







The researcher–practitioner symbiosis: Evolving mutualisms from parachutes

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Abstract

Researchers and practitioners often exist symbiotically, but this relationship does not always benefit both parties. We here discuss a mutualistic research symbiosis that our organizations have developed over the last decade, the challenges which we have experienced as part of this process, and how our experiences may help others intending to develop such mutualisms. The defining characteristic of our model is that conservation implementers, not investigators, lead the research. This power balance has promoted synergies between researchers and practitioners and has resulted in one of the first ever Randomized Control Trials of a conservation intervention. We have shortened the distance between basic research and field practices by ensuring that the people who will use the results of an investigation play a lead role in designing and implementing it. Local conservation practitioners have been trained in cutting edge scientific methodologies, while university researchers have had an unparalleled role in designing the conservation and development intervention. Our research model is not perfect, however. Although we have facilitated tight relationships between implementers and researchers, such partnerships take significant resources to develop. Moreover, shortening the traditional “arm’s length” distance between implementers and investigators is a double-edged sword: some donors are uncomfortable that our researchers and practitioners comprise a mutually dependent team. Nevertheless, we believe that our model’s benefits outweigh its costs. When our researchers undertake their investigations, they do so in ways that do not simply meet their publication needs. Rather, the integration of partners into a mutualistic research team ensures that our investigations are both scientifically cutting edge and that they can improve our conservation initiatives on the ground in real time.

KEYWORDS

collaborative science, co-production, evidence-based conservation, knowledge-action gap, research-implementation gap, science-practice gap

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1 | INTRODUCTION

Researchers and practitioners often exist symbiotically, but this relationship does not always benefit both parties. Perhaps the most usual researcher–practitioner symbiosis is a commensal co-existence with little value-added for either. At one extreme though, the interaction can be parasitic, in which one organization benefits while the other loses. This scenario has been experienced as researchers “parachuting” into a country, undertaking their research, and quickly departing, providing no local benefit or—worse—leaving their local hosts to cover the direct and indirect costs of the research. This is by no means necessarily the case, however, and mutualisms through which researchers and practitioners benefit synergistically can evolve. In this paper we examine the mutualistic research symbioses that our organizations have developed over the last decade, the challenges which we have experienced as part of this process, and how our experiences may help others intending to develop such mutualisms.

Within both the scholarly and practitioner communities, there have been calls to build a more mutualistic relationship between conservation research and practice (Burbidge et al., 2011; Toomey, Knight, & Barlow, 2017). Conservation science has been dominated by the ideas that practice should be informed by research and that it is important for practitioners to use science-based evidence to guide their programs (e.g., Bertuol-Garcia et al., 2018; Matzek, Covino, Funk, & Saunders, 2014; Walsh, Dicks, Raymond, & Sutherland, 2019; Toomey et al., 2017). Several studies have examined factors inhibiting or promoting the use of evidence in conservation, as well as the various spatial, temporal, priority, communication, and institutional mismatches between research and implementation (e.g., Jarvis et al., 2020; Koontz & Thomas, 2018; Rose et al., 2019; Taylor, Dussex, & van Heezik, 2017; Walsh et al., 2019). However, much of the financial, ethical, and logistical burden of adopting scientific evidence has fallen on conservation practitioners (Downey, Amano, Cadotte, et al., 2021; Koontz & Thomas, 2018; Taylor et al., 2017; Walsh et al., 2019). At the same time, there have been active discussions about what researchers can do to narrow the “research–implementation gap” (Knight et al., 2008, p. 610), the “knowledge–action gap” (Kristjanson et al., 2009), or the “science–practice gap” (Bertuol-Garcia et al., 2018).

