

PERSPECTIVE

Key practices for ethical research during scientific expeditions

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Abstract

Scientific expeditions are crucial for creating new knowledge. The term itself carries strong colonial associations and a legacy of extractive practices. In many cases, expeditionary practices undermined local knowledge and expertise. Here, we advocate for a shift from “parachute science” towards collaborative approaches that incorporate diverse expertise, perspectives, languages, and knowledge systems, strengthening local capacities and focusing on developing and supporting ethical, long-term partnerships. Building on recent publications that encourage a more equitable and respectful fieldwork environment, and drawing on our experiences, we synthesize some previously proposed practices and develop new ones. We reflect on and suggest best practices during scientific expeditions within research teams and in the team's interactions with different communities, from project planning and fieldwork to data management, publication, and outreach. By emphasizing transparency and mutual respect,

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this collaborative approach enhances scientific outcomes and the societal impact of research. Furthermore, the practices proposed here apply to any kind of fieldwork, not just scientific expeditions, making them valuable across diverse cultural, social, and environmental contexts.

KEYWORDS

collaborative research, decolonial research, ethical research practices, fieldwork, local knowledge, parachute science, transdisciplinarity

1 | INTRODUCTION

Scientific expeditions have resulted in breakthroughs and discoveries throughout history and continue to be essential for deepening our understanding of fundamental matters on Earth. However, many expeditionary practices still reflect a colonial legacy of parachute science, in which outside researchers from established, well-funded institutions rely on local assistance to access natural and cultural resources without fostering meaningful collaborations or strengthening capacities in communities (Stefanoudis et al., 2021; de Vos & Schwartz, 2022). Local participants, including scientists and collaborators, are often relegated to logistical roles, particularly as permit holders. Their training and knowledge of local phenomena, either traditional or scientific, are often undervalued, and sometimes appropriated and transformed without proper attribution. Research outputs from such interactions are often published in foreign languages and stored in distant institutions, without strategies for returning knowledge to local communities in accessible, contextually meaningful, and applicable forms. This model of extractive knowledge acquisition has been criticized for perpetuating power imbalances and creating barriers to equitable, impactful research at regional, national, and global scales (de Vos & Schwartz, 2022; Odeny & Bosurgi, 2022; Stefanoudis et al., 2021).

Knowledge co-production is an alternative, collaborative approach that integrates diverse expertise, perspectives, languages, and knowledge systems (Norström et al., 2020). This approach strives to enhance local capacity, strengthen networks, and foster transparency and social capital within communities, promoting greater sovereignty and local governance during scientific expeditions (Norström et al., 2020). Knowledge co-production benefits diverse actors in many ways, supports the long-term integrity of the findings of an expedition, and maximizes the possibility of future follow-up collaborations. Knowledge co-production involves meaningful engagement with local participants that extends beyond transactional interactions and focuses on creating genuine partnerships and generating beneficial outcomes that

recognize the expertise of local scientists and ensure that authorship reflects all contributions. These partnerships can be rooted in methodologies that prioritize shared and democratic decision-making, rather than hierarchical governance, emerging from a dialogue between people with different types of knowledge (Smith, 2012).

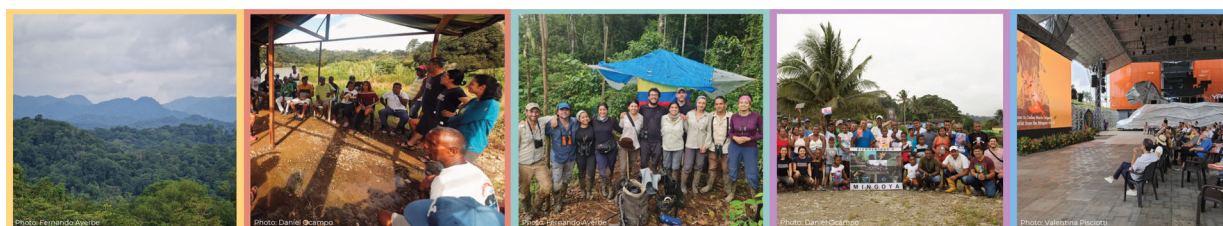
Given growing calls for more equitable and respectful fieldwork practices within the biological sciences, several recent publications have proposed principles and actions to address problematic historical practices (e.g., Norström et al., 2020; Ocampo-Ariza et al., 2023; Perry et al., 2024; Ramírez-Castañeda et al., 2022). As part of a research program involving diverse fieldwork activities (Box 1), we have implemented several of these principles, developed new strategies, and acknowledged our limitations.

