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RESEARCH NOTE

Gap analysis of social science resources for conservation practice

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Abstract

Conservation is an inherently social process—people collectively endeavor to enact conservation. Yet, in conservation social science, research methodologies, training, and competency are less common than in natural sciences. Globally, formal education and training in the social sciences are often unavailable or inaccessible to conservation practitioners, and nonformal education may help fill this gap. To identify potential opportunities, we implemented a global survey of practitioners to identify their knowledge gaps and social science training needs and conducted a gap analysis of available social science training resources. We compiled 449 resources, including 266 English-language and 183 non-English-languages resources into an open-access online database hosted by the

Conservation Social Science Partnership. Resources were categorized as communication, data collection, ethics and human rights, intervention, impact evaluation, or analysis. Most resources were open access (90%) and half were specific to conservation practice. Survey responses ($n = 90$) revealed demand for help with data analyses, research ethics, and human rights considerations. We found a need for organization leaders to prioritize social sciences in conservation, greater diversity of accessible training resources in alternate mediums and languages, resources tailored to conservation contexts, and additional ethics and human rights and data analysis resources.

KEYWORDS
capacity building, conservation policy, needs assessment, qualitative research, quantitative research, social science methods

INTRODUCTION

Conservation practitioners increasingly use social science knowledge and methodologies to shape programs and guide interventions that address the global biodiversity crisis (Bennett, Roth, Klain, Chan, Christie, et al., 2017; Massarella et al., 2021). However, effective deployment of these approaches remains challenging (Chua et al., 2020; Marchini et al., 2023; Partelow et al., 2023). Conservationists are criticized for poorly applying social research methodologies, inadequately grounding research in theory, and lacking rigor in their implementation and evaluation of social interventions (Martin, 2020; Moon et al., 2016; Olmedo et al., 2017; St. John et al., 2014). This potentially undermines the effectiveness of conservation interventions, producing unintended consequences (e.g., financial payments crowding out proenvironmental values [Ezzine-de-Blas et al., 2019]). Moreover, research conducted without adequate ethical standards may harm research participants and alienate stakeholders (Brittain et al., 2020; Ibbett & Brittain, 2020). These issues have been attributed to a range of factors, including disciplinary barriers between the natural and social sciences, a lack of capacity and knowledge of social science approaches among conservation practitioners, and institutional and organizational barriers to effective implementation of social science approaches (Bennett, Roth, Klain, Chan, Clark, et al., 2017).

Formal education and training may help overcome these challenges. Yet, numerous studies assessing the quality and content of formal conservation education programs highlight a mismatch between the continued focus on natural science training and the skills required for effective conservation careers, including social science skills. For example, recent surveys of conservation courses in the United Kingdom and Australia showed that few courses offered training in social science methods (Gardner, 2021; Slater et al., 2024). In the United States, a survey of wildlife and fisheries undergraduate programs showed that although human dimensions course offerings increased over time, these courses largely lack specific social science training (Dayer & Mengak, 2020). This means graduates of conservation programs often lack appropriate skills to tackle the social dimensions of the biodiversity crisis or may fail to see the relevance of the social sciences to their work. Moreover, a lack of institutional understanding of and support for the social sciences can hinder practitioners from accessing formal or nonformal training (Anne, 2022). Thus, this ongoing cycle reinforces the gap between conservation organizations' social science needs and their institutional capacity to deliver on these needs.

Addressing these barriers requires a variety of actions at multiple scales. Suggestions include overhauling conservation curricula in higher education systems, increasing recruitment of formally trained social scientists by practitioner organizations, and enhancing capacity-building efforts by providing educational resources and training courses (Loffeld et al., 2022; Martin, 2020). Two groups aim to support conservation practitioners and students to improve their social science capabilities: the Society for Conservation Biology's Social Science Working Group (SSWG) and the Conservation Social Sciences Partnership (ConSoSci). They seek to address institutional barriers, make a collective case for integrating the social sciences into conservation to funders and decision makers, and support efforts to mainstream the social sciences by individuals and organizations.

