Ru 2012). La región también es importante por su diversidad cultural. Las comunidades ubicadas dentro y adyacentes al PN ANMI Madidi consisten en grupos multi-étnicos, incluidos los pueblos indígenas de tierras bajas y las tierras altas, y las comunidades rurales compuestas por campesinos y interculturales. Cuatro territorios indígenas (TCO) se superponen al área protegida (San José de Uchupiamonas, Tacana 1, Lecos de Apolo y Lecos de Larecaja), y otros dos tienen frontera con Madidi (Tacana II y Tsimane'-Moseten). En total, hay 24.588 personas que viven en el área de Madidi de influencia, de los cuales 3.741 residen dentro de los límites del área protegida (SERNAP 2006).

Debido a la existencia de una diversidad de posiciones e intereses entre estos actores, es necesario tener espacios de comunicación y participación entre los gestores y vivientes del área protegida, especialmente en las áreas de sobreposición entre el AP y las TCOs. Tal cogestión está compuesta por dos partes: la toma de decisiones, y la información en la cual se basan tales decisiones. Por tal motivo, se necesita la

investigación científica en la región para informar a la gestión de los recursos naturales, especialmente en cuanto a las regulaciones asociadas con las actividades extractivas – ya que sean para fines de substancia o de comercio. Sin embargo, tanto en Madidi como en muchos áreas protegidas en el resto del mundo, la mayoría de las investigaciones científicas es impulsada por cuestiones de interés académica en lugar de las necesidades de los pobladores locales o administración del área. Si bien esto sirve para ampliar el conocimiento científico global, la comunidad científica esta perdiendo una gran oportunidad para ayudar a informar a la gestión sobre el manejo de las tierras y los recursos naturales.

Existen pocos estudios que han analizado las percepciones locales de investigación, e incluso las interacciones entre los científicos y las comunidades, en un contexto de manejo ambiental. Ya que la gestión informada debe de ser basada en la evidencia científica, es de importancia vital que los científicos se den cuenta de que la población local a menudo no entiende lo que están haciendo y por qué lo hacen, y por lo tanto no están dispuestos a aceptar las decisiones que se toman en base de datos científicos.

Marco teórico

La relación entre la conservación de las áreas protegidas y la investigación científica es compleja (Laird y Lisinge 2002; Knight 2008). Una cantidad desproporcionada de investigación científica, en particular la que se enfoca en las cuestiones de la diversidad biológica y el cambio climático, se lleva a cabo en parques y reservas (Martin et al. 2013). Sin embargo, muchos estudiosos han criticado la falta de información científica en la creación, diseño y gestión de las áreas protegidas al nivel global, pidiendo una conservación "basada en la evidencia", y citando la amplia brecha entre las prioridades que guían la investigación científica y las necesidades de la gestión del parque y otros tomadores de decisiones, tales como las comunidades locales (Kremen et al. 2001; Sutherland 2004).

Knight et al. (2008) llaman este fenómeno "la brecha investigación-implementación", y sus consecuencias se pueden ver en cómo se definen las prioridades de investigación: dónde (Lima et al. 2010; Martin et al. 2013; Gardner et al. 2009), sobre cúales temas (Smith et al. 2009), y para quién se llevan a cabo las investigaciones (Rodríguez et al. 2007; Shackleton et al. 2009). Salafsky et al. (2002) argumenta que el problema principal es que la mayoría de la investigación se centra en

los preceptos académicos y las soluciones técnicas, tales como la identificación de especies y ecosistemas en peligro, en lugar de trabajar directamente con los problemas impredecibles y complejos, especialmente vinculados con el contexto sociocultural. A pesar de que la investigación científica en estas áreas a menudo se centra en especies emblemáticas como los grandes felinos o primates, así como las amenazas ecológicas y antropogénicas para su supervivencia abundancia y diversidad de especies, en especial los que están en peligro de extinción, la gestión local normalmente requiere información que va más allá de las relaciones de causa-efecto para entender el cómo y el por qué de ciertas amenazas y encontrar maneras para combatirlas (Knight et al. 2006a; Whitten et al. 2001). "Como resultado de esta 'brecha conocer-actuar,' la ciencia de la conservación se pone por encima de las necesidades prácticas y pierde contacto con el campo de la práctica de la conservación (Fazey et al. 2006)" (Aat der Hoeven 2006, 120).

