FOR LOVE OR MONEY: HARNESSING ENVIRONMENTAL VALUES AND FINANCIAL INCENTIVES TO PROMOTE CONSERVATION STEWARDSHIP

by

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Abstract

Despite broad agreement that large scale funding is needed to address the severe risks associated with habitat loss and ecosystem service degradation, financial and market-based interventions have brought substantial division in the conservation sector. This dissertation examines the values and attitudes associated with financial mechanisms and incentives, considering diverse groups with different relationships to natural landscapes: Costa Rican farmers, North American tourists in Costa Rica, and potential conservation donors. Despite diverse barriers and motives for participation, this dissertation investigates the opportunity for financial mechanisms to bolster and support values associated with environmental responsibility.

The first study pilots methods for assessing 'relational values', a concept that transcends traditional instrumental/intrinsic value divisions in linking people to ecosystems. Results suggest that relational values are distinct from standard methods of measuring ecological worldview and are predictive of farmer attitudes at the landscape level.

The second study assesses environmental values and attitudes of Costa Rican farmers regarding their national payment for ecosystem services program. The study investigates a set of claims regarding the negative effects of monetary incentives associated with the idea of "motivational crowding out". Results indicate strong environmental concern across both participants and non-participants, and finds strong correlations between relational values and a series of farming attitudes associated with lifestyle and conservation.

The third study quantifies tourist preferences for specific attributes of conservation programs in Costa Rica, and explores the relationship between ecotourism and environmental values with knowledge of a prominent environmental challenge in the region. Stated interest in supporting conservation and strong environmental values presents an opportunity to leverage conservation values and increase financial support for conservation.

The fourth study introduces the concept of conservation impact investing, describes the unique challenges that differentiate it from other social impact investing opportunities, and outlines a research agenda for paths forward. I address the potential for conservation impact investing to expand the reach and constituency of support for conservation, and the risks associated with diverting funds from traditional conservation programs.

The dissertation lends support for the notion that appropriately designed incentive programs could significantly unite and expand interest and participation in conservation efforts rather than divide them.

Preface

Chapters 2, 3, 4, and 6 of this dissertation are intended to be published in academic journals as distinct manuscripts. They are therefore intended to stand alone, which results in some repetition of the larger research context across chapters. Chapters 2, 3, and 4 relate to research conducted as part of FuturAgua, a multi-disciplinary and multi-institutional research project that examined and supported planning processes for adaptation to climate change in Guanacaste, Costa Rica.

A version of Chapter 2 has been submitted for publication in a peer-reviewed journal. Lead co-authorship for that article (which includes data from other populations) is shared by myself and Sarah Klain, who co-developed the relational value index with Kai Chan and Terre Satterfield. Sarah and I pooled and analyzed the data, and co-wrote the paper with input from Kai Chan and Terre Satterfield. Data used in this chapter is from surveys that are described and discussed in greater detail in Chapter 3 and Chapter 4.

Chapter 3 has been prepared as a manuscript for submission. Survey design included input from Terre Satterfield and Kai Chan, and from university students and farmers in Nicoya, Costa Rica, in terms of content and terminology. Co-authors include Kai Chan and Terre Satterfield who contributed substantially to interpretation of results, and Jordi Honey-Rosés, who provided input to the manuscript. The UBC ethics certificate number associated with this work is H14-02572.

Chapter 4 has been prepared as a manuscript for submission. The survey was designed by me in conjunction with Kai Chan and Terre Satterfield. Data collection and analysis was completed by me. My supervisory committee of Kai Chan, Terre Satterfield, and Jordi Honey-Rosés offered

helpful guidance throughout the data analysis stages, contributed to the development and writing of the manuscript, and share authorship. The UBC ethics certificate number associated with this study is the same as the previous study, H14-02572.

Chapter 5 was previously published online by IUCN, the International Union for the Conservation of Nature, as part of their social science for conservation working paper series. I was a fellow in their social science for conservation program and wrote the report. I am a member of UBC's Public Scholar's Initiative, which encourages and endorses non-traditional forms of scholarship associated with our research to be incorporated in doctoral theses. This is an example of such a contribution.

Motivated by Chapter 5, Chapter 6 has been prepared as a manuscript for submission. It was written primarily by myself, with important contributions in design and writing from Jordi Honey-Rosés, Terre Satterfield, and Kai Chan.

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CAC	Regional Agricultural Extension Agency (Costa Rica)
CDFI	Community Development Financial Institutions
ES	Ecosystem Services
FONAFIFO	National Forestry Financing Fund (Costa Rica)
GEF	Global Environment Facility
GIIN	Global Impact Investing Network
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
MRI	Mission Related Investment
NGO	Non-Government Organization
PES	Payments for Ecosystem Services
PRI	Program Related Investment
ROI	Return on Investment
ROR	Rate of Return
SIB	Social Impact Bond
SROI	Social Return on Investment
TNC	The Nature Conservancy
UNAFOR	Union for Smallholder Farmers (Costa Rica)
USAID	United States Agency for International Development
WEF	World Economic Forum
WTP	Willingness to Pay
WWF	World Wildlife Fund

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The IUCN Social Science for Conservation Fellowship Programme provided an opportunity to formally expand upon a personal interest, and that work benefitted from the guidance of Alison Greenberg and Gernot Brodnig, and mentorship of J. Carter Ingram.

I was fortunate to receive generous funding to pursue this work. This included an NSERC Doctoral Award, UBC Four Year Fellowship, the Belmont Forum FuturAgua grant (NSERC G8PJ-437336-2012), as well as contributions from an NSERC Discovery Grant (17R82930), SSHRC Innovation Grant (22R09598), UBC's TerreWEB NSERC CREATE grant, the UBC Public Scholar's Initiative, SSHRC Partnership Grant OceanCanada (F16-02699), and a Queen's University Alumnae Award.

I am especially grateful to my family, who have always encouraged taking on new challenges and provided tremendous support throughout this process, to my friends who have both motivated me and provided innumerable welcome distractions, and to Mike, who has made it all fun along the way.

Chapter 1: Introduction: Finding value

Ambitious global conservation targets are not likely to be met on current trajectories, nor do many experts deem them sufficient to meet the global biodiversity crisis (Noss et al., 2012, WWF, 2016). The recognition that small victories are not leading to more widespread ecological improvements has resulted in calls for increased funding, and more radical social and institutional changes to integrate biodiversity in decision-making (Rands et al., 2010, Perrings et al., 2010). Due to the large scale of the challenge, such institutional changes are critical. However, there remains an important role for communities and individuals to shape social norms and values associated with environmental behaviour, which ultimately play a role in driving demand for change at institutional scales. This thesis explores the role of values and attitudes associated with conservation where financial mechanisms are linked to pro-environmental action. I develop and test value orientations that help explain human-nature relationships, and consider them in reference to those who are paid to steward the environment, and those who are willing to contribute to conservation in settings they have recently visited. I also explore the potential of a new investment strategy that could bring substantial financial support to conservation. In doing so I highlight opportunities to structure conservation solutions that include incentives for supporting environmental stewardship.

1.1 Economic development and conservation

In our globalized economy, technological advances alongside dramatic demographic changes have contributed to large scale natural resource exploitation (MA 2003, Rockström et al., 2009). Increasing awareness of the impact of economic development on air, water, land and seascapes has led to a variety of efforts to slow biodiversity loss, deforestation, and reduce carbon dioxide concentrations in the atmosphere (CBD 1992, CBD 2010, Pachauri et al., 2015). Unfortunately, we have not yet seen the dramatic transformation so often sought. The net result of policies and collective action is at best a slowing of negative trends, rather than a reversal to positive ones (Chapin et al., 2011, WWF 2016). Many strategies—from grassroots promotions to international agreements—have emerged to attract more attention and commitment to conservation efforts. Such commitments require financial and often political support to enact, which is problematic when environmental goals are not prioritized or are perceived to be in conflict with economic interests.

The introduction of "sustainable development" in *Our Common Future* marked a turning point in the approach to engage a broader constituency in conservation (WCED, 1987). The notion of sustainability was reinforced at the 1992 Rio Earth Summit, with a theme of *Environment for Development*, where sustainable management of resources (alongside conservation) was explicitly advocated to ensure long-term economic confidence. The endorsement of financial mechanisms to support simultaneous economic and ecological objectives abandoned previous literature about limits to growth (Meadows et al., 1972, Daly 1997, Adhikari and Boag, 2013). This approach enabled political leaders and NGOs to activate a larger base, as many environmental messages were no longer in opposition to economic growth, but instead seen as

essential for it (Robinson, 2004). International reports such as the Millennium Ecosystem Assessment, The Economics of Ecosystems and Biodiversity, and organizations like United Nations Environment Programme's Green Growth Initiative and the World Business Council on Sustainable Development all either implicitly or explicitly endorse the idea that we (as individuals, governments, businesses) will benefit in the long term from healthy ecosystems (MA 2003, TEEB 2010). This is the crux of the ecosystem services concept—even for those not motivated by a conservation ethic, human well-being is directly tied to functioning ecosystems and therefore their sustainable management is of interest to all.

1.2 Ecosystem services and financial mechanisms

Ecosystem services have become prominent in national and international environmental policy discussions; the concept is widely endorsed across the governments, NGOs, and increasingly business actors as well (Norgaard 2010, Farley and Costanza, 2010, Dauvergne and Lister, 2013) though perhaps not explicitly applied by decision makers (see Daily et al., 2009). In a review Jax and colleagues point out that the ecosystem service metaphor has developed to serve multiple purposes: awareness raising, policy guidance, damage compensation, rewards for stewardship, and profit making (Luck et al., 2012, Jax et al., 2013). They note the irony that while initiated with awareness in mind, the ES concept has mostly been implemented using explicitly economic frameworks (Jax et al., 2013). This is reflected in terminology we frequently see in reference to ecosystem services – terms such as national accounting, natural capital, ecosystem assets, and the emphasis on economic valuation.

Payments for ecosystem services (PES) emerged as a means to encourage pro-environmental behaviour using financial incentives, as part of a shift toward market mechanisms for conservation (Ferraro and Kiss, 2002, Wunder, 2005). The logic behind PES involves realigning incentives so that those who bear the cost of environmental externalities are rewarded by beneficiaries, or, incentives for stewardship are provided where it may not have existed previously (Barrett et al. 2013, Alston et al., 2013, Wünscher and Engel, 2012). Farmers may recognize the water quality benefits of installing fences to keep their cattle out of a stream, but the effect of not doing the activity does not negatively impact them, only those who are downstream. Conserving a rainforest to protect rare species that are globally valued does not help the economic challenges of a nearby farmer who could benefit from clearing land for agriculture. In short, private benefits and social benefits may not align, and PES is a strategy that seeks to address this imbalance (Jack et al., 2009). In its most simplistic form, the appeal is obvious. This is especially the case for governments in developing countries where natural resources are abundant and economic development is sorely needed. PES is a strategy that (at least in theory) alleviates the existing conservation-development conflict in which the environment has historically been the loser (Barrett et al., 2013). However, the design of PES projects presumes that appropriate incentives will induce both ecosystem and livelihood benefits. Critiques related to equity and damaged social and ecological relationships have questioned whether such benefits can be delivered (Pascual et al., 2010, Luck et al., 2012, Muradian et al., 2013, Pascual et al., 2014).

The criticisms of PES mirror the criticisms of a variety of market-based strategies to incentivize conservation action that promote ecological and economic "win-win" scenarios. Can such an

approach meaningfully contribute to sustainability or are marginal improvements the best one can hope for? At worst, do such interventions enable status quo consumption and globalized capitalism that is a primary driver of degradation, thus providing the illusion of doing good while only exacerbating the problem? (see McAfee 2012). Many social scientists in the environmental arena are highly skeptical of the apparent neoliberal logic being applied to nature with the implication that all values (besides prices) are shed (McAfee and Shapiro 2010, Kosoy and Cobrera 2010, Fletcher and Büscher, 2017). Related critiques have been applied to the ecosystem services literature, suggesting that such an anthropocentric perspective implies that anything not providing a "service" for people is devalued (McCauley, 2006). Ecosystem services can be used as a "complexity blinder" that masks the complexity in ecological and social systems that are critical to understand multifaceted global problems (Norgaard, 2010). Assuming economic motivators are primary, or ignoring how they interact with other motivators, can lead to undesirable outcomes (Fehr and Falk, 2002). Tapping into deeper motivators, such as pride, fairness, the desire to reciprocate, or to align with social norms (and often more importantly, not misaligning) can all contribute to behaviour and decision-making associated with the environment (Alston et al., 2013, Balderas Torres et al., 2013, Milner-Gulland 2012). Ignoring these other factors can be costly (Pascual et al., 2014, Van Hecken and Bastiaensen, 2010b).

1.3 Cultural ecosystem services and non-use values

Cultural ecosystem services (CES), which represent a range of non-material benefits of nature (e.g., recreation, spiritual benefits, and other non-use values) help explain how people relate to nature, though have not been well characterized (Chan et al., 2012a, Chan et al., 2012b, Chan

and Satterfield, 2016). Part of the challenge is that CES are not easily assessed or measured due to their "intangible" nature, and are therefore not as easily integrated in traditional decision-making processes (Satterfield et al., 2013, Satz et al., 2013). Several authors have explored ways in which ecosystem services thinking and decision making can be supported by a deeper understanding of ethics and values (see Luck et al., 2012, Chan et al., 2012a).

Studies that seek to classify values are often trying to determine how environmental attitudes influence behaviour and decision-making, with the implication that understanding and invoking certain values is a route to more sustainable actions and choices (Brown, 1984, Dietz, 2005). There are several ways to classify values that can support the way different people think about how we live and interact within the natural world. Instrumental values refer to things we hold in high regard due to their ultimate benefit to us (O'Neill et al., 2008). A forest might be valued for the timber or improved air quality it provides; the ecosystem services framework (not necessarily including cultural ES) revolves around instrumental thinking. Conversely, intrinsic values refer to the something's importance in and of itself (O'Neill et al., 2008). A forest does not need to provide a tangible good or service—it can be appreciated for its own sake. Both economic and ethical arguments for protecting nature invoke the axiomatic perspective that the environment is undervalued and a renewed appreciation will adjust our management strategies (Satterfield and Kalof, 2005).

Value orientations are often used to justify conservation, though have been rooted in arguments about whether to emphasize the intrinsic versus instrumental value of nature. For example, the

most widely measured index of values[1] is known as the New Ecological Paradigm (NEP), often used to help explain pro-environmental behaviour (Stern 1999, Dietz et al., 2005). A recent alternative to these positions has been described as 'relational values'—broadly, values linking people and ecosystems via the particular relationships they have with nature (e.g. kinship or stewardship) and which constitute principles, virtues and notions of a good life (Muraca 2011, Jax et al., 2013, Chan et al., 2016). Relational values reflect a position that recognizes that the apparent intrinsic/instrumental dichotomy is not reflective of the intuitive ways in which people think about their obligations to or relationships with nature and so too, then, what influences decisions (Chapter 2). Chan et al. (2016) argue that a relational value framing will also be more inclusive and responsive to known aspects of sources of well-being (e.g., connection to others, place attachment) than instrumental and intrinsic values, particularly when addressing how people make decisions and what they care about.

1.4 Research questions and thesis summary

While there has been significant debate in the academic literature between those who see the merit of various market-oriented techniques, as compared to those who highlight weaknesses with economic interventions (e.g., Rees 1998, Robinson 2004, Child 2009), there is increasing recognition of the benefit that can be gained from more integrated approaches (Armsworth and Roughgarden, 2001, Chan et al., 2007). In an effort to acknowledge the potential usefulness of certain economic tools while addressing shortcomings, several academic efforts have proposed

[1] The NEP is referred to as a measure of belief amongst those who reference the VBN (Dietz et al., 2005) and as a value measure by those using the concept of values more broadly (World Values Survey, 2014), as I do here.

inclusive strategies and productive paths forward (Wilson and Howarth, 2002, Armsworth et al., 2007, Carpenter et al., 2009, Gómez-Baggethun and Ruiz-Perez, 2011). It is in this spirit that this thesis seeks to explore how various financial tools that encourage contributions to conservation can benefit from a deeper consideration and understanding of attitudes and values. Whatever one's position, the financial aspect of conservation cannot be ignored – it is the language of donor nations, development banks, and of the commerce that drives much of the global ecological impact. Large scale financial support is critical to address the global scale challenge of conservation, the importance of which is highlighted by one of the Convention on Biological Diversity's goals for 2020 being devoted to financing conservation efforts (Perrings et al., 2010, CBD 2010). Simultaneously, the relative lack of transformative action thus far suggests that system-wide changes have not taken place, and there is a role for substantial increases of individual and community engagement. A preliminary step on this path requires understanding the underlying values that may motivate participation in pro-environmental actions as well as the demand for conservation action more broadly. As a result, the research questions addressed in this thesis involve exploring financial contributions to conservation via incentive (PES), donation, and investment through the lens of environmental attitudes and values, with a specific focus on relational values in particular.

1.4.1 Relational values (chapter 2)

Relational values highlight key relationships between people and nature, but have not been measured empirically as such across individuals or populations. By making explicit connections between nature and values that include the concepts of justice, reciprocity, and care, the hypothesis is that relational conceptions of the environment may resonate more powerfully than

traditional intrinsic or instrumental framings. If an empirical relational value measure can be demonstrated to be consistent and reliable, it offers a straightforward but fruitful means to examine how diverse populations think of themselves in relation to the environment.

A first step was to develop an index or indices for relational values as this did not previously exist. Doing so involved the development of a suite of statements to capture aspects of relationality, and piloting methods to assess their relevance across diverse populations. It was initially necessary to understand whether the relational value statements demonstrate internal coherence as a single construct. To situate relational values amid other measures of environmental values, I then compare them to other value measures or constructs including the New Ecological Paradigm (NEP) scale statements, which is the current standard for broad evaluations of environmental values. To further operationalize the construct, I examine the value orientations alongside farming attitudes by asking if relational values and NEP scores related to attitudes towards farm management. Our aim in this effort is to examine whether an environmental value measure that captures a different dimension of how people think of themselves in relation to the environment may provide a useful and more inclusive framing for pro-environmental behaviour and policy.

In order to enhance the 'realism' of these value investigations, we sought respondents who might be involved in incentive schemes as well as those public constituents who might benefit from these. Thus, two of the populations in the relational value study were Costa Rican farmers and international tourists in Costa Rica. Characterizations of relational values are further elaborated in chapter 3, which focuses on farmers, and chapter 4, which focuses on tourists. In each case, I explore the role relational values play with respect to economic mechanisms for conservation either in reference to

the fields that farmers tend, and in the context of those who may benefit from ecological experiences as part of recreational activities.

1.4.2 Financial and non-financial incentives in PES (chapter 3)

To more deeply understand the role of incentives in the promotion of pro-environmental activities, I tested the notion of motivational crowding out (and associated claims) in a PES context. Motivational crowding out stems from behavioural economic and psychological literature that suggests that intrinsic motivations for an action may be displaced when people are presented with financial incentives. However, the concept has limited testing in environmental contexts. The existing empirical studies of motivational crowding out focus on the activation of moral concerns as motivation for environmental action, whereas this chapter interrogates a broader set of claims, in a setting where incentive programs have had a long and storied history (i.e. where there has been time for value erosion to take place).

In PES in particular, studies of motivational crowding out are few, though it is frequently raised as a concern (Vatn 2010, Muradian et al., 2013). While there is evidence that financial incentives can undermine equity and even lead to perverse environmental outcomes, there are several examples where value-based explanations have been used to describe both positive motivators to engage in PES and the social co-benefits that emerge from participation (Narloch et al., 2011, Fisher 2012, Greiner and Stanley, 2013). Often these social benefits are convenient by-products, and those designing projects have not systematically assessed the underlying values and attitudes that may influence the success of particular intervention strategies (Vignola et al., 2012).

To address this gap, the second study assesses environmental values and attitudes of both participants and non-participants in a national payment for ecosystem services program in two neighbouring cantons in rural Costa Rica. Through several lines of evidence, the study investigates a set of claims regarding the negative effects of monetary incentives broadly associated with the idea of "motivational crowding out". That is, whether monetary incentives confuse or undermine environmental values and attitudes, and their role as motivation for pro-environment actions. Preferred incentive types (monetary and otherwise), motivators for participation, and farming practices are examined in relation to farmer attitudes and values. I discuss findings of this study alongside, 1) plans for a new PES advocated for by smallholders and Costa Rica and, 2) recommendations for a more robust PES (Chan et al., in revision) to situate this regional case in a national and global PES context. In doing so the aim for this work is to contribute to the ongoing development of PES that considers the underlying values of participants that may enhance their PES experience and ultimately the environment.

1.4.3 Ecotourism (chapter 4)

Similar to PES, ecotourism was initially heralded as a means to protect biodiversity and promote conservation by bringing non-consumptive income streams to communities with substantial natural resources (Ross and Wall, 1999, Loumou et al., 2000). Costa Rica is a globally recognized ecotourism destination, where tourism expansion in the northwest has contributed significantly to economic development as well as conflict associated with water allocation and use. Tourists in the region are therefore in a position to both contribute to conservation through their economic activities, while also likely contributing negatively to a local environmental issue.

Economic contributions to conservation in the ecotourism literature are frequently focused on indirect contributions via payment for services (e.g., park entry fees) rather than charitable contributions. In an effort to understand the extent to which tourists are willing to directly contribute to conservation and are able to connect their visit to ecological impact, the third study quantifies stated preferences for specific attributes of conservation programs for Costa Rican tourists using a choice experiment. Tourists are also assessed on a number of measures associated with tourism, knowledge of a drought in the region, and relational values to detect trends associated with giving patterns and preferences. Program attributes include a choice between conservation projects that conserve water or biodiversity, anticipating a preference for biodiversity that may be mediated by knowledge of the drought.

Behaviour change is one of the greatest hurdles to achieve sustainable outcomes, and testing the knowledge, value, and attitudinal factors that may influence contributions to conservation is a step to better understand what appropriate strategies may be. As a leader in ecotourism, we believe Costa Rica may be an appropriate place to instigate this shift in norms when it comes to tourism.

Together both of the farmer and tourist studies are intended to support the work of local partners associated with the FuturAgua project, who are creating long term development plans in the northwest of Costa Rica where the tourism and agriculture sectors have substantial environmental impacts. Beyond the broader academic conclusions reached from these studies, understanding the preferences, values, and motivations of the key constituents is critical for managers to develop sustainable plans that align with the priorities and practices of those who interact regularly with the landscape.

1.4.4 Conservation impact investing (chapter 5 and chapter 6)

From farmers on the landscape to international Costa Rican tourists, I move to a larger scale – both in geographic reach and relative level of financial contribution with social and conservation impact investing. Impact investing is emerging as a means to finance social issues, with conservation applications just beginning to develop. We imagine PES projects being recipients of impact funds, and ecologically minded investors (with a similar demographic profile to ecotourists) as potential participants in this emerging field. Given the potential for large influxes of capital and associated assumptions and risks, Conservation Impact Investing (CII) bears similarity in both the enthusiasm for and concerns about PES two decades ago. The aim in bringing forward key issues associated with CII is to facilitate discussion enabling appropriate investment strategies that minimize concerns of the conservation community leading to more effective partnerships.

Chapter 5, a report developed for IUCN and their conservation practitioner constituents, is an overview of the relevant concepts associated with social impact investing, and situating conservation within it. IUCN's social science for conservation fellowship program seeks to promote and support research on emerging topics relevant to biodiversity conservation where social science perspectives and approaches are beneficial. Social impact investing emerged as a theme that member states and organizations sought more guidance and understanding. Though not a traditional academic output, this chapter is included as a demonstration of a different application of academic scholarship, as endorsed by UBC's Public Scholars Initiative. It led to the development of Chapter 6, which is an academic output inspired by the report.

Chapter 6 considers concretely the contribution of the former practice-oriented piece to the academic literature. The chapter introduces and defines the concept of conservation impact investing, describing the unique challenges that differentiate environmental conservation from other social issues. I address the potential for conservation impact investing to expand the reach and constituency of support for conservation, and the risks associated with diverting funds from traditional conservation programs. The scale of the opportunity is great, not only because of the large magnitude of funding available, but also because conservation impact investing could potentially broaden the mission of conservation and spread conservation-friendly norms. However, the risks are also considerable, and conservation organizations and agencies will need to weigh the risks and opportunities associated with engaging in conservation impact investing projects. If the conservation community plays an active role in setting criteria and boundaries for CII while learning to effectively engage with the financial community, we propose that CII may be able to significantly expand the scope for conservation without undermining its integrity. Together these chapters provide a more complete view of the current state of conservation impact investing, its key constituents, its current applications, and proposed strategies to deal with existing concerns.

All chapters are connected through their examination of relational values (as developed in chapter 2) and associated concepts, their examination of several populations with different relationships to the landscape, their engagement in a particular financial mechanism, and the barriers that need to be overcome in order to support more widespread participation in a given conservation action (Figure 1.1).

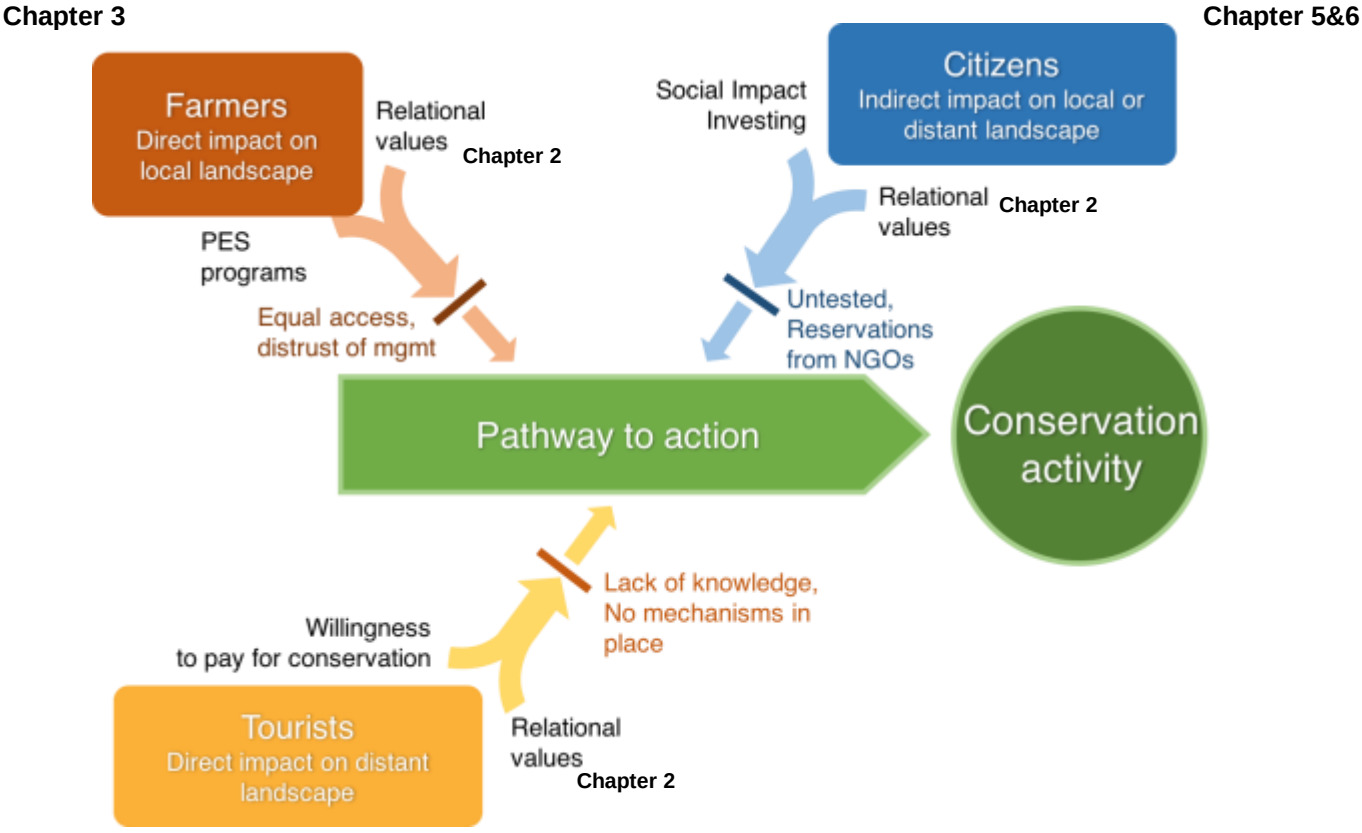

Figure 1.1. Relationship between thesis chapters, where populations and associated financial mechanisms are highlighted along with barriers to barriers to participation. Relational values are introduced in chapter two and are proposed as a tool to catalyze participation. As relational values remain a theme throughout the dissertation, thee term appears in multiple places in the figure.

Together this work comprises a systematic effort to explore the role of values in alongside the use of financial incentives for conservation.

Chapter 2: Relational values resonate broadly and differently than intrinsic or instrumental values, or the New Ecological Paradigm

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2.1 Introduction

Conservation scientists and practitioners have often drawn on ethical arguments to garner support for the protection of biodiversity. To those outside the conservation community, it may come as a surprise that the "Why conserve nature?" value debate about how to motivate people to achieve conservation outcomes has become increasingly heated and arguably detrimental to conservation science despite calls for "a unified and diverse conservation ethic" (Tallis and Lubchenco, 2014, p. 27, Vucetich et al., 2015). "Traditional conservationists" advocate for focusing on the intrinsic value of nature, to protect nature for its own sake (McCauley, 2006). They often focus on strategies to minimize human interference with ecological processes and invoke ethical and moral arguments to support their stance while being skeptical of corporate involvement in conservation (Soulé, 2013). Such advocates are often pitted against the "new conservationists," who champion the instrumental value of nature, justifying and prioritizing conservation action based on nature's benefits to people (Kareiva et al., 2011). New conservationists tend to be more open to using market-based incentives and collaborating with corporations to protect and enhance the benefits of nature to people (ecosystem services), often derived from human-dominated landscapes (Tercek and Adams, 2013).

Underpinning the intrinsic vs. instrumental debate is a common objective—to promote and encourage conservation actions, from the level of the individual to national governments and international decisions. Marvier (2013) and other new conservationists claim that utilitarian conservation arguments do not undermine conservation justifications based on nature's intrinsic value or an ethical duty to protect biodiversity. Rather, many contend that instrumental arguments offer additional ethical justifications and so "potentially broaden the tent of conservation" (Marvier 2013, p. 1). This strategy relates to the total economic value evaluation of ecosystems, where both use and non-use values are assessed collectively to highlight the contributions of a range of values (Pearce, 1992). This model implies that all intrinsic values can be captured by non-use values, which is useful in settings when valuation is required although other disciplines would point to such values as being independent of valuation. The perceived instrumental-intrinsic dichotomy can be constraining or possibly alienating to many who may potentially care more and take additional action if environmental issues were framed differently (Chan et al., 2016). Reducing the importance of nature to only intrinsic or instrumental and monetized value is also not reflective of the largely intuitive ways that people make decisions, understand the world, and decide what's right (Haidt, 2007, Kahneman, 2011, Levine et al., 2015).

The burgeoning field of ecosystem services (ES) (Costanza and Kubiszewski, 2012), long associated with a purely instrumental perspective, has recently been broadened to include other perspectives on value. The ES concept became globally recognized with the Millennium Ecosystem Assessment (MA, 2003), which emphasized diverse connections between human well-being and nature, but the category of cultural ES arguably never fit well in the publications

that ensued over the next decade (Chan et al., 2012a, Daniel et al., 2012). The instrumental orientation of ecosystem services is one explanation for the cause of the poor fit, in part because instrumental values are by definition substitutable, whereas cultural values often are not (Chan et al., 2011, 2012b). Quantified and/or monetized ES data often omit the more intangible values that "really get at well-being," (Hannah in Chan et al., 2012b), such as connectedness and belonging to a community (both human and non-human), sense of place and other culturally and psychologically mediated relationships between people and ecosystems (Russell et al., 2013). Consequently, researchers from a wide range of backgrounds, including anthropology, political science, economics, and ecology, have begun to develop methods designed to enable social, cultural and intangible values to play a more prominent role in ES assessments and decision-making without compromising their distinct nature (Chan et al., 2012b, 2012a, Daniel et al., 2012, Gould et al., 2014, Klain and Chan, 2012, Martín-López et al., 2012, Plieninger et al., 2013). As a result of these and related efforts, the ES field is evolving to the point that the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) conceptual framework has included an additional conception of values: relational values, to its mandate (Diaz et al., 2015).

The hope, as argued by Chan et al. (2016), is that a relational-value framing will be more inclusive and responsive to known aspects of sources of well-being (e.g., connection to others, place attachment) than instrumental and intrinsic values, particularly when addressing how people make decisions and what they care about. In this case, we refer to framing as in the *framing effect* – deliberate construction of (in this case) a value statement that may influence the

response. The relational "framing" is intended to present value statements such that they facilitate the connection between humans and the natural world.

Relational values encompass "eudaimonic" values — values associated with living a good life as well as reflection about how preferences and societal choices relate to notions of justice, reciprocity, care and virtue (Jax et al., 2013, Muraca, 2011, Ryan and Deci, 2001, Ryff and Singer, 2008). Relational values are derived from interactions with and responsibilities to humans, non-humans, landscapes and ecosystems (Chan et al., 2016). However, despite these conceptual advances, empirical investigation has been lacking.

Here we test the application of social-ecological relational statements quantitatively, as a first step to potentially transcend the limitations of the instrumental-intrinsic dichotomy. We acknowledge that this dichotomy is often an oversimplification of the complicated ways in which people relate to nature, which can include elements of both of these perspectives simultaneously. Relational values are intended to capture ideas that could be considered instrumental or intrinsic without losing additional values and often more powerful motivations to protect nature. We pilot several social-ecological value statements, including instrumental, intrinsic, and relational value statements as well as value statements that use metaphors to convey a value. We assess if our set of relational value statements demonstrate internal coherence as a single or multi-dimensional construct. We compare responses to relational value statements with instrumental, intrinsic and metaphorically phrased value statements.

We also address a fundamental question: How do relational values compare to other scales often used to assess strength of environmental commitment? The New Environmental Paradigm question set (Dunlap and Van Liere, 1978), subsequently revised as the New Ecological

Paradigm Scale (NEP) (Dunlap et al., 2000), is the most widely used method to measure ecological beliefs. The NEP aggregates responses to 15 (or as few as 5) statements to assess ecological worldview, many of which address ecocentric as opposed to anthropocentric beliefs. Social scientists have used the NEP scale with diverse populations, responses have demonstrated variation along the ecocentric-anthropocentric continuum (Nordlund and Garvill, 2002).

Although global values surveys using NEP show variation, research finds that most people are concerned about the natural world and prefer the notion of "co-existing" with nature over dominating nature (Nordlund and Garvill, 2002). The NEP largely aligns with an ecocentric vs. anthropocentric framing, by assessing the extent to which people recognize 1) ecological limitations to growth; 2) the importance of maintaining a balance of nature; and 3) rejection of the idea that nature "exists primarily for human use" (Dunlap, 2008, p. 6). Thus, the question remains: does the addition of relational value items add something to the study of environmental beliefs or values, perhaps complementing the NEP by offering a different framing?

An additional question is whether relational values, once tested, are instructive in describing pro-environmental attitudes when compared to other values. The example used here involves attitudes associated with farming management in rural Costa Rica. Specifically, we evaluate NEP and relational values prompts as they relate to farmer attitudes associated with on-farm environmental priorities, economic priorities, and farming lifestyles.

This discussion of both value types and their applicability can be summarized as four research questions underpinning our survey design and stated below:

1. Do various types of relational value statements correlate as a single construct?

2. Do relational value statements (including those strongly stated) resonate with (i.e., elicit agreement) amongst diverse populations?
3. Do people respond to relational value statements in a consistently different way than the New Ecological Paradigm (NEP) scale statements?
4. In the case of farmers, can relational values and NEP scores help explain conservation-oriented farm management attitudes?

In the following sections, we outline our approach to data collection and analysis, present our results, and discuss the implications for environmental research and practice.

2.2 Methods

Our methods involved three components: diverse sampling, comparing value types, and testing values in reference to farming attitudes. For our sample, we targeted three populations: farmers and international tourists in Costa Rica, and residents of U.S. coastal New England states[2]. Our surveys included value and attitude statements followed by Likert scales to assess agreement/disagreement. Our analysis included conducting factor analysis (for correlation in patterns of responses across questions and groups of questions), calculating Cronbach's alpha (for assessing consistency in responses across questions), and running Pearson correlation tests. Each step is described in more detail below.

2.2.1 Survey value statements and sample

We derived a list of value statements related to the environment including NEP, instrumental, relational, intrinsic, and values conveyed using metaphors. The instrumental value statements

[2] For the purposes of this thesis, the findings of the New England survey are present in the pooled data and mentioned as needed to describe methods and analysis, but are not otherwise discussed in detail.

were derived from concepts advanced in overviews of ecosystem services (MA, 2003). The NEP statements are a selection from the standardized NEP survey instrument to assess ecological worldview (Dunlap et al., 2000). The intrinsic, relational and metaphorically phrased value statements are derived from cultural ecosystem services literature (Chan et al., 2012b, Gould et al., 2014, Klain et al., 2014, Raymond et al., 2013). The metaphor statements are a rewording of four of the relational value statements. In contrast to the metaphor statements that focus on the social-ecological relationship itself, the relational value statements express the relationship as a premise for a value statement (e.g., the kin metaphor statement, *kin_m*, is "I think about the forest/ocean and the plants and animals in it like a family of which I am very much a part" vs. the kin relational statement, *kin_r*, is "Plants and animals, as part of the interdependent web of life, are like 'kin' or family to me, so how we treat them matters"). In all three surveys, in which the values questions were one of several components, the value statements (Table 2.1) were the final section, so as not to prime responses in other areas of the otherwise different surveys. Survey takers were asked to respond to the value prompts using a 5 point Likert scale (i.e., highly disagree = 1, highly agree = 5).

Table 2.1. Value statements used in surveys. F = Costa Rican Farmers, T = International tourists at the Liberia airport in Costa Rica, MT = Mechanical Turk respondents. Reverse codes were used when appropriate so high scores mean pro-environmental, y = yes, n = no.

Variable	Category	Statement	Population	Reverse code
comm	Relational	There are landscapes that say something about who we are as a community, a people	F, T, MT	n
health	Relational	My health or the health of my family is related one way or another to the natural environment*	F, T, MT	n
iden	Relational	I have strong feelings about nature (including all plants, animals, the land, etc.) these views are part of who I am and how I live my life	F, T, MT	n
kin	Relational	Plants and animals, as part of the interdependent web of life, are like 'kin' or family to me, so how we treat them matters	F, T, MT	n

Variable	Category	Statement	Population	Reverse Code
resp	Relational	How I manage the land, both for plants and animals and for future people, reflects my sense of responsibility to and so stewardship of the land	F, T	n
wild	Relational	I often think of some wild places whose fate I care about and strive to protect, even though I may never see them myself	F, T, MT	n
other	Relational	Humans have a responsibility to account for our own impacts to the environment because they can harm other people	F, T, MT	n
abuse	NEP	Humans are severely abusing the environment	F, T, MT	n
bal	NEP	The balance of nature is strong enough to cope with the impacts of modern industrial nations	F, T, MT	y
bau	NEP	If things continue on their present course, we will soon experience a major ecological catastrophe	F, T, MT	n
crisis	NEP	The so-called "ecological crisis" facing humankind has been greatly exaggerated	F, T, MT	y
spaceship	NEP	The earth is like a spaceship with very limited room and resources	F, T, MT	n
decade	Intrinsic	Humans have the right to use nature to meet our needs, even if this includes impacts that will take a decade or more to recover	MT	y
right	Intrinsic	Humans have the right to use nature any way we want	F, T	y
		*I think about the forest and the plants and animals in it like: **		
iden_m	Metaphor	Something I identify with so strongly that it makes me, me	F, MT	n
kin_m	Metaphor	A family of which I am very much a part	F, MT	n
other_m	Metaphor	A world we must care for so that any damage doesn't also negatively affect humans who depend on it elsewhere	F, MT	n
resp_m	Metaphor	Beings to which we owe responsible citizenship and care	F, MT	n
extract	Instrumental (economic)	Natural resource extraction is necessary for countries to develop	F, T	y
clean	Instrumental (health)	It is important to protect nature so we have clean air and water	F, T	n
loss	Instrumental (use)	We can lose forests and wetlands, as long as we are keeping enough for the environment to function	F, T	y

* This statement was reversed for the M-Turk sample: “My health, the health of my family and the health of others who I care about is not necessarily dependent on the natural environment.” We do not recommend reversed coding this prompt because we later realized it caused confusion.

** The farmer sample responded to metaphorical statements related to forest. The M-Turk sample responded to metaphorical statements related to ocean. Tourists were not presented metaphorical statements.

Our aim with the different populations and samples is not to suggest they are representative, but to compare across different populations. We targeted three populations with different methods including online and paper-based surveys.

2.2.1.1 Online survey

For the online sample, we used Amazon's Mechanical Turk (M-Turk) system to enlist respondents, which has become a common recruitment method for experimental research (Goodman et al., 2012, Paolacci et al., 2010). Data outputs are generally just as reliable as those acquired with traditional recruitment methods (Buhrmester et al., 2011). We attempted to minimize selection bias in our sample by describing it on M-Turk's HIT (Human Intelligence Tasks) list in general terms as a survey about preferences based on different text and image-based descriptions, without using any language related to ecosystems. The sample was limited to M-Turk workers who have mailing addresses in coastal New England states (Connecticut, Maine, Massachusetts, New Hampshire or Rhode Island). We collected self-reported demographic data from the sample to later compare it with census data to determine the extent to which this sample is representative of the population of these states. Upon survey completion, respondents were given a code to submit to the M-Turk system for payment. Respondents were paid $1 to take the 10-15minute survey. Given that the typical M-Turk worker is willing to complete tasks for ~$1.40/hour (Horton and Chilton, 2010), our payment was higher than the average reservation wage to expedite participant recruitment. Incomplete responses were discarded for a total of 400 M-Turk respondents.

2.2.1.2 Paper-based survey

Two paper-based surveys incorporated value statements for two distinct populations in Guanacaste, Costa Rica. The first (n = 260) were international tourists in Costa Rica, who were randomly sampled in the Liberia Airport upon departure from the country. This airport primarily services coastal tourist destinations and thus all international flights at this time were to the United States or Canada. Every other tourist in the departure lounge (i.e. those who arrived just in time to board did not have time to participate) during the week of May 25, 2015 were asked if they had travelled in the region, and if so if they were willing to participate in a survey. They were predominantly tourists from North America (and the U.S. in particular). The second group consisted of farmers in the Nicoya region (n = 253), mostly cattle ranchers, who derive their livelihoods directly from the environment.