Although accessing social science resources cannot replace collaboration with trained social scientists (Martin, 2020), increasing accessibility of social science tools, methods, and approaches across a diversity of geographies and sociocultural contexts can help practitioners better engage with social research. This approach to decolonizing information often inaccessible outside an academic setting can improve uptake of insights from social sciences, ease collaboration with trained social scientists, and contribute to improved organizational cultures and ideologies. Furthermore, trained social scientists can also benefit from continued study or self-study opportunities provided by these resources (Loffeld et al., 2022).

However, little is known about conservation practitioners' current social science capacity needs, and no comprehensive review of current resources exists to identify gaps in coverage or help prioritize new resource development. To meet this need, we conducted a 2-part study. Using a questionnaire, we surveyed conservation practitioners and researchers about the social science methods they use and their perceptions of social science resources they need. We then undertook a gap analysis to assess the extent, coverage, and scope of online social science resources currently available to conservationists.

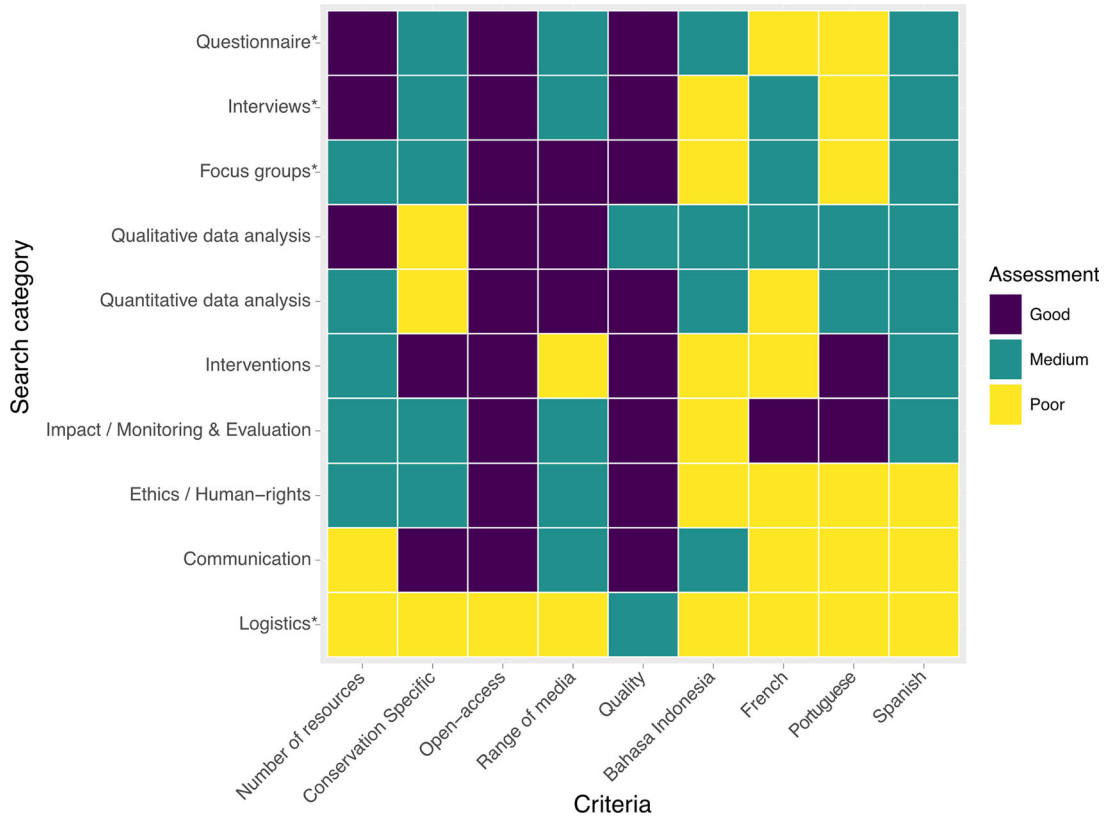

FIGURE 1 Coverage of conservation social science in resources by search category and quality (good, medium, or poor) of assessment criteria (*, category is under a broader category relating to data collection). The first 5 columns of the assessment criteria are for resources in English, and the subsequent 4 columns provide the coverage and quality assessment for resources in non-English for each research category.