Las implicaciones de esta brecha son cada vez más importantes en las áreas protegidas inhabitadas, donde existen presiones fuertes de poblaciones humanas, y dónde la gente local tiene derechos legales en la gestión de estas zonas, como en el caso donde los territorios indígenas se superponen los parques nacionales (Danielsen et al. 2005; Nepal 2002; Pretty 2002). Frecuentemente, estas situaciones están implicadas en la cogestión de la zona, la que normalmente significa la participación y diferentes formas de intervención de los diferentes actores sociales (Berkes 2004). Incluso, cuando las investigaciones incorporan una metodología 'participativa', en muchos casos, el concepto de la participación se maneja de manera superficial o inadecuada, con el motivo de conseguir financiamiento y hacer que sean aceptados por la población local. Entonces, la cuestión es cómo profundizar estos discursos teóricos de la participación para que se convierten en un mecanismo de comunicación y colaboración reciproca.

Contexto político-social

El concepto de la conservación se empezó a desarrollarse en Bolivia a finales del años 80s, como parte de la reacción regional frente a la sobreexplotación de los recursos naturales en las tierras bajas por empresas y personas que venían de fuera de la región. Tanto las comunidades originarias a la zona, representadas por pueblos indígenas amazónicas que habían empezado a demandar sus derechos sobre la tierra y los recursos naturales, como ambientalistas nacionales y extranjeros preocupados por la

perdida de la biodiversidad y la deforestación en "los pulmones del mundo", buscaron maneras de proteger estas tierras de intereses comerciales. En el año 1990, se dio la primera Marcha por el Territorio y la Dignidad por pobladores indígenas de las tierras bajas, y en 1996, se creó la denominación del Territorio Originario de Origen (TCO) por la Ley INRA, el cual dio un primer paso a la autonomía de los territorios indígenas a través del establecimiento de territorios legales (Costas 2010). A la vez, se estaban estableciendo a varias áreas protegidas a través del territorio nacional, como patrimonio Boliviano, con el resultado de que en las tierras bajas, hoy en día hay 13 áreas protegidas con sobreposición con 22 TCOs, una situación que requiere la cogestión de los áreas (Ibíd.).

Esta coadministración está bajo la jurisdicción del Sistema Boliviano de Áreas Protegidas (SNAP) y el Servicio Nacional de Áreas Protegidas (SERNAP). Los principios que guían la gestión de estas instituciones hacen hincapié en la importancia de reconocer los derechos, usos y costumbres de las poblaciones locales que viven dentro y alrededor de las áreas protegidas, haciendo mención específica de respetar la diversidad cultural de los grupos indígenas, que han desarrollado formas de conocimiento y vivencia con la naturaleza que no siempre son valorados, y para la distribución justa de los beneficios. Estos principios son compatibles con la legislación nacional, en particular la Ley del Medio Ambiente (especialmente el artículo 92° que dispone que los pobladores locales tienen el derecho de participar en la gestión ambiental, a fin de llegar al desarrollo sostenible en sus tierras), el artículo 48° del Reglamento General de Áreas Protegidas que establece los Comités de Gestión, la Ley INRA, la cual establece que la titulación de las TCOs es compatible con la creación de los áreas protegidas, y el articulo 385 de la constitución política del estado, lo cual indica que la gente tiene que ser parte de la toma de decisiones donde hay sobreposición entre áreas protegidas y comunidades indígenas o campesinas.