We sought diversity across our three samples and anticipated farmers to display different environmental value profiles than the other two groups, but expected the international tourists to resemble the M-Turk population more closely, insofar as they both include substantial representation of middle and upper income Americans. The farmers were randomly selected from lists provided by the agricultural extension agencies in the region, and the value statements were included as part of a survey about environmental practices on the landscape more broadly.

2.2.1.3 Sampled population characteristics

Our M-Turk population was on average younger (32) than the tourist (45) or farmer populations (58) (Table 2.2). The tourists and M-Turk samples were a majority female while the farmers were mostly male (88% male) (Table 2.2).

Table 2.2. Demographic characteristics of the three surveyed samples.

Population	Socioeconomic Characteristics	Description	*N*	Percentage or Mean of Sample	Percentage or Mean from Reference Population
M-Turk					**2014 US Census**
	Income	Annual household income before taxes	400	~$53,000*	$66,200
	Age	Years old	400	32	40
	Female	Gender	400	0.59	0.51
	Education	Bachelor degree or higher	400	0.66	0.38
	White	Caucasian race	400	0.83	0.82
Tourist					
	Income	Income before taxes	260	~$75,000	
	Age	Years old	260	~45	
	Female	Gender	260	0.63	
Farmer					
	Education	Bachelor degree or higher	253	0.15	
	Age	Years old	253	~58	
	Female	Gender	253	0.12	

2.2.2 Statistical analysis

We assessed the discrimination or uniqueness of each value category using factor analyses and principal components analyses. Then we analyzed each using Cronbach's alpha to test the internal consistency within value measures.

2.2.2.1 Eigenvalues and scree test

We calculated eigenvalues and created a scree plot to determine how many factors to include in the factor analysis. Eigenvalues associated with components or factors are included in descending order in a scree plot. The inflection point, or 'elbow' at which point eigenvalues level off, demarcates components/factors to retain while subsequent components/factors are generally ignored. A common heuristic is to retain components/factors with eigenvalues ≥ 1, which means that the component/factor accounts for as much or more variance as a single variable (Field et al., 2012).

2.2.2.2 Factor analysis

Our factor analysis investigated the structure of a set of variables to determine if there are clusters of correlation coefficients, which indicate latent variables, also called factors. This method derives a mathematical model from which underlying factors are estimated. Each latent variable is associated with some amount of the observed variable's overall variance. In a setting where strong agreement with NEP, relational, and other statements would result in correlated responses. We explore the correlations between the variables, and sought to understand if there were different factors driving the agreement. we sought to understand if there were different factors driving the agreement and that the measure is providing new information regarding the values of those surveyed. We conducted an exploratory factor analysis with the hypothesis that responses to relational value statements comprise a factor distinct from responses to NEP statements (Figure 2.1).

2.2.2.3 Consistency measure: Cronbach's alpha

We calculated Cronbach's alpha for all of our social-ecological statements to determine the extent to which responses are consistent across NEP statements and relational statements. Cronbach's (1951) method is loosely understood as splitting a dataset in two in every possible way, then computing the correlation coefficient for each split. Cronbach's alpha (α)—the arithmetic average of these pairwise correlation coefficients within a group of questions—is the most common metric of scale reliability (Field et al., 2012).

2.2.2.4 Correlation testing of environmental values and farmer attitudes

To perform a correlation analysis, we created three indices of different values (NEP, relational, and metaphor) for the farmer population. We calculated indices based on the average response across any value type as results from the factor analysis and Cronbach alpha (Table 2.4, Figure 2.1) indicated that relational statements are internally consistent and distinct from the NEP. The metaphor relational value statements also had a high level of consistency. The farmer population responded to an additional survey section with 15 attitude statements about farm management divided into three categories of 5 statements each: conservation, lifestyle, and economics (adapted from Maybury et al., 2005, Figure 2.4). We tested the correlation between these indices and responses to the farm management attitude statements.

2.3 Results

Our results suggest that relational value statements show internal coherence as a single dimensional construct, particularly when compared to responses to NEP prompts. We identified two factors when NEP and relational value statements were pooled and analyzed from our three

populations using eigenvalues, a scree test, and factor analysis. These two types of value statements showed high levels of internal consistency based on their high Cronbach's alpha scores. We also found significant positive correlations between the farmer population responses to environmental value statements and conservation and lifestyle attitudes associated with farm management, and negative significant correlations with profit maximizing attitudes.

2.3.1 Two distinct factors based on eigenvalues and scree test

In order to understand distinctiveness in responses to types of environmental values and determine a reasonable number of factors/components to retain in the factor analysis, we calculated eigenvalues and conducted a scree test (Appendix A.1 and Table 2.3). Our scree plot, parallel analysis and optimal coordinates indicate that two factors ought to be retained for the factor analysis. The acceleration factor identifies where the slope of the curve changes most abruptly, which in our data, is directly after the first factor (Appendix A.1).

2.3.2 Factor analysis results: NEP is distinct from relational value

The factor analysis shows that survey takers responded differently to relational value prompts than NEP statements (Table 2.3 and Figure 2.1).

Table 2.3. Factor weights

Variable	Factor 1 Relational	Factor 2 NEP
comm_rel	0.54	
wild_rel	0.61	
iden_rel	0.78	
kin_rel	0.75	
other_rel	0.52	0.35
abuse_nep	0.31	0.68
bal_r_nep		0.5
spaceship_nep		0.67
bau_nep	0.36	0.78
crisis_r_nep		
	Factor 1 **Relational**	**Factor 2** **NEP**
Eigenvalues/SS loadings	2.43	2.11
Proportion Variation	0.24	0.21
Cumulative Variation	0.24	0.45

The proportion of variation attributed to Factor 1, the "Relational" Factor (0.24), is higher than the proportion attributed to Factor 2, "NEP" factor (0.21).

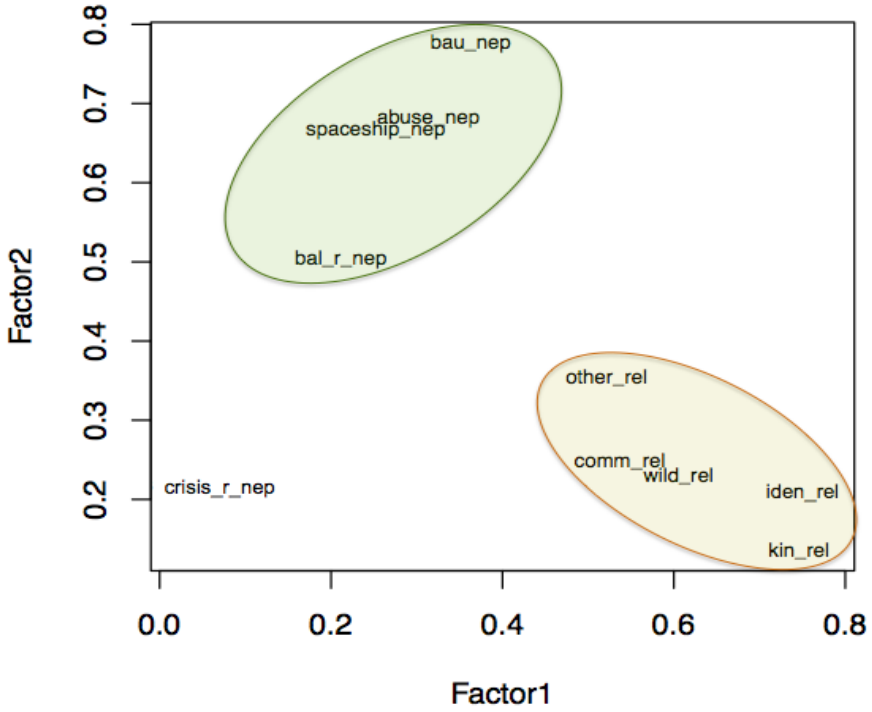


Figure 2.1. Graphical results of factor analysis.

The factor analysis results show a grouping of the relational questions that is distinct from the NEP statements. The crisis NEP statement is an outlier in the pooled data (Figure 2.1), which is discussed in greater detail in the discussion.

2.3.3 High levels of agreement and consistency with types of environmental value statements

Strong relational value statements resonate with diverse populations, as seen in the average response score for both the relational value and NEP statements was 4 (Agree). The responses to NEP statements, on average, reflect relatively high ecological concern (see Table 2.4). NEP responses were consistent (Tourist α = 0.79 and M-Turk α = 0.84), except for Costa Rican farmers (α = 0.35), largely due to the farmers' wide variation in response to the "crisis" prompt

(*The so-called "ecological crisis" facing humankind has been greatly exaggerated*, see Table 2.1). We did not include instrumental or intrinsic value statements when calculating α because of the limited number of statements in these categories.

Table 2.4. Cronbach's alpha, mean response and standard deviation of responses across value statements.

	Cronbach's alpha	Mean	Standard deviation
NEP (5)			
Full dataset	0.73	4.0	0.75
Farmers	0.35	4.3	0.49
Tourists	0.79	3.7	0.81
M-Turk	0.84	4.0	0.74
Relational (6)			
Full dataset	0.80	4.0	0.68
Farmers	0.73	4.4	0.43
Tourists	0.79	3.9	0.75
M-Turk	0.79	3.9	0.61

Costa Rican Farmers responded differently to our value statements than the M-Turk and Tourist samples. The Farmers on average responded with higher levels of agreement to relational value prompts (mean = 4.4) as compared to Tourists (mean = 3.9) and M-Turk workers (mean = 3.9) (Table 2.4). Farmers on average scored higher on the NEP scale (mean = 4.33) than Tourists (mean = 3.65) and M-Turk workers (mean = 3.96) (Table 2.4, Figure 2.2, Figure 2.3). The relational and NEP statements as well as the distribution of Likert-scale responses across the three populations are shown in the histograms in Figure 2.2. The x-axis is the number of respondents and the y-axis is the items of the Likert scale (1 means strongly disagree to 5 meaning strongly agree).

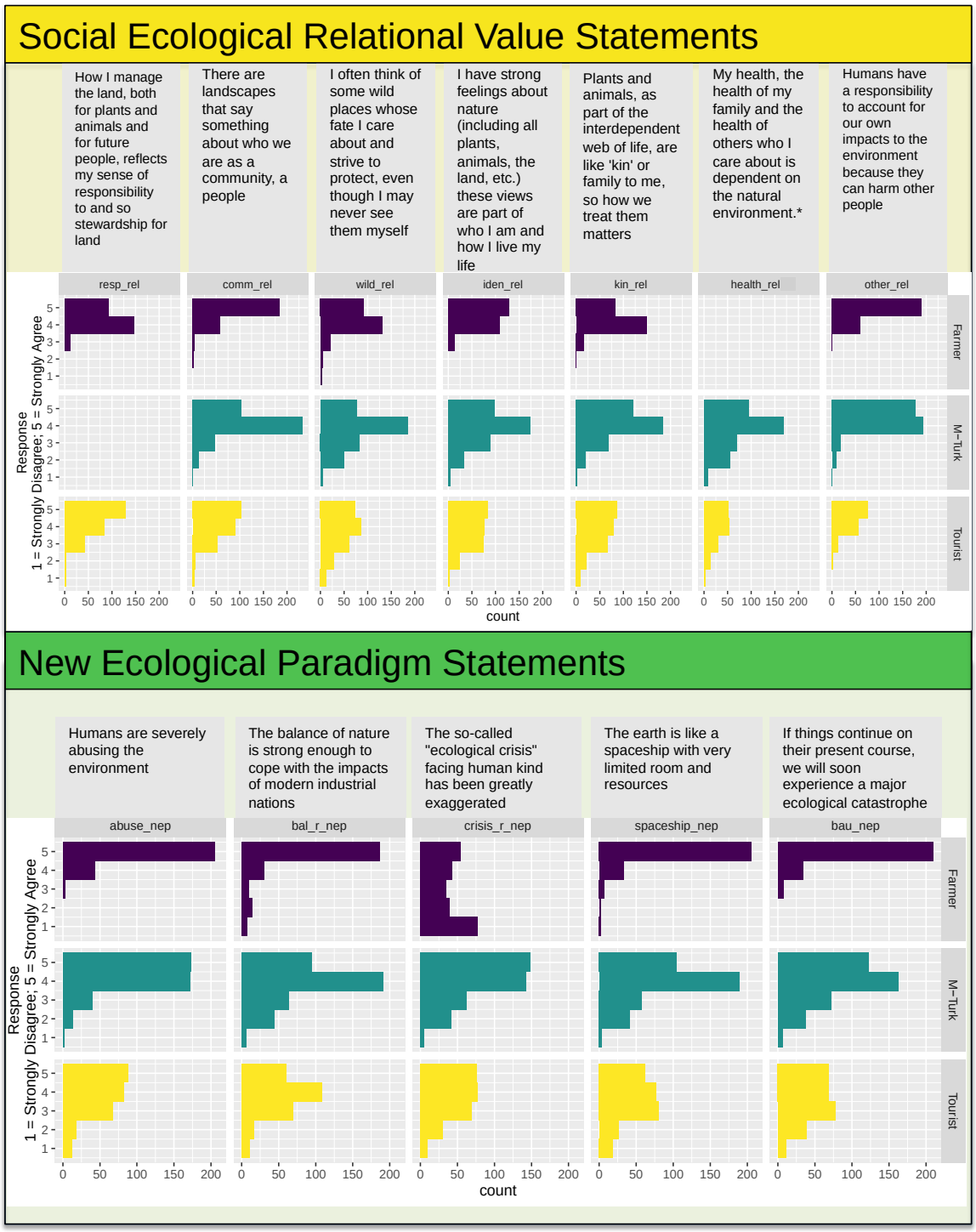


Figure 2.2. Distribution of responses to relational value prompts and New Ecological Paradigm Statements. The sample includes Costa Rican farmers (n = 253), tourists in Costa Rica (n = 260) and US M-Turk workers (n = 400).

*The health_rel prompt for the M-Turk population was worded "My health, the health of my family and the health of others who I care about is not necessarily dependent on the natural environment." Scores were reversed for this population when included in the analysis.

A shown in Figure 2.3, the M-Turk and tourist populations responded similarly to the instrumental value statements (the standard errors overlap for 2 out of 3 instrumental value prompts). Costa Rican farmers agreed more strongly with the metaphorical statements than the M-Turk population. Except for the '*crisis*' statement, Costa Rican farmers scored the highest on the NEP scale, followed by M-Turk then the Tourist population. The M-Turk and Tourist populations responded similarly to the relational value prompts and lower than the farmers (except for the similar responses to the responsibility prompt, '*resp_rel*').

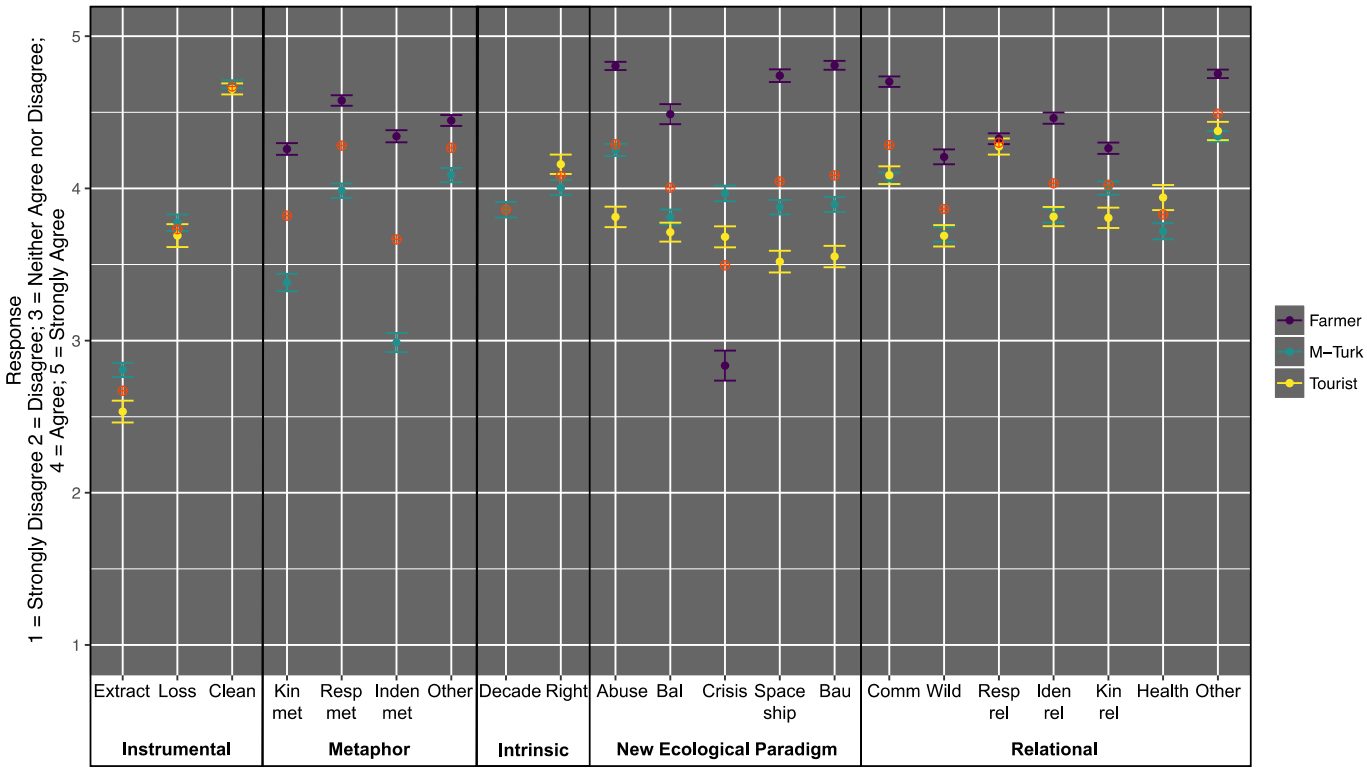


Figure 2.3. Mean response with standard errors to value prompts across three populations. Red circles indicate the mean response across the populations for each value statement.

Out of all of the environmental value statements that we tested, the highest average response for the M-Turk and Tourist population was agreement with an instrumental value: It is important to

protect nature so we have clean air and water ('*clean*'). Two NEP statements ('*BAU*' and '*abuse*') ranked highest for the farmer population as shown in Figure 2.3 and Table 2.5.

Table 2.5. Top six mean responses to environmental value statements across three populations. The top four farmer scores are not statistically different from each other, effectively all being tied for first, comm_rel is statistically different from the first two, bau_nep and abuse_nep.

Rank	M-Turk	Tourist	Farmer
1	Clean (4.69)	Clean (4.6)	BAU (4.81)
2	Other (4.34)	Other (4.4)	Abuse (4.81)
3	Abuse (4.25)	Responsibility (4.3)	Other (4.75)
4	Other (4.09)	Right (4.1)	Spaceship (4.74)
5	Community (4.07)	Community (4.1)	Community (4.70)
6	Right (4.00)	Health (3.9)	Responsibility (4.58)

Instrumental
Intrinsic
Metaphor
NEP
Relational

2.3.4 Relational statements significantly correlate to environmental priority associated with farm management and the NEP does not

Mean responses to the farming attitude statements indicate conservation and lifestyle attitudes were more resonant and were found to be statistically significantly higher than the economic statements (Figure 2.4).

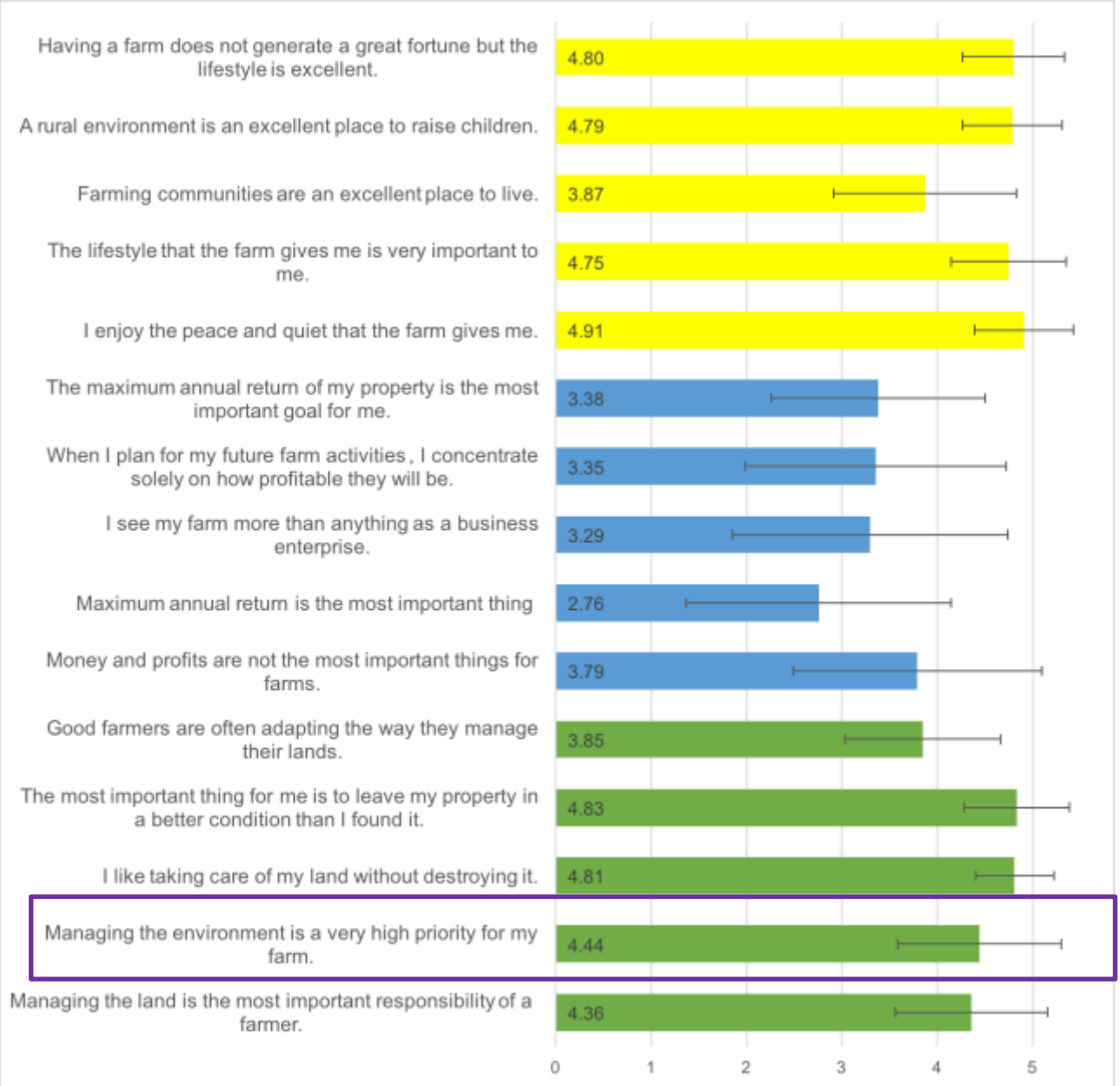


Figure 2.4. Mean scores of farmer population responses to 15 attitude statements. Five are associated with the lifestyle of farming (yellow), the next five are associated with profit maximization (blue), and the final five are associated with conservation (green). Error bars represent one standard deviation from the mean. "*Enviropri*" statement highlighted as a reference for Figure 2.5 on following page.

Pearson's *r* correlation coefficients indicate high internal correlation between individual statements and indices comprised of the mean responses to NEP, relational values, metaphor statements (*avNEP*, *avrel*, and *avmet*, respectively) and farming attitudes. In Figure 2.5 we highlight one statement, '*enviropri*' (highlighted in Figure 2.4) associated with prioritizing on-farm environmental management and its relationship to NEP, metaphor, and relational statements. We also see significant positive correlation between '*enviropri*' and the suite of relational and metaphor statements, whereas there are not any significant correlations with the NEP statements individually or as an index score.

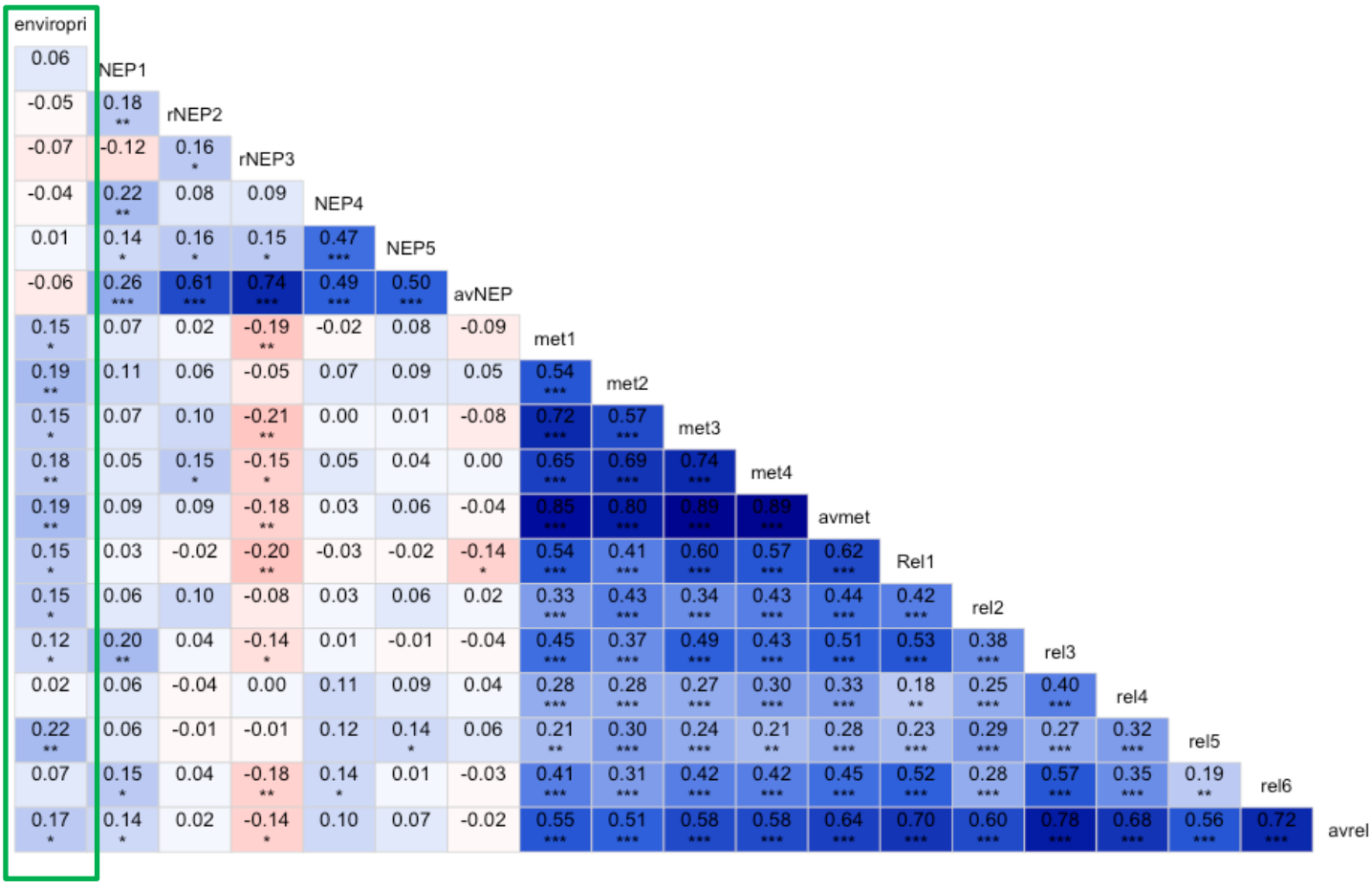


Figure 2.5 Correlation matrix of NEP, metaphor, and relational values statements for comparison with one environmental attitude statement. Red denotes a negative correlation while blue is positive. P-value of < 0.0005 is "*", <0.005 is "**", <0.05 is "*".**

2.3.5 Relational statements significantly correlate to both conservation and lifestyle attitudes and negatively with economic ones

To take this a step further, when aggregating the conservation, lifestyle, and economic statements, we see the relational statements are positively and significantly correlated to the lifestyle (collectively *'ls'*, 0.22 p<0.5) and conservation (*cons*, 0.18, p<0.5) indices, whereas the economic/profit maximizing statements (*econ*) are negatively correlated (-0.12, p<0.1). The metaphor statements exhibit a similar pattern, with the lifestyle index being significantly positively correlated (0.13 p<0.1) and the conservation index is positively correlated, though the correlation is not statistically significant. The NEP does not exhibit significant correlations with any of the attitude indices.

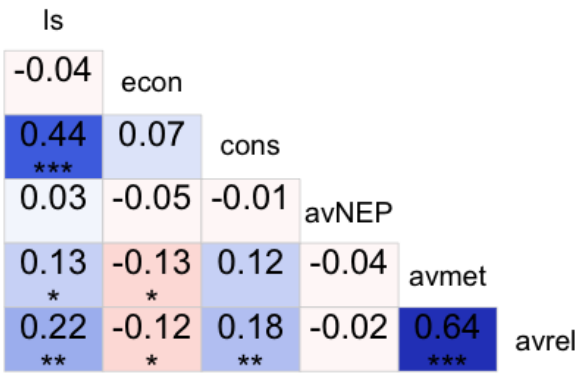


Figure 2.6: Correlation matrix of farming attitudes and NEP, metaphor and relational statements. Red denotes a negative correlation while blue is positive. P-value of < 0.0005 is "*", <0.005 is "**", <0.05 is "*".**

2.4 Discussion

This research is a first step in seeking to operationalize a "relational values" construct in a survey form in reference to other widely used constructs (intrinsic and instrumental) and a measure of environmental concern (NEP). The following sections discuss the research questions in turn. The first is associated with the relational concept in general, namely that diverse populations agree with the statements, suggesting that what we refer to as a "relational framing" (in terms of the phrasing rather than as an experimental design) is widely resonant. The following two sections discuss how responses differed between the relational statements and the NEP, followed by how there was consistency in responses to the relational statements, which could lead to treating this set of statements as an index. The correlations between farmer attitudes and positive relational and NEP responses are briefly discussed (they are expanded upon in Chapter 3) amid a broader discussion of the theoretical and policy implications of these findings.

2.4.1 Diverse populations tend to agree with strong relational value statements

Agreement with relational values across populations was higher than anticipated. The mean response across all three of the populations to the relational value statements was 4 (see Table 2.4, Figure 2.2 and Figure 2.3), which is equivalent to "agree" on the Likert scale. The average for each relational value prompt differentiated by population was higher than 3.6. We had expected somewhat lower means given the explicit nature of the social-ecological linkage and our deliberate attempt to phrase the prompts strongly to foster variation in our sample. The relational prompts therefore push the bounds of how people think about the environment in relation to themselves – such as thinking of wildlife as kin and considering the environment as part of their identity. Although environmentalism may have become marginalized in the last

decade (Marvier and Wong, 2012, p. 292), these social-ecological relational statements clearly resonate with our M-Turk, tourist and farmer samples (i.e., respondents tend to agree and strongly agree with the value statements) (Figure 2.2). The overall agreement with relational statements as demonstrated in the mean scores indicate more limited variation in response than anticipated. A future direction for empirical testing of relational values may benefit from increasing the range on the Likert scale, and including rankings or tradeoffs that would foster variability and enable deeper analysis of differences among individuals and between populations.

The comparison between the relational value and metaphor statements is instructive, suggesting that although social-ecological *relations* are lower in North American populations, associated *values* remain strong in the populations we surveyed. M-Turk samples tend to be comprised of ~90% urban residents (Huff and Tingley, 2015). The farmers' responses to the metaphor statements were significantly higher than the M-Turk responses, and in the same range as their relational responses. The M-Turk population responses to the metaphorical statements were significantly lower than both the farmers and the M-Turk relational responses (Figure 2.3). We speculate that the farmers are comfortable talking about nature in a deeply relational way, while the M-Turk population is likely less comfortable with such 'relationality', but can still agree with the moral conclusion expressed in the relational statements. We view this as further indication that a relational framing may be an accessible way to engage diverse parties for the purpose of conservation, including those who do not have an ecocentric worldview.

Relational value responses do not have the highest average among the types of value statements in the three populations (Table 2.5). Out of the 17 statements presented to all three populations, the overall highest ranked statements (in two of the three populations (Tourist and M-Turk) was

the '*clean*' statement: "It is important to protect nature so we can have clean air and water." We classified '*clean*' as an instrumental statement (Table 2.1), but it is not narrowly self-oriented, in that it implicitly includes concern for the well-being of others. The highest overall statement for the Farmers was '*bau*' ("If things continue on their present course, we will soon experience a major ecological catastrophe," i.e., business as usual). However, since the farmers were so high in their responses overall—their top 5 responses averaged over 4.7, meaning that the majority of respondents answered 5— the differences between the top 5 are not significant (with the exception of the fifth being different from the first and second rank based on t-test results—Table 2.5,), thus the top four could all be considered a top response.

It is not surprising that relational values were not noticeably higher in the farmer population as compared to their NEP scores. We perceive the benefit of relational values is that it may allow people to express environmental concern that they otherwise would not (on a scale like the NEP, for example). For people with pre-existing strong environmental values, it is not surprising they score equally high in this alternative framing.

The top six overall mean scores of our three populations are depicted in Table 2.5. For the tourist population, four of the top six mean scores were relational statements. All three populations included the "community" statement as the fifth highest. The M-Turk and farmer population shared two of the top five ("community" and "other"). The community statement refers to recognizing the uniqueness associated with place, where as "other" refers to responsibility to reduce environmental harms felt by people elsewhere. All six relational statements are represented in the top 6 value statements when all three populations are combined, suggesting 1) there is resonance of relational statements in general, and 2) different aspects of relational values

resonate with different populations, that is, averaging across different populations we see high levels of agreement with several relational statements.

2.4.2 Relational value responses are distinct from NEP

The factor analysis (Table 2.3, Figure 2.1) reveals a distinction between relational value responses and the NEP. The statements cluster in the factor analysis differently as individual populations (see Appendix A.2) as compared to pooled results (Figure 2.1), but in all four cases the distinction between the two sets is clear. Examining uniqueness of the relational statements as compared to the NEP, the former has a higher proportional variation in the pooled data set (Figure 2.1), meaning the relational statements are more tightly knit as a group than the NEP.

2.4.3 Relational statements can be a single construct and have potential as new index

Our Cronbach's alpha scores suggest, somewhat to our surprise, that the six relational values statements cluster together strongly as an index. The six statements capture different aspects of values about relationships with nature, and are not intended as multiple expressions of the same idea, so it is interesting how strongly the statements do cluster. This result was echoed in the tourist and M-Turk population, with α scores of 0.79 and 0.84 respectively, whereas the farmers had a score of 0.35. The exception driving this unexpected result is the farmer response to the crisis statement; the widely distributed spread of responses for this statement can be seen in Figure 2.2.

Typically, the expectation is that those with a tendency toward an ecocentric worldview will score low for this statement (until it is reversed for the purpose of analysis), and those with anthropocentric worldview will score highly. The farmer results across all statements (see Figure 2.2 and Figure 2.3) demonstrate consistently high mean responses that are also statistically higher than the other two populations. This rural population of predominantly small-holder Costa Rican farmers are reliant upon environmental conditions for their livelihoods, and thus their strong environmental values (as understood through all of their responses) are expected. This is reflected in their high scores, and in the case of the abuse statement, statements where not a single farmer answered lower than a 4 (i.e. all respondents answered agree or strongly agree). This brings in the question of why the farmers did not follow the pattern of eco-centrism, which is associated with strong environmental values and evident here.

We propose two possible explanations for the anomaly, but do not believe this is problematic for our overall results. The first possibility is wording. The statement reads, "the environmental crisis is greatly exaggerated," with the expectation that those answering 4 or 5 (agree or strongly agree) are not as concerned about the environment as 1 or 2 (strongly disagree or disagree). It is conceivable in this region that those answering highly are deeply concerned about environmental issues, but it is such a focal point that from their perspective it is overemphasized. That is, their agreement with the statement speaks to the strong wording of "great exaggeration" rather than suggesting environmental issues in their region are not present. An additional possibility is that these farmers are better equipped to cope with change than their neighbours, thus reducing an overall sense of urgency. All farmers who responded 4 or 5 to this question (about 30%) responded in the expected NEP pattern matching an ecocentric worldview, so we do not believe

it is a case of a subset of farmers who do not have ecocentric views. In any case, this result did not impact the analysis dramatically insofar as the NEP and relational factor analyses remained separate across all populations and as demonstrated in Table 2.3 and Figure 2.1.

Farmer anomaly aside, the inclusion of NEP statements enabled us to demonstrate that for the most part the statements correlated as expected, and our populations behaved consistently with NEP experiments elsewhere. The high Cronbach's alpha scores across the individual populations and all three pooled means people responded consistently to the NEP and social-ecological relational statements. In general, an alpha of 0.7 and higher is considered strong (Mohsen Tavakol, 2011). Our high relational value alpha of 0.8 suggests there may be potential to generate a scale or index when considered collectively as a group, and we consider the development of such an index an avenue for future research.

2.4.4 Theory implications

As proposed in the introduction, we see potential to utilize relational values as a means to solidify or enhance connections to the natural world, by invoking other held values that are not necessarily environmental. That is, instead of thinking of nature as external or "outside of oneself", by connection to family, places we care about, and human well-being, 'nature' becomes part of an individuals' realm of care.

We refer to relational values as a framing rather than as a novel way of thinking about the environment to recognize and emphasize that we are not suggesting this is entirely new conceptual territory. Environmental values have been studied extensively, along with their connections to attitudes and behaviours (Stern et al., 1995, Dietz et al., 2005, Spash et al., 2009).

Likewise, the attributes captured by our value statements were selected based on existing studies and theory that suggests associations with family, community, and identity are powerful and meaningful ideas that people will take action to protect and uphold (Martín-López et al., 2007, Nichols, 2014). Our eventual aim is to examine whether this new value-frame can augment and support existing theories of value that posit pathways between different categories of values (and beliefs in the NEP sense of the word) and behaviour. This study is not sufficient to do so, but our data does point to some encouraging possibilities for continuing along this path. Here we discuss how we envision the relational framing to contribute to the values, beliefs and norms framework (Dietz et al., 2005, Stern et al., 1999).

Values, beliefs and norms (VBN) theory of concern for the environment suggests that there are relationships linking, 1) the acceptance of basic values; 2) believing that something important is threatened; and 3) the activation of a personal norm (obligation) to take action to restore those values (Dietz et al., 2005, Stern et al., 1999). VBN posits that values influence our worldviews, which in turn influence our beliefs of how environmental change has consequences for our values, and these beliefs underlie norms from which we take action (Dietz et al., 2005). Figure 2.7 outlines the VBN theory in green, and highlights in purple how we imagine our selected relational value dimensions contribute to this pathway. Our results are far too limited and preliminary to support the hypothesis that social-ecological relational framing influences behavioural intention (let alone behavior —even the VBN theory does not claim to comprehensively explain pro-environmental behaviour), but we propose future studies to test this.

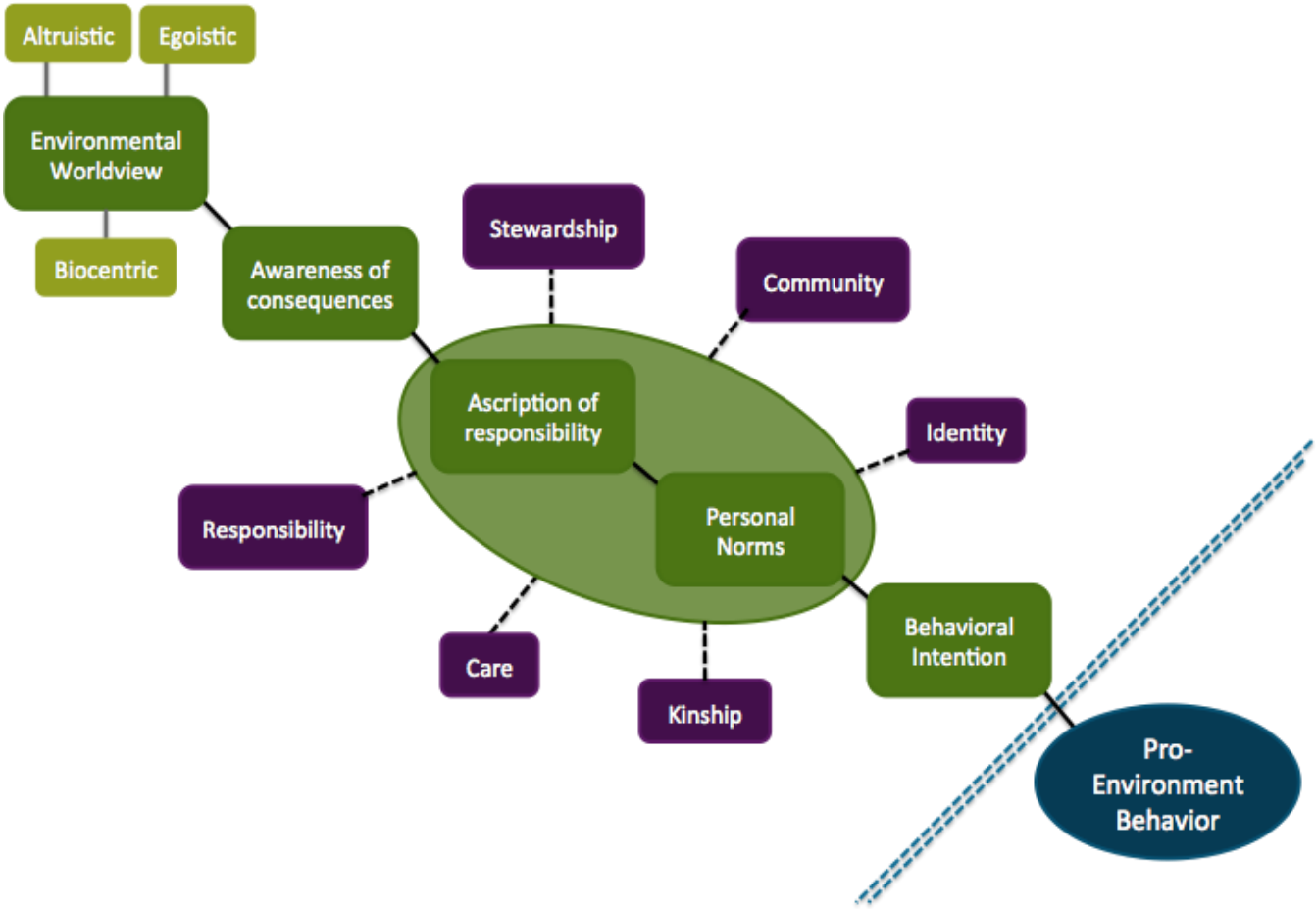


Figure 2.7. Value-belief norm model (green) with our proposed ways in which relational framings (purple) could influence steps of this pathway (black dashes). We acknowledge the variety of barriers between behavioral intention and pro-environment behavior (dashed blue line).