METHODS

Assessing practitioner social science training needs

We circulated a questionnaire (Appendix S1) to conservationists to examine what social science research methods they used, their interest in building social science capacity, and the resources and their other needs to do so. The questionnaire consisted of optional, single-choice, multiple-choice, and open-ended questions (Appendix S1) and was refined through discussion and piloting among ConSoSci members. It was administered online with KoboToolbox (KoBoToolbox, 2023). We sampled 127 individuals from the ConSoSci network, the Conservation Coaches Network, and SCB SSWG listservs via email. Recipients were asked to share the questionnaire through their networks, resulting in a purposive snowball sample. Data were collected from 1 September to 31 December 2020 and analyzed using Microsoft Excel. The study was approved by the Institutional Review Board of the Wildlife Conservation Society (approval number 20–32).

Resource gap analysis

We conducted a gap analysis to evaluate existing online social science training resources, create a database of online high-quality training resources covering the breadth of social sciences, and identify gaps in these available resources. We did not aim to systematically assess the available resources, but to maximize the discovery of relevant high-quality resources for practitioners. Our gap analysis had 4 stages: first, mapping search parameters; second, defining search protocols; third, compiling the database; and fourth, identifying resource gaps. The full protocol is provided in Appendix S11.

We first identified the scope and boundaries of our search. Building on needs identified through the questionnaire, we used review articles (e.g., Bennett, Roth, Klain, Chan, Christie, et al., 2017), textbooks (Newing, 2011), and our own knowledge to list social science theories, concepts, tools, methods, and analytical approaches relevant to conservation until we reached saturation. Using a pile sorting approach (Puri, 2010), we organized these elements into 10 hierarchical categories (Figure 1; Appendix S2). We next listed possible search locations for accessing relevant materials (Table 1; Appendix S2), including open-access resources covering a diverse range of media.

Following initial pilot searches of the categories, locations, and media identified, we developed an iterative search protocol, employing predefined terms and adding new keywords or locations as they were discovered. We divided the 10 search categories between 3 team members (E.d.L., H.I., T.G.) and first searched using the high-level categories, then worked iteratively down to more specific topics and keywords (Table 2;

TABLE 1 Summary of the number of resources compiled in Conservation Social Sciences Partnership database on training resources.

Language[a]	Total (%)	Number of open access (%)	Number conservation specific (%)	Conservation specific by language (%)
English	266 (59)	240 (53)	151 (33)	57
Spanish	28 (6)	28 (6)	13 (3)	46
French	59 (13)	53 (12)	28 (6)	47
Portuguese	63 (14)	51 (11)	23 (5)	37
Indonesian	33 (7)	33 (7)	12 (3)	36
Total	449 (100)	405 (90)	225 (50)	

[a]Languages not listed include Dutch, Khmer, Swahili, Arabic, and Burmese.

Appendix S2). We discontinued searches when predefined search strategies were exhausted or when keywords no longer returned relevant resources. To expand our search coverage, we also requested resources through our professional networks, institutional mailing lists, online forums (i.e., SCB SSWG ListNet, LinkedIn groups), and social media (X, Facebook). We particularly sought to contact colleagues who speak other languages than the research team. Our main search effort was in English, but searches in French, Spanish, Portuguese, and Indonesian were also conducted by native speakers using the same protocol. All searches were conducted in April 2021 and were conducted on 2 different days.