Breves referencias al caso Madidi

Madidi fue creado en 1995 mediante Decreto Supremo N° 24123. En el contexto de los áreas protegidas en Bolivia, la idea de la participación se promueve a través del concepto de la cogestión, la cual forma una parte importante de la políticas de la administración del parque según los documentos e informes del SERNAP al respecto. En Madidi, aunque existen algunas estrategias y herramientas para establecer tal coadministración, tales como los Comités de Gestión, todavía no se han establecido

lineamientos y reglamentación con relación especifica al tema de la investigación científica que ocurren en las áreas de sobreposición. Actualmente, entre los pobladores locales existe mucho desconocimiento sobre los investigadores que se ingresan a Madidi para estudiar tanto la flora y fauna como las tradiciones y practicas de las comunidades indígenas en la región. Existe un amplio rango de percepciones sobre lo que es la investigación y para que sirve, tanto entre los diferentes territorios y comunidades, como entre los dirigentes que se relacionan más con los científicos y los comunarios que solo los ven entrar a sus tierras sin saber el propósito de sus actividades. Incluso, existe la percepción popular que la investigación científica es una actividad de mucho lucro, y que los científicos se están haciendo ricos en 'descubrir' especias nuevas a la ciencia, las mismas que los comunarios conocen desde hace siglos.

Incluso cuando los investigadores intentan responsabilizarse de comunicar los propósitos y resultados de sus investigaciones a los gestores de los APs y las comunidades, deben enfrentar obstáculos logísticos e institucionales. Conociendo esta problemática, al menos en parte, esta investigación propone mejorar los canales de comunicación con respecto a la investigación científica entre la Dirección del PN ANMI Madidi, los actores locales y las instituciones científicas con el fin de explorar el potencial de la 'investigación participativa' para una cogestión más responsiva e inclusiva.

Antecedentes: Actividades en 2012 – Fase preliminar de investigación

Entre Julio y Noviembre de 2012 se realizó las siguientes actividades:

1. Obtención de permisos para realizar la investigación dentro del Madidi y Pilón Lajas, y en las siguientes TCOs (Tacana 1, CRTM, San José de Uchupiamonas, y Lecos de Apolo), y se firmó un convenio de apoyo mutuo con WCS
2. Entrevistas semi-estructuradas con 56 personas viviendo y trabajando dentro de y en las afueras del Madidi y Pilón Lajas para registrar y sistematizar sus perspectivas, valores y actitudes hacia los proyectos de conservación y investigación
3. Entrevistas semi-estructuradas con 54 personas sobre los proyectos de auto-monitoreo de caza y pesca en la TCO Tacana y la TCO Tsimane'-Moseten

En total, se realizaron entrevistas semi-estructuradas e informales con más de 100 individuos, incluyendo comunarios, líderes indígenas, personal de área protegidas y otros investigadores y científicos. También, tuve la oportunidad para asistir a algunas reuniones y talleres importantes, (por ejemplo al taller de cogestión en la comunidad de Torewa y una reunión de asamblea de la nación Lecos de Apolo), y observar el trabajo cotidiano con guardaparques de Madidi en San Buenaventura y Apolo.

Objetivos

El objetivo general del proyecto es examinar el potencial de la ciencia participativa para coadyuvar a cerrar la brecha entre la investigación y la gestión de los recursos naturales en la región del Parque Nacional Madidi, Bolivia. Específicamente el proyecto tiene por objeto:

1. explorar diferentes puntos de vista sobre las actividades de investigación en la región e identificar las áreas prioritarias de investigación (geográficos y temáticos)

2. entender hasta qué punto las investigaciones anteriores y en el actual han incorporado valores, conocimientos y intereses locales.

3. buscar maneras de hacer que investigaciones futuras sean más relevantes y participativas, para generar estrategias de mayor participación social en la gestión de las áreas protegidas.