Figure 2.7 highlights where our relational value framings might support the theorized linkages to the VBN. We propose that by leveraging some of the components of the model—namely responsibility to others (both human and non-human) and personal norms—the pathway may be strengthened or some of the other components may be bypassed. For example, a mother with anthropocentric views and little understanding of consequences of a particular threat where she lives (such as climate change influencing flooding), may still be induced to support a new coastal protected area in her community, if doing so is consistent with notions of good parenthood or citizenship.

Reflecting upon our results in the context of this diagram, we note that the highest scores from the relational statements were those that referred to groups in which they are a part or to which they feel a sense of responsibility, including family and community. Psychological evidence points to the importance of in-groups, social norms, and peer-pressure to influence behavior, both in general and with pro-environmental behaviours specifically (Cialdini and Goldstein, 2004, Crompton and Kasser, 2010). While instrumental and intrinsic values tend to focus on individual ways of thinking about the world, we propose relational framings have the capacity to establish or enhance social influences that encourage action.

2.4.5 Policy and practical implications

Governments, NGOs, and decision-making bodies wrestle with how to effectively engage communities in environmental decision-making processes (Reed, 2008). Regulatory bodies and environmental impact assessment require consultation, yet assessments tend to focus on biophysical impacts and have struggled to capture cultural ecosystem services, due to their less tangible and less quantifiable nature (Chan et al., 2012b). We propose there is a gap in the traditional tools that explore and explain values on how we relate to the environment. Relational values may be used to frame or facilitate discussions in decision-making processes linking environmental change to tangible and intangible values. Here again we refer to framing in terms of a value construct, rather than comparative framing used in experimental designs. Methods to assess social-ecological relational value could be further refined to characterize how communities or individuals think about the environment. Invoking relational values may be key to reframing conservation policy approaches (Berbés-Blázquez et al., 2016).

Relational value statements could be a part of how the Key Biodiversity Areas partnership conducts biodiversity documentation, which would include consistently collected information that assists policy advocacy on-site, as well as broader analysis. This partnership, as just one example of a potential application of relational values, identifies important sites for various taxa, and is currently consolidating a variety of partners to create a framework for assessment (threats, associated ecosystem services, etc.) (Eken et al., 2004). These data could support prioritizing conservation actions and policies that resonate with people locally. In a similar vein, diverse conceptualizations of values are incorporated in the conceptual framework of IPBES. Relational value statements may help operationalize these diverse conceptualizations in the planned regional assessments.

Framing conservation with relational values may offer more powerful leverage rather than an emphasis on instrumental or intrinsic values. Intrinsic values in and of themselves are enough to motivate only a minority of people to achieve conservation goals (Armsworth et al., 2007). A potentially broader array of people can be motivated by appeals to financial benefit and self-interest in the name of conservation, but an instrumental-value basis for conservation can only motivate conservation that is demonstrably useful (Chan et al., 2007). We anticipate the concern that employing community values or framing options could be used to merely leverage instrumental values. Though we do not explicitly test that, our hypothesis relates to encouraging environmental values in those who may not already feel strongly by anchoring them to something they already care about and with which they already identify (e.g., community, family). Our results linking environmental values to farming attitudes lend support to the idea that relational values can be meaningfully associated with environmental attitudes. Our intention

is not to find another avenue to "sell" the environment and its associated benefits to a broader audience. As highlighted by Chan et al., "To be more than mere marketing, environmental management must reflect on and possibly rethink conservation in the context of local narratives and struggles over a good life" (p. 1464).

2.4.6 Proposed paths forward

Our first pass at assessing social-ecological relational values resulted in a preliminary assessment scale that can help launch future research. Our objective was not to create a new, universally valid scale for social-ecological relational values. Although we capture diverse types of relational values, we do not claim to have captured all aspects of "relationality." We did not exhaustively test dozens of statements to arrive at our final set, and acknowledge there may be different and/or additional statements that could enrich a social-ecological relational index. We can imagine several research trajectories, as well as how other future research may augment the ambitions of this preliminary study.

- **Expand and refine social-ecological relational statements**. Our six relational statements are likely not comprehensive. We can imagine further dimensions to be tested, such as the extent to which natural elements contribute to a sense of belonging. Index development in the psychological literature entails including more overlap between statements to probe similar themes in multiple ways and test agreement with various statements in different cultural settings (if universality–to the degree it is possible–is the goal). The list should be refined list until there is greater certainty of its appropriateness

and accuracy for assessing the presence and strength of social-ecological relational values.

- **Explore social-ecological relational values with other methods.** Surveys can be useful, but other methods, such as interviews and focus groups, can help delve into the complexity and context-specific dimensions of social-ecological relational values.
- **Use social-ecological relational value statements as an index in before/after or control/impact studies**. Such research would shed light on values in the context of various environmental management and conservation interventions.
- **Embed social-ecological relational values research in scenarios with real-world constraints.** We envision empirical testing of relational values in the context of tradeoffs and/or external constraints, including scenarios or choices to more accurately reflect the types of decisions people make on a daily basis. This may reduce the overall agreement with relational values but would likely provide more variability in the responses. One particular set of people whose behaviours are of particular interest includes consumer responses to relational framings, and testing consumption behavior when the disconnect between consumption practices and environmental impact are made more explicit.

- **Further test relational value statements in comparative framing experimental designs to estimate influence of relational values on conservation practices.** Our exploratory analysis suggests that relational values relate to conservation and lifestyle attitudes of farmers. This points to the potential to more deeply and systematically consider stewardship and community values when promoting pro-environmental practices on the landscape. That is, where relational values are strong, the risk of

"crowding out" intrinsic motivations may be reduced. Future research could focus on uptake of conservation farming practices with different incentive structures tailored to value orientations.

2.5 Conclusion

The study provides preliminary empirical evidence of widespread support for social-ecological relational values, an emergent topic in conservation (Berbés-Blázquez et al., 2016, Chan et al., 2016). We foresee diverse paths forward to test this idea of relational values as a means of overcoming the instrumental vs. intrinsic value of nature debate.

Self-interest tends to prevail when instrumental values dominate communications, campaigns and debates (Blackmore et al., 2013). Instrumental values, however, are one type of the various values that can come into play when we make decisions. Insights from cognitive psychology highlight how we often make decisions and act based on affective responses to situations rather than mental calculations of utility associated with different outcomes (Kahneman, 2011, Levine et al., 2015). Similarly, while we acknowledge the logic behind instrumental justifications for biodiversity conservation, studies show numerous other values, beliefs and attitudes motivate conservation action, including, but not limited to, identity and social norms, biophilia, altruism and notions of reciprocity. Leveraging these motivators in relational terms might engage more people and enable individuals and communities to rethink conservation in the context of local narratives and what it means to pursue a good life, which goes far beyond focusing on instrumental values (Chan et al., 2016).

This study suggests a relational value framing as a new direction for innovation when it comes to ecosystem service assessments, designing conservation initiatives and addressing concerns associated with financial incentives to promote sustainable practices. This could not only inform, but also inspire the action necessary to cultivate a better future for humans and other species.

Chapter 3: Costa Rica's PES coincides with strong environmental values, no evidence of crowding out

Paige Olmsted, Terre Satterfield, Jordi Honey-Rosés, Kai Chan

3.1 Introduction

Natural resource management decisions are often fraught with controversy, when the immediate benefits of economic development are pitted against the longer term benefits of intact habitats including clean air and water, carbon sequestration, and sustaining biodiversity (McShane et al., 2011). Payment for ecosystem (or environmental) services (PES) programs are a means to simultaneously support economic development while promoting the conservation of critical ecosystem services (Kinzig et al., 2011, Wunder et al., 2008). Though specifics vary across programs, the general concept involves paying land owners to conserve or restore land, resulting in more economically viable means to engage in sustainable practices, as opposed to adding costs (Wunder et al., 2008). In theory, the outcomes are improved livelihoods for landowners, an improved resource at a lower cost than other possible intervention, and the environment as a whole is managed in a more sustainable way (Farley and Costanza, 2010). PES programs range from the watershed scale to country-wide programs, and have diversified to become far more wide reaching and complex than a simple payment to achieve a specific environmental practice or ecosystem service gain.

In an effort to achieve both ecological and social objectives, significant questions are raised as to the appropriateness of PES as a conservation intervention (Kemkes et al., 2010, Muradian et al., 2013). Though initially heralded, in the two decades since their inception, PES programs have been critiqued for commodifying nature, with the proposal that monetary incentives change the relationship landowners may have with their land (Kosoy and Corbera, 2010, Vatn 2010, McAfee 2012). Other common critiques include the suggestion that such arrangements reinforce existing power imbalances among landowners or resource users (Pascual et al., 2010, Sommerville et al., 2010, Pascual et al., 2014); involve structural impediments that mean programs can overlook those whose need is greatest with regard to the (anticipated) livelihood benefits (Muradian et al., 2013); and that PES incentives may erode intrinsic motivations for environmental protection. Such erosion is referred to as motivational crowding out (Bowles 2008, Fisher et al., 2012, Rode et al., 2015).

The role of motivational crowding out (or, conversely, crowding in) is receiving increased interest in the conservation field as part of a broader discussion regarding the efficacy of financial incentives for long-term ecological benefits (Van Hecken and Bastiaensen 2010a, Greiner and Gregg, 2011, Narloch et al., 2011, Rode et al., 2015). The potential for incentives to both encourage and/or undermine values and attitudes emerged in the behavioural economics literature (Frey, 1992, Fehr and Falk, 2002, Bowles et al., 2008). Though PES studies have identified

Working Definitions
Values, attitudes, incentives, and motivations are critical concepts to this paper, and yet can be defined in different ways by different populations or disciplines. Here we refer to them and distinguish them in the followings ways:

Values – (in reference to environmental values) personal positions or beliefs as represented by statements associated with world view and how one sees oneself in the environment
Attitudes – a settled way of thinking about … an evaluation of specific approaches associated with farm management
Incentive – a good or reward provided to support a specific activity on-farm
Motivator – a reason given to engage in a practice that might be encouraged with one of the above incentives
Motivation – general desire to engage in an activity, though we do not intend to suggest that motivation is a single entity that certain levers can set in motion; it involves multi-faceted and context-specific factors.

concerns or pointed to specific non-financial motivators that may influence participation (e.g., Fisher et al., 2012, Garcia-Amado et al., 2013), there are few that explicitly examine motivational crowding out (Rode et al., 2015, Kaczan et al., 2016). In the first of these studies, a meta-analysis of economic incentives in conservation policy included both PES and non-PES programs, demonstrated evidence of both crowding out and crowding in (Rode et al., 2015). Kaczan conducted a set of behavioural economic studies in Kenya and demonstrated limited crowding out and some crowding in, often as a function of social and demographic variables (Kaczan et al., 2016). Both studies and another recent review (Wegner, 2016) stress the importance of understanding motivation as a component of program design, but conclude further evidence is required. One proposed response to the crowding out critique is to engage in PES where strong conservation values do *not* already exist, and making crowding-in more likely (Wunder, 2013). In this line of thinking, crowding out need not be a concern because the best places to engage in PES are those where there are not pre-existing intrinsic motivations to be influenced.

Whereas most empirical studies of motivational crowding out have stemmed from psychological studies over short time frames in carefully constrained contexts, the concern is understandable that over longer time frames motivational crowding out might erode broader environmental values and concerns. For example, Vatn (2000) argues that payments for actions towards the environment could confuse ethical values. On one hand, to suggest that underlying values themselves can be changed appears counter to the long history of social science scholarship demonstrating such values tend to be stable over one's lifetime (e.g., Stern and Dietz, 1994), and interventions like PES are not generally enough to alter them. However, such a sentiment

appears applicable to *held* values rather than *assigned* or *relational* values (Brown 1984). Assigned values, those expressing the worth of particular items, may fluctuate or interact with other motivators to induce behaviour change (Steg and Vlek, 2009). Relational values, which may be crucial for motivating conservation (Chan et al. 2016), may also be influenced by the relationships people have with nature. Accordingly, assessing these values in conjunction with perspectives associated with incentives may inform program design.

The empirical examinations of motivational crowding out have been restricted narrowly to the activation of moral concerns as motivation for environmental action, whereas this paper interrogates a broader set of claims, in a setting where incentive programs have had a long and storied history. In the context of their national environmental incentive programs, we seek to understand what are the conditions, features, or underlying motivations that support participation in the specific context of the Guanacaste region of Costa Rica. Specifically, we seek to explore whether assumptions associated with motivational crowding out hold true in a setting where environmental values are assumed to be strong. By asking about preferred incentives, motivators, relational values, and specific land-use practices, we examined the following questions:

1) Does PES participation influence interest in financial incentives?
2) Do monetary incentives negatively impact expressions of environmental values (as measured by the NEP and relational value scale) and/or attitudes (as defined by specific statements associated with conservation, lifestyle, and economic statements)?
3) Is the participation in PES programs related to pro-environmental activities on the landscape?

3.2 Methods

This study compares the experience, attitudes and values of farmers who both have and have not participated in PES programs in Hojancha and Nandayure, two neighbouring cantons of the Guanacaste province of Costa Rica. Costa Rica is an interesting case in this regard as the country has a long standing PES program as well as a reputation for having a national environmental identity (Evans, 2010). Farmers are frequent targets of PES programs, who even in developed countries face immense financial constraints and must often make decisions to maximize production when conservation strategies could be desirable (Grenier et al., 2013). We first describe the study site, followed by a description of PES administration and incentives, and the survey methodology.

3.2.1 Study site

The Nicoya Peninsula is situated in north western Costa Rica, and predominantly made up of the Guanacaste province (Figure 3.1). This province is the driest part of the country and recent climate analyses suggest rainfall volume will stay stagnant, but with greater volumes at peak times and increased drought in dry periods (Steyn et al., 2016). It is also a region with substantial agriculture (predominantly sugar cane, rice, and cattle grazing for beef) and a growing tourism sector, which consists increasing of large-scale coastal development in the north west (Barrantes-Reynolds, 2011). Nicoya, the state capital of Guanacaste, is a city of approximately 13,000 residents. The surrounding area is predominantly pasture land for beef cattle, though there are some vegetable crops and tree plantations – of teak in particular. PES coordination in Guanacaste occurs via five sub-regions, of which we focused on two – Nandayure and Hojancha.

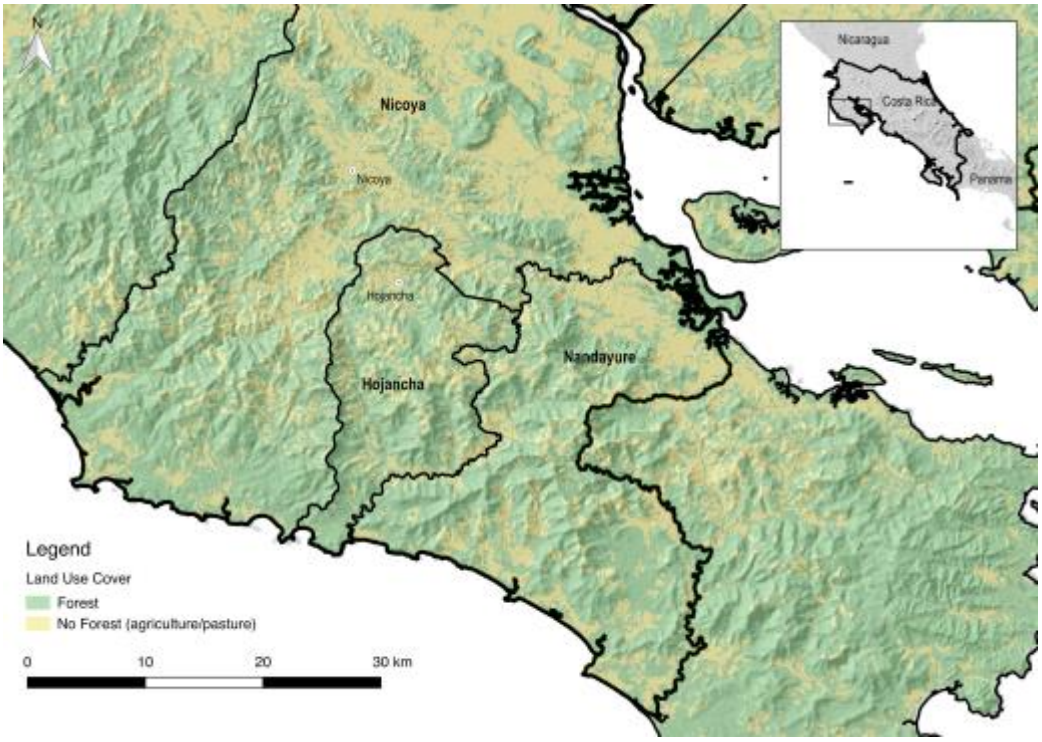


Figure 3.1. Nicoya Peninsula and study regions – Hojancha and Nandayure—in the context of the rest of Costa Rica.

3.2.2 PES administration

FONAFIFO, the National Forestry Financing Fund is the administrative arm for the national PES program, an arms-length government institution associated with the Ministry of Forests. Initiated after the passing of law 7575 in 1996, FONAFIFO has adapted the national program over time, in part to respond to critiques such as access and additionality addressed above. While initially focused exclusively on avoided deforestation and reforestation, new modalities to the program have been added – including riverine buffers, and agroforestry – though reforestation and forest conservation (i.e. avoided deforestation) are still the major components of the program in terms of land use committed to these modalities. In recent years FONAFIFO has become more

strategic ecologically, targeting biological corridors to increase connectivity between protected areas on public lands. The program now includes four different modalities for payment:

- Reforestation: Trees are often teak, though a sub-program that pays a premium for reforestation of native species ($1000/ha non-native, $1500/ha native species)
- Natural regeneration: letting pastures and other previously cleared land to regenerate with minimal impact ($215/ha)
- Forest protection: this includes the "protection of hydrological resources program" for the maintenance of buffer zones, as well as a program for "forests in areas of conservation need" for forests that include ecotypes that are underrepresented in the country's protected areas ($22-44 ha/year)
- Agroforestry: In contrast to the above this newest modality pays by the tree instead of by the hectare and is applicable to a variety of crops.

Currently, there is a national campaign to create an entirely new PES program (the preferred option of proponents) to meet the needs of campesinos, or smallholder "peasant" farmers (UNAFOR, 2016). They arguably benefit more from economic incentives than larger landholders, who tend to be overrepresented in the demographics of the national PES program (Daniels et al., 2010). That is, larger landholders are likely already financially secure (relative to smallholders), and also are more likely to have large tracts of forested land they do not have plans to develop (Zbinden and Lee, 2005). These issues have called into question both the equity of the national program, and the additionality provided by the program (i.e. how much additional forest cover is being provided in comparison to forest cover in the absence of a program), and are primary critiques (Zbinden and Lee., 2005, Porras et al., 2013). We sought to better understand the preferences, values, and attitudes of smallholders in an effort to contribute to PES design

discussion in the region, and contribute insights associated with the role of values in incentives to the PES literature more broadly.

3.2.3 Survey

We surveyed farmers (n=253) in Hojancha and Nandayure, two of the five PES sub-regions regions in Guanacaste, including farmers who both have (n=54) and have not (n=199) participated in the existing national scale PES program.

A preliminary survey was piloted with the local PES stakeholders as well as a small number of farmers to test for length, phrasing, and relevance. Farmers in the two regions — Hojancha (n= 173) and Nandayure (n=71) were contacted via lists from their respective Centro Agricola Cantonales (CACs). These arms-length government-funded organizations are the direct contact for farmers for technical support and information sharing in their respective regions and serve the role of an agricultural extension agency. Hojancha and Nandayure were chosen as study sites for two reasons. The first is that both areas are proximate to the focal region of the FuturAgua project. The second is because Hojancha is both the pilot site for a new PES program targeting smallholders, and a well-studied region due to its long history engaging in PES and associated projects to enhance water supply (Rugteveit 2012). A devastating drought in the 1970s led to an early incarnation of PES in Hojancha, where local people contributed funds via additional contributions to their utility bills to purchase highlands in an effort to restore their watershed. The result of these efforts is a protected area near the town where the forest has been restored. Meanwhile, additional infrastructure was built to transport water to Hojancha from a neighbouring watershed to improve access to water and increase water security. Anecdotally, this improvement has led to increased water pressure, which leads to an impression of higher water

availability, and thus perhaps an inaccurate link between the restoration of the region and current water use. Household water use is much higher in Hojancha than surrounding regions, despite the heightened awareness of water issues due to the community's previous experience with severe drought (R. Vignola, personal communication).

A closed ended survey was distributed to eligible participants upon receiving consent, and included five sections – farm data, perceptions of environmental and social conditions, preferred actions, incentive programs and motivation, and environmental values. Well-established and new index questions associated with environmental values included the New Ecological Paradigm (NEP), (see Dunlap, 2000) and relational values (Chapter 2). Value statements are outlined in Table 3.5. A series of attitude statements specifically associated with farming asked about farmer management priorities and farming approaches in three categories, "conservation", "lifestyle", and "economy". Each category was characterized using five discrete statements for each measure (adapted from Maybury et al., 2005, featured in Figure 3.3). Questions throughout the survey were predominantly on a 5 point Likert scale, with 1 representing strongly disagree, and 5 representing strongly agree. Preferred incentives and program design elements were asked of both previous participants and non-participants.

UNAFOR, the union for campesinos in Costa Rica, is currently exploring the potential for a new program to better meet the needs of rural smallholder farmers. They coordinated and undertook a series of 9 workshops reaching over 200 farmers across the country in the spring and summer of 2015, at the same time as this study's quantitative survey of two PES sub-regions. One of the surveyed areas, Hojancha, is the pilot region for UNAFOR's new PES approach for small holders. The qualitative results of the study undertaken by UNAFOR via a series of workshops

are discussed alongside the quantitative results and commentary from farmers in this study to explore common themes.

3.2.4 Sampled population characteristics

Surveys were conducted in-person by local research assistants to reduce bias and increase the likelihood of culturally appropriate interpretation of responses. The demographic data of participants is summarized in Table 3.1.

Table 3.1. Population characteristics of farmers sampled in this survey, and median farm size in hectares as well as the quartile range. Regional population characteristics and farm size are also characteristics are also described within the two surveyed regions, and as they related to participation in PES, from which there is representation from both regions.

	Total	Hojancha	Nandayure	PES	Non-PES
Gender	89% male	90% male	85% male	91% male	92% male
Median Farm Size (with quartile range) (ha)	20ha (7-50)	15ha (6-37.5)	36ha (15-70)	34.5ha (21-66)	15ha (6-40)
Participants (n)	253	182	71	55	198
Education	25% highschool or higher	24% highschool or higher	31% highschool or higher	42% highschool or higher	21% highschool or higher
Age	65% 50+	60% 50+	85% 50+	60% 50+	67% 50+

National farm data associated with the most recent agricultural survey suggests the average farm size in the study is slightly lower than the Guanacaste average of 54.6 ha per farm (INEC, 2014). The Costa Rican average farm size is 25.9 ha; Guanacaste has the largest farm size on average nationally despite being the poorest region of the country (INEC, 2014).

3.2.5 Statistical methods

Survey data analysis was done in R, where data were analyzed to determine the differences between participants and non-participants in PES in their:

1) Interest in financial incentives for conservation in particular
2) Self-assessment of attitudes, environmental values, and any relationship between these and types of preferred incentives
3) Actual practices on their landscape that are a reflection of PES incentives

Descriptive statistics of means and paired t-tests were used to determine significance of differences between mean responses of participants. Results for a few specific questions were not normally distributed (in the values section in particular responses skewed toward agree and strongly agree), but with sufficient sample size (>20) t-tests tend to be robust to non-parametric samples (Field, 2013).

Correlation coefficients indicate the signal (positive or negative) and statistical significance when comparing two variables, which are displayed in a series of colour-coded correlation matrices for ease of interpretation (Figure 3.4, Figure 3.5, Appendix B.1, B.2). Data collation was done in Excel, analysis was performed in R, tables and figures were generated with plot.ly and R packages correl and ggplot2.

3.3 Results

Our results demonstrate widespread support from PES participants and non-participants for all incentive types, including monetary incentives. Attitudes and values associated with the environment are consistent across both groups, and we find no relationship between an interest in financial incentives and any particular profit motivator. The differences between participants and

non-participants in PES lie in their land-use practices, though the role of incentives in explaining the difference is complicated by financial and geographic constraints, as well as attitudes toward deforestation. In the absence of before-after data to explore the influence of PES participation on variables of interest, we consulted farmers in two regions that both have and have not participated in the program.

3.3.1 Motivators and incentives

Both PES participants and non-participants had the same top 6 motivators for program engagement (Table 3.2). There is a similar ranking pattern between the two groups, though several means are statistically significantly higher in the non-participant group (Table 3.2). PES participants also evaluated their current motivators (as compared to those recalled from the outset of their participation). Statistically significant increases were measured for: access to technical support, help doing activities they already wanted to do, and positive relationship with the intermediary. Since PES administration is regional through the CACs, the intermediary in this case refers to the CAC through which farmers have a relationship, and who may facilitate awareness and interest in PES. There was a significant decrease in the self-reported score for only one motivator, “increase income”.

Table 3.2. Mean scores (Likert scale 1-5) for motivators to participate in PES, either in reality for existing participants, or hypothetically for non-participants. Paired t-tests compared PES participant motivators over time in column 1 and 2, and non-paired t-tests compared PES participant scores to non-participant scores. P-values denoted by *p <0.1, ** p <0.05, *** p < 0.01. Ordinal numbers refer to the overall rank of the motivator compared to others on the list.

Motivator	PES mean score and rank	PES over time	Non- PES mean score and rank
Increase income	4.62 - 2	4.45* Decrease	4.91 – 3 **
Simplify production	4.63 - 2	4.53	4.85 – 5 **
Improve biodiversity	4.52 - 5	4.49	4.87 – 4 **
Improve water quality	4.54 - 4	4.51	4.95 – 2 **
Someone you know had a positive experience	2.75	2.98	2.57
Improve access to technical support	2.90	3.37*** Increase	3.24
Reduce impact of climate change	4.56 - 3	4.71	4.77 – 6
Improve water quantity	4.50 - 6	4.57	4.95 – 2 **
Recognition	2.71	2.90	2.90
Help do activities I already wanted to do	2.52	2.96 *** Increase	2.75
Existing relationship with intermediary	2.23	3.27*** Increase	2.41
Future generations	4.67 - 1	4.67	4.99 -1 - **

Regarding incentives, short term contracts were the top ranking, and long-term contracts the lowest (and the only one with a mean score below 3) for both PES participants and non-

participants (Table 3.3). Regarding farmer's perceptions of what others would like, we found all of the other incentives were ranked higher for "others" as compared to themselves. That is, survey participants believed that other people would evaluate the incentive as more desirable than they did themselves.

Table 3.3: Ranks and mean scores of incentive preferences for PES and non-PES farmers, and farmer scoring of the perceived interest of other people. Survey scores ranged from 1 (not desired) to 5 (strongly desired). P-values indicating significant difference between the populations denoted by *p <0.1, ** p <0.05, *** p < 0.01.

Type of incentive	PES farmer personal preference rank (mean)	Non-PES farmer personal preference rank (mean)	Farmer evaluation of what others would respond to the same question
Short term contract	1 (4.77)	1 (4.85)	1 (4.87)
Long term contract	7 (1.56)	7 (1.62)	7 (1.6)
Financial benefit	2 (4.38)	2 (4.46)	2 (4.77)***
Access to credit	5 (4.19)	4 (4.36)	3 (4.75)***
Technical Assistance	4 (4.25)	3 (4.37)	5 (4.73)***
Equipment	3 (4.34)	5 (4.32)	3 (4.75)***
Recognition	6 (3.02)	6 (3.41)*	6 (3.8)***

3.3.2 Preferred interventions

Regarding farmer preferences for government incentives, the four policy actions that received the most first place rankings –more environmental education, increased local capacity building, increasing parks and protected areas, and more government incentives—were also among the most supported overall (Table 3.4). The participant and non-participant populations are not separated, as the difference between them is not statistically significant.

Table 3.4. Level of support for a suite of policy alternatives to address environmental concerns. Percent in support considers all farmers who agreed this was an appropriate policy. First place rankings refer to the number of individual farmers who indicated a particular policy was their preferred strategy out of the entire list.

Potential Policy action	Percent in support	First place rankings
Stronger regulations for industry	81%	1 (0.4%)
More government incentives	**97%**	**33 (13%) (16% PES, 11% non-PES)**
Limit large scale development	70%	0
More parks and protected areas	**94%**	**37 (15%)**
Moving water from one area to another	91%	8 (3%)
Improving existing infrastructure (pipes etc.)	96%	8 (3%)
Restrictions on construction for tourists	76%	4 (2%)
Capacity building for communities to develop own solutions	**97%**	**41(16%)**
More environmental education	**97%**	**63 (25%)**

3.3.3 Value orientations and farming attitudes

Regarding farmers' value orientations, we found mean scores to be consistently over 4 (agree) in both PES and non-PES populations, with the exception of the NEP measures where reverse statements anticipate low scores. Though not pictured, the same analysis between communities showed similar results, with few statistically different results between scores that were all over 4. In each case the residents of Nandayure had higher scores.

Table 3.5. Environmental value statements included in farmer surveys in three subcategories – relational statements, NEP statements, and metaphor (relational) statements.

Variable	Category	Statement
Comm (rel_6)	Relational	There are landscapes that say something about who we are as a community, a people
iden	Relational	I have strong feelings about nature (including all plants, animals, the land, etc.) these views are part of who I am and how I live my life
kin	Relational	Plants and animals, as part of the interdependent web of life, are like 'kin' or family to me, so how we treat them matters
resp (rel_2)	Relational	How I manage the land, both for plants and animals and for future people, reflects my sense of responsibility to and so stewardship of the land
wild	Relational	I often think of some wild places whose fate I care about and strive to protect, even though I may never see them myself
other (rel_5)	Relational	Humans have a responsibility to account for our own impacts to the environment because they can harm other people
abuse	NEP	Humans are severely abusing the environment
bal	NEP	The balance of nature is strong enough to cope with the impacts of modern industrial nations
bau	NEP	If things continue on their present course, we will soon experience a major ecological catastrophe
crisis	NEP	The so-called "ecological crisis" facing humankind has been greatly exaggerated
spaceship	NEP	The earth is like a spaceship with very limited room and resources
		I think about the forest and the plants and animals in it like: **
iden_m	Metaphor	Something I identify with so strongly that it makes me, me
kin_m	Metaphor	A family of which I am very much a part
other_m	Metaphor	A world we must care for so that any damage doesn't also negatively affect humans who depend on it elsewhere
resp_m	Metaphor	Beings to which we owe responsible citizenship and care

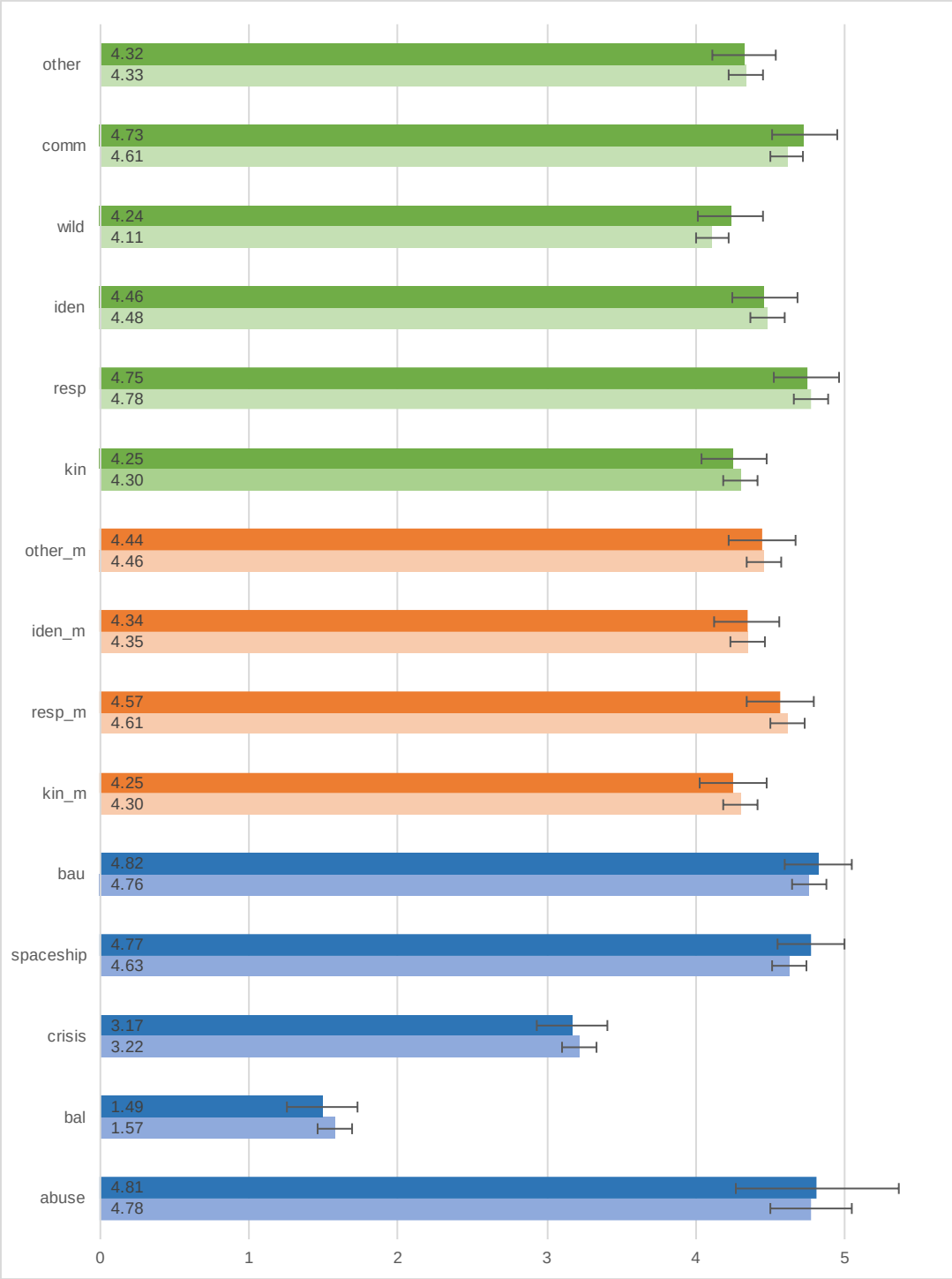


Figure 3.2: Scores for statements regarding relational values (top 6), relational metaphor (middle 4), and NEP (bottom 5) for PES and non-PES participants. Both PES (dark bars on top of each pair) and non-PES participants (light bars on the bottom of each pair). Error bars represent one standard deviation of the mean.

Mean scores for attitude statements were highest in the lifestyle and conservation categories, with economic statements scoring significantly lower. Comparing PES to non-PES farmer responses, the trends were similar – that is, PES participants were not statistically significantly more likely to hold economically oriented attitudes as the mean scores for these statements were not statistically different between the two groups.

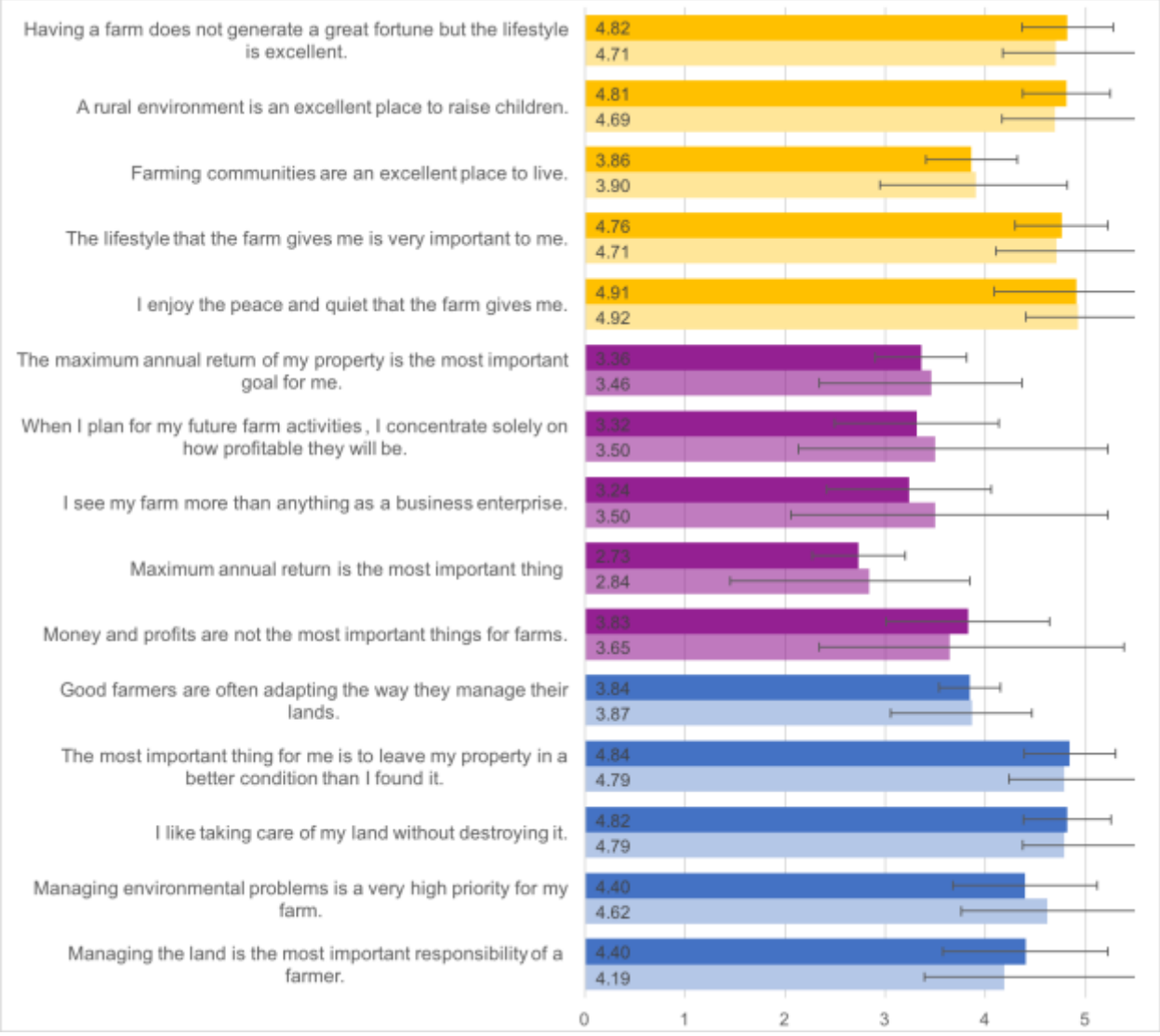


Figure 3.3. Responses to farm management attitude statements with lifestyle in yellow, financially oriented statements in blue, and environmental statements in green (with 1 = strongly disagree, 5 = strongly agree). The PES participants are the top bars in each case, and the non-PES participants are the bottom bars. Error bars represent one standard deviation of the mean.

3.3.4 Attitudes, incentives, and motivators

Testing for relationships between attitudes and incentives for participation broadly reveal that economic attitudes are not correlated to any of the identified incentives or motivators, financial or otherwise. Lifestyle attitudes are not positively correlated to incentives, but are positively correlated to several motivators, namely biodiversity improvements (in codes: '*bd*', addressing climate change (*cc*), water quality and quantity improvements (*quality*, *quantity*), and leaving a legacy for future generations (*future*). Conservation attitudes are positively correlated to the incentive of recognition, and shared the positive correlations for motivators seen in the lifestyle attitude. Preference for the explicitly financial incentive (*financial*), was nonsignificant for all of the attitudes – econ, cons, and lifestyle –though there was high internal correlation with other incentives, especially access to credit (*credit*), equipment (*equip*), technical advice (*tech*), and recognition for taking environmental actions. Financial incentives were positively correlated to several motivators, including improving biodiversity (*bd*), addressing water quality (*quality*), access to technical support (*tech_s*), addressing climate change (*cc*), leaving a legacy for future generations (*future*), and increasing income (*income*). Recognition (*recog*) for taking environmental action correlated significantly and positively to all of the motivators except increase income (*income*) and leaving a legacy for future generations (*future*).

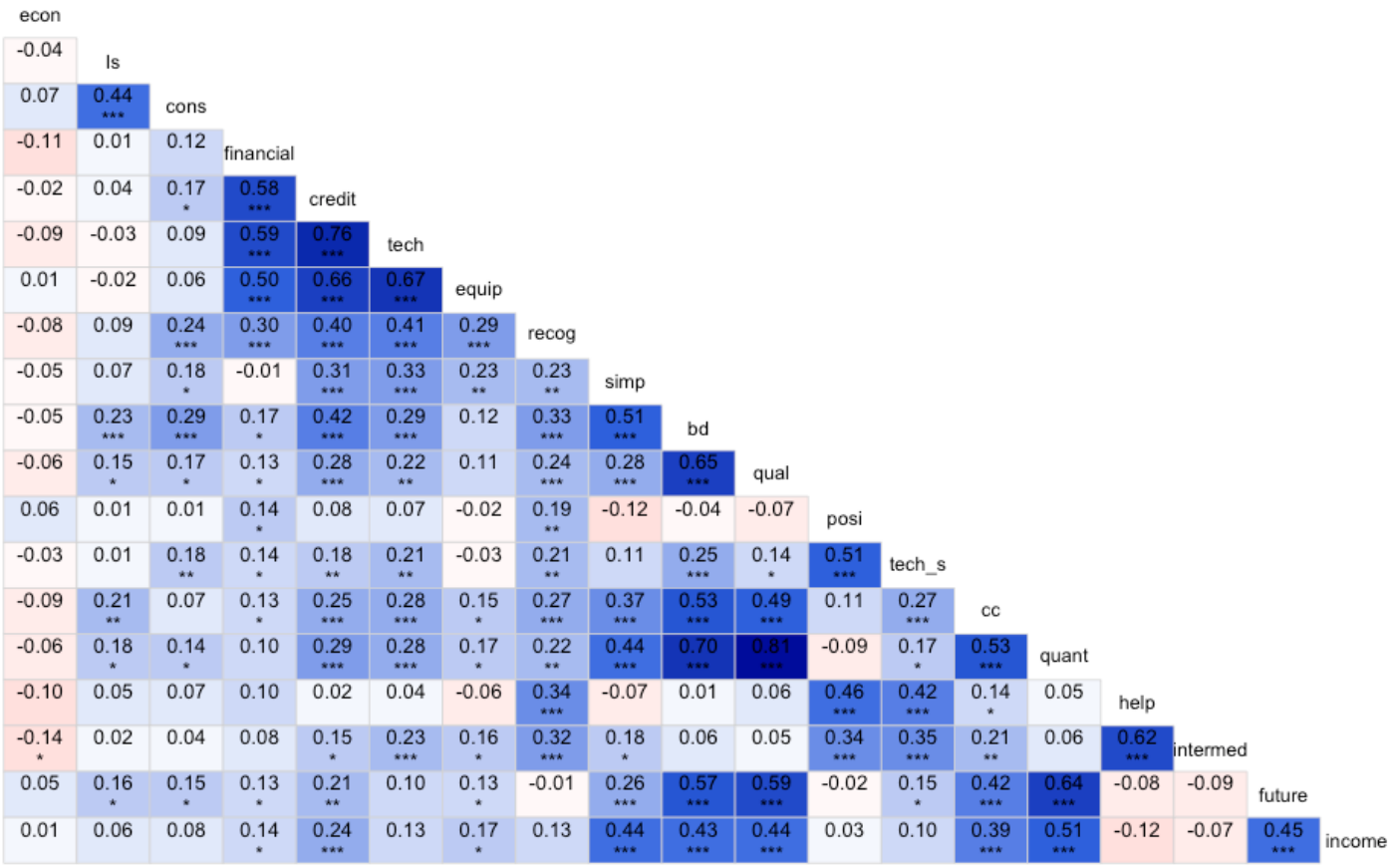


Figure 3.4. Correlation table of all farmers, featuring three attitude indices for lifestyle (ls), economics (econ), and conservation (cons), alongside the series of incentives and motivations from tables 5 and 6. Labels used as short form here are featured in table. P-values denoted by *p <0.1, ** p <0.05, *** p < 0.01.