For research to be put into action by practitioners, knowledge must be perceived as salient, credible, and legitimate by decision makers (Cash et al., 2003; Matson, Clark, & Andersson, 2016). Various recommendations have been made for creating and facilitating spaces where conservation research and practices can better align (Jarvis et al., 2020; Toomey et al., 2017). These recommendations generally cover topics of relationship

building (e.g., Pietri et al., 2013; Roux, Nel, Cundill, O’Farrell, & Fabricus, 2017; Walsh et al., 2019), data and information sharing and accessibility (e.g., Scarano et al., 2019; Sutherland et al., 2019; Zheng, Naylor, Waldron, & Oliver, 2019), improving communication (e.g., Kadykalo, Cooke, & Young, 2019; Rose et al., 2019), education and training of conservation researchers (e.g., Toomey et al., 2017), improving joint funding mechanisms for researchers and practitioners (e.g., Arnott, Kirchhoff, Meyer, Meadow, & Bednarek, 2020; Caudron, Vigier, & Champigneulle, 2012; Jarvis et al., 2020; Taylor et al., 2017), the role of boundary organizations in facilitating the collaborations (e.g., Posner & Cvitanovic, 2019; Roux et al., 2017), and improving institutional structures to support inclusive research practices (e.g., Jarvis et al., 2020; Rose et al., 2019; Toomey et al., 2017).

A guide for collaborations developed by the MIT Governance Lab calls for using equity as a guiding principle for improving the researcher–practitioner research process (Lipovsek & Zomer, 2019). More recently, there has been an increasing call for co-production as a principle for producing actionable science (e.g., Beier, Hansen, Helbrecht, & Behar, 2017; Bremer & Meisch, 2017; Clark & Harley, 2020; Clark, Van Kerkhoff, Lebel, & Gallopin, 2016; Djenontin & Meadow, 2018; Leimona et al., 2015; Roux, Nel, Freitag, Novellie, & Rosenberg, 2021). Co-production refers to processes that are designed to bring together diverse actors (in this case, conservation researchers and practitioners) to jointly define shared research needs, produce context-specific knowledge, products, and decisions, and stay engaged with each other throughout the process of producing knowledge (Beier et al., 2017; Roux et al., 2021; Wyborn, 2015).

There is a wide range of theoretical foundations, motivations, modes of conduct, and outcomes of utilizing the coproduction approach (Chambers et al., 2021; Miller & Wyborn, 2020), but so far, most co-production processes have been initiated and studied within the scientific community (Norström et al., 2020; Pohl et al., 2010; Popovici et al., 2020; van der Hel, 2016). Despite this large and growing scholarship, progress toward creating more mutualistic spaces and overcoming mismatches between conservation research and practice has been limited (Jarvis et al., 2020). Moreover, few practitioners have led or participated in such efforts (Caudron et al., 2012; Mazer et al., 2020). Insights and lessons learned from conservation organizations are thus largely missing in the literature.

This paper describes the experiences of one conservation organization, Fundación Natura Bolivia, and examines the mutualistic research symbioses developed between Natura and its research partners. This case study provides a critically underrepresented perspective from a

conservation organization that we hope will help other conservation organizations and researchers to anticipate, prepare for, and address the challenges associated with developing mutualistic researcher–practitioner symbioses.

2 | ORGANIZATIONAL BACKGROUND

Fundación Natura Bolivia is not-for-profit “Implementing Institution” based in the city of Santa Cruz de la Sierra, at the foot of the Andes mountains in the headwaters of the Amazon. Almost two decades ago Natura piloted and has since refined and replicated “Watershared” (Acuerdos Recíprocos por Agua [“Reciprocal Water Agreements”]), an incentive-based conservation program. Watershared agreements provide upstream landowners and communities with alternative development projects, such as fruit tree seedlings, irrigation pipes, and beehives, in exchange for commitments to forest conservation. Upstream landowners can thus move away from drought-susceptible annual agriculture, and at the same time improve hydrological functioning, improving water quality and quantity for human consumption and agricultural production downstream (Asquith, Vargas Ríos, & Wunder, 2008).