Este proyecto contribuirá a los esfuerzos de cogestión existentes en el parque, donde hasta la fecha ha habido poco debate sobre el potencial de la investigación científica para informar a la conservación y gestión en la región. Ya que Madidi atrae a un gran número de investigadores en las ciencias sociales y naturales, los administradores del parque y las comunidades locales tienen mucho que ganar en aumentar la medida en que las investigaciones en la región 'devuelvan' la información a los actores sociales. Tal 'devolución' no debe de ser limitada a simplemente entregar reportes, sino también de buscar la apropiación de las comunidades locales de los proyectos e investigaciones científicas como una estrategia de acercamiento entre los distintos actores. Así, este proceso también servirá los intereses de conservación, ayudando a fortalecer alianzas

entre comunidades indígenas e instituciones científicas, las cuales pueden ayudar a proteger el Madidi de los intereses externos de desarrollo.

Resumen de resultados preliminares

> Si no tenemos la información, ¿cómo podemos protegernos a nosotros mismos? Tenemos que pensar en cómo hacer contrapropuestas a los megaproyectos en la región.[92]

Uno de los objetivos estratégicos establecidos en el plan de gestión de Madidi es "impulsar y apoyar el desarrollo de la investigación científica y el monitoreo integral en el Área Protegida, con la finalidad de fortalecer las acciones de manejo y conservación del AP, así como la valoración y recuperación de tecnologías y sistemas tradicionales de uso sostenible de recursos naturales" (SERNAP 2006, 215). Según el mismo documento, se requiere la identificación de las necesidades y los vacíos en la información existente, así como el desarrollo de las capacidades locales y la participación en actividades de investigación, entre otras estrategias.

Para obtener un permiso para llevar a cabo investigaciones en el área, una propuesta de investigación debe ser aprobado por SERNAP - firmado por ambos el director ejecutivo en la sede nacional en La Paz y el director del área protegida donde la investigación se lleve a cabo. El motivo de este proceso es que toda investigación debe proporcionar información que sea de interés directo para el parque, y los resultados de investigación deben ser difundidas al SERNAP y la oficina del parque.

Sin embargo, conversaciones con el personal del parque, incluidos los encargados de la lectura de los informes y artículos escritos por investigadores que trabajan en la región, dejaron en claro que la mayoría de las investigaciones no llegan a las manos de los gestores del área o los actores locales, quienes los podrían utilizar para informar a la toma de decisiones. En los pocos casos en que sí, muchas veces están escritos en la forma de una tesis académica, a veces incluso en un idioma que no se habla por los lugareños. El personal del área expresó su frustración frente a está situación, y algunos informantes comentaros que cuando los investigadores no cumplen con sus promesas, se puede transformar en un problema más para el parque con las comunidades, ya que los comunarios puedan llegar a culpar a la administración del área por la informalidad de tal investigador. También,

[92] Entrevista a Guido Mamani, Vice-presidente de la Comunidad de San José de Uchupiamonas

conversaciones con los guardaparques arrojaron luz sobre la falta de reconocimiento que reciben al ayudar a los científicos, incluso cuando los llevan a buscar animales que pueden ser nuevas especias para la ciencia (por ejemplo, con el mono luchachi). Aunque algunos investigadores son más responsables en este sentido, y mandan resultados y agradecimientos a los que les ayudaran, no existe ningún protocolo para reconocer los esfuerzos de los guardaparques o de comunarios locales que sirven como guías en estas actividades, lo cual resulta en un desanimo por la parte de las entidades locales para participar en la investigación científica.