3.3.5 Relational values and attitudes

Overall farmers indicate strong endorsement of environmental value orientations, as measured by both the NEP and relational values scales (Figure 3.2). Lifestyle attitudes (as represented by *ls*) and conservation attitudes (*cons*) are strongly correlated to each other (0.44, p<0.01), and ls and cons are also correlated to the suite of relational statements (code: *av_rel*, 0.22 p<0.05, and 0.18 p<0.05 respectively). Two relational value statements in particular, those associated with responsibility ("Humans have a responsibility to account for our own impacts to the environment because they can harm other people", *rel_2*) and stewardship ("How I manage the land, both for

plants and animals and for future people, reflects my sense of responsibility to and so stewardship of the land", *rel_5*) correlate to a number of lifestyle and conservation statements. Of the attitude statements, there are multiple positive and significant correlations between relational values and the environmental priority statement (*enviro_pri*), the importance of a farming lifestyle (lifestyle), and statement regarding farm communities being an excellent place to live community (*commun*). This stands in stark contrast to the negatively significant correlations with the econ attitudes, driven in particular by "money", which represents the statement, "dollars and cents are what farming is about".

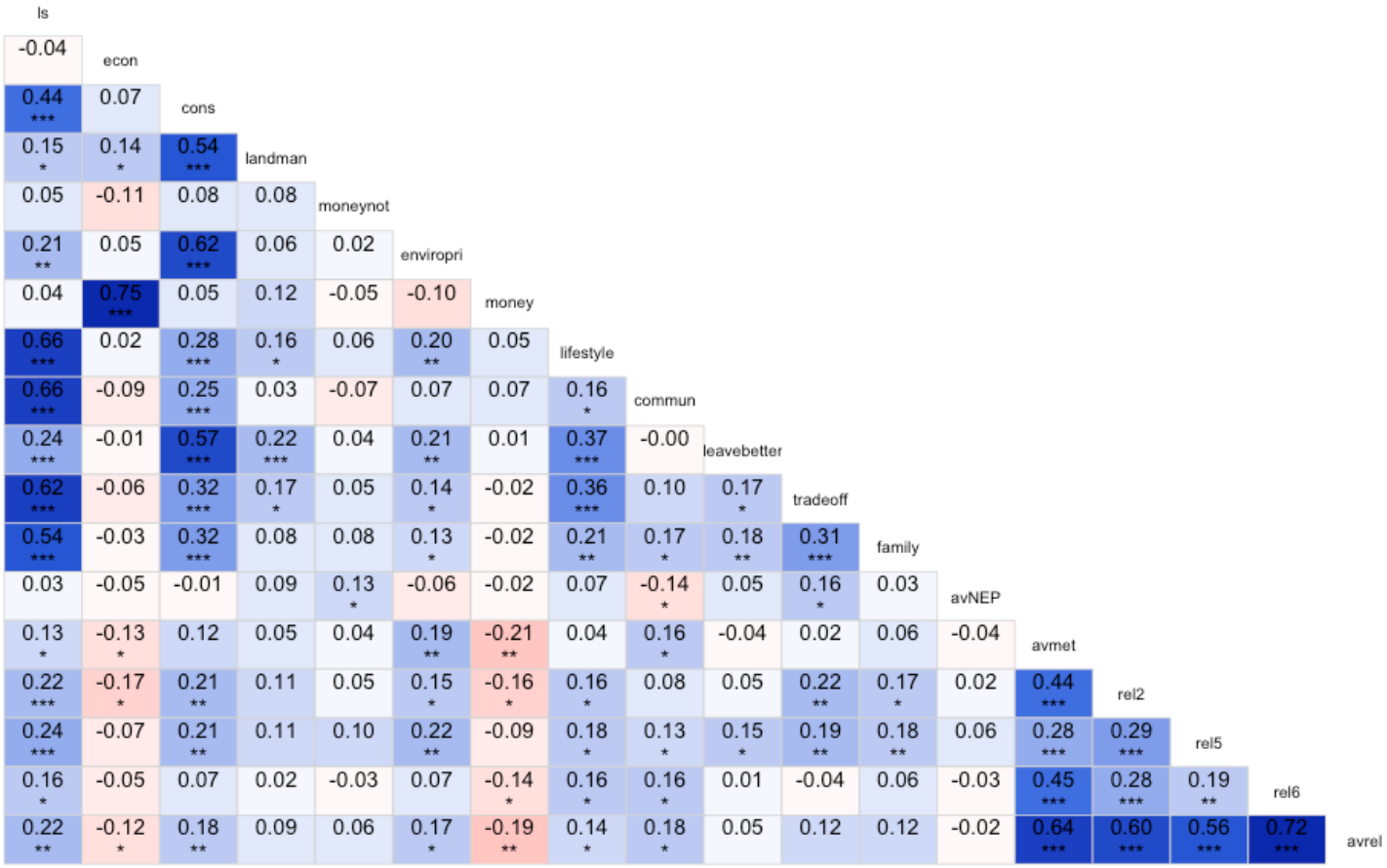


Figure 3.5. Correlation table of all farmers, featuring the three attitude indices for lifestyle (ls), economics (econ), and conservation (cons), and several specific attitude statements of interest within the indices, alongside the average NEP and relational values and metaphor statements. P-values denoted by *p <0.1, ** p <0.05, *** p < 0.01.

3.3.6 Land use and practices on the landscape

The overall average and median farm size for PES is larger than non-PES, as observed by previous studies of PES in Costa Rica (Porras et al., 2013, Daniels et al., 2010). Our analysis of PES as compared to non-PES land use highlights the influence of the payment program on-farm, with different patterns of use and frequency of practices between the two groups (Figure 3.6). Almost all farmers had multiple land uses, though having land allocated to pasture was the most common throughout. “Improved pasture” refers to additional/introduced plants sown in the pasture for improved nutrition of the livestock. The most dramatic differences between the PES and non PES farmers are in the land types “conservation forest” and “plantations or commercial forests”. PES farms are twice as likely to have both conservation forest and commercial forest, though they have a smaller average area of plantation forest. These land uses are related to reforestation and avoided deforestation, the two most common interventions of the PES program.

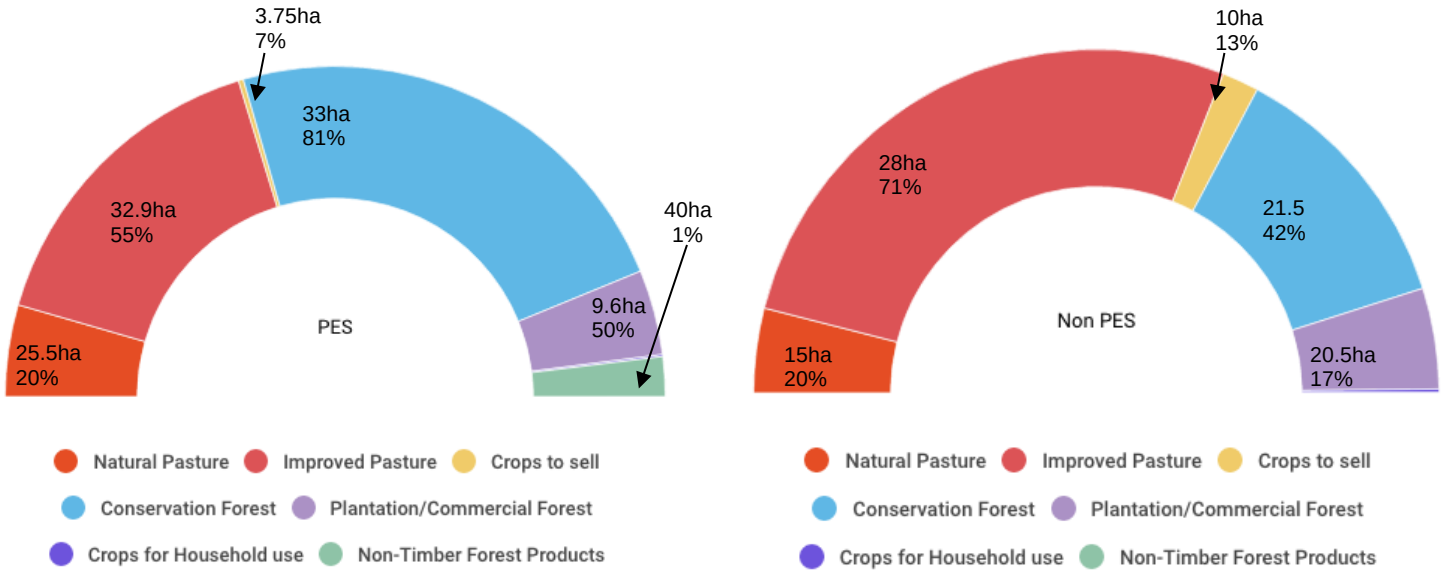
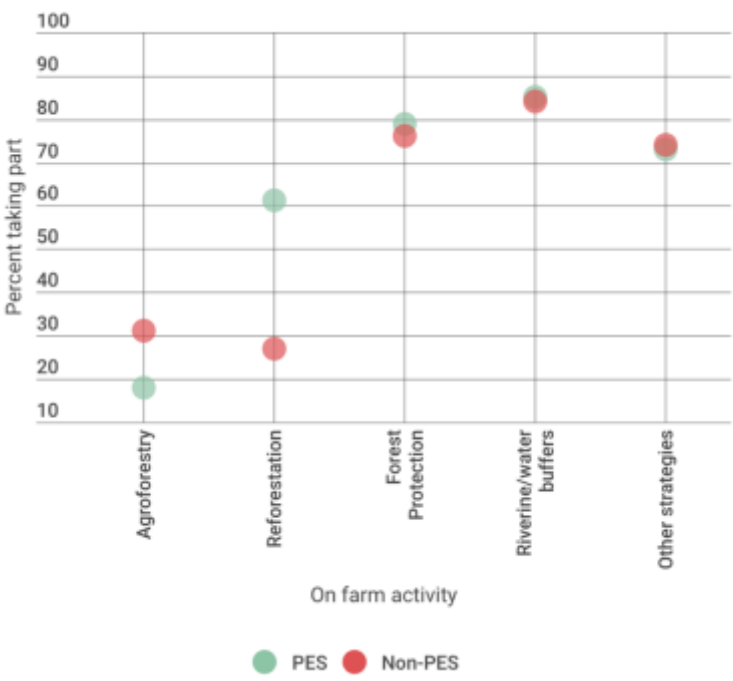


Figure 3.6: Proportion of a given land use type land for PES and non PES farmers in study area, with labels indicating the average farm area dedicated to that land use, and percentage of farmers that have that land use. PES percentages are relative to PES farms, and non-PES relative to non-PES farms, thus the difference in overall farm size is taken into account. Land dedicated for crops for household use were under three hectares and engaged in by fewer than 10% of non-PES farmers and fewer than 4% of PES farmers so their proportion is too small to be easily seen in the figure. Non-PES farmers did not devote any land to non-timber forest products.

Of the specific PES practices, reforestation was far more common on PES farms (Figure 3.7a). The practices illustrated in Figure 3.7a– with the exception of the "other strategies" category—are eligible for PES payments when enrolled in the program. Note that non-PES farmers are engaging forest protection and rivierine buffers at the same level of PES farmers, and there are substantially more non-PES farmers participating in agroforestry, even without an added payment to do so.

Most farmers state that they would engage in additional practices given some combination of circumstances—either given more land, more incentives, or both (Figure 3.7b). Agroforestry and Reforestation indicate the most potential for growth due to fewer people already engaging in the practice. Though there is a generally favourable view of most practices, the results indicate that

one quarter (26%) of farmers do not want to reforest, and do not want *others* to reforest. All other practices had near unanimous support.



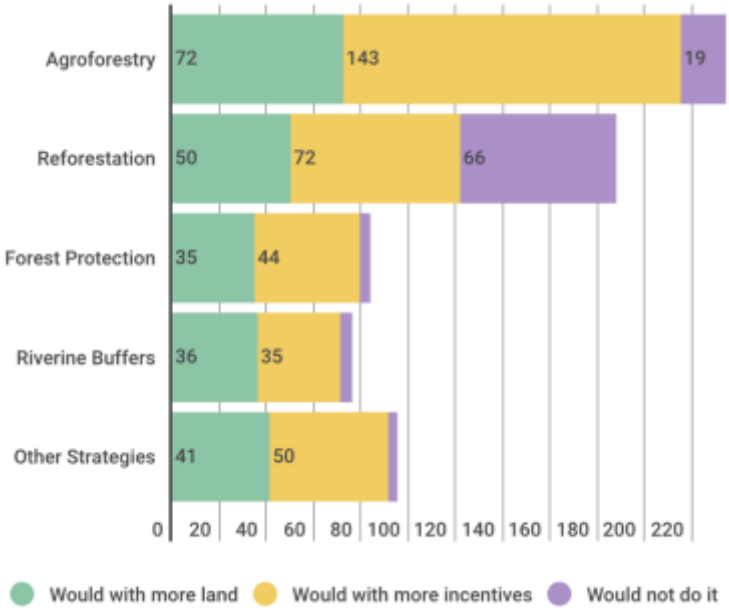


Figure 3.7a: Percentage of PES farmers, and non-PES farmers engaging in different practices on their land. Figure 3.7b (on the right): Number of farmers who would engage in listed practices with more land, with more incentives, or would not elect to participate at all.

3.4 Discussion

We document a widespread endorsement of both monetary and non-monetary incentives as well as overall agreement with strong environmental value and attitude statements (lifestyle and conservation), which suggests that incentive programs have not crowded out environmental motivations in the surveyed population. It is notable that farmers are not necessarily content with the current program, indeed, the UNAFOR campaign to create a parallel program for small-holder farmers is evidence of deep dissatisfaction. Nevertheless, the discontent appears not to

have significantly undermined a widespread interest in undertaking many of the actions encouraged by the PES program.

In the subsections below, we discuss our findings in relation to common assumptions encountered in the critical PES literature, which are restatements of the research questions posed in the introduction. Three main sets of results bear upon our research questions in multi-faceted ways. Contrary to the expectations associated with crowding out, we found that 1) Participation in PES did not have a measurable influence upon interest in financial incentives as compared to non-participants, and for participants interest in monetary incentives decreased over time rather than the increase crowding out would predict (Table 3.2, Table 3.3); 2) Lifestyle and conservation attitudes were frequently correlated with relational values, and more highly correlated to the series of incentives and motivators, whereas profit- maximizing attitudes were more often neutral or negatively correlated with motivators and independent of incentive type (Figure 3.4,Figure 3.5, Table 3.4); 3) Incentives may help explain some land use differences between PES participants and non-participants, but perceived negative environmental impact of reforestation reduces the influence of the incentive (Figure 3.6, Figure 3.7). After discussing the three assumptions in sequence, we then discuss findings in the context of the proposed new PES program for smallholders as proposed by UNAFOR, and discuss recommended paths forward for more robust and value-inclusive PES.

3.4.1 Assumption 1: PES participation leads to increased interest in financial motivators

When PES participants rated factors that encouraged their participation at the outset of the program and at present, we found that the only motivator to decrease with statistical significance was the desire to increase income (Table 3.2). If crowding out had taken place, we would expect

economic motivations to rank higher among participants as compared to non-participants (they were similar across groups, and as ranked as high several social and environmental motivators), or increase over time, where as they decreased. The three motivators that had statistically significant increases for the PES participants– access to technical support, relation with intermediary, and providing the opportunity to engage in activities they already wanted to do—are either social co-benefits, or in the final example, potential evidence of crowding in.

The significant increase could be due in part to their neutral score at the outset thereby providing 'room' to improve. However, it has been shown that intermediaries can play a role in facilitating positive PES experiences (Bosselmann and Lund, 2012). With respect to engaging in activities farmers already wanted to do, there is evidence to suggest there is potential to increase the chance of lasting impact when PES incentives are for practices already desired by service providers, supporting self-actualization and autonomy (Kemkes et al., 2010). For the motivators that had strong agreement both before and after participating in the program, it was not possible to score higher still. Even so, the increases we did see suggest there were benefits that were not originally anticipated as much as others, but appreciation for them increased over time. Naturally, with the PES participants this is not a pre-post controlled experiment, but perceptions – though imperfect - are increasingly accepted as useful evidence in this type of context (see Bennett, 2016).

More strikingly, when PES participants were asked if they would continue their current PES practices in the absence of a payment, 52 out of 55 (95%) said yes. One interpretation of this result might indicate limited additionality achieved by the program. That is, participants would have engaged in activities as they do now without payment from the outset. Interestingly,

farmers consistently evaluated other farmers desiring incentives more than themselves (Table 3.2). However, as we saw the statistically significant increase in score for "activities they already wanted to do" as a motivator, the incentive may serve as a nudge, and the personal benefits to the farmer may only become evident over time. Going back in time to verify this claim in not possible; however, our findings suggest that with additional incentives farmers could alleviate structural and capital constraints to engage in more PES practices, directly contributing additional environmental benefits.

Together these findings suggest that an incentive was (and is) helpful at the outset to encourage taking part in ecosystem improvements, and over time either the social or ecological benefits realized encourages ongoing activity, a finding that has been shown in other farm settings (e.g., Grenier and Stanley, 2013). It is also possible that the size of the payment (noted to be relatively small and in some cases merely covering costs associated with land management practices) may not be substantial enough to warrant the ongoing monitoring demands associated with participation. In either scenario, the activities continue. The question of whether attitudes and values change in this process are discussed in the following section.

3.4.2 Assumption 2: Monetary incentives undermine conservation and lifestyle attitudes and values and promote economic attitudes

Financial incentives (in codes: '*financial*') were highly desirable across participant and non-participants, though correlations were nonsignificant for all of the attitudes – *econ, cons*, and *lifestyle*, suggesting there is not a particular attitude associated with desire for financial incentives (Table 3.3, Table 3.4, Figure 3.4). If profit maximizing attitudes were related to financial incentives, we would expect to see positive correlations between the '*econ*' attitude and

the '*financial*' and '*income*' motivator rows in Figure 3.4. Positive statistically significant correlations between financial incentives and access to credit (*credit*), access to equipment (*equip*), and access to technical advice (*tech*), none of which were related to any particular attitude type reinforces that incentives as a whole are welcome (Table 3.4) without the indication that monetary incentives are related to economic attitudes in particular (for similar trends in the ungrouped data for PES and non-PES separately, see Appendix B).

A similar result is seen with '*income*,' where a high mean score captured the near-unanimous desire to increase income as part of participation in the program (Table 3.2). However, that finding is not accompanied by a significant correlation to economic attitudes. Instead, we see several correlations to a variety of environmental motivators such as biodiversity conservation (*bd*), water quality improvements (*qual*) and climate change (*cc*), as well as alternative financial incentive mechanisms such as access to credit (*credit*) and technical support (*tech_s*). Overall this suggests that while economic incentives are appealing, they are not related to economic attitudes toward farm management itself in these settings. In other words, contrary to the presumption of crowding out, financial motives for participation do not help explain a preference for profit maximizing management strategies, which could be considered a manifestation of motivational crowding out.

The lifestyle and conservation attitudes indices were correlated to each other, as well as several incentives and motivators. Notably, improving water quality and quantity, improving biodiversity, and consideration for future generations were all significantly and positively correlated (Figure 3.4). Conservation attitudes were found to be significantly strongly correlated to the desire for recognition for on-farm activities ('recog' in Figure 3.4). These findings are

reinforced by comments from farmers in the survey, including one participant who noted, *"people who register into PES should be convinced about (the importance) of conserving and not about economic benefits."* Overall this suggests that while there is a keen desire for financial benefits, it is also independent of the conservation and lifestyle attitudes, and the desire to support and maintain environmental quality remains high.

3.4.2.1 Values

A difference in either the relational or NEP indices between PES participants and non-participants could be one basis for an interpretation of motivational crowding out. Consider the shared strong endorsement of environmental values across PES and non-PES participants in the following ways. That is, there is no meaningful differences between these two groups or as a proxy for before/after assessments of participants prior to taking part in the program (Figure 3.2). This could indicate: 1) Both groups strongly endorsed environmental values to begin with, and the participants continue to hold these; 2) participants were motivated by the financial mechanism and had lower values to begin with, but they increased over time (crowding in). 3) PES participants had even higher values to begin with (when we could not measure them), and they have eroded somewhat. If either 1 or 2 is true, we do not have evidence of crowding out. The third case is unlikely due to the lack of statistical difference between participant and non-participant populations and almost unanimous support of incentive programs, and because overall the scores remain quite high (i.e. to be higher would be difficult).

Of particular note are values orientations associated with stewardship – if these were undermined or seen to be lower across participants, it could be one basis for an interpretation of motivational crowding out. The relational value statements that demonstrated consistent correlations to both

attitudes and motivators were those that encapsulate responsibility and community identity respectively. As seen in Table 3.2, the highest ranking motivator for both PES and non-PES groups is consideration future generations, which correlated with several environmental motivators and attitudes (Figure 3.4). Figure 3.5 demonstrates the lifestyle and tradition attitudes within *ls* had the strongest correlations to the suite of relational values, even more so than conservation (*cons*) priorities, which still had several. Conversely, several of the *econ* attitudes have negative correlation with the whole metaphor and relational section, meaning that the higher relational scores correlated to lower scores associated with maximizing profits (Figure 3.5). This is another area where we can make the important distinction between profit maximization (i.e., the *econ* attitudes) and desire for higher income (which tended to be universal).

We have limited results to report about the different regions as they were consistently similar. Hojancha has a long history of experience with payment programs, and it was thought this may influence of values with respect to PES participation. However, we found values and attitudes in a community where incentivized environmental action is long standing no different from an adjacent community where there has been less structural support for such action (though this is not to say actions have not been taken). The overall presence of strong environmental values do not necessarily exist in other communities or settings engaged in or considering PES. Since there are consistently significant correlations between attitudes associated with farm management and relational values, our intent is to point to the strength of values associated with stewardship, community, and responsibility (as represented by relational values in this example) as worthy of

exploring in other environments to test for relevance when encouraging or promoting land use actions.

3.4.3 Assumption 3: Monetary incentives influence pro-environmental activities

The apparent impact of PES on land use decisions is evident when comparing relative allocation of activities on farms (Figure 3.6). However, if the financial incentive was the primary motivator to engage in an activity we would not expect the high proportion of non-PES farmer engagement in the same on-farm practices (Figure 3.7). PES farms have more land committed to plantation (reforested) property and conservation forest (avoided deforestation) however, avoiding deforestation and planting buffers are regularly reported by both groups (close to 80% of those surveyed engage in these practices). Despite the payment mechanism in place, more non-PES participants engage in agroforestry (31% as compared to 18% of PES participants). The majority of both groups (75%) also report engaging in other conservation activities that are not paid for via PES.

The level of additional ecosystem benefits that can be attributed to the incentive program is also confounded by the overall larger average land area of PES farmers: that is, those with larger farms are more able to commit land to PES purposes (Daniels et al., 2010). Differences in farm size across the groups is not great, however. Both the PES and the non-PES group in the surveyed regions fall within what are considered to be smallholder farms. Only a few (>10) individuals in both the participant and non-participant groups have farms larger than 100ha.

The reforestation modality in particular illustrates the complexity in trying to address the extent to which financial incentives are driving specific activities on the farm. Non-native tree

reforestation has introduced substantial controversy in the region. Teak is one such non-native tree that is eligible for reforestation payments through the PES program. Teak is particularly contentious as there are large scale plantations (often foreign owned, and intended for export) expanding on the Nicoya peninsula. Several farmers expressed concerns about the promotion of teak for on-farm reforestation, and the perceived environmental risks including excessive water consumption relative to native species – a concern that is particularly sensitive in a region where droughts are common. Conversely, some farmers attribute reforestation to the restoration or improvement of hydrological services, specifically water quantity. These opposing views regarding the impact of teak on water supply was also a point of conflict between project administrators and farmers. It is notable that over 26% of farmers indicated they would *not* engage in reforestation, nor do they want others to engage. Thus, to a subset of the population there is a lack of social approval for the practice, particularly when compared to the other practices, which tend to be supported wholeheartedly. Three short excerpts from farmer surveys highlight their concerns:

"I think that what does not work is the wrongly called "reforestation" with Teak. The [teak trees] are cut down and at the end the land is left totally deforested without a single native tree from the region."

"The institutions of defense of the environment should make a proposal to analyze the environmental damage caused by Teak and gradually substitute this practice, since I perceive that FONAFIFO employers do not care about our environment."

"FONAFIFO should [employ] efficient and professional people that know about sustainable development, not the people they have processing Teak plantations with the objective of

reforestation, that instead, promote the deterioration of the land and worsen economic profitability."

Both environmental concerns and economic concerns are driving the relative lack of enthusiasm for reforestation. There is skepticism about the current species used for reforestation and how these actions are promoted by FONAFIFO. Both PES and non-PES farmers mention reservations about teak reforestation, and though the practice does continue, the frustration is oriented toward administrators of the PES program, rather than farmers themselves. Teasing out the influence of these views is further complicated given that (non-teak) reforestation is supported, as exemplified by the following comment, "*Conservation is important. It is important to reforest areas that are suitable and ready for reforestation."*

It is therefore challenging to determine whether those reforesting are those who do it as a response to a payment, those who do it because they think it is a good practice, or those who choose not to do it because of concerns associated with water or non-native vegetation. This highlights that despite stated preferences, multiple influences and constraints lead to actual on-farm behaviour. That we found such strong support for incentives, strong environmental values, and evidence of interest in doing more on the landscape suggests that many willing farmers are left out of the program, do not have enough support to engage in certain activities to the extent they would desire, and are willing to do more with appropriate support.

3.4.4 UNAFOR

The ongoing grassroots movement to promote a new PES program for smallholder farmers brings this last point of discussion to the fore. While there is consistent support for incentive programs, as demonstrated by the survey findings and supported by UNAFOR's report, the feeling of disenfranchisement by rural farmers is substantial. They argue that the PES program as-is does not serve the best interests of smallholders and a parallel program that addresses their specific concerns is desired to "recognize and encourage the various environmental services they provide on their farms" (UNAFOR, 2016). Cross-country consultations indicated that farmers desired the continuation of cash as well as non-monetary contributions to promote on-farm environmental activities. Equity was emphasized separately from other values to highlight its importance. Perceived fairness is a consistent critique associated with PES (e.g., Narloch et al., 2011) and while equitable participation and distribution is desired, the converse may be more costly – perceptions that the current PES is not fairly distributed undermines overall goals.

There was also support for new mechanisms for social participation (to go "beyond consultation"), with an emphasis on participation and capacity building, and specific focus on women and youth. Similar support was found for capacity building in the survey (Table 3.4), and a sample population highly skewed toward older men reflects the new proposal addressing underrepresentation. Corresponding to an overwhelming response in our survey that emphasized conservation to benefit future generations (Table 3.2), the proposed program aims to embody a "vision of the future".

The highest level concerns highlighted by workshop attendees were regarding their means of participation on their own terms, with an emphasis on stewardship. This is not surprising,

although workshop participants did not coincide with surveyed farmers, the relational value statement associated with stewardship had the highest overall mean score for both PES and non-PES participants (Figure 3.2). To that end, when posed with variety of ways to prioritize/select land for this hypothetical new PES including: optimizing economic gains (prioritize poorest) or optimizing environmental outcomes (highest quality land), there was overwhelming support for a third criteria. The preference was for programs to be implemented where the communities themselves were already the most engaged in environmental stewardship (UNAFOR, 2016). The logic behind this thinking is that in such communities there is a higher chance of program success, and if the program is supported and endorsed locally, the ability to maintain control and avoid/resist external pressures (of any form) is strengthened. In addition, the report stated "environmental service payments should go to places with better organization", they should go to "conscious and hard-working" people, so that resources are used to the maximum, by people interested in the environment that already produce important environmental services (UNAFOR, 2016). Such a sentiment runs counter to the idea that PES run the risk of motivational crowding out in populations where environmental values are already strong (Vollan 2008, Wunder 2013). Indeed, the opposite is seen in this case—the perception is that those who are motivated are more likely to succeed.

As highly motivated farmers who lack resources to engage in more sustainable practices, but understand the benefits of conservation practices and seek rewards and capacity to do so, there is potential to design a new program (or one in parallel to the existing program) that complements the values and attitudes of participants at the outset. By doing so, people both within and beyond

the program can recognize benefits of activities, and use PES as a tool for collective action (Muradian, 2013).

3.4.5 Beyond Costa Rica and PES moving forward

The new UNAFOR program is an example of how large scale programs may evolve or spinoff into different creations. As PES as a whole continues to evolve, we consider key elements for a more inclusive and value-enhancing PES by relating our findings to the recommendations in a forthcoming article (Chan et al., in revision) that promotes pathways forward for PES.

Encouraging agency at the local level. Allowing for the possibility of novel and self-organized means of participation in PES may be more motivating and inclusive (Chan et al., in revision). Autonomy and flexibility were both highlighted by surveyed farmers and the UNAFOR report as important characteristics to be emphasized in a new program, seen in other PES programs where farmer engagement increased when they were able to choose the means to meet particular goals (Fleury, 2015). In the case of those surveyed in Hojancha and Nandayure, short contracts were significantly preferred to long ones (Table 3.3). The financial security associated with a long contract was not as highly valued as perceived autonomy and flexibility associated with not committing land to a particular use for 15 years or more.

Though perhaps obvious, it makes sense to identify socially amenable payment types or other design features that are deemed fair by participants (Adhikari and Boag, 2013). For example, access to equipment or technical support may be more critical to achieve autonomy than an income supplement, and may be more highly regarded by the target community (Vignola et al., 2012). Shared values were observed in the surveyed regions, where multiple demonstrations of a commitment to stewardship and sense of environmental responsibility were not unique to PES

participants. By operating in communities where commitment is evident rather than those with the most need (either ecologically or economically), there is potential to model successes and benefit from the spread of social norms.

Coordinated funding streams. Enabling different types of funders to mitigate their own impact through payments could engage broader funding streams (Chan et al., in revision). The UNAFOR report proposes that tourism and tourists are beneficiaries of Costa Rican ecosystem services that could provide additional contribution to a smallholder PES program, and a survey of tourists in the region expressed interest in more directly supporting conservation during their visit (Chapter 4). However, given the concerns associated with teak reforestation and farmer perception of associated environmental hazards, simply finding new revenue streams is not enough.

In the survey results we note that many non-participant farmers engage in practices without payment, and that a large majority of PES participants indicated they would carry on with PES practices without it. However, many comments touched on the relatively small payment relative to the work associated, with one farmer calling it a "joke". Another added, "*Incentives are good, but the amount received does not make it worth it. Nowadays, there is too much paperwork that does not allow many people to use the incentives. The process is too costly (also-complicated) to be up to date and the money received from the incentives is too little to help cover the costs*." To the extent that the payment mechanism is causing frustration, other motivators must be present to encourage participation and satisfaction. To the extent that the program is currently oversubscribed, there is not much incentive for FONAFIFO to change, though access to new funding could jumpstart alternative programs like the one proposed by UNAFOR.

Reduce focus on additionality. Emphasis on additionality has perhaps missed the potential to foster values beyond the scale of the individual property. Reinforcing attitudes that emphasize community building and social norms associated with conservation may spill over to those that are not in a program, and contribute to more lasting effects (Chan et al., in revision). In a setting where values are high across the board, existing logic associated with crowding out argues against programs where perceived additionality is minimal (i.e., people are motivated to engage in practices regardless of payment). It is reasonable to imagine that farmers do not want to engage in a practice for "free" when a neighbor is being compensated, despite survey results demonstrating many do engage in such practices, though perhaps not at the same scale. UNAFOR proposes to sidestep this issue by paying anyone who engages in specific practices, whether it is new or not, to avoid perverse incentives and foster long term stewardship activities.

Reducing the burden of monitoring. If motivations are intrinsic and social approval is present in an activity, the desire to cheat is reduced while monitoring needs are reduced as well (Chan et al., in review). Currently, PES audits are a large financial burden carried by the landowners themselves, and serve as a barrier to participation. The program proposed by UNAFOR incorporates wider range of potential activities which is good for flexibility, but challenging for measurement. They propose a single calibrated ecosystem service unit to assess and reward actions already being taken, rather than the costly audits. The ease with which one can assess bundled services accurately will be explored in their pilot study. Since there is high level of participation and social approval for most practices (with the exception of teak reforestation), less stringent monitoring may work in settings where there is a high level of community buy-in, though this is less likely elsewhere. Twenty years on from the initiation of Costa Rica's national

program, significant growth in participation (of farmers and land), has resulted in close to 20% of Costa Rican private land participating in an incentive program (Wunder 2013, FONAFIFO 2015). As emphasized by the findings from the regional survey and workshops across the country, smallholders in the surveyed area tend to endorse multiple types of incentive, and PES programs in general, despite a number of criticisms associated with the current program. Their solution is not to abandon PES, but to create a program that better meets their needs.

A series of the above suggestions address specific critiques and aim to reinforce values and attitudes that encourage undertaking pro-environmental action (see Chan et al., in revision). Despite shortfalls in Costa Rica's national program, its oversubscription, as well as proposals for adaption, there remains interest and commitment to engaging in environmentally beneficial practices which (with the notable exception of teak plantations, as discussed above) farmers generally support. Contrary to the recommendation that to avoid crowding out the appropriate approach is to avoid areas where values are high, this case provides support that while management choices can lead to disputes and disengagement, in terms of motivation and overall values, they are not undermined by the incentive itself.

3.5 Conclusion

The limited discussion, demonstration of understanding, and measurement of attitudes, values and underlying motivators for participation in PES appears to be a substantial gap in in PES design and implementation. Two decades of PES have provided multiple examples of challenges associated with incentive programs, and also indicated there is potential for real environmental, and at times social benefits when they are well-designed. Beyond economic inputs into a system (which can be either beneficial or risky), many of the social benefits have been incidental rather

than carefully assessed, and convenient by-products rather than implemented by design. Accounting for attitudes and values that foster social co-benefits, or consider them as potential motivators may encourage more buy-in and participation even when economic benefits are over-subscribed.

By overstating the potential influence of economic incentives and underestimating the role of attitudes and values in a given setting, we may risk missing opportunities to find conservation solutions that can include desired incentives while supporting stewardship. Though PES are borne from ecological and economic rationale, an increased emphasis to understand factors that relate to enthusiasm for delivering ecosystem services may enhance the longevity of a program, and thus more likely support environmental goals in the long run.

Chapter 4: No drought about it: Exploring the opportunity to finance conservation via tourists in Guanacaste, Costa Rica

Paige Olmsted, Terre Satterfield, Jordi Honey-Rosés, Kai Chan

4.1 Introduction

Ecotourism, where visitors prioritize destinations with the natural environment as a focal point, has risen dramatically in the last two decades (Butcher, 2006 Yeoman 2009). With increased enthusiasm for new and unique travel destinations, ecotourists often also seek unique cultural experiences, to support local employment through their visit, and to minimize the footprint of the tourist experience itself (Blamey, 1997). Ecotourism is broadly thought to be more benign than mass-tourism, but also brings about concerns including habitat degradation in vulnerable environments, and the potential to introduce socioeconomic and cultural conflicts in a community (Stem et al., 2003, Das and Chatterjee, 2015). The scale of tourism (now upwards of 1 billion international travelers annually) is such that even small impacts—positive or negative—can have substantial cumulative impact on global sustainability (UNWTO, 2013, Ardoin et al., 2015).

Early enthusiasm for community-based ecotourism saw it as a new means to protect biodiversity by providing non-consumptive revenue streams for local communities, and by encouraging conservation (Ross and Wall, 1999, Loumou et al., 2000). A well-known example in the Bwindi Impenetrable forest in Uganda involves visitors paying considerable entry fees to visit rare mountain gorillas. Though the details and distribution of benefits remain complex issues, the

local community benefits from employment and the sale of goods to tourists, and the forest benefits from reduced extraction due to the direct economic benefit of an intact gorilla habitat (Tumusiime and Sjaastad, 2014). Most ecotourism sites do not have rare charismatic species that generate substantial revenue, however, some argue that direct payments (via international donors, via government support, via individual donors) are more effective for conservation than the indirect pathway of ecotourism (Kiss, 2004). A meta-analysis of 251 ecotourism sites found that while over 60% could be considered "sustainable,", just 17% made *positive* contributions to conservation as measured by both new areas conserved and changes in attitude toward conservation by local communities (Kruger, 2005). Even when the contribution is positive, strong dependence on tourism revenue is also risky: a global analysis found dozens of endangered mammal species relying upon this unpredictable funding source and highlighted associated management challenges (Buckley et al., 2012).

Economic contributions to conservation in the ecotourism literature are frequently focused on indirect contributions via payment for services (e.g., park entry fees) rather than charitable contributions. Several studies indicate that ecotourists are willing to pay more when the proceeds of their experience are known to contribute to local communities, or will directly contribute to biodiversity conservation in the region (Baral et al., 2008, Cheung and Jim, 2013, Wang and Jia, 2012). Choice experiments are a frequent tool to examine tourist preferences, often focusing on features that would encourage visiting a particular site, and find that tourists are willing to pay more for "ecotourism experiences" that augment the overall visitor experience (e.g. Huybers et al., 2000, Chan and Baum, 2007, Chaminuka et al., 2012). Other common studies examine features that might increase willingness to pay for upgrades to a site, for example, paying a

higher entry fee to a national park for better signage, new trails, or additional infrastructure (Hearne and Salinas, 2002, Lindberg and Veisten, 2012, Cheung and Jim, 2013). While a few studies have explored factors that influence the likelihood of contributing directly to conservation at or soon after visiting a tourist site (e.g., Skibins et al., 2013), minimal research has focused on the features that influence willingness for tourists and ecotourists to contribute directly to conservation at the end of their trip—potentially a new cash-flow for conservation.

Charitable giving is often examined at a national scope, where demographic factors help explain giving patterns, or at individual scales, where attitudes and values influence support of particular types of charities (Gittell and Tebaldi, 2006, Lee and Chang, 2007). The latter studies indicate that individuals contribute more to specific charitable causes if they have or express relevant experiences or values (e.g., those with pets and scoring higher for empathy are more likely to select an animal welfare charity) (Green and Webb, 1997). Following this logic, we propose that ecotourists, who are already motivated to spend time in nature, may be more likely to hold environmental values, and consequently may be more willing to contribute directly to conservation efforts.

Costa Rica is an ideal setting for an investigation of the influence of tourism on charitable contributions to conservation. Often considered the poster child for ecotourism, Costa Rica ranks highly in international ecotourism standards as well as environmental performance in general, ranking 5th out of 135 countries (Honey et al., 2010, EPI 2015). Tourists identify biodiversity as a primary reason to visit the country, and biodiversity conservation is directly tied to the Costa Rican economy (Hearn and Salinas, 2002, WEF 2013). Despite Costa Rica's green reputation, rapid coastal development in the northwest in particular has concentrated resource demands and

at times lead to conflicts between developers, local communities, as well as regional and national governments (Van Noorloos, 2011).

A new avenue of research associated with nature-based tourism is the influence of an ecotourism experience on tourists themselves, particularly how ecotourism experiences support the development of pro-environmental behaviours (which in this case could include a donation to conservation) (Ardoin et al., 2015). In this study we conduct a survey including a choice experiment to ask: how much might tourists contribute directly to conservation in the region they have visited, and what design elements influence the kinds of programs they are more likely to fund? In particular, are tourists more interested in paying for biodiversity (which many tourists seek to see) or water conservation (where tourists may recognize their water use). We also ask if those expressing environmental values, identifying as ecotourists, and those knowledgeable of the water stress in the region, are willing to pay more. In doing so we seek to understand the extent to which tourists are a viable source of support for direct conservation.

4.2 Methods

Our methods included three components. We conducted a paper-based survey which included a choice experiment presenting options for conservation contributions, targeting tourists to Costa Rica's Nicoya Peninsula at the departing airport. We analyzed the choice experiment data and additional survey data to interpret factors influencing contribution to conservation and to characterize tourist awareness of environmental conditions in the region. Following a description of the study site we describe these components in turn.

4.2.1 Study site

Costa Rica is an ecotourism hotspot, due to its extensive National Park network (over 25% of Costa Rica is formally protected), volcanoes, Atlantic and Pacific beaches, and diverse flora and fauna (Hearne and Salinas, 2002). It is also easily accessible from North America, and is the most politically and economically stable country in Central America. Steady increases in tourist arrivals since the late 1980s reached 2.66 million international tourists in 2015 (WTTC, 2016). Tourism constitutes a substantial 12% of Costa Rica's GDP and is projected to grow to 16.6% by 2023, with a doubling of job growth in the tourism sector in the same time period (WEF, 2013). The Nicoya peninsula makes up much of the coast in the northwest region and is home to the majority of the country's large hotel developments (Figure 4.1). Growth in the region was stimulated by the construction of the Liberia International airport in 2002. The Liberia airport is the country's second largest, having brought in 330,309 tourists in 2013 (WEF, 2013). Both tourist visits and longer term ex-pat residents or "residential tourists" in the region are increasing steadily, which has multifaceted consequences, and implications for water appropriation and use in particular (Van Noorloos, 2011).