The first Watershared agreements were initiated in 2003. By 2021, Watershared had been adopted in 60 municipalities of Bolivia, with almost a quarter of a million water users providing development projects to 10,000 upstream indigenous and rural families, in exchange for the protection of half a million hectares of water-producing forests. The program’s crucial innovation is that it provides development projects as “seed capital” to catalyze a process by which, over time, downstream water users can build the required local institutions to self-finance upstream conservation. The Comarapa Watershared Fund is one such example (Vargas, Forno, Secomb, & Torrico, 2010). Set up in 2007, it now disburses ~US\$15,000 worth of development projects to upstream families every year, in exchange for the conservation of 12,106 ha, with 6% annual growth in hectares protected.

Parallel to its development in Bolivia, the Watershared model has been replicated in four other countries across a range of ecosystems and socio-economic realities. Indigenous Guaraní communities receive water tanks in return for protecting the dry Chaco Forest on Bolivia’s border with Argentina, while intensive dairy farmers above Bogotá obtain premium milk prices in exchange for conserving their riverbanks. Meanwhile, smallholder maize producers are receiving beehives to help them prevent pesticide pollution of the Tekit cenote source in Mexico’s Yucatan peninsula. The Watershared model is thus now being implemented across Latin America (Asquith, 2016; Bauchet et al., 2020; Martinez, Green, & DeWan, 2013).

The development of Watershared was initially described by Natura staff in academic publications (Asquith, 2016; Asquith et al., 2008; Asquith & Vargas, 2007), leading to interest from external researchers in evaluating different components of the Watershared model. Some of these independent researchers co-authored publications with Natura staff (Le Tellier, Carrasco, & Asquith, 2009), while others worked together with Natura to develop their research and interpret their results (D’Adda, 2011; Jack & Recalde, 2014). Other researchers used Natura to facilitate their logistics and published their results without further consultation with the institution (Bétrisey, Bastiaensen, & Mager, 2018; Bétrisey, Mager, & Rist, 2016).

Notwithstanding the value of externally led investigations, by 2008 Natura still had a pressing unanswered research question: Does the Watershared model work? Teasing out the answer to this question required detailed hydrological experiments, and the use of a large-scale, social-ecological randomized controlled trial (RCT)—something that had never been attempted in the conservation field (Asquith, 2020; Pynegar, Jones, Gibbons, & Asquith, 2018). Natura was thus faced with a paradoxical challenge.

The institution needed to recruit world-class evaluators to design experiments and conduct subsequent analyses but did not have funding available to hire consultants. At the same time, Natura recognized that it would be difficult to recruit academic researchers to work on a preconceptualized, applied investigation. Such research would require a substantial time investment but may not result in high-profile academic publications that would offer significant intellectual advances. The challenge was therefore to develop a research model that could simultaneously (a) allow Natura to access external expertise from University Researchers to focus on answering Natura’s applied questions (e.g., Pynegar et al., 2018) and (b) provide the University Researchers with the flexibility to develop and publish their own hypotheses-driven investigations that would be nested within Natura’s overall program (e.g., Grillos, 2017).

3 | THE MUTUALIST RESEARCH MODEL

The model we developed over a decade of collaboration is depicted in Figure 1 and comprises a seven-step process (red numbers in Figure 1).

1. Natura’s Implementation Team and Innovation Lab identifies and maps out the applied questions that Natura needs answering (e.g., Do landowners comply with the conservation contracts they sign?).
2. University Researchers help design a research program that can answer the practical questions, but can also