We compiled resources into a database, recording for each descriptive metadata, resource type, whether it was open access, and language. We developed 4 descriptive indicators to help users assess the quality and utility of each resource: clearly written, step-by-step guidance included, examples or case studies provided, and targeted a conservation audience.

For each category searched, we assessed resource coverage along the following criteria: (1) existence of relevant resources; (2) variety of media types; (3) accessibility of resources; (4) specificity to conservation; (5) quality of resources; and (6) linguistic coverage. Three assessors independently determined whether there was good, medium, or poor resource coverage. These assessments were subjective; rather than defining precise thresholds to assess resource coverage (e.g., availability of resources in different formats), we examined the resources available in each format and assessed whether they adequately captured the topics highlighted in that category (Appendix S2), quality (according to the 6 criteria above), and practitioners' needs, as highlighted by the questionnaire. We repeated this for resources identified during the non-English language searches; however, due to language capacity constraints, assessment was conducted by only one person per language.

RESULTS

Practitioner social science training needs

We obtained 90 responses. Fifty-four respondents were based in North America, but all continents were represented. Respondents came from a wide variety of institutions, geographies, and roles. Respondents were from nongovernmental organizations (NGOs) ($n = 28$), universities and research institutes ($n = 25$), government agencies ($n = 3$), donors ($n = 3$), consultancies ($n = 2$), and unidentified organization types (Appendix S3). Respondent roles included research ($n = 48$), monitoring and evaluation ($n = 33$), and strategy and planning ($n = 33$), among others. Twenty-four respondents had over 10 years of experience working in the conservation sector, and 62 reported receiving some training in the social sciences during their formal education. Twenty-nine received social science training in their current organization or institution, such as on social science theories or data collection and analysis.

Most of the 90 respondents ($n = 73$) reported using social science methods in their role. The 3 social science methods most reported by respondents were semistructured interviews ($n = 53$), questionnaires ($n = 47$), and informal interviews ($n = 41$). These methods were perceived as valuable for their context specificity and ease of data analysis and implementation, respectively. Qualitative and quantitative data analysis approaches were also reportedly used by 45 and 41 respondents, respectively. Participatory mapping and participant observation, among others, were valued for their context specificity but were less commonly applied and perceived as more challenging to implement (Appendix S4).

For the 73 respondents who used social science methods, data were reportedly collected by field staff ($n = 45$), project managers ($n = 28$), external consultants ($n = 27$), and volunteers or students ($n = 26$), among others. Respondents collected data from Africa ($n = 50$), Latin America ($n = 35$), Asia ($n = 32$), North America ($n = 24$), Oceania ($n = 6$), and Europe ($n = 4$) Twenty-three respondents did not answer the question. Half ($n = 37$) of respondents who used social science methods reported following formal ethics guidelines or protocols when conducting research involving people.

Of the 17 who did not use social science methods, 10 indicated they would be useful for their work. Reasons given for not using social science methods included lack of expertise ($n = 9$), lack of prioritization by leadership ($n = 5$), and limited knowledge of ethical research approaches ($n = 5$), among others (Appendix S5).

Most respondents ($n = 76$) reported that they and their teams would benefit from further training or additional resources, believing that field staff ($n = 37$) and project managers ($n = 33$) would benefit most. The 3 preferred formats for training were online instructor led ($n = 51$), in person instructor led ($n = 40$),

TABLE 2 Key findings from a gap analysis of the coverage of social science resources in 7 search categories.