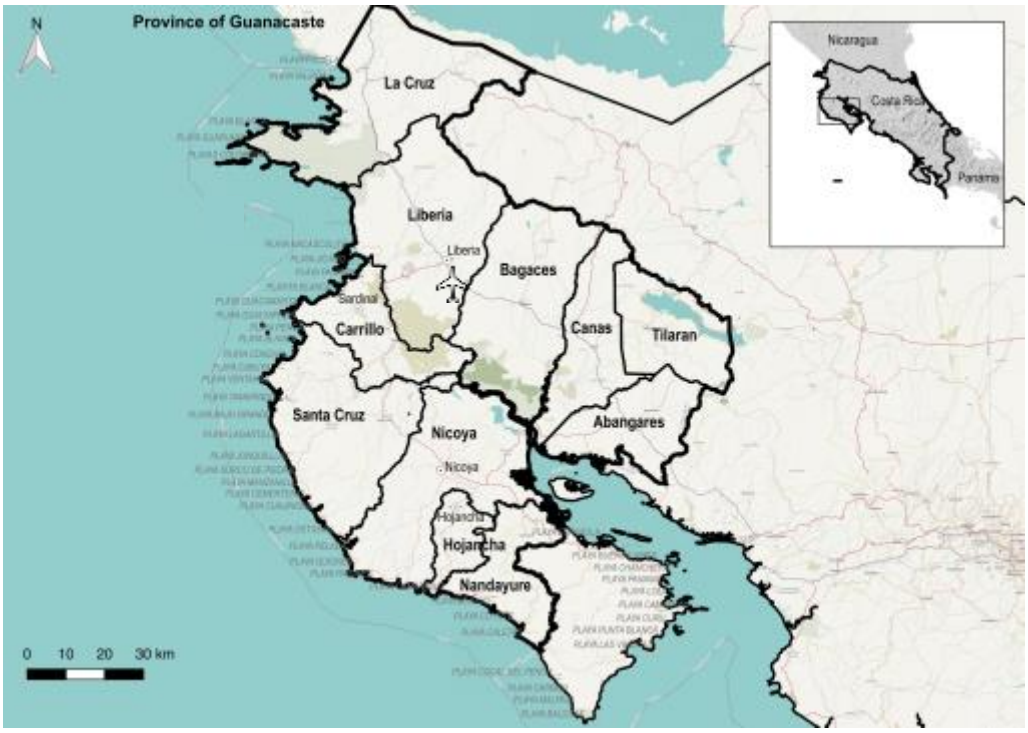


Figure 4.1: Map of the Nicoya Peninsula, featuring the location of the Liberia airport and major roads to the coast where many tourist beach destinations are located.

The Nicoya peninsula makes up much of the Guanacaste province, the poorest and driest province of Costa Rica. Some communities find themselves hamstrung – tourism brings jobs in several sectors, and often an influx of capital to local economies, yet apprehension remains about both short and long term impact on resources (Barrantes-Reynolds, 2011). Water is of utmost concern for all communities in the region, with much of the non-coastal (i.e., non-tourist) areas being farmland and pasture, producing beef, as well as rice, pineapple, and several other cash crops for both local consumption and export (Ramírez-Cover 2007, MINAET 2008). In the recent dry seasons, regional water districts have turned off water on several occasions due to shortages, directly impacting tourist operations (S Hund, personal communication). Growth in the region has been criticized as opportunistic and poorly planned (Honey et al., 2011); further

growth in the tourist industry will be a significant factor in the future planning of the Guanacaste region, particularly related to freshwater demand (Babcock et al., 2016).

4.2.2 Recruitment

A paper-based survey was conducted in the departure lounge of the Liberia airport in Guanacaste during the week of May 25th, 2015. Tourists sitting in the departure lounge was asked if they had recently traveled in the region, and if so, if they were interested in participating in a short survey regarding their activities on their trip and views/observations about their experience. Every second tourist was asked, with an acceptance rate of approximately 80%. Of the 348 people who accepted a survey, 260 were fully completed (a response rate of 60%). Participants were predominantly from the USA (57%) and Canada (28%). The sample included 42% male and 58% female respondents, with the majority (84%) in the 18-49 age range. Household income levels were relatively high with 35% over $100,000 per annum and an additional 13% over $75,000 per annum, and 20% of respondents opting not to disclose. As international flights and thus international tourists were the target, we would expect at least modest incomes, though several backpackers and students partook as well. Table 4.1 summarizes the sample demographic data.

Table 4.1. Summary of survey participant demographic characteristics.

Characteristic	Description	Percentage of sample
Gender	Male	42%
	Female	58%
Age	18-29	41%
	30-49	43%
	50-64	9%
	65+	4%
Country of Origin	Canada	28%
	USA	57%
	Europe	2%
	Other	3%
	Did not disclose	12%
Household Income		
	Under $24,999	9%
	$25,000-$49,999	9%
	$50,000-$74,999	11%
	$75,000-$99,999	13%
	$100,000	35%
	Prefer not to say	20%

4.2.3 Survey

The survey consisted of five parts. The first asked basic questions about their trip: purpose, location, activities, and an eco-tourist self-assessment consisting of four questions. The second section was a choice experiment with 8 paired conservation program scenarios, one of which they could (hypothetically) contribute to depending on its specific attributes. Participants were also provided the opportunity to opt-out and not support either of the provided scenarios. The third section asked about specific exposure to information about the water shortage in the region. The fourth included three measures of environmental values – NEP (Dunlap et al., 2000),

relational values (see Chan et al., 2016, Chapter 2), and intrinsic and instrumental values. The final section included standard demographic data including country of origin, age, gender, and income.

4.2.4 Choice experiment design

Choice experiments have been used in multiple settings, particularly health and the environment, as a tool to tease out preferences for specific attributes when a choice between two options varies across multiple factors (Adamowicz et al., 1998, Louvriere 2000, Train 2009). By asking respondents to choose one response over another across multiple pairings, the cognitive burden is manageable, and relative weights of various attributes can be inferred. Studies of biodiversity conservation and environmental policy including flagship species (e.g., Veríssimo et al., 2009), policy design (e.g., Ruto and Garrod, 2009), and recreational preferences (e.g., Horne et al., 2005) have found choice methodology to be particularly useful.

Being mindful of the challenges in developing a useful choice experiment, the following steps were undertaken: establishing attributes and attribute levels that were realistic, designing choice sets that are distinguishable, and pre-testing the questionnaire (Mangham et al., 2009). To generate relevant attributes we conducted informal interviews with tourists and tourist operators to understand which factors would influence the level of interest in contributing to a given conservation effort.

The final design consisted of four attributes – target of intervention, type of financial support, administration of the payment, and level of support in dollars (Table 4.2).

Table 4.2: Levels and attributes associated with the choice exercise in the tourist survey. Starred items are the base case, meaning that the attribute coefficients in relation to these levels, and why those levels do not appear in Table 4.4.

Attribute	Description	Levels
Target of Intervention	The intended focus of the conservation project	Water conservation* Biodiversity
Type of Financial support	Fund refers to a generic fund on the theme in question, from which outside evaluation would determine how various projects were funded. Direct suggests to a location they personally had seen and could allocate	Fund* Direct to place they visited
Administration of Payment	To whom the payment was made and would run the program	Government* Local NGO International NGO Hotel
Level of Payment	The amount that would be contributed to the project associated with their selection	$5* $10 $20 $50

The first two attributes had two levels, the latter two had four levels, meaning there were 64 (2x2x4x4) possible combinations of the different attributes. Given the large number of possible combinations of pairings, we used a fractional factorial design and used 32 choice pairings, which is sufficient to estimate orthogonal main effects (Louviere et al., 2000).

As this is too many for an individual person to evaluate, four versions of the survey presented 8 pairs (after a worked example). Fractional factorial design is common practice to ensure meaningful engagement of respondents for a relatively short period of time in an effort to reduce response fatigue (Louviere et al., 2000). An example of what participants were presented with is shown in Table 4.3. JMP software produced the pairings for the four surveys to reflect even representation of each of the attributes and balanced pairs. In addition to the pairs, there was a

third alternative in each pair that served as an opt-out – that they were not interested in supporting either of the two options. Analysis was done in R with the mlogit and CE packages.

Table 4.3 Example of choice pair as seen by survey participant.

	Restoration Program 1	Restoration Program 2	
Who is responsible for administering the program	Government	International Environmental organization	I would not be interested in supporting either of these programs
What sector is being targeted	Water (eg. improved infrastructure)	Biodiversity (eg. habitat protection)	
What type of project is being supported	Local site you have visited	General fund to which organizations can apply	
Level of support	$10	$20	
Please Tick **ONE** box only	☐	☐	☐

4.2.5 Econometric analysis

There are multiple strategies to model choice data, which are selected based on tradeoffs and assumptions embedded in the models themselves. The most common analyses, including the conditional and random parameter logit models (both were tested and the latter used in this study), stem from the assumption that individuals will select an alternative that maximizes their utility (Train, 2009). This can be expressed by the random utility function:

$$U_i = V(\beta, X_i) + \varepsilon_i, \qquad (1)$$

Where V is a function of attribute levels for alternative i, X_i is a vector of attribute levels defining alternative i, β is a vector of estimated coefficients, and ε is a random error term (Hauber et al., 2016). The estimated coefficients are a preference weight of the relative utility derived from that attribute.

Conditional logit models assume constant preferences among participants and the random error term is assumed to follow an independently and identically distributed distribution (Louvriere et al., 2000). This assumption leads to independence of irrelevant alternatives (IIA) property, which means that the probability of choosing one alternative over another is not affected by the introduction or removal or additional alternatives in the choice set (Hanley et al., 2009). Random parameters or mixed logit models allow us to relax the IIA, and allow a distribution of preference weights across the sample. This reflects differences in preference among respondents, which is often more realistic view of a given situation (Hanley et al., 2009). In this mixed logit model personal preferences denoted by the estimated utility coefficient β vary randomly across the sample population, and parameters were assumed to be normally distributed. The probability of a given choice is a function both the attribute levels of the alternative and attribute levels of all other profiles presented in the task. This can be expressed as follows:

$$\text{Probability of choice i} = \frac{e^{V(\beta,x_i)}}{\sum_j e^{V(\beta,x_j)}}, \qquad (2)$$

When representative utility is parameterized this way, the marginal willingness to pay for a given attribute can be defined as a ratio of the regression coefficients for the attribute divided by the negative cost coefficient (Train, 2009).

To improve realism, an opt-out alternative (no donation) was included in the choice exercise. Marginal WTP is calculated to measure differences between attribute levels in reference to the base case, which are the items marked by an asterisk in each level of Table 4.2. In choice experiments where the opt-out is a status quo option, the base case can be simply the lowest level of each attribute, but this does not work in our example when an opt-out is equivalent to not participating, and having levels for the attributes would not have meaning. To deal with this, we use the alternative specific constant (ASC) associated with the opt-out choice to compare overall willingness to pay of those who choose to contribute using the "state of the world" approach (Hanley et al., 2009), which is represented by the following equation:

$$CS = -\frac{1}{\beta}(V_1 - V_0) \quad (3)$$

Where CS refers to the compensating surplus, which is the difference in WTP between any two suites of attributes. By using the attributes with the lowest coefficients as one set, and the highest coefficients as the other set, we can calculate a WTP range once the difference in utilities is divided by the negative price coefficient.

4.2.6 Additional survey analysis

As an exercise to test how accurately respondents understood the choice exercise and were able to capture their own sentiments, immediately following the choice experiment we asked participants to rank the factors they had just assessed in the paired questions, and compare the coefficients generated by the econometric model to the rankings. Several other indices were

measured in the survey, including a suite of questions regarding activities on their trip, their knowledge of the water scarcity in Guanacaste, and environmental values including relational values (as described in Chapter 2). An ecotourism score was derived from four questions on a 1-5 Likert scale, that each assessed agreement with a defining characteristic of ecotourism (Blamey, 1997). The same approach—devising a score from a series of statements—was used for the relational value and NEP statements, as the coherence of these measures were assessment in Chapter 2. Several variables of interest were interacted with the choice model to explore any relationship between the willingness to pay for conservation and additional data. Goodness of fit was measured using the Akaike information criterion (AIC), with the best fit described in the results below. Further descriptive statistics and correlations outside of the choice model are used to help explain results.

4.3 Results

Choice experiment mixed model results suggest the strongest preference is for local NGO administration of a program, followed by site specific support, whereas the target of the intervention (water vs. biodiversity) is not significant in the mixed model. When demographic data other variables including support for ecotourism, hotel type, income, and knowledge of the drought are interacted with the choice experiment, we find ecotourists are statistically significantly willing to contribute more and prefer biodiversity projects. Knowledge of the drought did not relate to increased support for water projects, though those who were aware were willing to give more. Following a more detailed outline of the choice experiment results, the explanatory variables and their relationship to values are discussed in more detail.

4.3.1 Choice experiment –local NGO administration most important

According to the mixed logit model, the local NGO administration type and amount contributed had the most statistically significant preferences ($p<0.01$). The site specific funding choice was also significantly preferred as compared to the general fund option. The type of program (that is, water oriented or biodiversity oriented) were not found to be significant.

Table 4.4. Mixed logit model results of the choice experiment. The left side highlights the model without interactions, and the right the model with ecotourist and cost interactions, contributing to overall improved model fit. The McFadden's pseudo R^2 values are relative, but between 0.2 and 0.4 is considered good model fit (Hauber et al., 2009).

Mixed Model					Model with interactions			
variable	coefficient	SE	p-value		coefficient	SE	p-value	
ASC	-2.5895588	1.19214	<2.2E-16***		-2.8232943	0.2156659	<2.20E-16	***
Admin: International NGO	0.1310608	0.145022	0.341295		-0.2820344	0.1677789	0.0927651	.
Admin: Hotel	-0.9349718	0.166209	1.23E-06***		-1.1130489	0.1926566	7.59E-09	***
Admin: Local NGO	1.0631964	0.1448048	2.22E-16***		0.7716903	0.1410744	4.50E-08	***
Biodiversity target	-0.0208192	0.196566	0.3922575		-1.3420691	0.5433596	0.0135133	*
Supports site	0.2995383	0.1161799	0.0511162**		-0.8104235	0.5332909	0.1285952	
Amount given	-0.075383	0.0065171	<2.2E-16***		-0.1704498	0.031078	4.14E-08	***
Amount:large hotel					-0.0537839	0.0093603	9.14E-09	***
Amount:income					0.0096798	0.0028977	0.0008362	***
Amount:ecotourist					0.011168	0.0053516	0.0369018	*
Biodiversity:ecotourist					0.3026252	0.1270014	0.0171792	*
Biodiversity:drought					-0.0723092	0.0677624	0.2859275	
Amount:drought					0.0093244	0.0027582	0.0007231	***
Site:ecotourist					0.1720248	0.1298102	0.1851039	
Log-likelihood	-1748.7				-1600.3			
Adjusted R^2	0.31172				0.31762			
AIC	3555.486				3272.64			
WTP range	$18.14-$52.69							

The relative size of the coefficients indicates strength of preference, and when divided by the negative value of the cost coefficient (amount given – the negative sign indicates the lower amount was consistently selected, a common finding) can be interpreted as the marginal willingness to pay (Louvriere, 2000). For example, with local NGO as the most preferred attribute in the mixed model divided by the negative value of amount given (0.131/ 0.07), the marginal WTP for this attribute is $14.10. That is, on average respondents were willing to pay $14.10 more for programs that included local NGO leadership. For total mean WTP we can compare the suite of attributes at the low end and high end to the ASC (representing the opt-out) as described by equation 3, and find a range of $18.14-$52.69. This WTP range is not indicative or reflective of error or standard deviation around a mean, the low end is the median WTP for the least desirable attributes, and the high end is the median WTP for the most desirable attributes. Confidence intervals associated with specific attributes or suites of attributes can be derived using the error terms outlined in Table 4.4.

We also interacted the model with several demographic and index variables associated with values, as seen in the right side of Table 4.4 to determine if specific subpopulations or sample characteristics influenced the results. Variables of interest were used to develop multiple models, and the best fit (according to the AIC and log-likelihood measure) is included in the table. The mixed model with interactions helps explain some preference heterogeneity in the sample. AIC comparison between the model without interactions and the model with interactions suggests the interaction model has a better overall model fit, which is also shown by the slightly higher pseudo R^2 and higher (less negative) log-likelihood ratio. The sign and magnitude of the coefficients in the interacted model indicate that the amount given was statistically significantly

influenced by where respondents stayed – those that stayed in large hotels were more likely to give less. Overall household income was significant, which is to be expected as those with more money are assumed to be more able to give (List 2011), though the low coefficient indicates this factor does not have a large impact. This may be partially explained by the large number of participants who were not willing to disclose income, thus the complete income picture is difficult to assess.

A higher ecotourism score also predicted a higher contribution to conservation in the model. The ecotourism score was compared against the other attributes, and was found to be significant in predicting the type of project, with preference for biodiversity projects. For ecotourists contributing to a specific site as compared to a general fund was not preferred. We also did not find a relationship between knowledge of the drought and the tendency to support one project or another. That is, water did not emerge as preferred when participants were aware of the drought, however, in the interaction model, there was a statistically significant preference water projects that was not seen in the model without interactions.

The explicit ranking task confirmed results from the choice experiment, e.g., that the institution administering the program was the most important factor. Participants ranked the dollar value associated with the choice pair as the least important attribute, while the choice data suggests otherwise. The range of responses for water, biodiversity and type of support may help explain the lack of significant trend in the choice data.

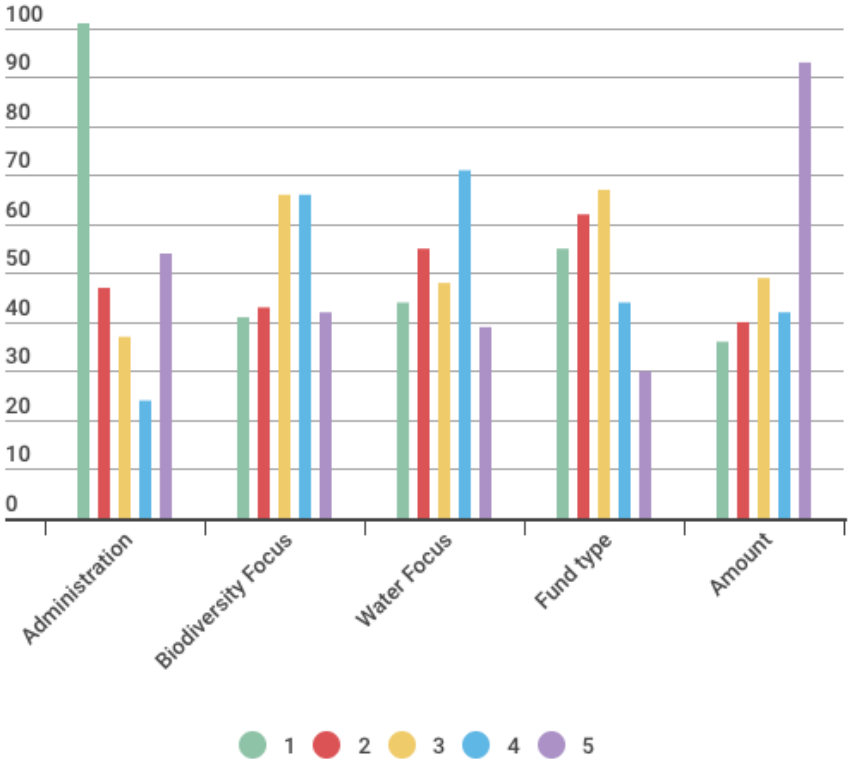


Figure 4.2. Self-reported ranking of attribute importance post-choice experiment exercise. Rank order is represented by 1-5, with 1 being the most important attribute and 5 being the least.

4.3.2 Ecotourism, knowledge of drought

The mean score of the four ecotourism measures was 4.0 (+/- 1.01) out of a maximum score of 5. The components from which the score was derived (based on the elements of ecotourism) included an evaluation of the importance of experiencing nature (4.4 +/- 0.87), learning about local culture (4.3 +/- 0.86) reducing impact on the environment (3.9 +/- 1.1), and supporting conservation in the region (3.6 +/- 1.2). The lower scores were also those with the most variability.

4.3.3 Awareness of drought

Drought awareness was captured with three questions – the extent to which tourists heard about it at all during their trip, whether their hotel provided any information about water concerns, and if they were provided with any specific guidance or recommendations associated with water use (Figure 4.3). The first question – knowledge of the drought, regardless of any exposure to actions, is the sole variable that was used in the choice model.

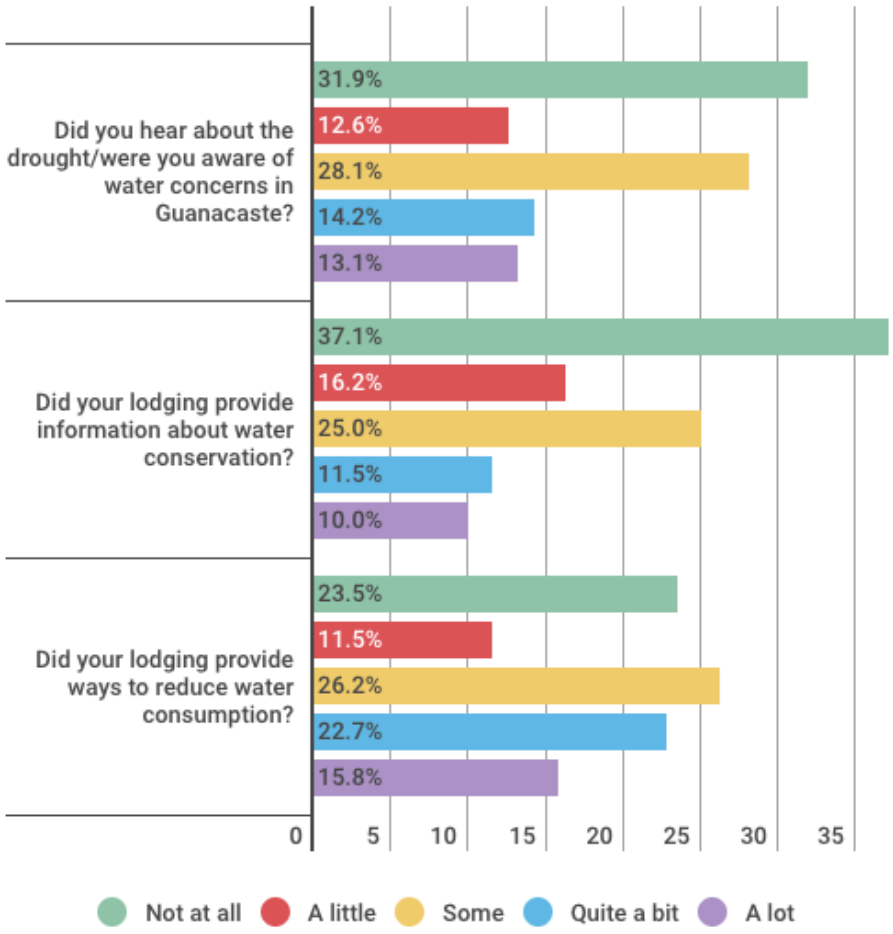


Figure 4.3. Knowledge of water situation and exposure to information associated with water during visit to Guanacaste. The x-axis is the percentage of respondents who gave the indicated response.

A third of participants heard nothing at all about a drought in the region (32%), a larger proportion (37%) said no information was provided at their lodging. In an open-ended question regarding guidelines for action, the bulk of the reported activities were associated with reducing linen and towel washing.

4.3.4 Correlations

Analysis of the relationship between tourist activities, drought knowledge, and values revealed strong positive correlations within the ecotourism construct, and between ecotourism and popular activities (Figure 4.4). Popular activities include those in which more than 20% of respondents participated –rafting, hiking, zip lining, and visiting national parks (for levels of participation in these and other activities see Appendix C). Drought knowledge ('*drought*') did not correlate significantly with ecotourism or value scores. Income correlated negatively with a number of measures, including the same popular activities, the NEP, and the suite of ecotourist characteristics. Income only correlated positively with the likelihood of staying at a large hotel. A measure of human dominance over nature, ('*right*', which measured agreement with the statement "Humans have a right to do whatever we want to the environment") was negatively correlated to the ecotourism measures and the environmental value indices. For strongly correlated variables, such as the ecotourism and relational values scores, only one was used in the integrated mixed choice model.

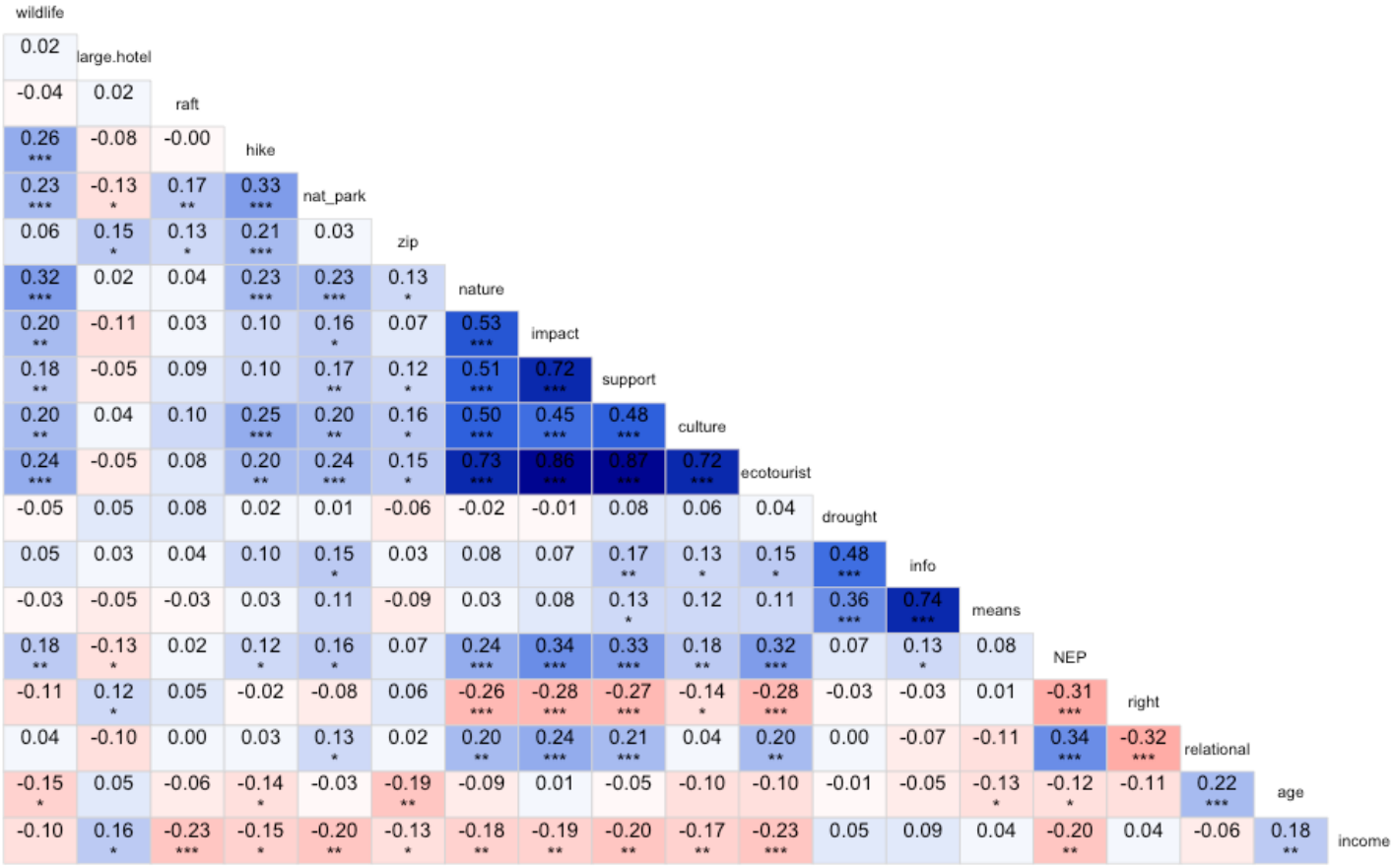


Figure 4.4. Correlation diagram examining relationships between demographic, ecotourist, knowledge of drought, and value index variables from the broader survey.

4.4 Discussion

Our results highlight tourist interest in supporting conservation in the region they have recently traveled, and demonstrate broad alignment with the concepts that underpin ecotourism. Despite a relationship between ecotourist components and relational values, which suggests an overall appreciation for nature and environmental stewardship, there was limited knowledge of the drought, which was a major current environmental challenge in the region. Similarly, WTP was not influenced by awareness of drought, but by factors that point to a connection to place, suggesting that financial support from tourists may be more effectively leveraged by pointing to

and enhancing such connections.

4.4.1 Support for conservation

Overall, 77.5% of the individual choice pairings included support for a conservation program as opposed to opting not to contribute, far above the expectation in choice experiments that the status quo (in this example, not contributing to any program) is preferred (Veldwijk et al. 2014). The enthusiasm to participate may be partly explained by the hypothetical nature of the survey. For this reason, choice experiment studies that include a cost function may have an inflated willingness to pay as compared to a real-world setting, though the inclusion of an opt-out option is intended to temper this effect (Hanley et al., 2009). Additional enthusiasm may be accounted for by the slightly different approach -- tourist choice experiments often reflect a particular service one is paying for rather than a donation, where people may be further inclined to participate (hypothetically) to reinforce a self-image as being socially responsible (Nyborg et al., 2006).

4.4.1.1 Amount given

Despite the caveats listed above, the WTP range of ($18.14-52.69) is not out of line from reported charitable contributions by Americans, who along with Canadians made up the bulk of survey participants. Reports on charitable giving estimate that Americans give on average a total of $548 across five charities a year, with wealthier people giving more (List, 2011). It is possible that at the end of a trip where one has spent thousands of dollars, an additional $10, 20, or $50 donation seems relatively unsubstantial. It is worth noting however that enthusiasm may have been tempered—perhaps strongly—by the administration of the survey in the departure lounge

almost immediately after departing tourists would have paid the mandatory $29USD exit fee at the airport. Often tourists are not aware of the fee prior to their arrival at the airport (and are not very happy about it), thus some may be even less inclined to contribute. Additional open-ended comments at the end of the survey echoed this idea, e.g., "Our tourist dollar should be sufficient to support conservation. Not willing to pay $ in addition to departure tax and other expenses."

Curiously, in the ranking exercise after the choice experiment, by ranking "amount" in the last position most consistently, participants indicated it was the least important factor in the choice decision making, despite the expected significant negative coefficient derived from the model indicating that participants regularly chose the lower amount (Table 4.4). Whether this was a function of participants believing themselves to not be influenced by the dollar amounts, or wanting to appear more generous, is not clear. For these reasons, the absolute dollar amounts are less important than the consistent willingness to contribute and the relative weights of the factors influencing such contributions are emphasized as the key findings.

4.4.1.2 Design features

Survey respondents selected administration by local NGOs as the attribute most likely to influence their contribution. This aligned with the ranking exercise where this attribute had the highest number of first place rankings, supporting the notion that people understood the exercise and were consistent. The finding itself however, was surprising. We hypothesize the enthusiasm to support local NGOs is a result of being exposed to various local organizations during their holiday. They are likely organizations that a visitor would otherwise not be aware of, or would not have knowledge or confidence to support from a distance. The Values, Beliefs, Norms theory of environmental behaviour includes a component associated with one's ability to reduce a threat

(Stern et al., 1999). If tourists have witnessed the impact first hand, they may be more enthusiastic to support, feeling a direct ability to make a difference and trusting that the money would be well spent. Indeed, several tourists commented about specific local groups they believed to be doing excellent work related to the environment.

The support for local NGOs relative to international NGOs was surprising (hotel-mediated programs were least preferred), because international NGOs are likely the primary means that American, Canadian, and Europeans contribute to conservation overseas. For example, major conservation NGO World Wildlife Fund in the United States received $33 million from individual donors in 2015 (WWF-US, 2016). While we were unable to find data associated with environmental sector, in humanitarian organizations less than 2% of international donor funding goes to local grassroots charities, as opposed to direct contributions to larger international organizations (IFRC, 2015). Such support for local NGOs is an indication that an opportunity for local NGOs to benefit from contributions when a positive experience is recent and tourists have enthusiasm for and a personal connection to the work of a specific organization. Additional support for this hypothesis comes from the parallel finding that there was a slight preference to contribute to site-specific conservation programs (Table 4.4), which has also been found in other studies (Hearne and Salinas, 2002).

The preference for site-based donation as opposed to a more general fund was only marginally significant, and was not significant in the integrated model (Table 4.4). This could be partly explained by the support of local NGOs—that if a tourist has encountered an organization they believe to be doing good work, the specific project is less important. This lack of strong preference in the integrated model is suggestive that fund-based programs could also work,

particularly with the right marketing. Many studies associated with donations do not focus on the features associated with donation programs, but the psychological factors that can influence what is contributed. For example, one study in a national park found several factors associated with donations – anonymity, reciprocity, and conformity – increased contributions (Alpizar et al., 2008). Public donations were 25% higher than private, receiving a gift increased donation by 5%, and reference levels also influenced the overall contribution (Alpizar et al., 2008).

The lack of strong preference across the sample for water or biodiversity projects was unexpected given that biodiversity is a major draw for Costa Rican tourists. Conversations with tourists and tourist operators while developing the survey pointed to enthusiasm for biodiversity conservation projects, but the lack of compelling description of specific projects may have influenced the result. Future studies might consider adding additional levels and specifying a particular bird or mammal species to distinguish greater heterogeneity. In the integrated model, while ecotourists demonstrated a strong preference for biodiversity projects, the overall measure for project preference was significantly in favour of water projects (as indicated by a negative and significant coefficient for biodiversity). This could suggest those less inclined toward ecotourism may be less familiar with the term biodiversity, though at least one study has shown tourists have an intuitive understanding of what biodiversity means (Bakhtiari et al., 2014). It is also possible that despite a lack of specific knowledge regarding a drought, a contribution toward water is seen as more beneficial to the population at large, whereas biodiversity is more niche, though further data collection is required to confirm any of the above suppositions.

4.4.2 Ecotourism

Tourists in this study indicated strong alignment with the four key criteria of ecotourism -- visiting nature, reducing impact, contributing to conservation, and learning about culture. It is therefore not surprising that the most popular activities were visits to national parks, hiking, and canopy tours, with over 60% of respondents having engaged in this specific activity. The second most universally popular activity was national park visits; a previous study indicated North American and European tourists to Costa Rica visit on average two and three parks respectively (Hearne and Salinas, 2002). We do not know whether ecotourist sentiments pre-existed or the extent they may have been further developed during their visit, but ecotourist scores helped explain variation in the choice model, where goodness of fit was improved when interacting the ecotourism variable with the choice model attributes. Each of them was found to be positively influenced by the variable, that is, those with higher ecotourist scores tended to contribute more, were more interested in biodiversity projects, and more interested in supporting sites they had visited. We consider contributing to conservation a pro-environmental behaviour, that may be influenced or encouraged by other knowledge gained associated with the ecology of the region during their trip. However, the lack of awareness of the water situation in which tourists and the tourism industry are playing a direct role presents an opportunity to help address the problem with a susceptible ecotourist audience.

The hospitality industry is centered on customer service, and not likely to want to suggest there are any problems or limitations for guests. Several hotels on the coast truck in fresh water when needed, though do not advertise or use this as an opportunity to promote conservation to their guests (D. Olmsted, personal communication). We did not see correlation between ecotourist

scores and hotel size, which was hypothesized as a potential negative relationship, as tourists staying at all-inclusive resorts have many activities on site and have less reason to go further afield and witness drought conditions for themselves. The Liberia airport was constructed to attract developers to build big coastal hotels, and thus there is documentation that there is a different tourist profile for those that come through Liberia (Honey et al., 2010). Tourists in the region tend to stick to the northwest, whereas more experienced travelers looking to cover more ground are more likely to enter the country via San Jose (Honey et al., 2010). Staying on the coast may also insulate guests from environmental realities of the region, which may help explain why ecotourist scores were not correlated to knowledge of the drought (Figure 4.4).

4.4.3 Knowledge of drought

At the time of the survey this region of Costa Rica was supposed to be a month into the rainy season, but at the point of data collection (late May) limited rain had fallen. As a consequence, much of the land was dry and brown, including the view from the airport lounge where the survey was taken, which looked out onto a barren field. The physical evidence of dry conditions and consequent limited of awareness of a drought were surprising. One commenter noted, "Costa Rica needs rain really quick. Was not aware of water shortage. Government should now use desalination plant in the rural areas. Love Costa Rica will come again." This highlights that the physical necessity for rain in the form of dry conditions was acknowledged, it did not translate to any consideration about water recharge and use. Similarly, more tourists noticed actions about water conservation in their hotels that indicated knowledge about a drought, study participants did not appear to connect the guidance regarding water conservation to a regional concern (Figure 4.3).

Within the choice model, knowledge of the drought did have an impact on preference, though in the opposite direction than was expected. That is, for those that indicated knowledge of the drought were more likely to have a preference for biodiversity as opposed to water projects. Though statistically significant, the magnitude of the coefficient was quite small, therefore the preference is not a strong one. A more likely interpretation may be that among those who were aware of environmental conditions include individuals who are more interested in environmental issues in general, and thus more likely to support conservation causes. Overall while one might expect knowledge to influence WTP, the relational consideration associated with local organizations was far more impactful.

Riu Guanacaste is one large hotel in the Sardinal region that has been a focal point of water-related controversy, due to the anticipated water needs at the time of development. Locals felt priority was being given to external economic interests (where many benefits accrue at the developer/national scale, as opposed to regional scale), and resulted in protests (van Eeghen, 2011). We were interested if results associated with those who reported staying at the Riu indicated any trends, however those who stayed there reported no knowledge of the drought and knowledge of it in relatively equal measure. Similar to the finding associated with all large hotels, several listed common water conservation methods highlighted by the hotel, others responded that none were present. This suggests some of the "no information" responses are explained by a lack of observation on the part of the tourist, rather than a lack of action by the accommodation. One comment (information about specific hotels was not solicited, this comment stems from the open opportunity to comment at the end of the survey) was as follows, "*We chose to stay at the Riu because we got a great deal but before we became aware of their*

negative environmental impact. Given what we now know, we would not have chosen this property." This participant indicates that knowledge they now possess would have changed choices on their trip. While this is a single example, given a sample population indicating strong support for ecotourism, financing conservation, building knowledge that is augmented by the relationship to a place appears to be an opportunity that is currently not being realized.

4.4.4 Connecting visit to impact, and knowledge to action

Financial support via a contribution is one mechanism to act on values associated with a particular cause, and empirical evidence suggests WTP relates to ethical motives and social norms (Spash et al., 2009). There are a variety of means for directing tourist dollars to conservation. The aforementioned airport tax could include direct support for conservation, and such a concept is endorsed by conservation groups looking to increase the reach of the national payment for ecosystem services program for smallholder farmers (Chapter 3). While an embedded cost fulfills the goal of generating funding, it does not help increase awareness among tourists of the consequences of their activities. While in theory at least some component of tourist dollars eventually support conservation associated with ecotourist destinations, we propose that more direct compensation provides both a local financial benefit, and increases the connection between the tourist and their impact. Tourism studies have shown that with greater awareness tourists are more concerned about issues in the locations they visit (Wurzinger and Johansson, 2006), and more attention to factors like place attachment and environmental sensitivity can help mediate the path between knowledge and environmentally responsible behaviour (Cheng et al., 2014).

The substantial proportion of tourists who lacked knowledge of the drought may point to an opportunity to engage tourists more directly on the impact of their visit, and of the impact of tourism in the region. A recent review pointed out that the bulk of tourism studies involving the impact of ecotourism explore knowledge in isolation, without the potential of leveraging this knowledge to result in lasting changes in behaviour (Ardoin et al., 2015). Simply providing additional information, however, is not necessarily an effective strategy to incite change. Indeed, scientists have invoked the information deficit disorder (i.e., "If I just provide more information people will act accordingly…") for decades while behavioural economists and psychologists point to the underlying strength of attitudes, values, and social norms as central to encouraging pro-environmental behaviour (Spash et al., 2009). A tourist study of towel re-use in a hotel (a common intervention highlighted by tourists in this study) that compared the effectiveness of different messages to incite water conservation indicated that social pressure rather than call for conservation or environmental concern were more likely to alter behaviour (Goldstein et al., 2008). While these studies take place in particular settings and cannot be generalized per se, tourist experiences may be able to help activate or change attitudes associated with sustainability and the environment (Walker and Moscardo, 2014).

4.5 Conclusion

Ecotourism can serve as a conduit to develop an appreciation for and connection to nature, though also contribute to existing environmental challenges, as is the case with the tourist water footprint in Guanacaste. Given stated enthusiasm for conservation, and ecological motivation of many tourists to this area, our results suggest there may be potential for planners and tourist operators to leverage relational connections in an effort to seek contributions to alleviate stresses,

and educate tourists on the impact of their travel. Though knowledge alone will not necessarily result in action, more strategic education programs that leverage values and promote pro-environment social norms could be a first step to both support and create demand for tourism that is more sustainable.

Chapter 5: Social impact investing and the next generation of conservation finance

Paige Olmsted

Note: As outlined in the preface, this chapter was previously published online by IUCN, the International Union for the Conservation of Nature, as part of their social science for conservation working paper series. As it is a report, the level of referencing is more limited than a traditional academic paper. UBC's Public Scholar's Initiative, of which I am a part, encourages and endorses non-traditional forms of scholarship associated with our research to be incorporated in doctoral theses. This is an example of such a contribution, which laid the foundation for the academic contribution on this theme that follows in Chapter 6.

5.1 Introduction: Aligning financial supply and ecological demand

The wide-ranging benefits of conserving nature are well understood, yet financially enabling ecological and biodiversity conservation programs and activities remains a global challenge (Bruner et al., 2010, Rands et al., 2010). The current estimate of annual global expenditures for conservation is in the vicinity of US$30B whereas the global need is estimated to be between US$200-300B per year (Credit Suisse et al., 2014). While these are estimates and some might quibble with the exact numbers, few would disagree with the crux—the shortfall is substantial. Climate change will likely increase the need and demand for financial support – to respond to

increased pressure on naturals resources alongside the need to maintain healthy ecosystems to provide resilience and facilitate adaptation.

Conservation programs and projects are predominantly government, foundation, and donor-supported (individual donors, as well as international bilateral funders such as the GEF, USAID, World Bank, etc.). However, government and donor funded conservation has remained stagnant over the past twenty years, and in some cases declined, while conservation needs have only increased (Miller et al., 2013). Conservation organizations are increasingly looking to diversify the strategies through which they finance their programs to address the aforementioned funding gap and attract new interest in conservation-related causes, increase public understanding of the benefits we receive from nature, and induce possible cost savings associated with restoration of certain ecosystem types (e.g., wetland protection to improve flood regulation).

Social impact investing (SSI) is one such diversification strategy, which leverages funding from the private sector to support social goals. SSI refers to investments with the "intention to generate a measurable, beneficial social or environmental impact alongside a financial return" (GIIN, 2015). The goal is for the investor to receive "blended" returns, making SII an investment that seeks to generate both social/ecological and financial returns. Such investments may take the form of bonds, shares in an organization, direct payments, low interest loans, and other strategies discussed in this report. SII investors can be individuals, governments or foundations, as well as financial institutions and private investment firms.