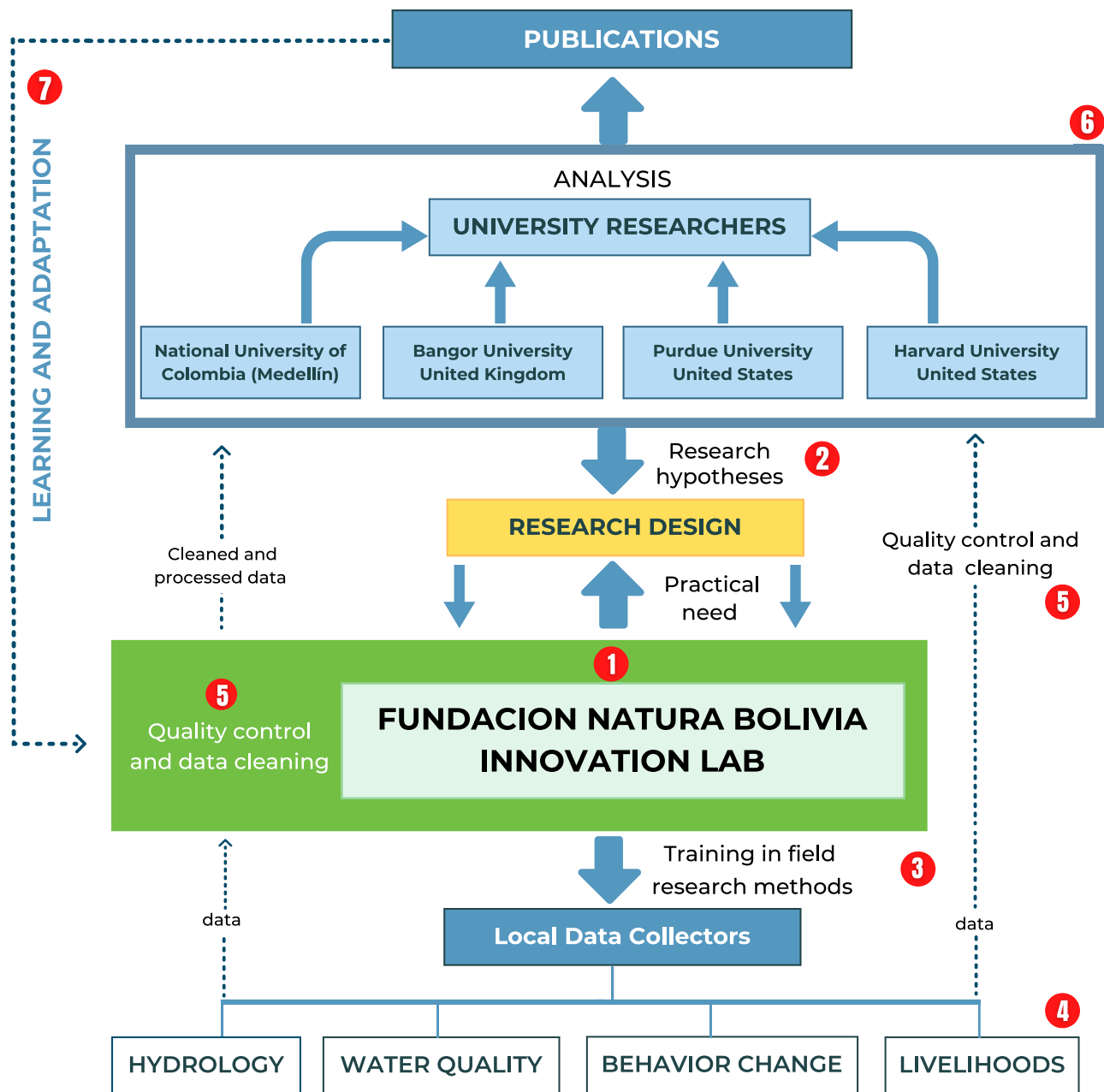


FIGURE 1 The mutualist research model

provide a platform for addressing more broadly applicable questions (e.g., do extrinsic motivations to participate in a conservation program crowd-out intrinsic motivation?; Grillos, Bottazzi, Asquith, & Jones, 2019).

3. University Researchers and Natura's Innovation Lab select and train local students and professionals for data collections (Local Data Collectors) in the required methods and tools, and Natura provides infrastructure, logistical support, and contextual knowledge to facilitate data collection.
4. Local Data Collectors undertake fieldwork.
5. Data are then processed and cleaned either by Natura's Innovation Lab, or, more usually, passed

directly to the University Researchers, in order to maintain the independence of the research process and to minimize potential conflict of interest.