Así mismo, entrevistas con los pobladores en la región expresaban su percepción que la mayoría de las investigaciones solo sirven para "ayudar al tesista para obtener su grado", en lugar de tener alguna utilidad para la comunidad. Particularmente, la investigación etnobiológica sobre los saberes y las prácticas de manejo de los recursos locales es preocupante para los lugareños, y existe la susceptibilidad que "se están llevando nuestros saberes." Parte del problema es que pocos investigadores dejan los resultados de las investigaciones con las comunidades, incluso aquellos que prometen lo contrario al inicio del proyecto. "Nos traicionaron", dijo un líder de la nación Lecos de Apolo, quien pasó a explicar cómo una antropóloga norteamericana que llevo a cabo investigación etnobotánica en su territorio, desapareció luego sin dejar rastro, a pesar de haber firmado un convenio oficial con CIPLA.

Sin embargo, también del punto de vista de algunos investigadores trabajando en la región, no es siempre fácil comunicarse con los comunarios, y los esfuerzos por parte de los investigadores de involucrar a las comunidades a veces resultan en más confusiones. Por ejemplo, un científico que trabaja en la zona de Apolo dijo que al intentar dedicar el nombre de una nueva especia de ave al pueblo leco, se entró en problemas con algunos dirigentes de CIPLA. Otra experiencia, de una investigadora que llevó a cabo un estudio geográfico en la comunidad tacana de San Miguel de Bala, dijo que al presentar algunos resultados preliminares en una asamblea comunitaria, fue acusada de estar "robando los conocimientos de los comunarios."

Por otro lado, tanto los gestores del área como los actores locales reconocen el papel fundamental que la investigación tiene el potencial de desempeñar en la gestión de los recursos naturales. A pesar de que algunos líderes indígenas lamentaron la tendencia de los investigadores a "tomar sin devolver", también hicieron declaraciones como "toda investigación es bienvenida - no tenemos otras formas de obtener

información acerca de nuestro territorio", y "la investigación es un arma que podemos usar para defendernos." Más de cincuenta entrevistas con participantes en los proyecto de auto-monitoreo de cacería y pesca en las TCOs Tsimane-Moseten y Tacana 1 mostraron los beneficios educativos de la investigación participativa, ya que varios participantes hablaron en detalle el orgullo que sentían al "aprender algo nuevo, de una manera diferente." También, entrevistas con guardaparques que participaron en el Programa de Monitoreo Integral, arrojaron luz sobre el potencial de este proyecto para involucrar más al personal del área en la investigación y gestión del área, en el sentido de la necesidad de reforzar sus capacidades tanto para 'tomar el pulso del parque', así como para interactuar más con las comunidades en registrar cambios demográficos y culturales. Aunque un guardaparque[93] dijo que "realmente, hemos hecho monitoreo por años," antes no había sistematización de los datos, y como resultado se perdió la información. Ahora con el nuevo programa, habrá un base de datos donde se podrá accederla cuando se necesita. No obstante, todavía existe mucho potencial para que haya una mayor participación social en este programa, por ejemplo en realizar el monitoreo de fauna y caudales en conjunto con comunarios de TCOs sobrepuestos, o con respecto a los indicadores sociales y culturales, que deben de ser dirigidos por las comunidades.

Tales observaciones apuntan a la posibilidad de la investigación científica sea una fuerza para el cambio social en la región mediante la creación y fortalecimiento de alianzas entre científicos y actores locales para investigar áreas de interés común. Estos tipos de alianzas pueden servir para establecer colaboraciones entre actores sociales como comunidades indígenas con instituciones gubernamentales y científicas, las cuales, si se hacen con el espíritu correcto, pueden llegar a ayudarlos a identificar y manejar intereses en común de manera efectiva.

Como resumen, se puede observar que existen muchas perspectivas acerca de la investigación científica entre los gestores y actores locales, las cuales deben de ser relacionadas con las experiencias previas con investigadores y información que les han comunicado al respecto. También, es importante reconocer que hay una falta de comunicación sobre el tema de la investigación entre los gestores de los APs y las comunidades locales, una realidad que ha resultado en la perdida de una oportunidad valiosa para que las investigaciones lleguen a tener un impacto más allá de los círculos

[93] Entrevista a GP Luis Francisco Apana Hinojosa, Octubre 2012

científicos y académicos. Aunque esta situación se debe en parte a las dificultades presupuestarias, tanto de la parte de los investigadores como de la administración del SERNAP, todavía hay mucho desconocimiento sobre las causas por las cuales se presenta esta falta de difusión adecuada de tales materiales, por lo cual se requiere más investigación para identificarlas.