Any mention of private finance associated with conservation can bring about concern regarding the commitment to conservation objectives if they come in conflict with monetary goals. The examples discussed herein are predominantly programs in which there are multiple partners and

"outside" organizations such as banks that issue bonds or provide funding but are not involved in the design or implementation of projects. And naturally, not all projects are suitable for impact investment, as we will discuss in more detail. However, existing novel partnerships, applicable examples from other social sectors, and the potential scale of funding available is such that we believe impact investing will receive increased attention in the future. As a result of the potential access, and examples from other sectors, it will benefit conservation organizations to understand if, when, and how impact investments can support their goals and objectives. Existing reports from a variety of banks and foundations in partnership with consulting firms target investors to demonstrate how impact investing can address environmental issues while meeting their investment needs (eg. Credit Suisse et al., 2014, EKO Asset Partners, 2014). Far fewer resources concerning impact investing are currently available for conservation practitioners.

The purpose of this report is to serve as broad overview of the impact investing landscape, and how it both relates to and could pertain more deeply to the conservation arena. Critically, the intention is not to advocate for impact investing as a strategy, but to advance understanding, stimulate thought, and begin a conversation about how organizations may prepare for, participate in, and potentially benefit from such arrangements as impact investing continues to evolve and grow. In Part 1 we further explore the tension between funding gaps and conservation concerns, Part 2 addresses critical features of impact investments, and Part 3 outlines the roles of key actors in the space and current types of projects they are partaking in. Parts 4 and 5 examine existing strategies to address these concerns, and how they may apply to conservation sector moving forward.

5.2 Leveraging impact: Why invest in conservation?

Conservation organizations compete against one another for grant and donor funding, and use prioritization frameworks such as biodiversity hotspots, umbrella species, biological corridors and buffer zones among many others to optimize conservation returns with the understanding that not all needs can be met (Brooks et al., 2006, James et al., 2001). Species and ecosystem goals and objectives are set within and across nations, including through the Convention on Biological Diversity (CBD), yet are chronically underfunded (Bruner et al., 2010). Indeed, multiple parties to the CBD pointed to financial shortcomings as a reason that the global 2010 target was not achieved (CBD, 2010). A critical component to the 2020 Aichi Targets is the inclusion of a new goal associated with financing, with the understanding that all programs and organizations require funding if gains are to be made and sustained (CBD, 2010). But where will this money come from?

Currently there is an estimated US$60B in impact investments across a variety of social issues, including poverty reduction, housing access, and within the environmental sector (Saltuk et al., 2014). *This amount alone is double the estimated total global annual spending on conservation*. Impact investing is estimated to grow to over US$1 Trillion in assets under management by 2020 (JP Morgan et al., 2010, New Climate Economy, 2015). Remarkably, impact investing represents a mere 0.02% of the global financial market; should it grow to a projected 1%, in the coming decade, its market share would translate to US$3 Trillion (GIIN, 2014). Though the boundaries of what is considered impact investing may inflate the reality of available assets for investment, Figure 5.1 and 5.2 on the following page attempt to put these estimates into perspective.

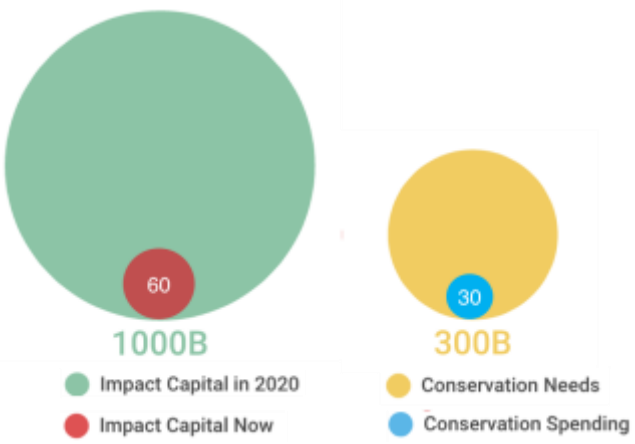


Figure 5.1. Relative scale of overall impact investing and current conservation funding.

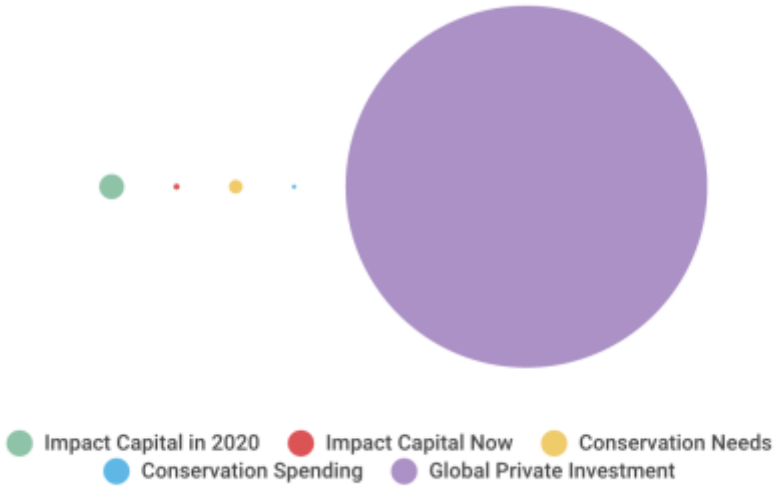


Figure 5.2. Relative scale of impact investing, conservation funding, and global private investment.

The profile of today's investors and impending wealth transfers provides evidence to support anticipating such a shift toward value-based investing. The World Wealth report in 2014 reported that deriving social impact from investments is important to 92% of high net worth

individuals (RBC Wealth Management, 2014). Additionally, younger generations are more supportive of impact investing principles than older ones – 67% of millennials agreed with the statement "my investment decisions are a way to express my social, political, or environmental values" as opposed to 36% of Baby Boomers (US Trust, 2014). The wealth transfer between these two groups in the coming decades is estimated to be US$30 Trillion, the largest transfer of wealth in history (Accenture, 2012). And, to be sure, some contributions to conservation organizations may already be seen as a type of "investment" among donors who are motivated by the potential for healthy ecosystems to provide long-term benefits. However, going beyond philanthropy and tapping into dollars reserved for different types of investment could meaningfully address the existing funding gap for many conservation organizations.

5.3 Potential for conservation and impact investing

In an effort to assess the scale and potential for impact investing in the conservation realm, EKO Asset Management Partners (now Encourage Capital) partnered with NatureVest (the impact investing arm of The Nature Conservancy) to survey a range of private and institutional investors to better understand the current state in this sector. In this study, they refer to conservation broadly, and include projects focused on water and agricultural management, though improved management in these realms often results in direct or indirect biodiversity co-benefits. Survey highlights are provided here. It is worth noting that these numbers are not modeled but real numbers based on interviews with investors and thus represent actual investments or planned investments. As a consequence, they are certainly underestimates since those surveyed represent a subset of all conservation impact investors.

- US$23.4B in global conservation impact investments were made from 2009 through 2013. Though there is likely overlap and different boundaries for inclusion, this is sizable in relation to existing private and public donations to conservation. Investments by development finance institutions (DFIs) such as the International Finance Corporation totaled US$21.5B; private investments accounted for US$1.9B.
- DFI funding primarily supported water related conservation projects (like water funds, see below), with total investments of US$15.4B.
- Private investment is currently relatively small, but grew 26% on average between 2009 and 2013. Private sustainable agriculture investments grew rapidly, increasing from US$67M in 2004-2008 to US$472M in 2009-2013. Critically, from 2014 through 2018, private investors surveyed anticipate further investments of US$1.5B of capital that is already raised, while also raising and investing an additional US$4.1B, meaning there is US$5.6B planned among this surveyed group alone to be invested in conservation oriented activities in the next five years.
- Of the close to US$2B of private funds invested in conservation impact from 2009-2013, 66% was in sustainable food and fiber production, 23% in habitat conservation, and 11% to water quality and quantity programs (EKO Asset Management, 2014). To compare to the impact investing sector more broadly (including housing, poverty alleviation, and other areas) these projects represent only 4% of global impact investments in this timeframe (New Climate Economy, 2015).

Around the same time as this survey, the Global Impact Investing Network (GIIN) compiled a profile of impact investing through their IMPACTBase database. The GIIN is a non-profit that originated in 2009 to increase the scale and effectiveness of impact investing through data and knowledge sharing, and is a key intermediary organization in the impact sector. Their IMPACTbase database organizes types of investments and is a very useful tool for comparing opportunities along with existing projects seeking funding (and can be found in Appendix H along with other helpful resources). Examining environmental content in their database, with

overlap across categories, they found that 43 of the 310 funds listed investments in "food and agriculture", 39 in "sustainable land use", and 21 in "carbon and environmental commodities" (GIIN, 2015). The average committed capital per fund in all sectors was US$52.5M, for a total of over US$16B (GIIN, 2015).

5.3.1 Conservation integrity in a world of investment

The loose definitions of conservation projects, notably the 66% of projects associated with sustainable commodities and the classifications in IMPACTbase, may call into question for some whether the activities constitute "real conservation". One might imagine the following criticism:

Perhaps we could get more money into the conservation sector, but wouldn't that just dilute the enterprise of protecting biodiversity? If conservationists get involved with the financial sector, will that pervert conservation away from core objectives?

These are very real concerns, and part of the reason why it is important for conservation organizations to understand what is currently taking place in the impact investing sphere. Some organizations actively engage in projects associated with sustainable commodities – such as bird-friendly coffee or improving grazing practices to minimize environmental impact and add value for smallholder farmers. For others, it may be of value to consider how engagement in the space may contribute to their evolution, and given the scale and growth in impact investing, as well as the interest of impact investors themselves in natural resource conservation, there is likely a need for guidance in order to achieve desired conservation impact, including and beyond sustainable commodities.

5.3.2 Emergence of social impact investing in conservation

Interacting with financial markets is certainly not new in conservation practice. Some conservation programs may be wholly government implemented, but still draw on market-based principles in their design. Specific types of financial interactions, such as carbon and biodiversity offsets, may set their prices according to external economic drivers, and can be purchased by public or private organizations as well as individuals. Land trusts and conservation easements may allow certain specific resource uses while conserving other portions of the property. Income generating activities, such as park entry or user or licensing fees, or taxes and levies, may finance further conservation activities. A carbon tax on gasoline is one of the main financial sources for Costa Rica's well-known Payment for Ecosystem Services (PES) program where farmers are paid to conserve and restore forest on private lands.

Results-based finance and pay-for-service models utilize market logic to achieve ecosystem benefits. Similar to Costa Rica's PES program, the European Union applies performance payments to the agriculture sector, where farmers are rewarded for changing landscape management practices to benefit local ecosystems. Aspects of these types of programs, including impact assessment and monitoring strategies, are being considered as impact investing deals are structured to facilitate participation from farmers (in this case), who are able to make their own decisions on the ground to meet agreed upon outcomes, and optimize biodiversity impact for the funder.

These examples are among the types of conservation activities that could be supported through an impact investment, which begs the question: what makes impact investing different? In some cases, nothing at all, it is merely harnessing a different funding channel. In others, there may be features of a project that are more likely to lend itself to impact funds. The attributes of projects and data requirements are discussed in the following sections.

5.4 What are the critical features of impact investments?

Though the long-term benefits – financial, social, and ecological – of conservation may be obvious to those who work in the field, particular features and data are required to determine if a program or fund is appropriate as an impact investment versus traditional donor funding. NatureVest estimates that while they are personally constructing large deals (US$100 M+) there is US$1B in capital that could be invested in the United States not being used due to the lack of appropriate projects (EKO Asset Management & NatureVest, 2014). This highlights the lack of "absorptive capacity" (i.e. available funds or deals that meet investor requirements) that conservation organizations can work together to address. The question becomes how do conservation organizations, government agencies, and other entities in the space harness the interest, enthusiasm, and growing capital. As suggested above, barriers do exist, with a primary one being that many conservation projects are not well-suited for impact capital because they may lack one or more of the following features. To the extent possible the highlighted examples are from the conservation sector, otherwise they are intended as illustrative examples where there may be potential to apply similar models in the conservation realm.

5.4.1 Cash flow

This is an extremely important concept. Preserving a wetland may have a "value" and the value can even be quantified using a variety of different types of economic tools. However, there is a stark difference between ascribing a value for a decision-making process (e.g., cost-benefit analyses of building a hotel in a coastal region vs. conserving it for habitat and recreational opportunities) and generating a consistent and predictable financial return. For any project integrating conservation values into agriculture, fisheries, or any kind of value-added commodities, there is usually some form of cash flow, which means incremental repayment of a loan or return on capital investment is possible. Investments could be made directly to the program, or to an intermediary that evaluates the program. Consequently, there has been more investment in those projects which produce a return by integrating conservation values into commodities. This is why these are areas where more investment has taken place.

Capital improvement projects function this way, and can be seen in many renewable energy projects. There is an upfront cost, but a savings in the long term that can be returned to the investor over time. In Toronto, Canada, **Co-Power Energy** operates in this manner. They select projects or institutions for solar energy retrofits, investors agree to a term and rate of return, and Co-Power acts as the intermediary to implement the infrastructure improvement as well as facilitate payments back to the original investors. Repayment of the loan is possible because of the cash flow from either selling the energy or reducing existing energy bills. In the case of agriculture improvements, **NatureVest** partnered with conservation organizations in Kenya to re-organize the value chain for livestock production and enhance economic and environmental benefits to farms across several value streams. Cash flow derived from ecotourism and higher

standards for land management added value to their livestock and helped them gain access to larger markets and price premiums. The added income contributed to expanding access to sustainable livelihoods and landscape management in the community.

5.4.2 Time frame

Short term investments must not be too volatile to attract interest, whereas longer term investments can have lower rates of return as they typically involve less risk (Boyd et al., 2012). Given the need for sustained funding to maintain habitats and ecosystems, long term investments that do not produce as much profit are a viable possibility for environmental programs. Loans or bonds are associated with a specific time frame, and investors rely on consistent returns in that period or a guaranteed payout at the end. Green Bonds are gaining interest and traction -- globally, the Green Bond market hit a record US$41.8B in 2015 (Climate Bonds Initiative, 2015). This is not a new strategy, as government bonds are frequently issued for infrastructure development, the difference is the focal area and can be about timing. Conservation organizations can be the beneficiaries of investments from these bonds for their efforts in promoting particular initiatives (e.g., parkland conservation) to meet desired outcomes. In 2014, California raised US$200M from a green bond issue, 98% of which was invested in air quality improvement. They are using a similar model to invest in water infrastructure.

The true long term potential for investment in the environment and environmental infrastructure is being demonstrated in Washington DC, where a 100-year US$350M green bond was issued by the water utility DC Water. Previously DC Water had issued 35-year bonds, but as 100 years is better suited to the lifecycle of tunnels, the costs will be spread across all those who benefit – they refer to it as "intergenerational equity and fairness" – while also locking in historically low

interest rates (JP Morgan, 2013). Another important feature of this bond is that it was the first to have an independent review of the impact credentials, which is a requirement for compliance for the Climate Bonds Standard. Demonstration cases such as this one in DC will provide data that can support development of future investment opportunities.

5.4.3 Rate of return

Understanding the expected rate of return for an investor is important, but figuring out how to generate one is even more fundamental. Though cultural, biological and even economic benefits of conservation may be evident, a financial return is not necessarily quantifiable and "real" with respect to cash flow. Thus, the conservation and investment communities face the challenge of identifying how these values can be monetized through financing and investment mechanisms. That is, despite ecosystem valuations worth millions, conserving a wetland does not translate to funds being available. Calculations are possible however: one study reported that the loss of a one-mile strip of wetlands along the US Gulf coast results in an estimated US$5.7M in average annual increases in property damage (Paterson et al., 2010). Such studies can help provide an evidence base to rationalize investment in and reasonably estimate the return on investment for financing efforts like wetland conservation.

When the government is a partner, the return on investment can be generated from cost savings in another sector; for example, in health, education, or other areas where there are substantial budgets and opportunities for savings and improved efficiency[3]. When this is not feasible, social

[3] In theory this is true – some government budgeting systems do not allow accounting to behave in this manner (which is a shortcoming to more holistic solutions and contributes to silo-ing – therefore policy reform in this arena can also be an enabling factor worth considering.)

impact bonds (SIBs) are another strategy to generate upfront capital for innovative programs the government does not want to take the risk to test, but will pay out when a pre-determined level of success is achieved. This is slightly different than the standard bond model, as SIBs are tend to be applied to one specific intervention program. The model is a popular example of an impact investing innovation, and is fleshed out in more detail in Section 4 of this paper.

Rate of return associated with value-added products is likely why sustainable agriculture (like livestock in Kenya) and fisheries (as in Chile, where investors can capture double digit returns on investment from better managing fisheries versus the money lost from poor management) have had more attention from investors, as was found in the EKO Asset Management and TNC survey. Commodities have pre-existing revenue streams based on supply chains into which additional conservation benefits can be integrated and, thus, a return over time is easier to model and manage.

The amount that investors can earn on their initial investment is a critical deciding factor and useful tool to compare to other investment opportunities. In the ***GIIN assessment of the IMPACTBase*** *participants, 42 impact funds were identified as targeting environmental issues. Within these, fund managers sought internal rates of return (IRR) of 5–10% in the conservation area. Different regions, political environments, and the success rates of implementing agencies will all play into the assessment of risk and will have significant influence on participation. Both the IMPACTBase database and the* ***EKO*** *survey show that fixed income impact investors will often be willing to accept a 5% return on debt for conservation as long as risks are managed.*

Return on Investment (ROI) is an issue related to rate of return with respect to conservation, and has its own subset of controversies. "Rate of return" refers to the financial return to investors,

whereas “return on investment” can refer more broadly to project impact, and in conservation is often discussed in relation to comparing outcomes of different projects (Boyd et al., 2012). For example, if the same monetary input conserved twice as many species in protected area A compared to protected area B, project A could be considered to have a higher return on investment. However, reality is far more complicated – rarity of a species, its role in the ecosystem, the location of the protected area and its overall habitat quality can influence how significant a factor the absolute number of protected species is (Boyd et al., 2012). These issues and recommendations for conservation ROI are discussed in much greater detail in a Resources for the Future whitepaper on the topic and listed in Appendix H .

5.4.4 Level of risk

Risk can come in a variety of forms -- commodity market risks, policy and political risks, unreliable infrastructure, macroeconomic risks, weather risks and business risks such as difficulties in finding trained staff (Credit Suisse et al., 2014). Differential risks often explain why loan rates are different to different borrowers, and conversely why some projects need to have a higher return than others to attract investors (Saltuk et al., 2014). In one assessment of impact investment, those projects that took place in Africa on average needed internal rates of return to be 5% higher than comparable conservation investments in Latin America because of this associated risk (Saltuk et al., 2014).

Risky environments or conditions may provide a venue for governments and foundations to play a supporting role. Such institutions could serve as a guarantor (i.e., agree to repay a loan to investor if the loan defaults), provide tax relief – for example, capital gains taxes could be lower

for a social impact investment, or provide seed or bridge funding at the outset to attract additional private capital.

Insurance companies are experts in understanding, quantifying and pricing levels of risk, which are reflected in differentiated premiums. Quantifying risk associated with a conservation project has not been common practice, but the development of metrics and approaches to do so could provide practitioners a new way to report on impact and better communicate risk with donors or investors.

*As highlighted above, **NatureVest** is a leader in impact investing in the conservation sector, and this is largely due to the minimized risk associated with dealing with TNC. A long standing organization with well-established relationships and partnerships, most of TNC's impact projects are taking place in regions where the organization has a track record, a team of staff members that are well-versed in deal creation. Finally, critically, some of TNC's projects have a **credit rating**. This is an external evaluation of the risk, in the terms that financial institutions are used to dealing with. This enables a direct comparison to other investment opportunities.*

5.4.5 Impact measurement

Monitoring and evaluation is often discussed in conservation projects, but even in programs associated with payments, such as PES, it is challenging to retrieve consistent available data to evaluate success (Naeem et al., 2015). For impact investing purposes, impact measurement is critical for confidence on all sides, not only at the outset, but as part of ensuring non-financial impact associated with the investment. According to one fund manager, given the lack of consistent existing measurements, it is currently sufficient for some investors to simply know

there is impact associated with an activity or business in which they are investing (Genus Investment Partners, personal communication, 2015). As time goes on, multiple reports suggest that consistent, quantitative metrics for comparison will be required if this sector is to grow (GIIN 2014, Credit Suisse 2013, WEF, 2015).

In an effort to consolidate and standardize impact metrics, the following tools are gaining traction in terms of use and applicability:

Global Impact Investing Rating System (GIIRS) - requires a paid membership, and applies mostly to funds and businesses. Though similar metrics could be used, they are currently not particularly applicable for conservation organizations.

Impact Reporting and Investment Standards (IRIS) - developed by the GIIN, is a user friendly database including guidance to perform impact assessments using established third party metrics where possible.

Social Return On Investment (SROI) - based on a set of principles rather than specific metrics or means of measurement, SROI is a tool to attribute monetary values to significant intended and unintended outcomes of projects as part of an impact evaluation.

When identifying impact investment opportunities to support conservation, it is essential that an investment enhances the values of natural capital that can be monetized, and consistently provide financial returns to investors per the agreed upon time frame and rate of return. Currently, monetization is not always factored into program assessment, but donors (not just impact investors) are pushing for more evidence-based approaches to conservation and want to quantify their return on investment, even if that return is not a financial one. USAID and the World Bank,

major funders of biodiversity and conservation globally, are both moving in this direction. For several of the above data needs, it may simply become good practice to account for these criteria to demonstrate impact for any conservation contribution. Indeed, many leading conservation donors also comprise those interested in pursuing impact investing. In the following section we review the key actors and the current SII and SII-like activities in which they are engaged.

5.5 Who are the key actors and what are their roles?

There are a variety of actors and investment mechanisms in this area. Some are the traditional donors to conservation efforts, such as governments, foundations, and high net worth individuals, whereas others may be new to conservation. Here we outline a few of the main actors, whose roles may differ depending on the project, and thus we use a few examples to demonstrate the range of activity and projects in the space. Figure 5.3 demonstrates a generalized conceptual diagram of some of the key actors and how they might interact in an impact investing arrangement.

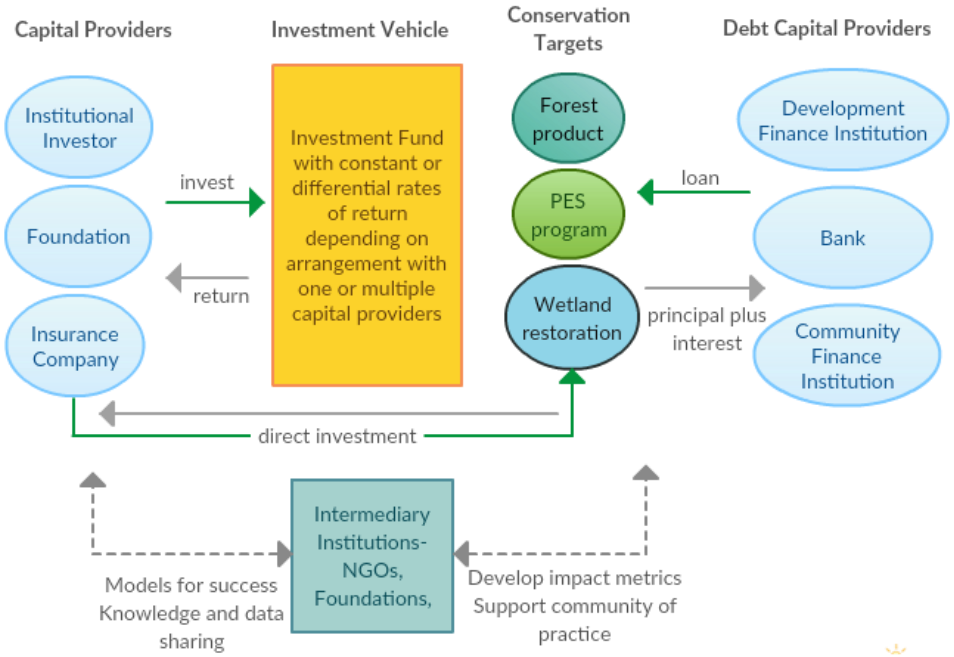


Figure 5.3. Relationship between investors, investment targets, and the flow of capital between them and other actors. Solid lines are capital flows, dashed lines are knowledge flows[4].

5.5.1 Foundations

Foundations are acting as both funders and intermediaries, as they have been instrumental in setting the agenda for growth among investors and investees in the conservation community and impact investing at large. In the United States, large foundations like the Rockefeller Foundation and the Gordon and Betty Moore Foundation are using their considerable convening power to bring together relevant groups across all of the following categories to chart a path forward for impact investing in conservation.

[4] A different version of this diagram is found in Chapter 6 (Figure 6.1). This is the diagram as it appears in the IUCN report available online, the revised version is adapted to show a more integrated role of intermediary institutions.

Within the foundation world there is already a trend toward impact investing, though often organizations are not sure where to find best impact (Social Finance, 2014). This is a trend in the impact investing space and conservation in particular – there is interest and capital, but not enough available and appropriate projects (EKO Asset Partners & NatureVest, 2014). Within a foundation's own investment portfolios, there are different impact strategies. For example, like many foundations, the JW McConnell Foundation in Canada divides their impact investments into Mission-Related Investments (MRIs) and Program-Related Investments (PRIs). MRIs are made in either for-profit or non-profit enterprises with the intent of earning market-rate financial returns. PRIs are investments made to charities as well as for-profit and non-profit enterprises to further the foundation's program objectives, but – unlike grants, which are another category of foundation fund allocation all together– they also aim to generate financial returns, with a tolerance for below-market returns. PRIs or other long term investments where market-level returns are not required can be particularly helpful as bridge funding or seed funding, for higher risk investments to encourage other investors to participate in cases where a project may take some time to generate returns.

The Rockefeller Foundation *has participated in, financed or coordinated a number of efforts to support the development of conservation impact investing. They hosted the meeting in 2007 that is credited with coining the term "impact investing", and were a partner in the creation of NatureVest, the impact investing arm of The Nature Conservancy, that has since initiated and facilitated several major conservation impact projects. Since 2007 Rockefeller has invested US$50 M in the development of infrastructure and knowledge generation around impact investing.*

5.5.2 Large financial institutions (banks)

Like foundations, banks are in a position to participate as investors or debt equity providers in impact projects or funds, but also have the capacity to take actions that enhance the scale and reach of the sector. TD Bank and RBC (the Royal Bank of Canada) are expanding green bond offerings, engaging in social impact bonds, and responding to retail consumer demand for funds that meet their impact needs. There is not a consensus among various banks as to how this may influence acceptable risks and ROIs but like governments, due to their sizable holdings and staying power, they are able to create new financial instruments and to invest over the long term. This may mean they are in a position to take on more risk, though they are generally less likely to pursue below market returns in the way that is more feasible for foundations.

Early innovators in this space in the United States are Goldman Sachs and JP Morgan, who have not only committed funds to impact investments, but also have played roles in fundamental research and data development. JP Morgan is a founding partner in the Global Impact Investing Network (GIIN), which provides basic information about impact investing, as well as a database of funds and projects to facilitate investment for others. Goldman Sachs has been an early adopter and participant in novel funding mechanisms, including social impact bonds (discussed below). As more organizations engage in pilots to test and demonstrate the feasibility of such projects, more data, confidence, and ultimately capital will follow.

JP Morgan *participates in the EcoEnterprises Fund. This fund is a Latin America-based collection of enterprises – including organic agriculture and ecotourism enterprises – that help investors offset biodiversity loss through habitat conservation, reforestation efforts, and sustainable use of natural resources. The Fund's first portfolio created over 3,500 jobs,*

benefited 293 communities and conservation groups, generated US$281M in sales, leveraged an additional US$102M in additional financing, and conserved 860,773 hectares of land (EcoEnterprises, 2014). The rate of return target and results to date are competitive with market return. They have expansive monitoring and evaluation that includes the use of the external auditing of variety of certification schemes for individual fund participants, as well as their own monitoring and evaluation tool and the Fund's Social and Environmental Guidelines (ImpactAssets.org, 2015).

In addition to being participants, banks can create their own funds with specific objectives, such as the US$15M ***Eye Fund*** *created by* ***Deutche Bank*** *to provide access to health care and eye care in particular, or in the case of Credit Suisse, a US$500M fund of funds for agricultural opportunities in Africa (World Economic Forum, 2015).*

5.5.3 Community development finance institutions (CDFIs)

CDFIs provide credit or loans to underserved communities, and in the US, specific legislation facilitated their creation by providing tax and credit incentives to those who lend and provide capital to such organizations. While CDFIs receive government funding or can be supported by larger funders (including foundations and large banks), projects are more easily tailored and suited to local needs. They are often more eager to invest in local and smaller scale projects. Microfinance (or small scale loans) was born out of community level finance institutions, and serves as a useful growth model for impact investing. Though it took time and substantial investment to establish appropriate criteria and metrics to measure the impact associated with microfinance, once the infrastructure was in place, traditional finance industry players helped expand the market to rural poor, small business owners, and individuals around the world. As

more sophisticated measurements for performance and impact emerged, there was an increased emphasis on standardization (Oleksiak et al., 2015). In 2008, Standard and Poor's announced their plan to establish global risk ratings for micro-lending institutions. This is the type of standardization that could dramatically influence access to capital for all scales of conservation projects.

*The **Resilient Capital Program** is a unique, high-impact investment program that makes up to US$15M available for qualifying social enterprises and ventures to help build resilient communities, with the mission of the investee to be centered around social and environmental resilience. In Canada, this program is made possible by a partnership between **Vancity** (a community finance institution) and the **Vancouver Foundation,** and funded by bank patrons through a deposit program. Term deposit investors received "reasonable" returns insured by deposit insurance and thus had a very low risk (Social Finance, 2013). Community and social enterprise impacts and financial metrics are reported on quarterly.*

***Kiva** is an online micro-lending platform that brought microfinance to the mainstream and enabled individuals to participate as direct contributors to impact capital. The local lending institutions were in place, but Kiva provided an online platform for investment enabling anyone to provide a zero interest loan. Crowdfunding as a means to leverage capital from individuals has grown significantly and is expected to move into the investment space. The potential for crowdfunded conservation through low or no-interest loans is currently being investigated by a team of researchers at the University of British Columbia, and may provide another means of participation for low net worth individuals to participate in the impact space. One of the first real-world examples recently took place in New Zealand, where local people used crowdfunding*

to purchase a private beach for public access and recreation near Abel Tasman National Park (BBC, 2016).

5.5.4 Government: municipal, state/provincial, and federal

There is a huge role for all scales of government to participate in impact investing, both in terms of policies and programming. For example, the UK Government provides a 30 percent tax relief for social investments, which is anticipated to stimulate as much as GBP 500 million in additional investment over the next five years (JP Morgan, 2013). The law does not state how these impacts will be measured (gov.UK, 2016), this could be a lost opportunity to evaluate success beyond the scale of investment.

In the US, the Community Development Finance Institution Fund positions twenty dollars of private capital for every one dollar of federal funds invested (WEF, 2013). These policies may increase agency expenditures, but they often repay their costs over time or attract considerable private funding. Policy measures can be instrumental in unlocking funds toward important social and environmental causes. As with microfinance, regulatory changes were instrumental in the growth of venture capital in the 1980s. High risk/high reward ventures have led to considerable innovation, with clean tech representing 10% of all venture capital investment in the 2000s (Forbes, 2015).

*In Canada, **Coast Funds**, endowed by the federal and provincial governments as well as philanthropic groups, support long-term activities to maintain or improve the Great Bear Rainforest or to support sustainable enterprises in first nation communities. Coast Funds operates in a similar fashion to a community development finance institution, but the majority of*

its funding at the outset was provided jointly by the federal and provincial government. It has since leveraged CDN$168M of private capital.

5.5.5 Pension funds

Like banks and foundations, the large sums that pension funds manage present significant potential for impact. Client demand is a driving force, and while a survey indiciated that currently only 6% of pension funds currently participate in impact investing, that number is expected to grow to 64% in the near term (GIIN, 2013). An issue holding back institutional investors, businesses, and pension funds from impact investment is the concept that fiduciary responsibility to shareholders means that financial returns should be the first priority. However, regulatory changes in the 1980s clarified the ability of pension funds to engage in venture capital, and similar regulations permit the consideration of social and environmental factors insofar as they influence the long-term financial performance of investments (Forbes, 2015).

***PGB** is a Dutch pension fund that is actively participating in impact investing. PGB contributed 20 Million Euros from their 18 Billion Euro pension fund toward a microfinance fund in the Netherlands. It is worth noting that while they were motivated to participate for social returns, the 5% return on investment was comparable to non-impact investments. In other words, within the financial sector, competitive rates of return are likely required to attract interest.*

5.5.6 Insurance companies

This is another area where there is stated interest by would-be investors, and substantial growth is possible (WEF, 2015). Insurance and re-insurance companies have significant assets, as well as a financial stake in mitigating impacts of floods, storm surges, crop failures, and other issues

associated with natural resource management. Consequently, insurance companies are increasingly cognizant of capturing the value of nature, and investing into projects that alleviate their risk. Municipalities and other jurisdictions often offer bonds to raise capital for infrastructure improvements. Increasing the recognition of the value of investing in green infrastructure and considering natural capital as an asset class could greatly enhance engagement and participation from the insurance industry. This is an avenue for organizations who focus on restoration of coastal wetlands and other ecosystems that provide regulating and risk reduction services.

Zurich *(Insurance) is actively working to support the development of the green bond market. At the same time, Zurich is currently looking into possible approaches in the credit and private equity space, taking a "cross-asset class view" of impact investing (World Economic Forum, 2014).* ***LeapFrog Investing*** *makes private equity investments, and is a partner in an emerging program in Indonesia to support sustainable palm oil production. They will be designing and financially backing a program for crop insurance with the idea that reducing risk for farmers will reduce the need to encroach upon (i.e. burn) new territory for planting (LeapFrog and personal communication, 2015).*

5.5.7 Development finance institutions (DFIs)

Organizations like the World Bank, InterAmerican Development Bank and the Asian Development Bank are relatively few in number, but make large scale investments that can involve infrastructure and other major capital expenditures that have significant environmental impact. In a recent JP Morgan survey 6% of respondents indicating a DFI affiliation, but DFI investors made up 42% of impact investment assets under management (JP Morgan, 2013).

Development banks have a stated motivation to support economic development. They also engage in projects that can have negative ecological consequences – and as in other financial arenas, there is increased pressure to minimize these consequences through direct changes, or to attempt to offset negative impact through investment opportunities. Many of their current strategies that are classified as "impact investing" are not new or novel financing mechanisms, but have improved levels sophistication in the way they measure impact, and how impacts are quantified and reported.

*The **International Finance Corporation** model is to mobilize capital and support companies and other private sector partners in areas where there are currently funding gaps. The overall impact focal point has been poverty alleviation through economic development, particularly in emerging markets (i.e., developing countries). Though this approach has generated controversy in the past with developing countries paying large costs to finance debt, one strategy to address the debt servicing problem is through **debt-for-nature swaps**. Pioneered in the 1980s in Latin America to address deforestation, debt swaps have recently been implemented (and brokered by TNC) to allow debt payments to be applied to climate change adaptation efforts. In a recent debt swap in the Seychelles coordinated by the Nature Conservancy, 400,000 km^2 will be managed as marine protected areas within the next five years (TNC, 2015). Multiple partners and cash flows make this a complicated arrangement, but by raising US$23M in impact capital loans as well as US$5M in grants, they facilitated the purchase of US$29.6M of Seychelles debt at 5.4% (TNC, 2015). The restructured debt provides a cash flow payable to and managed by a private-public trust fund, the Seychelles Conservation and Climate Adaptation Trust. For more information, see the NatureVest website, which provides a detailed explanation of the arrangement.*

5.5.8 Intermediary institutions

As highlighted in Figure 5.3, there are a number of intermediary institutions who are essential to this process, though the process is more complicated than receiving a grant or donation. The capital -> fund -> investment target flow is not unlike a traditional investment model, with advisors or banks receiving fees along the way. The financial and other intermediaries are of particular importance for impact investing, since it is they (and they could be foundations, government agencies or regulators, or NGOs) who facilitate and jumpstart the process. While NGOs can be the target for investment, they can also be critical facilitators, particularly in the realm of knowledge and data sharing.

***NatureVest**, the impact investing arm of TNC, is a leader and innovator in this space. They are engaging with capital providers and structuring multimillion dollar deals to suit their investment needs. TNC is in a relatively unique position, as most conservation NGOs do not have the capacity and expertise to deal directly with banks or support a staff that focuses exclusively on the development of such transactions. Fortunately, by providing examples and developing data to support the concept of impact investing, other groups can benefit from TNC's experience and expertise.*

The term "deal" is used to describe the arrangement to which the relevant parties have agreed. In a specific "deal" there are likely participants from several of the above sectors as partners and multiple funding sources have led to collaboration and leveraging of funds. Social impact investing is growing rapidly and representing substantial amount of capital, but appears thus far not to be harnessed broadly by the conservation community. In the following sections we discuss first an assessment of the existing status of conservation in impact investing, followed by

an explanation of the type of mechanisms that can be implemented, and finally the critical components of impact investments that must be considered and integrated into any potentially investable project.

5.6 How do we engage? Advances and strategic opportunities for conservation organizations

Impact investment capital is not currently flowing directly to conservation without concerted effort and multi-institutional partnerships. Here, we provide more detail for a few of the strategies that have been highlighted in some of the examples featured above.

5.6.1 Capital stacking or "mezzanine" investing

Capital stacking is the technical term for bringing in multiple financial partners at different stages and with different requirements to alleviate risk. For example, in the production of sustainable agricultural products, a foundation could provide funds until natural resource restoration is far enough along to provide adequate market return on its own to compensate for investment costs. Those investing in the rural areas of developing countries tend to face all the usual risks of investment, but also additional concerns about capacity, and thus bridge funding at the outset can alleviate these concerns and provide time to attract other investors.

5.6.2 Revolving funds – community finance and microfinance

Community finance and loans can be used to produce environmental gains. In Washington State, Craft3 invested close to $20M in conservation impact investments between 2009 and 2013 (JP Morgan, 2014). Five million of the total was loaned to 280 households who committed to repairing and replacing failing septic systems on sensitive waterways such as shellfish harvesting zones and marine recovery areas. The loans were paid back and the ecological impact was over 32 million gallons of wastewater treated and over 2,000 linear feet of sensitive riparian areas protected (Craft3, 2015). These revolving funds enable loans to be made, paid back, and made again from the same source over time – like a credit card. Microlending operates in a similar fashion, often with loans going directly to individuals. With specific goals in mind, it is feasible for conservation organizations to partner with finance institutions to achieve these kinds of very measurable and impactful results, with the possible knock-on benefit of creating more environmental stewards who may not have otherwise appreciated the ecological benefits and/or cost savings associated with a conservation activity.

5.6.3 Bonds – green and social impact

Green bonds are growing, and have been used in several of the above examples, and new ones continue to emerge, including a recently announced $1.5B bond issue by Apple Inc. to support green initiatives (in that case, renewable energy and energy innovation). Musician David Bowie was an unexpected innovator in bond space. In the mid-1990s, he offered a bond to investors, who then received a revenue stream as a portion of the royalties associated with the music (Chu, 1998). Rather than bonds associated with intellectual property, a lot of attention and enthusiasm currently surrounds social impact bonds (SIBs).

Though impact investing tends to be associated with private capital, in reality much of the innovation comes with how to leverage partnerships in an effort to address some of the above areas of concern. SIBs highlight these interacting relationships nicely. SIBs are an emerging concept to address financing shortages for many social sectors (Langford 2011, Draiman et al., 2010, RBC 2013). A contract is developed to coordinate the action and participation of three primary parties: a) the government entity that would normally administer a program or provide grants to agencies related to a particular social issue, e.g., homelessness, b) an agency or NGO would commit to a specific improvement within the sector that can be measured, e.g., a percentage decrease of people sleeping outside in a particular area, with the metrics agreed upon by the group, and c) a bank or foundation who would provide the funds to administer the intervention program (Draiman et al., 2010). If the goals are met within the agreed timeframe, the government reimburses the investor with a premium (though the gross amount spent is still less than the government would have incurred to provide the service), to supply a return on investment at somewhat competitive rates, though the exact percentage would be contingent on the exact arrangement (RBC 2013). The relationship between the parties may look something like this:

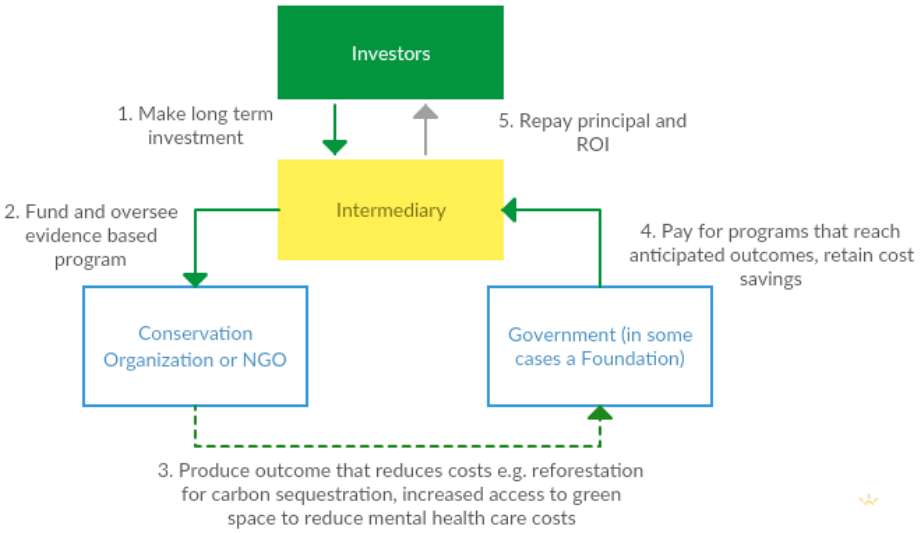


Figure 5.4: Typical SIB arrangement. Adapted from: Finance for Good, 2015.

A similar SIB was implemented in New York state, where the program was reduction in recidivism in Riker's prison. SIBs tend to be oriented around prevention programs, which are historically difficult to fund, but can have long-term savings (Langford, 2011). In this case the original investment by Goldman Sachs was guaranteed by Bloomberg Foundation. This reduced the risk for Goldman Sachs, ensuring that even if the program does not reach desired targets they will still receive some money back. From the perspective of the Bloomberg Foundation, the project gets off the ground and even if the overall target is missed some gains are still likely achieved, learning takes place for future program support, and results are achieved for less than if they had supported the project themselves from the outset (Warner 2013). Of course, if the program is successful they do not pay out and all of the above is also achieved.

5.6.4 Capital investment

Environmental improvements or adoption of more sustainable practices may be desired in certain sectors, but people and organizations lack the upfront capital costs to address the problem. In some cases, the incentive to invest is not present unless an entire or sector participates.