6. University Researchers analyze data, interpret results, draft publications, discuss drafts with Natura, and submit revised manuscripts to academic journals.
7. Co-authored articles are published in local and international, peer-reviewed journals, and the results feed back into the redesign and improvement of Natura's on-the-ground conservation interventions.

The Implementing Institution, Natura, is at the center of the entire model, thus ensuring that the research

program meets a local need. University Researchers take advantage of the mutualism to answer their own questions of interest, but under the umbrella—both logistical and intellectual—of the Implementing Institution.

Developing this seven-step process required constant relationship building. Communication was not only necessary for practical coordination between the Implementing Institution and University Researchers but was also important for building and maintaining mutual trust. A key element of our communication was that not all efforts were targeted narrowly at the immediate collaboration but included broader discussions of shared interests. Moreover, relationship-building and communication was not a step on its own; rather, it threads through each of the seven steps in our Research Model.

4 | WHAT WAS ACHIEVED

Our research mutualism has had a series of benefits for both the Implementing Institution and University Researchers.

4.1 | World class science, that fulfilled the Implementing Institution's research needs at low cost

Although RCTs are widespread in the development field, prior to our work they were still virtually unknown in conservation (Asquith, 2020, but now see Chaves et al., 2017; Jayachandran et al., 2017; Wilebore, Voors, Bulte, Coomes, & Kontoleon, 2019; Weigel et al., 2021). Our mutualist research model thus resulted in ground-breaking RCT-based publications (e.g., Authelet, Subervie, Meyfroidt, Asquith, & Ezzine-de-Blas, 2021; Bottazzi, Wiik, Crespo, & Jones, 2018; Grillos et al., 2019; Pynegar et al., 2018; Wiik et al., 2019, 2020). It is highly unlikely that a local Implementing Institution could have undertaken such high-quality research on its own. Indeed, Natura previously tried to undertake its own research, and demonstrated weaknesses in maintaining data quality and the rigor of the scientific process (Le Tellier et al., 2009). By deeply involving University Researchers in the Implementing Institution's applied questions, and at the same time facilitating University Researchers' own theory-driven studies, our research model allowed the Implementing Institution to access world-class research capacity. At the same time, the University Researchers' own institutions were able to cover laboratory analyses, office facilities, and salaries. The critical, foundational characteristic of this research model is that the Implementing Institution does not need to physically house its own investigators: the *de facto* leaders of Natura's Water Quality, Behavior Change, Economics, and

Hydrology Research Units, are based not in Natura, but at the Bangor, Purdue, Harvard, and the Colombian National Universities, respectively.

4.2 | Immediate link from research to improved practices on the ground

Our research model provides a way of short-cutting the university-led research that takes significant time (if ever) to influence on-the-ground practices. The timeline from research to impact in our model is significantly shortened because of the tight researcher-practitioner connections. For example, results from a PhD dissertation on water quality (Pynegar et al., 2018) that highlighted some of Natura's erroneous implementation assumptions were rapidly incorporated into the re-design of a new \$1.6 million, InterAmerican Development Bank-funded field project in 2016, even before the PhD research was published in academic journals. Similarly, upon learning that early iterations of the Watershed model were having a minimal effect on deforestation—likely because of low uptake (Pynegar et al., 2018; Wiik et al., 2019)—Natura switched to a new model, that required participant communities to put at least 50% of their watersheds under conservation contracts.

4.3 | Local practitioners trained in cutting edge scientific thinking

Developing RCT methodologies has proved challenging for even the most advanced researchers. Our research model trained a new cadre of local practitioners in the value and importance of the scientific methodology, including innovative tools such as RCTs. Our model facilitates direct links between University Researchers and staff across the Implementing Institution, developing the research endeavor through building equal partnerships rather than a top-down externally led initiative.

4.4 | Implementing Institution recognized as a world research leader

For the local Implementing Institution to get the answers it needed to improve its conservation projects, Natura itself needed to lead the research process. With the critical support of the University Researchers, Natura has been able to design a program that meets its ongoing research needs, maintains ownership of

the data collected, and at the same time provides University Researchers with opportunities to investigate their own research questions. The UK Government's Department for International Development noted that "By taking a rigorous scientific process to monitoring and evaluating impacts, Fundación Natura Bolivia succeeded in both reducing its costs of doing business and providing evidence that it works" (UK Government, 2014).