Search category	Strengths	Gaps	Recommendations for research, policy, and practice
Qualitative data analysis	Wide range of good-quality resources available in English Good-quality resources available in French, Portuguese, Indonesian, and Spanish Diverse range of media Includes resources on using analysis software (e.g., NVivo)	Most resources describing analysis software focus on NVivo (paid software) Deficit of conservation specific resources Resources assume prior social science training Deficit of interactive non-English media	Develop networks to help connect practitioners with social scientists specializing in qualitative analysis Produce resources to inform practitioners and policy makers about the potential of qualitative research for conservation Increase accessibility of resources in other languages and in other formats (e.g., videos)
Quantitative data analysis	Many open-access resources available across a broad range of media Resources cover a broad spectrum of analytical approaches and methods, including basics for entry-level users, and more advanced approaches Websites available for coding feedback and troubleshooting Good-quality resources available in Portuguese, textual resources available in Indonesian	Very few resources written for conservation contexts, those that are primarily focus on ecological data Lack of general introduction to various analytical methods Most resources focus on statistical programming language R (open-source tool) Few resources identified in French or Spanish	Increase accessibility for quantitative analysis in software besides R (open source) because practitioners may also use other software (SPSS, Stata) Produce a general text introducing analytical methods from across the social sciences that are relevant to conservation (particularly questionnaire data) Increase accessibility of non-English resources
Data collection (including resources on interviews, focus groups, questionnaires and logistics)*	Many good-quality resources covering a range of tools and approaches Resources available for entry-level users Some toolkits produced by environmental NGOs on commonly employed methodologies and include step-by-step instructions Resources available in French, Spanish, Portuguese, and Indonesian	More advanced and structured training not always freely accessible Few resources specifically for conservation contexts Resources on specific data collection tools often written for advanced users, rather than beginners Few resources covering the logistics of planning fieldwork or data-collection campaigns Few conservation-specific resources on ethnography (participant observation) Non-English languages only available in few media types	Develop toolkits covering specific methods and research questions commonly asked in conservation (e.g., research on sensitive topics, designing studies to assess conservation behavior using social psychology theory) Improve access to training in ethnographic research methods Develop resources covering the practical and logistical considerations of planning social science fieldwork, such as field assistant recruitment and training, survey translation, compensation, field etiquette, piloting, and testing survey instruments Develop resources in non-English languages
Research ethics and human rights	Most generalist social science resources included information on research ethics Social safeguard policies of some conservation NGOs publicly available	Specific ethical challenges of conservation research not covered by included resources Lack of resources about ethics in conservation context in Indonesian, Spanish, Portuguese, and French	Develop resources that specifically address the ethical challenges encountered in conservation social research (e.g., a website that deconstructs ethical dilemmas that can be encountered during research) and how to overcome them using case studies and examples Develop an open-access platform to facilitate research ethics reviews across the conservation sector Provide practical resources to guide the development of robust research ethics (e.g., templates for consent scripts, review forms, ethics checklists) Improve accessibility to resources in non-English languages
Impact evaluation	Guides and manuals available for practitioners with little prior knowledge, all open access Majority of resources written specifically for evaluation of conservation efforts, with others written for development interventions that may also be relevant to conservation Good resources available in French, Spanish, and Portuguese	Few resources available in alternate media (e.g., videos, online training courses) Resources in French, Spanish, and Portuguese not conservation specific No resources identified in Indonesian	Improve accessibility to resources in a wider variety of media (e.g., videos or online training courses) Develop resources in non-English languages

(Continues)

TABLE 2 (Continued)

Search category	Strengths	Gaps	Recommendations for research, policy, and practice
Communication	Resources covered a wide range of topics, were conservation specific, and most were good quality with step-by-step instructions aimed at beginners	Lack of resources in other formats than toolkits Few resources in French, 3 in Spanish, none in Portuguese or Indonesian	Develop resources on communications in alternate media (e.g., videos or online courses) Develop resources in non-English languages
Interventions	Nearly all resources were open access Most were written specifically for conservation audiences and covered diverse interventions Resources were available in Indonesian and Portuguese	Lack of resources in other formats (videos, online courses) Few resources on participatory mapping, particularly in marine contexts One guide to participatory natural resources management in French, Swahili, and Lingala No participatory mapping resources in Spanish	Develop hands-on training materials for participatory mapping in conservation in non-English languages

*Logistics, interviews, questionnaires, and focus groups are combined in this category.

and online self-guided ($n = 37$). Of the training needs presented to respondents, qualitative data analysis was most often selected ($n = 38$), followed by quantitative data analysis ($n = 29$) and ethics and human rights considerations ($n = 24$) (Appendix S10).