*For example, to address fishery declines in Atlantic Canada, the **WWF** has proposed a program called **FIRME** to improve gear for an entire fleet to catch only the more mature and valuable fish. Leaving juveniles to grow helps sustain the population over the long term, while increasing profits for fisherman so they may pay back the capital investment for the gear. Had a single fisher invested, the benefit to the fish population would not have been felt, nor would the financial benefit if other fishers continued to harvest more juveniles that sell at a lower rate (Rangeley and Davies, 2012).*

*As with sustainable agricultural practices, sustainable fisheries practices are a way to reduce impact, while also generating a cash flow for returns to investors. **Encourage Capital** spent two years working with fishers in Chile to develop their "Investment Blueprint" that considers how to transition to a more sustainable product with reduced environmental impact and also yielding digit returns for fishers and investors.*

5.6.5 Specifically designed project-based deals

Working directly with investors, organizations with a broad portfolio of activities or existing relationships in regions where an investor seeks impact may be able to work directly together. ImpactBASE and other databases such as the forth coming Convergence database are intended to match investor needs with existing projects, though this likely requires higher transaction costs at

the outset. There are likely different partnerships and strategies that are appropriate to source funding for different stages of a project, and that will change depending on the type of project.

Overall, despite challenges, we believe there are sufficient existing examples and ample opportunity for conservation organizations to become more involved and proactive in the impact investing space.

5.7 How do we move forward? Key opportunities and recommendations for increasing impact investment for conservation

There are several reasons why the conservation sector is relatively small in the impact investing world, although conservation is a significant global social challenge. The first is that, unlike some other outcomes such as building levies or investing in renewable technologies, *connecting a specific activity to a biophysical outcome in complex ecosystems is not straightforward or easily measurable or quantifiable*. This is why, in payment for ecosystem services programs, payments are often for an action (planting trees to create a riverine buffer) rather than an outcome (water quality). With so many other possible contributing factors to erosion and other inputs upstream, the impact on water quality of a few hectares of planted trees is hard to measure with precision. This also explains why sustainable agriculture and forestry investments are currently among the most popular for conservation impact investors – in such situations it is far easier to monetize results in order to generate either a cost savings or financial return.

Interacting with private sector firms has historically brought about *concerns regarding profit motive, transparency, and how financial returns are prioritized vis a vis social (or*

environmental) returns. As evidenced in critiques of market-based mechanisms for conservation, there is potential for perverse incentives or undesirable results (McAfee, 2012). Consequently, it is reasonable to understand why healthy skepticism exists on both sides. Investors, rather than being mission driven, tend to be far more cognizant of risk, return on investment, political and/or policy obstacles and barriers.

Perhaps not surprisingly, when asked about motivations for investing in conservation in the EKO study, the for-profit investors selected expected financial returns as their top consideration, followed by the investment's potential to help advance their organization's conservation objectives and the potential to advance other (non-conservation) objectives (EKO Asset Partners, 2014). Other considerations, such as diversification or corporate social responsibility reasons, ranked much lower. Conversely, not-for-profit investors overwhelmingly ranked non-financial considerations as the most important. Advancing an organization's conservation objectives scored highest by a large margin, followed by advancing other organizational goals. Financial returns ranked a distant third. When responses from all investors – for-profit and not-for-profit – were combined, advancing an organization's conservation objectives was the highest ranked choice by a large margin, followed by expected financial returns. The goals are aligned to a degree, but to facilitate growth and increase the magnitude of investment to promote what would qualify as real conservation, there are several actions and areas for improvement.

5.7.1 Connecting markets for conservation

The onus is on conservation organizations to present appropriate possibilities that match interest, time scale, and desired impact type to potential investors. One investor survey by the GIIN noted that 25% of deals considered (across all sectors, not just conservation) did not pass initial

screens (GIIN, 2013). This means there were critical factors – whether risk, rate of return, or confidence associated with impact measurement – that were not met and the project was not pursued from that point. Additionally, large capital providers generally prefer large sums to invest (on the order of tens or hundreds of millions of dollars) which is not common for a single conservation project. This is why conservation funds might be a preferable model, though they require the work and coordination of fund managers with specialized knowledge and interest in pursuing a fund of this nature. Currently, for an average bank or financial institution, so long as there are other opportunities for growth that may have easier impact tracking, one can see why a conservation fund is not a high priority and not yet a common investment.

Intermediary organizations can build capacity, by matching the supply side (investors) to investment-ready projects. A variety of the above actors can play an intermediary role – foundations have substantial convening power as mentioned above, as they are already an intermediary between large scale donors and NGOs for implementation of projects on the ground. However, for cash-strapped conservation organizations, the search and transaction costs that are necessary to develop a deal, connect with appropriate partners, implement and assess a project are still high. This will improve as demand and supply become less fragmented, and networks develop further.

5.7.2 Creating an enabling environment

Overall this means more support for understanding how and where impact investing can apply to the conservation sector, identifying and framing projects in a way that investors can accept. There is room for support on both the investor and investee side offer insight, including within the regulatory environment. From a regulatory standpoint, creating tax incentives and other

mechanisms, like enabling non-profits to have revenue generating arms, was one recommendation of the Royal Bank of Canada in their 2014 report on the state of impact investing (RBC, 2014). A new initiative by the World Economic Forum has a specific aim to connect investors and investees in an online searchable database, to reduce search costs and broaden networks. In a similar vein, the GIIN and its associated databases for impact measurement are intended to be the hubs and clearing houses for all of the most relevant impact investing information.

5.7.3 Alleviating risk

The different objectives of investors (i.e. finance first or impact first) provide an opportunity to improve risk–return profiles that match the investor's needs, and boosting the overall pool of resources available for conservation. Public or philanthropic institutional investors may be most concerned with impact, but worry that their potential funding is too small to meet needs. They may take bigger risks to leverage higher levels of good investment by others. Some impact investors may wish to get the chance for higher returns by taking an equity stake, and may be willing to take on the risk of equity, but not a large share of it. Others, such as pension funds, may be content to have a lower but predictable long-term return that is well protected from loss. *Bridge and mezzanine funding can provide either lower returns or financing in early stages before project is proven or a product is commercialized. This can be considered the "kickstarter" funding.* For some organizations (especially foundations or governments), the impact of moving a large program forward or leveraging additional funds may be sufficient and no net gains are required and the investment can act as a zero interest loan.

5.7.4 Governance

Political will is required to develop policies that address market and regulatory issues. Public sector funding will likely be necessary for credibility, capacity building, and bridge funding for startup costs. Public and philanthropic institutional investors are likely to play an important role as limited partners of private impact funds. This will impose much greater demands for transparency and community consultation in decision-making, which, ultimately, will result in better data and more confidence.

Convergence, one of the online platforms mentioned above, is funded in part by the World Economic Forum and the Government of Canada, and recognizes the capacity of public capital to attract significant private investment through public-private investment combinations. Provinces and states issue their own bonds, and in a more minor capacity, have acted as sponsors for events and conferences that bring together key actors in social finance space to foster networking and capacity building (e.g., Social Finance 2015 in San Francisco).

5.7.5 Monitoring and evaluation

This is already familiar territory for conservation organizations and a critical piece for progress towards harnessing social impact financing (Credit Suisse, 2014). Though of great value to any conservation project, it is particularly essential to be able to measure impact with credibility and confidence for impact investments. The development of more robust impact assessment methods would likely foster more capital stacking, by helping to make private investors more comfortable partnering with philanthropic organizations. Tracking non-financial impacts are a key element here, not just for an individual project, but for investors to be able to compare the relative impact

of different investment opportunities. *Ultimately investors and advisors require tools and data for impact investing that is equivalent to conventional investing. These data align with existing demands from funders for impact measurement.*

5.7.6 Transparency

Associated with monitoring and evaluation are concerns about greenwashing and weak standards that achieve the lowest common denominator. Something could be called impact capital but not necessarily guarantee a positive conservation outcome. As institutions respond to calls for more opportunities to allocate impact capital, this could serve as an incentive to take an easier assessment route, which may be less rigorous. To maintain the trust and integrity that should be associated with conservation impact investment, there must be reason to believe the impact is real. Risk assessment and deeper understanding of global social ecological systems are necessary – while all risk cannot be alleviated, there are examples of adverse consequences to good intentions. For example, the boom in interest and investment in corn-based biofuel, which was initially intended to reduce petroleum-based fuel content in gasoline ultimately resulted in higher global food expenses for poor (Monitor Group, 2009).

5.7.7 Knowledge translation and value shifting

Conservation organizations and financial institutions are typically not speaking the same language. Many potential projects and impact investing innovations are taking place at the small and medium scales, whereas large financial institutions are not well-equipped to manage at this level, and certainly not all conservation projects are appropriate to scale up. Small Enterprise Assistance Funds, a subsidiary of international development agency CARE, supports sustainable

development by investing in small scale businesses in developing countries, and has built substantial capacity by support entrepreneurs before and after investment with basic business training and strategic advice. Though capacity building efforts can be slow, by helping individuals and organizations (at any scale) see the value in conservation through the impact of their financial investment, it may possible to attract more people to understand the value and import of conservation writ large.

5.8 Concluding thoughts

An IUCN guidebook on sustainable financing for conservation produced in 2003 highlighted five significant contributors to the problem of funding gaps: current investments are inadequate, project-based funding often limits long term investments, private financing degrades ecosystems (i.e. through resource development such as mining and logging), new environmental business opportunities are being missed, and Earth's natural capital is undervalued (IUCN, 2003).

In the ensuing 13 years since the IUCN guidebook was issued, these problems persist, though we are beginning to be more strategic in several of the above areas, not least of which is the recognition that private financing does not have to degrade ecosystems, and indeed can be harnessed to do good. A secondary benefit may occur if an impact investment directs dollars away from investments that otherwise would have contributed in more harmful environmental impacts. Impact investing has the potential to address three other concerns, including the inadequate scale of funding, potential for longer term investments, as well as business opportunities. Impact investing is a tool that will require further research, thoughtful discussion, and field evidence to support the development of standards and capacity for conservation

organizations to effectively engage. Public demand paired with innovative policy will continue to foster innovation, and the more we can do to prepare and equip conservation organizations to work with and alongside those who seek to make sincere and impactful investments, to experiment with novel finance structures to conserve, limit externalities, and sustain critical ecosystems, the better chance we have to share these resources with generations to come.

Chapter 6: Conservation impact investing: Promise, pitfalls, and pathways forward

Paige Olmsted, Jordi Honey-Rosés, Terre Satterfield, Kai Chan

6.1 Introduction

The wide-ranging benefits of conserving nature are well understood, yet financially supporting ecological and biodiversity conservation programs remains a global challenge (Bruner et al., 2010, Rands et al., 2010). Global biodiversity assessments document and project dramatic species and habitat decline (WWF 2016), and such trends are exacerbated by climate change (Jantz et al. 2015). As highlighted at the 2016 World Conservation Congress and COP13 of the Convention on Biological Diversity, addressing the global conservation challenge requires multiple strategies with both leadership and financial commitments to support meaningful plans and effective partnerships (IUCN 2016, CBD 2016).

Social impact investing (SII) has attracted attention in other fields as an innovative approach to leverage new financial resources, improve operational efficiency, and support pressing social problems (RBC Financial Markets 2014, Oleksiak et al., 2015). SII attracts private capital to social causes by providing investment opportunities that realize both financial and social returns (Social Finance, 2014). Existing impact funds and initiatives demonstrate how billions of dollars can be leveraged to support projects ranging from healthcare to poverty alleviation to infrastructure, and highlight the opportunity for similar models to generate financial support for

conservation objectives (Draiman 2010, Imprint Capital 2012, JP Morgan 2013). Here we consider how this innovation may be applied in a conservation context.

There are several reasons why conservation might seek to engage with the impact investment community. First, and most obviously, it can bring in additional financial resources to support conservation objectives (Saltuk, 2014). Second, we can increase the visibility of conservation challenges, and broaden interest among groups who otherwise may not be focused on biodiversity protection or ecosystem management (EKO, 2014). Conservation impact investing may also lead to: (i) new collaborations and arrangements and between the financial sector and the conservation community, (ii) additional resources being attracted to a particular type of conservation problem, and (iii) innovation in measuring the impact of conservation projects, a long-identified need for conservation (Ferraro and Pattanayak 2006).

There are likewise several concerns and potential pitfalls with investment programs of this kind. Ecosystems are generally not measured and managed in the same way as other social sectors like education or healthcare. Furthermore, critiques of market-based approaches are well documented across the conservation literature (e.g., McAfee and Shapiro, 2010, Fletcher et al., 2017), and are clearly applicable to impact investing. If nature is being partitioned and assessed for the sake of profit, there will be commodification and other associated consequences (Gómez-Baggethun and Ruiz-Perez, 2011). These concerns are most relevant to projects where revenue streams do not currently exist, and the appeal of attracting new funds could compromise conservation objectives. For the limited projects that already generate revenue, concerns associated with commodification are less relevant. Regardless, the applicability of impact investing to conservation merits further exploration, in theory and in practice.

In this paper we seek to characterize the opportunity and identify potential pitfalls associated with impact investing for conservation. First, we define conservation impact investing (CII), clarifying what qualifies as a CII investment and what does not. Second, we identify and discuss unique challenges for conservation, clarifying key terms and concepts to build financial literacy. We close by discussing remaining concerns and critiques, as well as key research questions and paths forward so that conservation impact investing is better positioned to advance the conservation agenda.

6.2 Definition

A conservation impact investment is a financial vehicle that enables financial resources to be directed at conservation projects with the explicit goal of improving environmental outcomes and generating financial returns. The dual goal of environmental and financial returns parallels social impact investment, but merits distinction due to the unique features of ecosystems.

Conservation impact investments may take multiple forms – a bond targeting a particular project with a pre-determined rate of return, or a contribution to a fund that invests in multiple organizations similar to a mutual fund (Chapter 5). These include all cases wherein a fund loans money to support multiple projects, directs investment into a project with a profit generating component, or proposes other financial arrangements that need produce both environmental and financial returns. Central to these examples is the provision of capital as an investment or loan (debt capital) to support conservation goals either directly or via an intermediary institution, alongside anticipation of an eventual financial return (Figure 6.1).

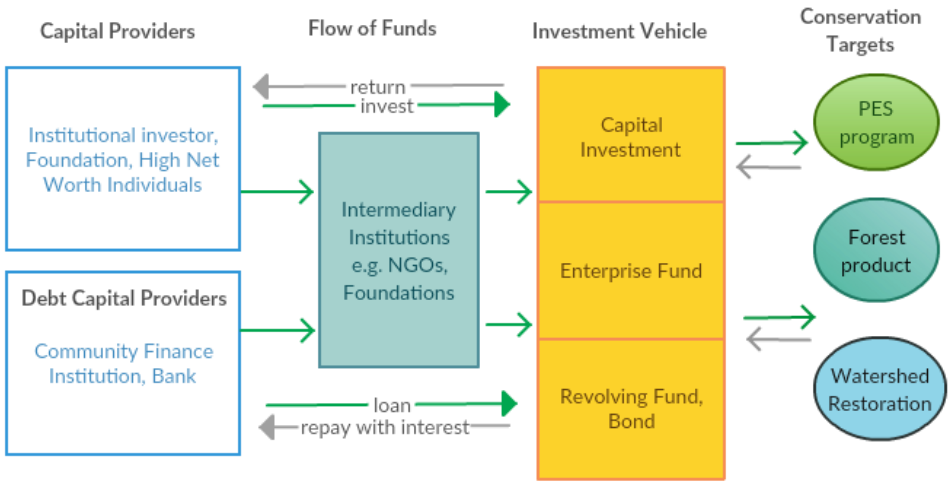


Figure 6.1. The pathways for Conservation Impact Investing. Capital can come from investments or debt capital, which involves bonds or loans that involve an upfront infusion of capital that is paid back over time (with interest). Intermediary institutions may be creating funds (like development banks, bringing partners together (like NGOs) or providing seed funding (like foundations). Various investment vehicles are then implemented to finance conservation targets. Proceeds or debt repayments are then returned over a predetermined time frame[5].

A conservation impact investment is characterized by five features: (i) capacity to generate cash flow; (ii) time-bound return on investment; (iii) measurable ecological impact; (iv) anticipated rate of financial return; and if possible (v) quantifiable risk to investors.

These features are standard components of most financial investments, but in a conservation context they are key considerations because they imply the need for data that are not normally or easily gathered by conservation managers. For projects with revenue potential, the ability to derive these data and interface with potential investors are hampered by several challenges arising from the current context for conservation:

[5] A different version of this figure is seen in Chapter 5, Figure 5.1. This one reflects more current thinking on how best to illustrated the relationships in a generalized conservation impact investment.

- **Ecological impact measurement** is not yet well established in conservation, especially compared to the precision common to finance. For instance, it is unclear which impact measures are the most meaningful, and which methodologies are appropriate to accurate collect and report these data.

- The **complexity of ecosystems** complicates the needed attribution of cause-effect relationships of an investment. For example, if one restores habitat to increase fish spawning population, many external factors beyond habitat quality may influence whether the population increases as expected.

- The **small scale** of many worthwhile projects and organizations that could benefit from CII is likely too small to command attention of large institutional investors, who are generally more interested in large projects. This challenge may occur in other settings, but any solution involving portfolios or middle managers would have to be tailored to conservation needs due to the above points.

Several of these challenges are being tackled in the biodiversity and carbon offset community, where impact assessment and measurement is essential. Offsets would not be considered a conservation impact investment, unless there is a mechanism for a financial return. For example, large-scale support for avoided deforestation (e.g., UN-REDD program) would not qualify as a CII since funds are predominantly from international donors without expectation of financial returns. However, investing in the development of a new carbon offset project, where the credits are eventually sold for higher than the cost of development, could create a revenue stream for investors in which case it would be considered a CII. Eco-certification programs have a revenue

stream, but would not qualify as a CII, except in a similar scenario to offsets, where money is loaned or invested to establish certification schemes, and funds are paid back over time through increased revenue stream from the certified product.

In the next section we expand upon the defining characteristics of conservation impact investments. To the extent possible the highlighted examples are from the conservation sector; where they are not, we use them to illustrate the potential to apply similar models in the conservation realm.

6.2.1 Cash flow

A project must generate cash flow to be eligible for impact investment, since without it, one cannot attract investors. Conservation projects that work with agricultural commodities, fisheries, or any kind of value-added commodities will usually have some form of cash flow.

Capital improvement projects may also generate cash flows. For example, renewable energy projects often require an upfront investment in order to obtain long-term savings that can be returned to investors over time. Projects in this category would also include investments that restore ecosystem services, such as the recovering of ecosystem processes that improve water quality and reduce downstream water treatment costs (Honey-Rosés et al. 2013). Most environmental social impact investments are in the realm of energy efficiency, where the cost savings to repay the investor is straightforward. The cost recovery model can be applied creatively for multiple benefits. For example, NatureVest partnered with conservation organizations in Kenya to re-organize the value chain for livestock production and enhance economic and environmental benefits to farms across several income streams (Goodman and

Kaiser, 2015). Cash flow derived from ecotourism and higher standards for land management added value to their livestock and helped them gain access to larger markets and price premiums. The added income contributed to expanding access to sustainable livelihoods and landscape management in the community.

6.2.2 Explicit rate of return

Conservation projects often produce clear biological, cultural, or even economic benefits, but financial returns may remain elusive. Even when ecosystem valuations assess natural assets in dollar terms, conserving a natural capital does not always yield new funds. This gap between valuation and real rates of return can be addressed under certain circumstances, e.g., in which a government investment could yield measurable cost savings in another government agency.

Following the cash flow example, when protecting a watershed to improve municipal water quality at a fraction of the cost of building new infrastructure, the rate of return can be interpolated against avoided cost. When this is not feasible, social impact bonds (SIBs) are one way to generate upfront capital for innovative programs the government does not want to take the risk to test, but will pay out when a pre-determined level of success is achieved. One study reported that the loss of a one-mile strip of wetlands along the US Gulf coast results in an estimated US$5.7M in average annual increases in property damage (Paterson et al., 2010). Such studies can help provide an evidence-base to rationalize investment—in this case, perhaps for an insurance company—and reasonably estimate the return on investment for financing such efforts.

The need for a real financial return explains why existing conservation impact investments have mostly focused on better management of resource extraction, since better management yields

higher future returns. This is why value-added products like sustainable agriculture and fishing practices make up the bulk current examples of CII—it is not only the cash flow potential, but the capacity to understand how much and when. In Chile, investors can capture double-digit returns on investment from better managing fisheries in comparison to the money lost from poor management have had more attention from investors (EKO, 2014). Commodities have pre-existing revenue streams (i.e., cash flow) based on supply chains into which additional conservation benefits can be integrated and, thus, a return over time is easier to model and manage. The amount that investors can earn on their initial investment is a critical deciding factor and useful comparison to other investment opportunities, though current low interest rates may encourage participation. In IMPACTBase, a database of impact investments, forty-two impact funds were identified as targeting environmental issues. Within these, fund managers sought internal rates of return of 5–10% in the conservation arena (IMPACTBase, 2016). Different regions, political environments, and the success rates of implementing agencies will all play into the assessment of risk and will have significant influence on participation. Both the IMPACTBase database and a survey of investors suggest that fixed-income impact investors will often be willing to accept a 5% return on debt for conservation (i.e. a loan) as long as risks are managed (EKO, 2014).

6.2.3 Impact measurement

The ability to measure the impact of investments is a necessary precondition for the successful adoption of CII arrangements. Impact evaluation is gaining more serious attention in conservation (Baylis et al., 2016) and there are diverse methods to measure impact with the same level of rigor used in other fields (Börner et al., 2016). However, collecting the data needed to

evaluate success is the exception rather than the norm in conservation—even in conditional cash transfer programs such as payment for ecosystem services (Prager et al., 2015). Measuring impact is critical to generate confidence and certainty on all sides. According to one fund manager, it is currently sufficient for investor to assume a benefit associated with their investment (Genus Investment Partners, personal communication, 2016). For example, purchasing a green bond dedicated to improving transit infrastructure will likely improve air quality by taking cars off the road, even if it is difficult to attribute the exact ppm of CO_2 reduction. If the CII sector is to grow, however, multiple reports suggest that consistent, quantitative metrics associated with environmental impact that enable comparison between investment opportunities will be required (Credit Suisse 2013, GIIN 2014, WEF 2015).

In an effort to consolidate and standardize metrics for investors that quantify non-financial impact, the following tools are gaining traction in terms of use and applicability. The Global Impact Investing Rating System (GIIRS) requires a paid membership, and applies mostly to funds and businesses. Though this system could be expanded, their environmental metrics focus on environment as a function of operations and outputs, but would not be applicable to conservation projects themselves. Impact Reporting and Investment Standards (IRIS), developed by the GIIN, is a user-friendly database including guidance to perform impact assessments using established third-party metrics where possible. It is similar to GIIRS, insofar as current metrics focus on operations are not applicable to ecological outcomes associated with conservation projects. Social Return On Investment (SROI), an approach based on a set of principles rather than specific metrics or means of measurement, enables attributing monetary values to significant intended and unintended outcomes of projects as part of an impact evaluation.

Donors (as well as impact investors) are pushing for more evidence-based approaches to conservation and want to know the expected and realized impacts of their investments (USAID, 2015). For several of the recommended data needs, it may simply become good practice to account for these criteria to demonstrate impact for any contributor. Indeed, many foundations that fund conservation are among those pursuing impact investing.

6.2.4 Time frame

Investors in CII arrangements will expect clearly defined time frames associated with ecological and financial return (Chapter 5). Although conservation managers are accustomed to working with clearly defined time periods associated with grants and funding cycles, conservation objectives tend to be longer term goals. One strategy to address this challenge can be through action and process outcomes to demonstrate action and assess impact by proxy. For example, one can measure hectares of protected habitat, as opposed to reaching a level of species recovery, which may be influenced by factors beyond local habitat protection. This strategy is common in many conservation activities though the ecological benefits of paying for outcomes rather than actions have been noted (Hanley et al., 2012). Long-term investments can be achieved via loans or bonds associated with a specific time frame, with consistent returns in that period or a guaranteed payout at the end (Boyd et al., 2012). Green Bonds are gaining interest as a fundraising strategy, and when applied to conservation outcomes, are an emerging CII strategy. The global green bond market—much of which is climate focused—increased to $93B in 2016, up 120% from the previous year (ImpactAlpha, 2017). This is not a new approach, as government bonds are frequently issued for infrastructure development. However, tweaks in focal area and timing could be crucial to be ecologically relevant. Conservation organizations

can be the beneficiaries of investments from these bonds for their efforts in promoting particular initiatives (e.g. wetland restoration) to meet desired outcomes (e.g. reduced flooding). In 2014, California raised US$200M from a green bond issue, 98% of which was invested in air quality improvement.

6.2.5 Level of risk

Risk comes in several forms -- commodity market risks, policy and political risks, unreliable infrastructure, weather risks and business risks such as difficulties in finding trained staff (Credit Suisse et al., 2014). Differential risks often explain why loan rates differ across projects, and conversely why higher-risk projects need to have a higher return than others to attract investors (Saltuk et al., 2014). In one assessment of impact investment, projects that took place in Africa on average needed internal rates of return to be 5% higher than comparable conservation impact investments in Latin America because of the associated risk (Saltuk et al., 2014). Risky environments or conditions may provide a venue for governments and foundations to play a supporting role. These supporting roles include serving as a guarantor (i.e., agree to repay a loan to investor if the loan defaults), providing tax relief – for example, capital gains taxes could be lower for a social impact investment, or providing seed funding at the outset to attract additional private capital.

Insurance companies are experts in understanding, quantifying and pricing levels of risk, which are reflected in differentiated premiums. Quantifying risk associated with conservation projects is not common practice, but developing metrics and approaches to do so could provide practitioners with a richer characterization of projects that might attract donors or investors. As highlighted above, NatureVest is a leader in impact investing in the conservation sector, and this

may be due to the expected lower risk associated with TNC projects. This maybe be attributed to well-established relationships and partnerships, as most of TNC's impact projects are taking place in regions where the organization has a good track record. Importantly, several TNC projects have a credit rating (see: Moody's, 2012), which provides an external evaluation of risk in terms that are familiar to financial institutions and enable direct comparison to other investments.

Table 6.1: Description of several impact investing mechanisms with examples. An additional consideration is that any of these examples can be facilitated/augmented by foundations and/or governments via seed funding or bridge funding that either receives lower return on investment or accepts higher risk, in order to leverage private funds.

Investment mechanism	Description	Example(s)
Capital investment/improvement projects	CII provides up-front funding to improve practice, paid back via funds realized from future cash flows	Support to start a biodiversity friendly business, proceeds pay back the investment. Watershed conservation to avoid costs associated with large scale infrastructure.
Green Bonds	Time-bound, return-specific government-issued opportunity, often for infrastructure improvement. Low risk for investors, but limited application to conservation thus far.	Conserving protected areas or green infrastructure when substantial upfront fundraising is required.
Social Impact bonds	Privately financed performance bond in which a payout only occurs when set targets are reached. Income generation (usually through cost savings) is required.	Limited application to conservation as yet, amendments for application to conservation projects with are discussed in detail in Chan et al., 2017.
Revolving Funds	Large pool of assets that allocate funding to projects, often housed in community-based financial institutions, municipalities or university campuses to support internal projects.	Washington state's drinking water revolving fund provides low-interest loans for public and private projects that improve public health or help increase drinking water compliance.

Investment mechanism	Description	Example(s)
Enterprise Funds	Loans, grants, or investments, often coordinated by large financial institutions and supporting multiple smaller projects on a case-by-case basis, thus distributing risk across the portfolio.	EcoEnterprises Fund focuses on small (but scalable) biodiversity or sustainable livelihood oriented businesses in Latin America. Investors include JP Morgan Chase, European Investment Bank, and the Global Environment Facility.
Specific one-off projects	Unique arrangement with multiple partners – often large scale and complex, but can reap large gains. Many examples of conservation impact investing are in this category so far, and require substantial staff and logistical coordination.	TNC, Seychelles government and coordinated a debt relief program with several European governments in which avoided debt payments were invested in MPAs around the Seychelles for climate adaptation. Seychelles MPA for climate adaptation (for details see Chapter 5 and NatureVest, 2015)

6.3 Concerns and critiques

Billions of dollars are currently invested as impact capital in conservation-related programs, and in the next decade dramatic increases are anticipated (Saltuk et al., 2014). The anticipated magnitude of available funding for investment in a traditionally donor-support sector brings about several concerns.

CII Displacing Traditional Donations: Most conservation projects are not income-generating, and there is concern that increased attention to the few income-generating options will shift funding away from traditional conservation projects whose benefits are not captured in revenue generating ones.

Profit-motive of Investors Undermining Ecological Integrity: Despite paired objectives of financial and ecological concerns, there is legitimate trepidation as to whether funding will flow to projects anticipating higher returns, which may be less concerned with ecological gains as compared to financial ones. If CII drives funding to less ecologically sound projects (e.g. reforestation of monocultures as compared to conservation of biodiverse forest), it could lead to more such projects being implemented. Likewise, environmental organizations may be tempted to choose different on-the-ground strategies that may not be as ecologically desirable i.e. adjustments made to meet CII criteria. Highlighted recommendations including impact assessment will support dialogue and decision making between funders and conservation organizations seeking support. Assessing conservation gains achieved by investment as compared to traditional donation can highlight the ecological implications of CII and help avoid perverse incentives in a given context.

Undermining Social Norms for Conservation: There are a myriad of benefits from conservation, of which financial gain (in the case of CII) is merely one. When a profit motive is presented, it could compromise these pre-existing values that conservation organizations aim to reinforce, bringing about concerns associated with motivational crowding out (e.g., Bowles, 2008).

For reasons discussed above and more, many may be skeptical about the ability for CII to advance conservation without co-option from financial interests. Our aim is to provide the common ground needed to enable diverse members of the conservation community to engage seriously in discussions about impact investing. Given existing shortfalls in funding conservation globally, understanding CII and its potential future role could be enormously beneficial to

conservation organizations and to biodiversity on Earth.

6.4 Pathways forward for conservation impact investing

The benefits and effectiveness of CII expansion will rely upon appropriate investment vehicles being available while achieving real conservation gains relies on the engagement of conservation community (Chapter 5). Both will require education, coordination, and leadership on the part of conservation organizations, investors, and organizations serving intermediary roles. The following avenues of research and practice are particularly pertinent to address concerns, advance discussion, and assess net benefits of these changes:

Improve and standardize impact assessment methods. A substantial barrier to CII is the capacity to estimate accurate rates of return, levels of risk, and measures of impact in a conservation setting.

Explore norm spreading. CII brings the potential to attract new players to the conservation arena, and augment interest and understanding in the benefits of conservation. The most substantial wealth transfer in history between baby boomers and their offspring will take place in the coming decades, and younger generations are far more likely to list value-based investing as a priority (Accenture, 2012). The extent to which this is an opportunity to leverage environmental values is an avenue worthy of exploration.

Facilitate the flow of large scale funding to small-scale projects. Many potential conservation impact projects are operating at small and medium scales, and large financial institutions are generally not well-equipped or seeking to engage with projects of this size. Some degree of

scaling or grouping would be necessary to have access to conservation impact funds. While institutional investors look to invest in large portfolios, other investors might engage more with smaller projects targeted towards regional needs. Pilot projects will help establish confidence as well as learning opportunities for conservation and finance community, while improving the capacity to create risk-return profiles for impact assessment.

Consider enablers in the conservation community. Increased capacity is needed to develop collaborations, partnerships, and internal and external learning opportunities. Conveners are needed to bring together cross-sector stakeholders in order to facilitate discussions and advance the impact-investing agenda.

Knowledge translation and value shifting. Conservation organizations and financial institutions are typically not speaking the same language. By helping individuals and organizations (at any scale) see the value in conservation through the impact of their financial investments, it may be possible to attract more people to contribute to meeting conservation goals.

Conservation impact investing is not a silver bullet for conservation funding shortfalls, as it applies only revenue generating projects – a relatively small subset of what is currently implemented by conservation NGOs. We see opportunities for innovation while recognizing that CII can pose risks to the integrity of conservation objectives if projects are developed in undesirable ways to attract funds. For example, if a preferred strategy for biodiversity was 100% protection of an area, but the potential for CII funds led to a different path, the optimal outcome is compromised. However, if impact funds were the only means to take any action, the overall conservation gain is potentially net positive. The intent is not to propose hard and fast rules as to when CII is appropriate, as it is inevitably context specific. There are a range of possible

projects from those that already generate revenue (e.g., value added products like rainforest friendly coffee) to those that could adapt existing activities to become revenue positive (e.g., through user fees, expanded use or access a conservation easement to protect new land on which a small portion is allocated for revenue generating activities). CII is wide open for creative partnerships and novel pilots to support development of standards and increase capacity for conservation organizations to effectively engage. The more that can be done do to prepare and equip conservation organizations to work effectively with those who seek to make sincere and impactful investments, the better the prognosis for biodiversity in the 21st century.

Chapter 7: Conclusion

A dramatic transformation in the way much of the world's population interacts with the natural world is necessary if we are to reverse alarming environmental trends (Chapin et al., 2011). As highlighted by Meadows (2001), among the multitude of ways to intervene in a system, top-down planning and economic instruments to are currently the primary means used to induce large scale transformation. Societal change also requires agency and interactions within communities to innovate and advocate for new approaches (Meadows 2001, Ostrom 2010, Loorbach et al., 2010). Financial mechanisms such as incentives, donations, or investments operate comfortably within the dominant economic and political systems, but are also a means to act on individual intentions, values, and motivations. Global values surveys suggest that environmental values are widely held, even when traded off against economic growth (World Values Survey, 2010-2014). The findings of this thesis similarly endorses the supposition that many people are supportive of environmental values, but there is a paucity of *barrier-free* pathways that encourage and reinforce important relationships between people and the environment.

Conduits that do exist for individuals and organizations to support or engage in conservation efforts have not inspired the necessary scale of contributions to address the global biodiversity challenge. Neoclassical economic and instrumental logic would suggest that a financial gain (in the form of an incentive or investment) should be motivation enough to engage in a particular action, and calls for conservation contributions often leverage intrinsic values to encourage donations. However, recent recognition that incentives – financial and personal, including social

norms—are often not well linked to stewardship and associated personal values suggests a need for incentives that strengthen positive feedbacks rather than those that can lead to perverse outcomes (Lubchenco et al., 2016). This thesis explored three pathways along which financial mechanisms can contribute to conservation, emphasizing the role of attitudes and values in encouraging stewardship and environmental responsibility.

7.1 Findings and significance

The empirical analysis of relational values in several populations supports the notion that people broadly value the environment—and often in ways that go beyond intrinsic and instrumental values. We found that representing relationships that connect people to the environment to be highly resonant across populations. While one might expect farmers to feel a strong connection to their landscape, international (predominantly North American) tourists found relational values statements to be equally meaningful, and more so than almost every other more instrumental justification. If, as we propose, relational values leverage key connections (family, identity, community) to help foster conservation action and support, such a framing may be a powerful strategy to attract and engage more people in pro-environmental actions. Though the findings thus far only apply to specific sample populations, the relational value construct has been incorporated in the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) conceptual framework, suggesting a strong need for work in this domain to test the validity and robustness of the measure in a multitude of settings.

The finding of this thesis is that relational values cluster together in people's responses across populations, and that they consistently differ from the New Ecological Paradigm (NEP) suggests

an important opportunity to broaden and deepen our understanding of environmental outlooks[6]. It is instructive, for example, that the six relational values statements cluster together, despite representing very different kinds of values about relationships with the natural world (e.g., from kinship to stewardship). This suggests that the relational value is both a robust construct in its own right, but also adds variation to the NEP. As a group the two value measures nonetheless diverge significantly suggesting that the more relational aspects of environmental values are not currently captured by the dominant tool for assessing environmental outlooks (the NEP).

Relational values were also shown to be a useful lens through which to explore farmer participation in PES, as well as participation in conservation actions on their farms regardless of their formal involvement in the national program. Although Costa Rica's PES might be imagined as a likely context for motivational crowding out, as discussed in chapter 3, we found no evidence of this effect and some evidence that non-monetary motivations may even be strengthened by the program. Notably, strong environmental values and endorsement of incentives were not an indication of support for the program itself. The level of dissatisfaction of smallholder farmers resulted in a campaign to develop a new PES program targeting smallholders specifically. Several details of the new program run counter to the prevailing national PES framework, and the proposed changes are reflective of our findings. The pilot program proposes to provide both monetary and non-monetary incentives, pay people based on what they are already doing (additionality is not a concern), and cover a broader array of ecosystem services (UNAFOR, 2016). The proposed program also endorses reforestation

[6] Recalling that the NEP is referred to as a measure of belief amongst those who reference the VBN (Dietz et al., 2005) and as a value measure by those using the concept of values more broadly (World Values Survey, 2014), as I do here. Using the term environmental outlook here is intended to capture these concepts inclusively.

practices that go beyond carbon benefits by including fruit trees, promoted as a means to achieve environmental goals while producing food, and supporting families and communities. Farmers who weighed in on the design of a new program emphasized "Values of solidarity, generosity with nature, trust, respect, happiness, justice, courage, faith and hope". Themes of transparency, community, and conservation emerged consistently, which align with several of the attitude and relational value statements. Thus, this concept of relational values seems to be tapping into a kind of value momentum that is already asserting itself in the broader world.

Collectively, the findings of the regional PES survey in Chapter 3 and national report also suggest the emphasis on the role money itself in achieving behaviour change in PES may be over emphasized. Though important and desired by participants, other aspects of a program are critical to satisfaction and enduring participation, even in relatively poor areas. This points to a substantial gap in design and implementation where discussion, understanding, and measurement of attitudes, values and underlying motivators for participation in PES are limited. Accounting for attitudes and values that foster social gains, or considering them as potential motivators may encourage more buy-in and participation even when economic benefits are over-subscribed.

Understanding values and motivations among tourists in Chapter 4 appear to highlight opportunities to foster conservation engagement and perhaps direct financial support. Our sampled population aligned strongly with ecotourist qualities and engaged in many ecotourism activities, where almost 80% of participants were willing to contribute financially to conservation. People were generally willing to pay more for conservation done by local NGOs (as opposed to hotels, the government, or international NGOs), and some evidence pointed to a preference for contributions to a region they had visited (as opposed to a general fund). This

suggests that the relational notion of connection to place has real implications for conservation intentions. The significance of connection to place in both social and physical terms is well-documented in the geography literature, and discussed in the tourism literature as an opportunity for on-site learning (Stedman et al., 2003, Wurzinger and Johansson, 2006). The dramatic increases of global tourism and ecotourism in particular presents the opportunity investigate new research directions that test how environmental connections forged on a holiday could translate experiences to environmental engagement that endures after a trip (Ardoin et al., 2015).

If relational values are useful facilitate connections between individuals and the environment, as suggested in Chapters 2-4, perhaps there is an unrealized potential for tapping into these via investments that both provide some financial return and also yield conservation gains. As I propose in Chapter 5 and Chapter 6, the scale of private capital in global markets is considerable, with the primary aim of increasing wealth. If there are more opportunities to make investments that also promote social objectives, and one feels connected to this impact, it may increase interest, awareness, and a sense of ownership in conservation outcomes. This can apply to those who were initially attracted by the financial benefit, as well as those who were initially attracted by the environmental benefit. The win-win language of conservation impact investing brings inevitable skepticism, which is why an exposition of the current state of conservation impact investing for practitioners rather than institutional investors was pertinent (Chapter 5). This is especially true given the absence of academic scholarship in social impact investing, let alone the specific concerns associated with conservation, outlined in Chapter 6. Thus, a novel outcome of this thesis is defining "Conservation Impact Investing", along with an explanation of key players and mechanisms through which conservation organizations can engage in CII. We point to

additional benefits of CII besides funding, as CII can be a means to develop robust impact assessment metrics, which have long been sought by the environmental impact assessment community and by the conservation community focused on evidence-based interventions. By targeting conservation practitioners rather than investors (the intended audience for the majority of grey literature outputs and guidance materials associated with social impact investing produced thus far), Chapters 5 and 6 are intended to enable conservation organizations to more fully engage in productive discourse as CII grows.

7.2 Limitations and next steps associated with specific findings

As this thesis explored several emerging areas of inquiry, it follows that there are a variety of limitations. Environmental values assessments are often survey based, and so may not capture some of the depth and range of values associated with the environment. While this strategy is simpler, cheaper and allows for easier comparison, several practitioners note that allowing time for deliberation and discussion can result in more nuanced values being expressed (Dietz et al., 2005, Satterfield 2001, Kenter et al., 2011). While the relational statements were shown to stand together well as an index, demonstrating that respondents were consistent in how they responded to relational value questions, we do not suggest it is inclusive of all dimensions of relationality. Moreover, as a pilot study of these statements, each discrete relational value was represented by only a single statement, which limits our ability to assess the robustness and validity of the survey instrument. Future tests of different statements, of multiple statements per relational value, and of different techniques to elicit values besides surveys will augment the robustness of a relational values assessment methods. In terms of the strong resonance of relational values across populations, we acknowledge there is a tendency for respondents to give positive responses; many measures

(including the NEP) include a balanced number of phrases in positive and negative (i.e., low number on Likert scale indicates agreement with relational values) to reduce such biases (Dunlap et al., 2000). As we did not expect such strong agreement with the relational statements, further studies can benefit from additional design strategies including scenarios that put statements into context that may provide more variability in responses.

Costa Rica has a long history with PES making it an appropriate venue to test for motivational crowding out. Multiple factors including cultural influences may support the underlying values present in the sampled population, which may not be present in other settings. However, the intent in examining motivational crowding was to examine if relational values can help explain actions and attitudes in circumstances where financial incentives alone cannot. For example, people engaged in practices without being compensated, and indicated they would continue practices in the absence of a payment, supports the notion that an understanding of attitudes and values at the outset can help craft programs that benefit from positively reinforcing incentives. The evolution of PES from a national scale program to a targeted (and initially local) PES for smallholders, provides a venue to test how design recommendations that account for values manifest themselves in practice. As UNAFOR is seeking tourist dollars as a possible funding source for the new program, there is an interesting potential connection between tourist impact and conservation outcome, providing a valuable testing ground for a comparison of factors that influence contributions to offsets as compared to donations.

In the tourist survey I identified limited knowledge associated with drought in the region, although it was covered by only three questions. More nuanced conclusions associated with this result could be obtained from a deeper dive into water shortage (or other environmental impacts

in which tourists are complicit in a given place) to connect the environmental issue, tourist awareness of their impact on that issue, and willingness to pay to offset their impact. Carbon offset studies have demonstrated that highlighting biological and community co-benefits of the offset increases willingness to pay (MacKerran et al., 2009). Exploring similar framings to compare offset opportunities to conservation donations to an NGO (or PES program) would promote understanding of how environmental responsibility, stewardship, and other factors mediate interest, type of desired conservation activity, and the amount of a contribution.

The choice experiment method enables concrete analysis of attributes that influence contributions to conservation, but it comes with several caveats. Since choice experiments are hypothetical, further experimental studies using real dollars, or tracking actual giving behaviour (or other pro-environmental behaviour) would provide great insight into whether our findings hold true when actual money is at stake. Also, while efforts are made to explain variability and control for external factors in quantitative surveys, there is a tendency to emphasize the role of individual decision-making when many actions are constrained or in response to existing social practices (Shove, 2010).