4.5 | Innovative research tools developed synergistically between University Researchers and Implementing Institution

Some conservation and development interventions may lend themselves to particular types of research approaches in evaluations of their impacts, and vice versa. For example, a social-ecological, large-scale RCT must be designed with great care to maintain its internal validity, because of risk of spillover due to spatial layout of relevant units (Pynegar, Gibbons, Asquith, & Jones, 2019). Details of both the research approaches and the conservation and development interventions are negotiated by both parties to maximize the utility of the intervention to both conservation and development outcomes and research deliverables.

4.6 | University Researchers had an unparalleled role in designing the conservation and development intervention

Because our model requires that research questions are identified a priori to the next iteration of the intervention, University Researchers had a strong input in designing not only the research approaches, but the details of the intervention itself. As mentioned above, Natura switched to a new model, that required participant communities to put at least 50% of their watersheds under conservation contracts, based on a yet-to-be published PhD thesis.

4.7 | Mutual transparency allowed both parties to moderate the other

Implementing Institutions are often pressured by their donors to show positive results. On the other hand, University Researchers can be pressured to interpret their results in a counterintuitive or theoretically interesting way. Our model provides mutual oversight between the

two groups to mitigate these potential pressures. University researchers oversee the data collection process—verifying its quality since shoddy methods would reflect poorly on them. Meanwhile, Natura weighs in on interpretations of the research results to demonstrate if, for example, the University Researchers are unaware of an alternate explanation that in-depth local knowledge could reveal. The Implementing Institution has an incentive to ensure interpretations are credible, so it does not appear to be out of touch with local context.

4.8 | Creation of a culture of self-reflection and analysis within the Implementing Institution

Being part of a research program can profoundly change normal institutional practices. Natura has been transformed to view the components of its intervention portfolio as simply hypotheses being tested and improved once new data are collected. Within the institution there is now an awareness of the need for greater understanding of mechanisms of action, and ways to improve: it is easier for field technicians to recognize their mistakes when the institutional culture presents each new intervention as a hypothesis being tested.

5 | LIMITATIONS OF THE MODEL

The research model we have described here is not perfect. Although we have integrated four world-class universities and our local Implementing Institution into a mutualistic symbiosis, the model has several limitations.

There is a critical need in our model for a tight, trusting relationship between implementers, donors, and researchers. The logistics of undertaking complex research and the need for flexibility as field circumstances change require that implementers and evaluators are part of the same team. We have thus shortened the traditional "arm's length" distance between implementers and investigators. We have provided a series of safeguards to ensure that there are no actual conflicts of interest—for example, University Researchers are fully authorized to publish their results independently with Natura having no veto power, even when results show no measurable impact of some of Natura's programs (Asquith, 2020). However, despite our effort to embrace transparency and academic independence, one donor did perceive a conflict of interest, which led to them pulling their financial support.

While the ethical dimensions of research by such a range of partners could have been complex (Brittain

et al., 2020), we have found such issues to be straightforward. Natura, as the coordinating institution, is at least co-owner, or in some cases sole owner of the collected data. Moreover, all data resulting from the partnership are deposited in a public archive (e.g., Bottazzi et al., 2017). When human subjects' data are involved, only deidentified data are deposited to protect the privacy and confidentiality of our study participants, following international standards for human subjects' research. So far, Natura has not encountered any disputes with its researcher partners regarding data ownership. However, this is mainly because relationships between Natura and research partners have been built slowly over a decade and continue to evolve with each new collaboration. Such relationship-building has allowed Natura and its research partners to cumulate sufficient social capital to discuss and negotiate problems to each partner's satisfaction. This kind of social capital may not be always available in newer researcher–practitioner collaborations.