Resource gap analysis

Our searches identified 449 unique resources in 10 languages (Table 1). Ninety percent of the resources we identified were open access. Resources requiring payment included textbooks, subscription-only journal articles, and online training courses or webinars. Fifty percent of the resources were developed specifically for conservation audiences; this percentage was lower for non-English resources (Table 1). Other resources were from fields such as development.

Resource coverage varied considerably by category and language (Figure 1). There was generally good coverage of high-quality English resources across all 10 categories. However, fewer high-quality resources were found in non-English languages, particularly Indonesian. No category achieved a good rating across all assessment criteria, and there was a significant deficit in 3 topics (logistics, communication, and ethics and human rights).

We found a notable gap in resources available in non-English languages. Text-based resources were most prevalent; materials in alternative formats were lacking. Resources were rarely conservation specific, and for other topics, such as data analysis, most resources targeted advanced-level audiences. For each of the search categories assessed in the gap analysis, the specific strengths and gaps and our recommendations are in Table 2. More detailed results are available in Appendix S11.

DISCUSSION

Our results revealed a widespread interest in applying social science approaches among conservation practitioners, congruent with trends in the wider conservation literature (Anderson et al., 2021). However, interested practitioners reported barriers to effectively doing so, including lack of support by organizational leadership and insufficient knowledge and skills (Pokhrel et al., 2011). We relied heavily on data that mostly reflected perspectives of the Global North, particularly North America. Our exploration of underrepresented views of local communities, Indigenous peoples, and other marginalized groups working in conservation was limited. Despite this, we believe our results provide useful insights. For example, respondents reported a need for more resources, even though social sciences have been applied in conservation and wildlife management in the United States for decades (Decker et al., 2012). Despite being based in the Global North themselves, many respondents worked in the Global South, underscoring a need for resources relevant to apply in these contexts and highlighting a wider need to also address issues of parachute science in conservation research (de Vos et al., 2022).

Responses highlighted the need for more accessible online resources relevant to conservation practice. Respondents expressed a need to develop quantitative and qualitative data analysis skills, representing a potential risk that practitioners currently collect data but overlook, oversimplify, misinterpret, or misrepresent findings due to insufficient knowledge of data analysis (St. John et al., 2014). This highlights a clear need for capacity building, but we caution against neocolonial north–south collaborations that may further marginalize Global South researchers (Ishengoma, 2016). A further alarming gap was that only half of the respondents reported following formal ethics procedures. These findings echo others who highlight insufficient use and documentation of ethics procedures in conservation research (Ibbett & Brittain, 2020; St. John et al., 2014), risking harm to participants and conservation outcomes (Brittain et al., 2020). Although some larger NGOs have established institutional review boards or research ethics committees (e.g., WCS, TNC, CIFOR-ICRAF, WWT), smaller NGOs with fewer resources may not have similar access.

Our intensive, but not exhaustive, resource search revealed variability in accessibility and quality across topics. Some topics,

such as data collection methods (i.e., interviews, questionnaires, focus groups, and quantitative and qualitative data analysis), were well represented. Combined with the stated need for training in analysis, this may indicate that such online resources are underutilized, inaccessible, or inappropriate. Practitioners explicitly highlighted a preference for instructor-led training, yet most resources featured in the resource library were written texts, such as journal articles, manuals, or textbooks. Developing resources in alternate media, such as video or online courses, may increase accessibility and help improve conservation practitioners' capacity (Sorden, 2012). This is particularly important because robust analytical skills are essential for producing high-quality research outcomes. Although the resource library (available at https://consosci.org/en-us/Resources/Training-Library) developed as part of this research will go some way toward addressing this gap, investing in data analysis training, multiple modes of delivery, and collaborating with experts from academia could help conservation practitioners access the skills they need to adequately design social interventions, analyze the resulting data sets, and translate the results into demonstrably effective interventions. Further, this also reinforces a need highlighted by others for these skills to be better embedded in the curricula of formal training and higher education programs around the world to ensure future conservation practitioners are graduating with sufficient understanding of the social sciences (Slater et al., 2024).