Actividades para la fase de investigación 2013

1. Entregar informes de avances de la gestión pasada a los actores involucrados

Con el objetivo de comunicar los avances de la investigación y el plan para la siguiente etapa con los grupos interesados en la investigación (instituciones científicas, administradores de parques y líderes de comunidades), el primer objetivo es proporcionarles información sobre las actividades y resultados de la primera temporada de campo realizado en 2012. Esta entrega se hará para impulsar un proceso de debate sobre las observaciones hechas y las actividades planificadas para la siguiente etapa de investigación, que genere espacios de dialogo entre la investigadora y las partes interesadas.

2. Revisión sistemática de estudios previos en Madidi

Con el fin de analizar la historia de la investigación científica en la región, se llevará a cabo una revisión exhaustiva de la literatura de las investigaciones anteriores, utilizando una combinación de fuentes secundarias, tales como publicaciones académicas, bibliografías e informes de agencias gubernamentales y bibliotecas académicas. Se definirá una tipología de las diferentes formas o modelos de investigación, por ejemplo, en qué medida la investigación tenía o no tenía fines explícitos para la gestión o la conservación, y de qué manera se logró o al menos intentó influir en la aplicación de los resultados.

3. Entrevistas semi-estructuradas con las partes interesadas (científicos, las comunidades, la gestión del parque, personal de ONGs)

Se llevará a cabo entrevistas con investigadores, especialmente aquellos que trabajan en las ciencias de la conservación, con el motivo de obtener una visión completa de las motivaciones, esperanzas y valores con respecto a la investigación y conservación de Madidi. Además, se realizará entrevistas con los tomadores de decisiones, tales

como el personal del área protegida, empleados de SERNAP y el Ministerio de Medio Ambiente y Agua, funcionarios de gobiernos municipales, así como los líderes de las comunidades indígenas y campesinas. Las entrevistas con los líderes locales y miembros de las comunidades también ilustrarán el grado en que los científicos y los gestores de la conservación han buscado aportaciones locales.

4. Dar seguimiento a los proyectos de monitoreo participativo

Continuaré dando seguimiento a los proyectos de monitoreo participativo, tanto del Proyecto Integral de Monitoreo con los guardaparques, así como el proyecto de auto-monitoreo de caza y pesca en las TCOs Tacana 1 y Tsimane'-Moseten, con el fin de establecer el potencial de estas metodologías para cerrar la brecha 'conocer-actuar' que normalmente existe en las ciencias de conservación. También continuaré con la aplicación de entrevistas a las personas involucradas en estos proyectos.

5. Talleres con los grupos interesados

Ya que este proyecto cuenta con un componente de investigación de 'acción participativa', se diseñará, organizará y llevará a cabo talleres en colaboración con los grupos focalizados. El contenido y la estructura de estas dependerá enteramente de las necesidades y preocupaciones de las partes interesadas. Entre mayo y julio tendré reuniones con las partes interesadas para ver cómo sería la manera más adecuada de ejecutar estos talleres. La realización de este aspecto de la metodología depende tanto de la disponibilidad y voluntad de los actores y gestores locales, así como de la recepción de financiamiento específico que ha solicitado la investigadora para estos talleres, y que actualmente está bajo consideración. Se espera saber el resultado de la solicitud a más tardar en el mes de Agosto, 2013.