Another important limitation to our model is that creating such a partnership takes significant time and financial resources. Natura was able to gain research funding from the UK Government's Ecosystem Services for Poverty Alleviation (ESPA) Program (www.espa.co.uk). Without such dedicated research funding to the Implementing Institution, developing the mutualism would have been far more difficult. Natura would have had neither the staff time nor the resources to think about research. Moreover, for the research relationship to be balanced, both partners had to find their own complementary funding. Mutualistic research financing needs to come from both sides of the partnership (Asquith, 2020). This may well be a challenge for many Implementing Institutions.

Specific components of research projects can cascade down to the field level, facilitating direct links between field technicians and members of the research team, including doctoral or master's students. Nevertheless, the primary relationship between the Implementing Institutions and the University Researchers needs to be at the institutional level—approved by the Executive Director of Natura and the Principal Investigator of the research team. The model thus perhaps only works when the Implementing Institutions' leadership is trained in the scientific process. In our case Natura's leadership had both advanced degrees and research experience (at Yale, Duke and Harvard Universities) and had received training in RCT methodologies (from the Massachusetts Institute of Technology).

In addition to requiring research expertise from the leadership of the Implementing Institution, the model may require a high level of technical knowledge on the part of the local staff. The model thus may not work when researchers work directly with communities or in

very small Implementing Institutions. At the very least, significant investments in capacity building are required. It is partially for this reason that our initiative has yet to develop strong links with Bolivian universities and research institutions, and we have yet to fully involve a cadre of local graduate and undergraduate students in our research.

Moreover, few Implementing Institution staff have appeared as authors on the journal articles that have resulted from our collaborations. Indeed, team members from outside Bolivia have led authorship of all our research papers. However, this apparent “weakness” actually reinforces the internal logic of our model. The University Researchers independently analyze the data and give independent results—what the model requires for academic credibility. Having Implementing Institution staff as co-authors might be a potential conflict of interest. Moreover, although researchers are invariably the lead (and sometimes the only) authors on the research papers, the Implementing Institution coordinates the overall research initiative—what the model requires for real world applicability. Our model relies on the fact that mutual exploitation—when agreed upon—can lead to mutual benefits for both parties.

6 | CONCLUSIONS

Commensal—or worse, parasitic—researcher–practitioner symbioses are unfortunately still common. It is unusual for a local Implementing Institution like Natura to be at the center of a fully mutualistic research symbiosis. The ESPA Program that supported Natura was an innovative 9-year research initiative that “explored the links between the environment and human wellbeing” and was firmly targeted to give “decision-makers and natural resource users the evidence they need” and required that local institutions were an intrinsic part of each supported project. Nevertheless, of the 132 research projects supported by the ESPA Program, 125 were led by universities and international research centers, and only seven (including two of Natura's), were led by in-country Implementing Institutions. Thus, even in ground-breaking ESPA, there remained a mismatch between the people designing and undertaking the research and the people supposedly benefiting from the research. When Implementing Institutions are not directly involved in research design, the likelihood of the results of the research and its interpretation being applicable to conservation and development on the ground are correspondingly reduced (Arnott et al., 2020; Chambers et al., 2021).

Our research model is neither prescriptive nor rigid, and we have needed to incorporate a variety of modalities.







For example, support from the ESPA Program catalyzed the piloting of the research model and the early socioeconomic research by Bangor University (matched by funds from Leverhulme Trust and the European Union). ESPA then financed the hydrological studies by the National University of Colombia, which provided the science-based justification for implementation funds from Coca Cola, that was complemented by a National Science Foundation research grant to Purdue University. Our research model has thus evolved over several years, with various actors.

Although we still have a long way to go in building the perfect mutualism, our research model ensures that the people who will use the results of an investigation play a fundamental role in designing and implementing it. When the University Researchers in our team undertake their investigations, they do so in a way that does not simply meet their publication needs. Rather, the integration of the researchers and practitioners into a mutualistic research team ensures that our investigations are both scientifically cutting edge (e.g., Wiik et al., 2020) and that they also support and improve—in real time—our conservation and development initiatives on the ground.

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