Few resources were developed specifically for conservation audiences. This may preclude conservationists from identifying the appropriate resources to guide their work. Moreover, even if the appropriate resources are identified, conservationists may still struggle to understand how they can be adapted and applied to conservation challenges. Our results suggest that creating social science resources that are targeted to conservation audiences may help accelerate the use of social sciences.

Accessibility of social science resources is likely even more challenging for conservationists working in languages other than English (Bielsa, 2023). Indeed, targeted searches by expert native speakers revealed few resources, even in widely spoken languages, such as French, Spanish, Indonesian, and Portuguese, despite increasing research published in these languages (Amano et al., 2021). Development of materials in languages other than English can foster greater engagement, inclusivity, and collaboration among diverse stakeholders and enrich conservation outcomes, although internet accessibility may still limit the accessibility of resources even when translated (Mailizar et al., 2020). Moreover, more social science resources developed by authors from the Global South would help ensure that diverse backgrounds, views, and perspectives are represented. This will require that social scientists based in the Global South can access the support that would enable them to participate fully in the development of such resources.

To address the identified gap in ethics training, ConSoSci developed open-access ethics tools and resources to guide practitioners during their research (available at https://consosci.org/en-us/Research-Ethics). To further ensure practitioners adopt appropriate methodologies in their research, ConSoSci has also developed a library of standardized survey templates and a decision tool to guide the selection of social science methodologies (available at https://consosci.org/en-us/Resources/). Further work is needed to provide resources on human rights in conservation, particularly given the importance of appropriate engagement with Indigenous peoples (Newing et al., 2023) and the efforts being invested in developing safeguarding frameworks by NGOs.

A key limitation of our gap analysis was that it was not exhaustive; resources certainly exist that were not included. Although the social science resource library continues to be updated, it would benefit from multimedia contributions from experts in other disciplines (e.g., anthropology, psychology) and from contributions from local communities and Indigenous people's organizations to ensure it covers the broader set of social science theories, topics, and perspectives and ways of knowing applicable to conservation practice (Bennett et al., 2022; Eyster et al., 2022; Stern & Stern, 2018). Additional searches of the existing non-English resources may be needed before investing effort in translating or developing resources.

To be effective, these efforts must be supported and complemented by broader institutional changes that mainstream the social sciences within the sector (Anne, 2022), including forming partnerships between scientists from the Global North and Global South more equitable (Rakotonarivo & Andriamihaja, 2023). For example, more recruitment of, and collaboration with, academic social scientists from a diversity of geographies could facilitate skills transfer and change mindsets. Funders also have a role to play by encouraging or requiring practitioner organizations to include social science-related outcomes in their strategies and budgets, by increasing financial support to hire and support social scientists, and by ensuring that their investment does not perpetuate helicopter research (Haelewaters et al., 2021).

Overall, interest and demand from conservation practitioners for further training in the social sciences are high, but our findings suggest capacity is lacking. Although enabling the uptake of the social sciences in conservation will require change on many fronts (Eyster et al., 2022), improving access to preexisting resources on social science methods and approaches is an invaluable step. By highlighting the availability of resources across a variety of topics, languages, and media, the resources library we developed addresses some of the need for improved skills expressed by conservation practitioners and supports the mainstreaming of social sciences into conservation practice. However, resources alone are insufficient. There remains a clear need to collaborate with and recruit social scientists into conservation organizations; this cannot be achieved without leaders of conservation organizations prioritizing efforts to build social science capacity.

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