Given the novelty of CII, many potential merits and shortfalls remain hypothetical. Our preliminary exploration raised several research questions of interest—whether CII opportunities will draw funding away from more traditional conservation and/or increase the volume and scale of contributions from a wider variety of contributors. Preliminary testing suggests that while some re-distribution may occur, the result is likely a net increase of conservation contributions rather than a shift by existing donors away from traditional conservation donations (Olmsted et al., in prep). Extending the idea of attracting new sources of conservation funding, further

research could test if the positive reinforcement that arises from economic and social benefits from a CII promotes re-investment. Such questions will benefit from experimental study with real funds to test how people respond to different types of financial and non-financial incentives, alongside empirical studies of the effectiveness of the conservation initiatives supported by CII.

7.3 Broader next steps

The feasibility of connecting environmental values to incentives may be clearer for those that physically work on the land (like a farmer) or benefit from visiting an exotic destination (like a tourist), whereas for many people, acting on environmental values is often a challenge, an additional task, or an expense. Motivated in part by the findings of this dissertation, future research directions include devising means to encourage mitigation for environmental impact associated with consumption. Currently, no user-friendly way exists for consumers to develop as planetary stewards by engaging with relevant conservation projects that reduce their environmental footprint, or to have lasting follow-through while tracking and earning rewards (i.e., incentives) for their commitments. We are building an organization called CoSphere to connect people to real conservation projects as a means to offset their own environmental impact, and to connect like-minded citizens to promote collective action. We seek to test whether taking part in this process may not only lead to positive environmental outcomes, but motivate and inspire more action as people experience their capacity to incite change (Boyd, 2016). In doing so, CoSphere embodies the findings of this thesis that appropriately designed incentives that attend to values have potential to unite and expand interest and participation in conservation efforts rather than divide them.

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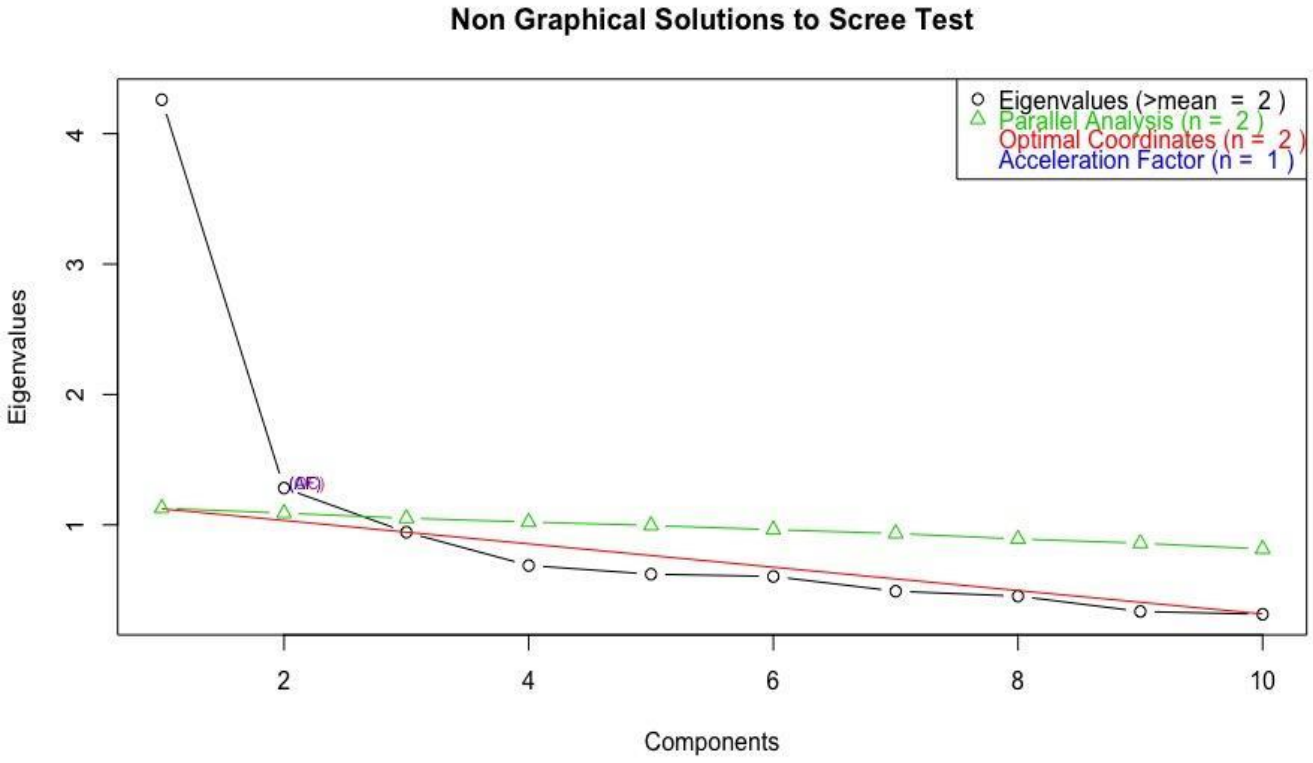
Appendices

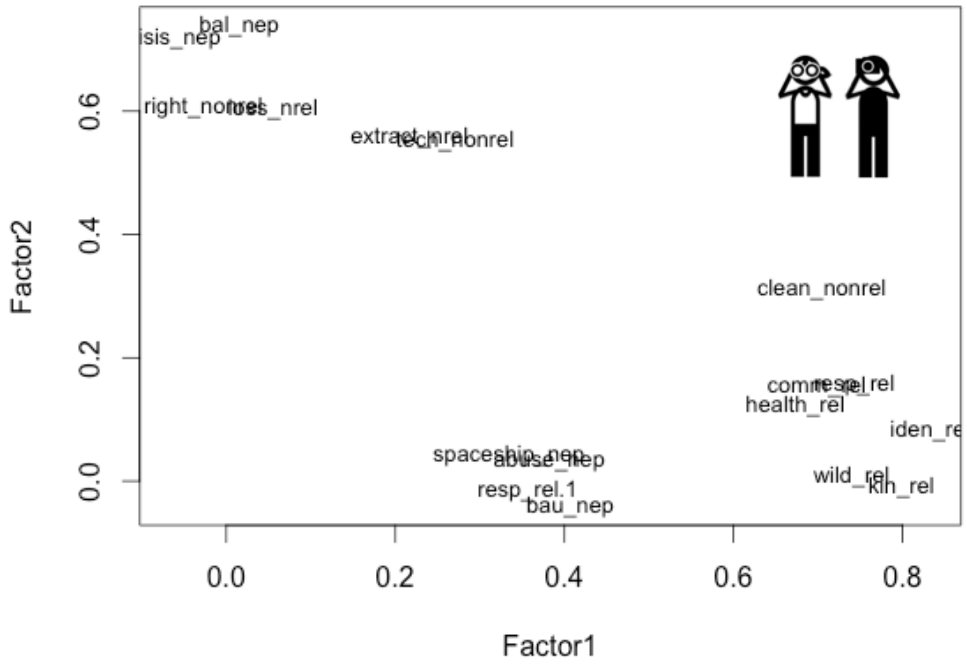
Appendix A Supplementary material for chapter 2

A.1 Scree plot

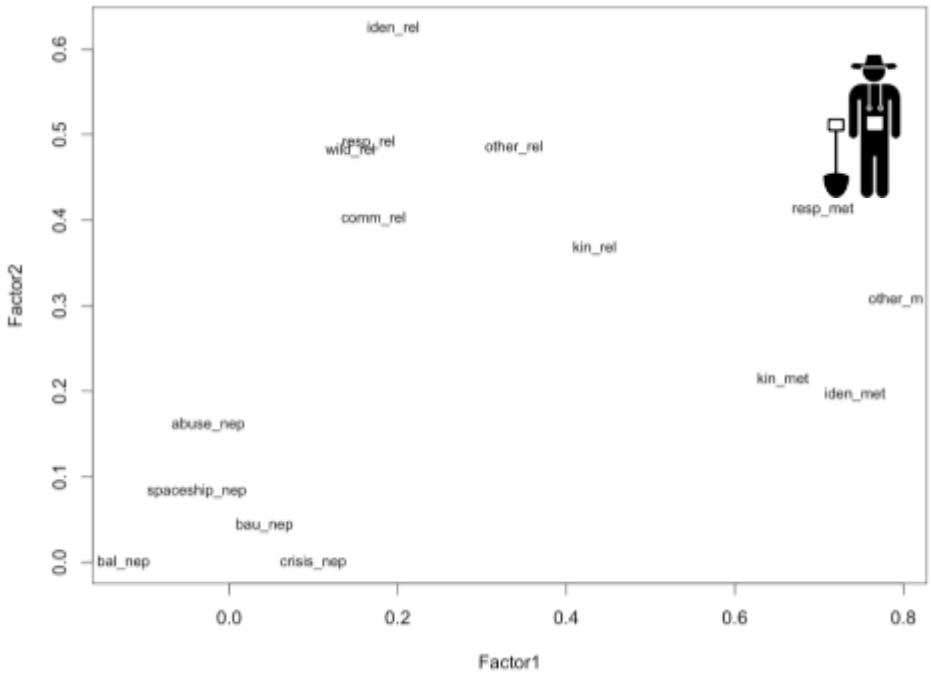


Scree plot including responses to five NEP statements and six relational value statements across all three populations. Parallel analysis, optimal coordinates and acceleration factors are different methods to determine the number of factors to retain (Ledesma, 2011).

A.2 Factor analysis by population



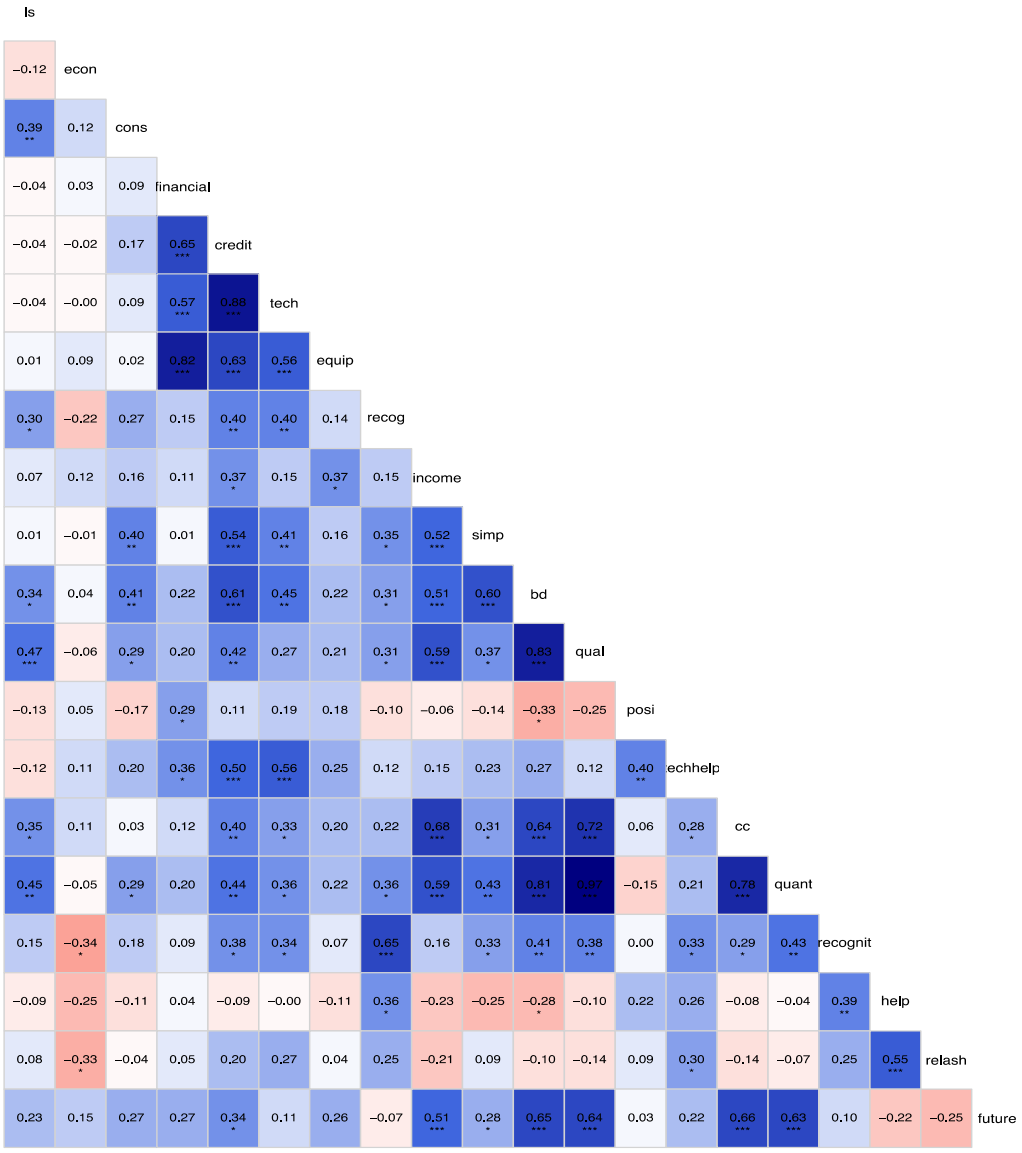
Factor analysis results from tourist sample



Factor analysis results from farmer sample

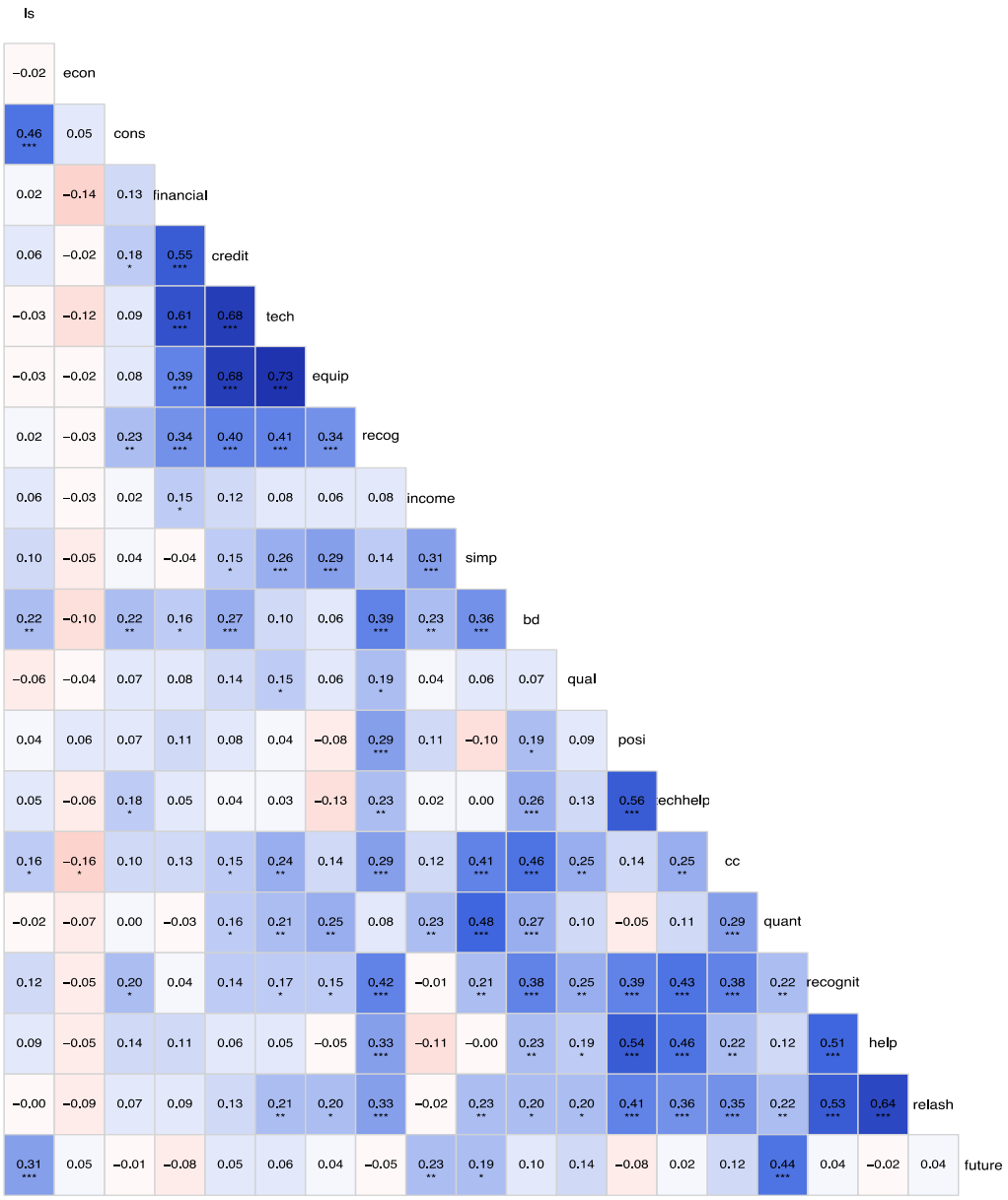
Appendix B Supplementary material for chapter 3

B.1 Correlation of attitudes and value scores of PES participants only



Correlation table of only PES farmers, featuring three attitude indices for lifestyle (ls), economics (econ), and conservation (cons), alongside the series of incentives and motivations from tables 5 and 6. Labels used as short form here are featured in the table. P-values denoted by *p <0.1, ** p <0.05, *** p < 0.01

B.2 Correlation of attitudes and values scores of non-PES participants only



Correlation table of only non-PES farmers, featuring three attitude indices for lifestyle (ls), economics (econ), and conservation (cons), alongside the series of incentives and motivations from tables 5 and 6. Labels used as short form here are featured in the table. P-values denoted by *p <0.1, ** p <0.05, *** p < 0.01.

Appendix C Supplementary material for chapter 4

Percentage of sampled tourists who engaged in various outdoor activities on their holiday in Costa Rica. Activities with more than 20% participation were further examined in chapter 4.

Activity	Percentage of sample participating
Fishing	11
Dive	7
Snorkel	2.5
Surf	16
Ocean swim	7
River swim	2
Beach	85
Kayak	16
Raft	21
Kitesurf	0.003
Windsurf	0.003
Hike	58
National Park visit	48
Canopy Zipline	60
Camping	0.003
Hotsprings	2
ATV	2
other	8

Appendix D Guanacaste farmer survey consent form

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Science
Resource Management and EnvironmentalStudies
InstituteforResources, Environment&Sustainability
2202 MainMall
Vancouver, BC Canada V6T 1Z4

Participant Consent Form
Ecosystem Services, Changes, and Preferences in Guanacaste Costa Rica

As part of the FuturAgua project this survey has been developed to better understand perceptions of environmental change in Guanacaste and future management preferences. Your voluntary participation plays a valuable role in this research project. The information you provide in this questionnaire will be kept strictly confidential.

Principal investigator: Kai Chan, Associate Professor, Institute for Resources, Environment and Sustainability, University of British Columbia; contact information: XXX
Co-Investigator: Paige Olmsted, PhD student, Institute of Resources, Environment and Sustainability, University of British Columbia, contact information: XXX.
Study procedures: If you decide to participate in this study, you will be asked questions about your views on changes in the Guanacaste region, reasons why people participate in incentive programs, and questions about how your land is used. The questionnaire will take about 30 minutes.
Confidentiality: Your identity will be strictly confidential. The data you provide with the survey will be stored securely.
Potential risks: There is a risk that you experience discomfort in answering questions both from giving out personal details of your property and opinions about resource management. Confidentiality will be assured to minimize potential risks. Please note that your participation in this survey is voluntary and you may choose not to answer any particular question at any time for any reason.
Potential benefits: Findings from this survey may be included in decision-making regarding planning for climate change adaptation in the region.
Ethical concerns: If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at (001) 604-822-8598 or if long distance email to RSIL@ors.ubc.ca or toll free 1-877-822-8598.
Contact for questions or concerns: If you have any questions or would like more information about this study, please contact Paige Olmsted at the. We invite you to ask questions before, during, and after the survey in person or on the phone number or email address listed above.
Consent: I understand the elements of this study. My participation in this study is entirely voluntary and I may refuse to participate in any or all parts of this study, or withdraw from the study at any time. I understand that by signing below, I am consenting to have the data I provide used as part of this study. I understand that this information will be stored to be analyzed.

Name_____

Signature_____

Date (DD / MM / YYYY):_____

Are you willing to be contacted by me at a later date to follow up on this project?
☐ Yes☐ No

Appendix E Guanacaste farmer survey questionnaire

Guanacaste Ecosystem Services: Drivers, Payments, Motivations Survey

READ DECLARATION OF CONSENT, BE SURE PARTICIPANT UNDERSTANDS IT IS VOLUNTARY AND CAN OPT OUT AT ANY TIME	Signature of Participant ☐ or surveyor ☐

This survey is about land use in Guanacaste: how it's changing, and how farmers do different practices on their landscapes, what motivates them to engage in such practices. We hope that you will take a few minutes to answer our questions, the results will help inform those who are interested improving land management strategies in the future for a more sustainable Guanacaste.

Demographic information

A01. What is your gender? [ ] Male [ ] Female

A02. What is your age? [ ]18-29 [ ]30-49 [ ]50-64 [ ]65+

A03. Which region do you live in
[ ] Nicoya [ ] Hojancha [ ] Santa Cruz [ ] Nandayure Village/town: _____

G04. How long have you lived here?
[ ] Whole life [ ] More than 10 years [ ] 5-10 years [ ] less than 5 years

G05. What sector do you work?
[ ] Agriculture – own farm
[ ] Agriculture – work on farm
[ ] Government – agricultural related
[ ] Government – water related
[ ] Government – environmental
[ ] Government – other
[ ] Small business owner
[ ] Homemaker
[ ] Employee of small business
[ ] Other _____

A06. What is your highest level of education?
[ ] Elementary school
[ ] Some high school
[ ] Completed high school
[ ] Some university
[ ] Graduated university
[ ] Post graduate studies

Land Use

Farm Size 2015 _____ ha PSA in 2015 _____ha type: _____ certified in 2015: _____ha type:_____

Natural Pastures	_____ha	Improved pastures	_____ha
Fruit/vegetables to sell	_____ha	Fruit/vegetables to keep	_____ha
Plantation forest	_____ha	Protected forest	_____ha
Forest for resources used on site	_____ha	Other: _____	_____ha

B. Characterization of region and perceptions of changes

The following are a list of changes experienced and stated by people in Guanacaste. In column 1 we ask on a scale of 1-5 (1=not significant, 3=neutral, 5=very significant) how significant these changes are.

	Change taking place in Guanacaste
Socio-economic changes	1=not significant, 3=somewhat significant, 5=very significant
B01 Increased urbanization, roads, etc.	1 2 3 4 5 Don't know
B02 Growth of tourism enterprises	1 2 3 4 5 Don't know
B03 More land held by foreigners	1 2 3 4 5 Don't know
B04 Fewer family farms	1 2 3 4 5 Don't know
B05 More people moving to big cities	1 2 3 4 5 Don't know
B06 Larger gap between rich and poor	1 2 3 4 5 Don't know
Environmental Changes	Change taking place
B07 More droughts	1 2 3 4 5 Don't know
B08 More intense rainfall and floods	1 2 3 4 5 Don't know
B09 Increased fires	1 2 3 4 5 Don't know
B10 Dried up rivers and water sources	1 2 3 4 5 Don't know
B11 Loss of natural habitat and animals	1 2 3 4 5 Don't know
B12 More teak plantations	1 2 3 4 5 Don't know

Many factors can lead to these changes. Using the same scale as above (1=not significant, 3=neutral, 5=very significant), which are the most significant? That is, which are you most concerned about? Which most heavily influence water availability?

	Are these factors leading to changes in Guanacaste? 1= not significant 5= very significant DK= don't know	Most heavily influencing water availability 1= no effect on water 5= big effect on water
B13 Population growth	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B14 Large scale coastal development	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B15 Expansion of industrial agriculture	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B16 Climate change	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B17 More Irrigation on farms	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B18 Reforestation	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B19 People using resources less responsibly (wasting water)	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B20 Government regulations to promote environmental responsibility	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B21 Government policies to promote economic growth	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B22 Unregistered wells	1 2 3 4 5 DK	1 2 3 4 5 Don't know
B23 Aging infrastructure (leaky pipes, etc.)	1 2 3 4 5 DK	1 2 3 4 5 Don't know

Area to describe any additional thoughts about changes or reasons for changes, or explain some answers if you want.

Below are some strategies to reduce stress on environmental resources. What are strategies do you already engage in, what are ones that you would be interested in engaging in if it was easier/possible, which are ones that you think other people should be doing?

Activities	Already doing on own property 1=yes 2=no	Would be willing 1= if I had more property, 2= if I had more incentives to do it, 3= not interested	Would like others to/generally support the idea 1= support 2= don't support 3= no opinion
B29 Agroforestry			Si no no se
B30 Reforestation (tree planting)			Si no no se
B31 Forest protection (limiting access to certain areas)			Si no no se
B32 River protection (trees and plants along rivers)			Si no no se
B33 Household changes to reduce impact (more efficient technologies, using less water, etc.)			Si no no se
B34 Stronger environmental regulations for industries			Si no no se
B35 More government incentives for sustainable practices for individuals			Si no no se
B36 Limiting large scale development (i.e. new towns)			Si no no se
B37 More parks/ protected areas			Si no no se
B38 Transporting water from other parts of the country			Si no no se
B39 Upgrading infrastructure (like pipes, drainage) but that may mean higher taxes			Si no no se
B40 Restrictions on tourist development			Si no no se
B41 Build capacity – more training for people to address infrastructure needs			Si no no se
B42 More environmental education at all ages			Si no no se

C. Incentive Programs

Incentive programs are one way to help people do some of the activities listed above. What type of incentive would motivate you to participate? What type of incentive do others want to participate in these kinds of activities?

Types of incentives	For you	Do others want
C01 Payment (short term contract)	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know
C02 Payment (long term contract)	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know
C03 Tax benefit	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know
C04 Access to credit	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know
C05 Technical assistance	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know
C06 Equipment	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know
C07 Formal recognition of stewardship activities by public	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know
C08 Other types of incentives : _____	1 2 3 4 5 Don't know	1 2 3 4 5 Don't know

If you have not participated in a program like PSA before, what reasons would motivate you to participate? If you have participated, please skip to next box.

Motivation	For you 1= least important, 5= most important	For others 1= least important, 5= most important
C09 Improve earnings	1 2 3 4 5	1 2 3 4 5 Don't know
C10 Simplify production (e.g., smaller herd to manage/less crops to produce)	1 2 3 4 5	1 2 3 4 5 Don't know
C11 Biodiversity improvements	1 2 3 4 5	1 2 3 4 5 Don't know
C12 Improve water quality	1 2 3 4 5	1 2 3 4 5 Don't know
C13 Neighbours/ someone I know had a positive experience	1 2 3 4 5	1 2 3 4 5 Don't know
C14 Connections to agricultural extension/access to technical support	1 2 3 4 5	1 2 3 4 5 Don't know
C15 Reduce impacts of climate change	1 2 3 4 5	1 2 3 4 5 Don't know
C16 Improve water quantity	1 2 3 4 5	1 2 3 4 5 Don't know
C17 Recognition for stewardship efforts	1 2 3 4 5	1 2 3 4 5 Don't know
C18 Helped do activities already wanted to do on the property	1 2 3 4 5	1 2 3 4 5 Don't know

C19 Already have a good relationship with intermediary	1 2 3 4 5	1 2 3 4 5 Don't know
C20 It is a good way to leave a legacy for my children/future generations	1 2 3 4 5	1 2 3 4 5 Don't know

If you have already participated or continue to participate in an incentive program like PSA, please answer the following questions. If not please skip to section D.

What were your initial motivations to participate and how did they change over time?

Motivation	For you initially 1= weak motivation 5 = strong motivation	Over time 1= strong motivation 5= weak motivation
C09 Improve earnings	1 2 3 4 5	1 2 3 4 5 Don't know
C10 Simplify production (e.g., smaller herd to manage/less crops to produce)	1 2 3 4 5	1 2 3 4 5 Don't know
C11 Biodiversity improvements	1 2 3 4 5	1 2 3 4 5 Don't know
C12 Improve water quality for myself	1 2 3 4 5	1 2 3 4 5 Don't know
C13 Neighbours/ someone I know had a positive experience	1 2 3 4 5	1 2 3 4 5 Don't know
C14 Connections to agricultural extension/access to technical support	1 2 3 4 5	1 2 3 4 5 Don't know
C15 Reduce impacts of climate change	1 2 3 4 5	1 2 3 4 5 Don't know
C16 Improve water quantity	1 2 3 4 5	1 2 3 4 5 Don't know
C17 Recognition for activities already taking place	1 2 3 4 5	1 2 3 4 5 Don't know
C18 Helped do activities already wanted to do on the property	1 2 3 4 5	1 2 3 4 5 Don't know
C19 Already have relationship with intermediary	1 2 3 4 5	1 2 3 4 5 Don't know
C20 It is a good way to leave assets to my children	1 2 3 4 5	1 2 3 4 5 Don't know

C21. What were any other advantages of the program?
[ ] Independence in decisions about the methods to manage the estate
[ ] Opportunity to discuss/negotiate the terms of the transaction
[ ] Personal relationship with an organization or person known
[ ] Have environmental benefits on the property
[ ] The transaction is fairly uncomplicated
[ ] Being rewarded to protect the environment makes me feel good
[ ] It is not too much work to adhere to contract terms
[ ] Other, specify _____

C22. What were disadvantages?
[ ] Less control of who I sell to
[ ] It takes too much time to negotiate a contract
[ ] I have less freedom to decide how to use the land
[ ] Costly to implement
[ ] Expectations for audits are too much work for the money
Other, specify: _____

C23. If the payment stopped would you continue the new practices for free?
[ ] yes
[ ] no
[ ] I would continue some of them, specify: _____

Optional: Any additional thoughts about motivations or incentive programs- what is good, what is bad, what works, what doesn't etc.

D. Attitudes and Values

Indicate your agreement with each of the following statements using the following scale from 1 to 5: 1= strongly disagree , 2= mildly disagree, 3= neither agree nor disagree, 4= mildly agree, 5= strongly agree	
Managing the land is the most important responsibility of a farmer.	
I see my farm more than anything as a business enterprise.	
When I plan for my future farm activities, I concentrate solely on how profitable they will be.	
I enjoy the peace and quiet that the farm gives me.	
Money and profits are not the most important things for farms.	
Managing the environment is a very high priority for my farm.	
Maximum annual return is the most important thing	
The lifestyle that the farm gives me is very important to me.	
Farming communities are an excellent place to live.	
The most important thing for me is to leave my property in a better condition than I found it.	
The maximum annual return of my property is the most important goal for me.	
Having a farm does not generate a great fortune but the lifestyle is excellent.	
I like taking care of my land without destroying it.	
A rural environment is an excellent place to raise children.	
Good farmers are often adapting the way they manage their lands.	

Indicate your agreement with each of the following statements using the following scale from 1 to 5: 1= strongly disagree , 2= mildly disagree, 3= neither agree nor disagree, 4= mildly agree, 5= strongly agree	
Humans are seriously abusing the environment.	
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	
The so-called “ecological crisis” facing humankind has been greatly exaggerated	
The Earth is like a spaceship with very limited room and resources.	
If things continue on their present course, we will soon experience a major ecological catastrophe.	

Indicate your agreement with each of the following statements using the following scale from 1 to 5: 1= strongly disagree , 2= mildly disagree, 3= neither agree nor disagree, 4= mildly agree, 5= strongly agree I think of the forest and everything in it as:	
A family that I am a part of.	
Beings that we should take care of and treat with responsibility.	
Something with which I identify very strongly. It has made me who I am.	
A world in which we must take care of any damage that is caused, so as not to negatively affect humans that depend on it elsewhere	

Indicate your agreement with each of the following statements using the following scale from 1 to 5: 1= strongly disagree , 2= mildly disagree, 3= neither agree nor disagree, 4= mildly agree, 5= strongly agree	
My health, the health of my family and the health of others who I care about is dependent on the natural environment.	
Plants and animals, as part of the interdependent web of life, are like "kin" or family to me, so how we treat them matters.	
I have strong feelings about nature (including all plants, animals, the land, etc.) and these views are part of who I am and how I live my life.	.
I often think of some wild places whose fate I care about and strive to protect, even though I may never see them myself.	
There are landscapes that say something about who we are as a community, a people.	
How I manage the land, both for plants and animals and for future people, reflects my sense of responsibility to and so stewardship for land	
d. There are landscapes that say something about who we are as a community, a people.	

Appendix F Guanacaste tourist consent form

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Science
Resource Management and EnvironmentalStudies
InstituteforResources, Environment&Sustainability
2202 MainMall
Vancouver, BC Canada V6T 1Z4

Participant Consent Form

Tourism Conservation Preferences in Guanacaste, Costa Rica

As part of the FuturAgua project this survey has been developed to better understand of tourist preferences for a potential conservation program in Guanacaste. Your voluntary participation plays a valuable role in this research project. The information you provide in this questionnaire will be kept strictly confidential.

Principal investigator: Kai Chan, Associate Professor, Institute for Resources, Environment and Sustainability, University of British Columbia; kaichan@interchange.ubc.ca
Co-Investigator: Paige Olmsted, PhD student, Institute of Resources, Environment and Sustainability, University of British Columbia, paige.olmsted@gmail.com, (001) 604-368-8007.
Study procedures: If you decide to participate in this study, you will respond to questions about your recent trip in Guanacaste and what you think about aspects of a future conservation program. The questionnaire will take about 10 minutes.
Confidentiality: Your identity will be strictly confidential. The data you provide with the survey will be stored securely.
Potential risks: There is a risk that you experience discomfort in answering questions that include sharing personal information, such as the details of your recent trip. Confidentiality will be assured to minimize such risk: your name will not be associated with your responses, individual responses will not be shared beyond the researchers, and will be analyzed and reported in aggregate. Please note that your participation in this survey is voluntary and you may choose not to answer any particular question at anytime for any reason.
Potential benefits: Findings from this survey may be included in decision-making regarding planning for climate change adaptation in the region.
Ethical concerns: If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at (001) 604-822-8598 or if long distance email to RSIL@ors.ubc.ca or toll free 1-877-822-8598.
Contact for questions or concerns: If you have any additional questions or would like more information about this study, please contact Paige Olmsted at the phone number or email address listed above.
Consent: I understand the elements of this study. My participation in this study is entirely voluntary and I may refuse to participate in any or all parts of this study, or withdraw from the study at any time. I understand that by signing below, I am consenting to have the data I provide used as part of this study. I understand that this information will be stored to be analyzed. I acknowledge that I have been given a copy of this consent form for my own records.

Date (DD/MM/YYYY)_____ **Signature**_____

Appendix G Guanacaste tourist survey questionnaire

Conservation Alternatives in Costa Rica

The following questions are going to ask some basic details about your trip including where you went and activities you participated in, followed by some examples of conservation programs and which ones you like the best. Thank you for agreeing to participate, this is voluntary and you may stop at any time. For additional information regarding this study and

Section A: Description of Trip

1. How many days did you spend in the Nicoya Peninsula? Please check one.

[ ]Less than 5 days [ ]6-14 days [ ]More than 2 weeks

2. What was the **primary** purpose of your trip? Please choose just one.

[ ] Holiday/vacation [ ] Visiting friends/relatives [ ] Business [ ] Other_____

3. Why did you choose Costa Rica?

[ ] Wanted to be on the beach
[ ] Got a good deal
[ ] To see wildlife (eg. monkeys, birds, turtles)
[ ] To visit rainforest
[ ] Recommended by a friend
[ ] Other: _____

4. What kind of **lodging** did you stay in

[ ] Large hotel (100+ room)
[ ] Medium sized hotel (20+ room)
[ ] Bed and breakfast/ Air BnB
[ ] Hostel
[ ] Rented House
[ ] Other _____

5. Where did you stay in the Nicoya Peninsula? Check all that apply.
[ ] Samara
[ ] Nosara
[ ] Playa Tamarindo
[ ] Playa Coco
[ ] Sardinal
[ ] Santa Teresa
[ ] Other: _____

6. What kinds of activities did you engage in while you were here? Check all that apply.

[ ] Recreational fishing	[ ] Spending time at the beach	[ ] National Park visits
[ ] Scuba diving	[ ] Kayaking	[ ] Zip line/canopy tours
[ ] snorkeling	[ ] White water rafting	[ ] Camping
[ ] Surfing	[ ] Kite surfing	[ ] None of these
[ ] Ocean swimming	[ ] Wind surfing	[ ] Other_____
[ ] River swimming	[ ] Hiking	

4. As a tourist, do you consider the following important on this trip to Costa Rica?
Please circle on scale where: 1=not important 3=neutral 5=very important

Visiting nature 1--------2--------3--------4---------5

Minimizing impact on natural places 1--------2---------3-------4---------5

Having your visit support conservation of the region 1--------2---------3-------4---------5

Learning about the local culture 1--------2---------3-------4---------5

Section B: Conservation scenarios

In this section you will look at 10 different scenarios that give you the choice of having 1 of 2 possible means of contributing to an environmental restoration program in Guanacaste, Costa Rica. Please assume that the two options presented in each scenario are the only options from which you may choose, given your current lifestyle (i.e. income, tastes, interests, etc.). Please consider carefully the various features described for each pair and then indicate which one (if any) you would support.

Example below

Suppose after examining the description of the following two programs you decide you would prefer the second one. You would indicate this choice by ticking the box under the column as shown here.

	Restoration Program 1	Restoration Program 2	
Who is responsible for administering the program	Government	International Environmental organization	I would not be interested in supporting either of these programs
What sector is being targeted	Water (eg. improved infrastructure)	Biodiversity (eg. habitat protection)	
What type of project is being supported	Local site you have visited	General fund to which organizations can apply	

Level of support	$10	$20	

Please Tick **ONE** box only ☐ ☐ ☐

This was followed by 8 scenarios, include two here as an example.

	Restoration Program 1	Restoration Program 2	
Who is responsible for administering the program	Government	International Environmental NGO	I would not be interested in supporting either of these programs
What sector is being targeted	Water (eg. improved infrastructure)	Biodiversity (eg. habitat protection)	
What type of project is being supported	Local site you have visited	Local site you visited	
Level of support	$5	$50	

Please Tick **ONE** box only ☐ ☐ ☐

Scenario 2

	Restoration Program 1	Restoration Program 2	
Who is responsible for administering the program	Government	Local Environmental NGO	I would not be interested in supporting either of these programs
What sector is being targeted	Biodiversity (eg. habitat protection)	Biodiversity (eg. habitat protection)	
What type of project is being supported	Local site you have visited	General fund to which organizations can apply	
Level of support	$10	$20	

Please Tick **ONE** box only ☐ ☐ ☐

Section C: Follow up from previous section. Which features of the above scenarios did you find most important when making your choice for which was preferred? (Please rank them from 1 to 5, with 1 being the most important feature, and 5 being the least important feature in influencing your decision)

Feature	**Importance rating**
Who is administering the program	_____
The fund support biodiversity conservation	_____
The funds support water conservation	_____
Type of project being supported	_____
Level of support	_____

5. You may have heard that Guanacaste has just had a serious drought, and droughts are expected to be more frequent and get worse in the coming years.

Did you hear about the drought/were you aware of water concerns in Guanacaste?	1----------2----------3----------4----------5 Not at all Some A lot
Did your lodging provide information about water conservation?	1----------2----------3----------4----------5 Not at all Some A lot
Did your lodging provide ways to reduce water consumption? (eg. recycle towels)	1----------2----------3----------4----------5 Not at all Some A lot

On a scale of 1 (Strongly Disagree) to 5 (Strongly Agree), to what extent do you agree with the following statements?

Humans are severely abusing the environment.	1----------2----------3----------4----------5
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	1----------2----------3----------4----------5
The so-called "ecological crisis" facing human kind has been greatly exaggerated.	1----------2----------3----------4----------5
The earth is like a spaceship with very limited room and resources	1----------2----------3----------4----------5

If things continue on their present course, we will soon experience a major ecological catastrophe. 1----------2----------3----------4----------5

Indicate your agreement with each of the following statements using the following scale from 1 to 5: 1= strongly disagree , 2= mildly disagree, 3= neither agree nor disagree, 4= mildly agree, 5= strongly agree	
a. Natural resource extraction is necessary for countries to develop	
b. We can lsoe forests and wetlands, as long as we are keeping enough for the environment to function.	
c. How I manage the land, both for plants and animals and for future people, reflects my sense of responsibility to and so stewardship of the land.	
d. There are landscapes that say something about who we are as a community, a people.	
e. I often think of some wild places whose fate I care about and strive to protect, even though I may never see them myself.	
f. It is important to protect nature so we have clean water and air.	
g. Technological solutions are sufficient to address many of our environmental concerns.	
h. I have strong feelings abotu nature (including all plants, animals, the land, etc.); these views are part of who I am and how I live my life.	
i. Plants and animals, as part of the interdependent web of life, are like 'kin' or family to me, so how we treat them matters.	
j. Humans have the right to use nature any way we want.	
k. My health or the health of my family is related one way or another to the natural environment.	
l. Humans have a responsibility to account for our own impacts to the environment because they can harm other people.	

Section F: General Demographic questions.

Please check the appropriate box for each question.

1. What is your gender? [ ] Male [ ] Female

2. What is your age? [ ]18-29 [ ]30-49 [ ]50-64 [ ]65+

3. What is your Country of origin?

[ ] Canada
[ ] United States
[ ] Germany
[ ] United Kingdom
[ ] France
[ ] Spain
[ ] Other Europe
[ ] Central America
[ ] South America
[ ] Other: _____

4. What is your annual household income?

[ ] Under $24,999
[ ] $25,00-$49,999
[ ] $50,000- $74,000
[ ] $75,000-99,999
[ ]$100,000+
[ ]Prefer not to say

Appendix H Supplementary resources from IUCN report (chapter 5)

Planning and assessment impact
Purpose Capital
http://purposecap.com/wp-content/uploads/Purpose-Capital-Guidebook-for-Impact-Investors-Impact-Measurement.pdf

Conservation Financing
WWF Conservation Finance Guide (2007) – How to develop your own financing strategy for long term sustainability of project. From WWF perspective
http://www.panda.org/standards/3_2_conservation_finance

Conservation Return on Investment
Resources for the Future Report (2012)
http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-12-01.pdf

Global Impact Investing Network (GIIN) is a non-profit organization dedicated to increasing the effectiveness of impact investing, currently sponsored by Rockefeller Philanthropy Advisers.
http://www.thegiin.org/

NatureVest
Website: www.naturevesttnc.org
Report of status of conservation impact investing

Rockefeller Foundation Key innovator and convener in social impact investing space
www.rockefeller.org

UN Principles for Responsible Investing (UNPRI) recognizes that the generation of long-term sustainable returns is dependent on stable, well-functioning and well governed social, environmental and economic systems.
www.unpri.org