Actividades en 2013	M	J	J	A	S	O	N	D
2013								
Reuniones con partes interesadas (entrega de reportes)	X							
Revisión sistemática de estudios previos en Madidi		X	X					
Entrevistas con las partes interesadas		X	X	X		X	X	X
Dar seguimiento de proyectos de monitoreo participativo		X	X	X				
Designar talleres con equipo y actores				X				
Preparaciones logísticas para talleres						X		
Realizar talleres						X	X	X

(en Nueva York durante el mes de Septiembre por compromisos personales)

Difusión de Resultados esperados en 2014

Una etapa final (que se realizará en el año 2014) se enfocará en reportar los resultados de la investigación a las partes interesadas. Aparte de entregar informes y otros productos del estudio, se llevará a cabo talleres de difusión para discutir la información obtenida, así como para discutir qué tipo de estrategias de difusión se podrían desarrollar para el futuro. Por ejemplo, ¿qué forma de presentación necesitan los gestores locales de los resultados de las investigaciones a fin de tomar decisiones basadas en ellos? Dependiendo de los resultados de la temporada de campo de 2013, pueden surgir oportunidades para llevar a cabo reuniones para el desarrollo de estrategias oficiales de investigación colaborativa en las tierras que se superponen las áreas protegidas.

Resultados esperados

Este proyecto propone reforzar la inserción de la investigación en las estrategias de cogestión en las áreas protegidas de Bolivia, con el fin de desarrollar y fortalecer alianzas entre las instituciones científicas y los gestores locales para beneficios mutuos.

Resultado 1: Mejora de la comunicación entre las partes interesadas. Aunque las comunidades en Madidi han servido de anfitrionas a decenas de proyectos de investigación, hay mucha confusión sobre lo que es la investigación. Este proyecto mejorará la comunicación entre las partes interesadas con el fin de aclarar las confusiones que existen sobre el supuesto lucro de las investigaciones científicas y crear capacidad local para futuras colaboraciones de investigación.

Resultado 2: Identificación del tipo de información que necesitan los actores locales para tomar decisiones informadas sobre el uso de la tierra y los recursos naturales. Este proyecto identificará prioridades locales de investigación y la identificación de futuras herramientas legales e institucionales para apoyar la investigación colaborativa en tierras superpuestas. Esto se difundirá en un informe que será distribuido a todos los interesados y a través de talleres y reuniones en 2014 para discutir y difundir los resultados del proyecto más ampliamente. También desarrollaré una guía impresa para los futuros investigadores de la región, con información adecuada para cada territorio

indígena, con una lista de necesidades prioritarias de investigación, así como preocupaciones sociales y culturales.

Resultado 3: Presentación de una propuesta de cómo la ciencia participativa puede promover la participación social en la cogestión de los recursos naturales en las áreas protegidas. Como parte de esta investigación se explorará métodos participativos y estrategias de difusión que los científicos pueden utilizar para fomentar una verdadera participación y comprensión de la investigación en las diferentes etapas del método científico.

Resultado 4: Mejora del conocimiento de cómo realizar la conservación comunitaria. Este proyecto tendrá resultados replicables más allá de las fronteras de Madidi, contribuyendo a los conocimientos académicos mundiales sobre el potencial de la ciencia participativa para cerrar las brechas de comunicación entre los gestores y actores locales para una mejor cogestión y conservación de los recursos naturales.

Productos

1. Informe anual de los avances, tal como este presente reporte.
2. Análisis cualitativo de las actitudes, perspectivas y percepciones de los actores sociales hacia los proyectos de monitoreo y conservación en la región para las partes involucradas.
3. Análisis cuantitativo de los tipos de investigación en el área protegida que se basará en la tipología que desarrollaré como parte de la revisión sistemática de las investigaciones realizadas en la región.
4. Guía para las partes involucradas para orientar a los investigadores futuros que vengan la región. Esta guía incluirá los temas prioritarias de investigación según las necesidades de los actores locales y preguntas claves para los investigadores, así como los procedimientos de interactuación con la población local sobre la base de la visión de corto plazo y sus expectativas.

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