Through our experiences, we have identified additional practices that promote healthy and symmetrical collaborations during scientific expeditions, and we were motivated to share our ideas. We recognize that knowledge co-production is an uncommon and challenging approach to implement during scientific expeditions. Academic institutions operate within a “publish-or-perish” system in which publication lists, citations, and journal impact factors continue to dominate productivity evaluations (Lee, 2014). This system, combined with short funding cycles, is often at odds with the slow, iterative, and relational work that ethical, co-produced research requires, as well as the time needed to build long-lasting projects alongside local communities. For example, Nunatsiavut (Canada) and Aboriginal Governance (Australia) committees highlight the need for approval or refusal rights during collaborative research projects, but exercising those rights takes time that grant deadlines and publication pressures do not allow (Tong et al., 2020; Zurba et al., 2022).

In this article, we outline our view of key practices for building transparent, meaningful, long-lasting collaborations between scientific expedition teams and local participants. We address how team members can engage with each other and with local communities across all expedition stages. We also endeavor to recognize the challenges imposed by the academic systems that we

BOX 1 The Colombia Resurvey Project

The Colombia Resurvey Project is a long-term research program that aims to understand changes in bird populations and communities over the past century. Team members revisit historical ornithological research sites surveyed by the American Museum of Natural History in the early 20th century and use standardized methods to analyze ecological, evolutionary, and conservation changes, including the impacts of landscape and climate change (Gómez et al., 2022).



A critical component of this project's success is working closely with local communities, emphasizing the knowledge, participation, and leadership of local participants, including community members, researchers, and institutions. Through workshops, environmental education, and participatory monitoring, the project helps build local capacity for conservation. Researchers from the core team and community members at the research sites co-produce knowledge throughout all project phases, contributing to regional, national, and international outreach initiatives (Gómez et al., 2022).

operate within. Our ideas are framed by the research we conduct as biologists, ecologists, and anthropologists, yet our ideas can be applied to diverse research fields. We encourage other research teams, especially those based in regions and institutions with histories of colonial influence originating in the Global North, to adopt collaborative approaches in their research and make a commitment to ensure that locally-extracted knowledge returns to, and remains with, local knowledge holders and communities.

2 | SCIENTIFIC EXPEDITIONS AND SHIFTING THE STATUS QUO

A scientific expedition is a planned journey where researchers gather empirical data, conduct field studies, and improve our shared understanding of phenomena in the natural world. These expeditions vary in scope and objectives and typically require multidisciplinary collaboration. Historically, expeditions were linked to colonial agendas, where researchers extracted knowledge and resources with little regard for local scientists and even less for local communities (Peralta, 2024; Quintero-Toro, 2012). Well-known examples include the expeditions to extract cinchona bark from the Andes, which European botanists used to isolate quinine

and establish large plantations in Dutch and British colonies. This quinine supply was used to treat malaria in regions of Africa and Asia, enabling deeper colonial expansion (Roersch van der Hoogte & Pieters, 2014). Beyond extractive practices involving plant and animal specimens, expeditions were also tied to resource exploitation and human rights abuses (see Robbins et al., 2023). Contemporary expeditions must avoid these exploitative practices by equitably engaging local communities, respecting human rights, and focusing on renewable resource extraction. Even more, contemporary expeditions must move beyond mere inclusion of local communities, which risks promoting tokenism over structural change, and move towards approaches that account for equity, justice, shared authority, and ownership (Chambers et al., 2021). The stakes of collaborative expeditions are thus not only scientific but fundamentally ethical and political. Under a collaborative framework, expeditions can be planned using different approaches (outlined in the project planning section below), reflecting unique relationships between academic teams and other actors. These relationships have distinct ethical and political dimensions, particularly regarding the expedition's purposes and how the results can benefit people and institutions beyond academia.

Sometimes scientific expeditions arise from initiatives led by local communities to pursue their own objectives,

with support from academic partners. For example, the “Search for the Sinú Parakeet” (*Pyrrhura subandina*) is a project that arose from a local ornithological society’s interest in finding an endemic, critically endangered Colombian bird species. Building on regional, national, and international partnerships, including academic researchers from universities, the ornithological society conducted surveys and workshops with local communities in the historical range of the parakeet (Sociedad Ornitológica de Córdoba, 2021). Projects that begin within local communities and proceed to a partnership with academic partners are rare, but such projects have the potential to lead to highly inclusive practices that reflect a collaborative system. Such opportunities are worth fostering.

A knowledge co-production model provides a framework to ensure meaningful involvement of scientists and local community members throughout all project stages, with an emphasis on clear communication of findings and strategies for fostering long-term impacts for both local and scientific communities (Gosliner & Burke, 2013). To have lasting impacts, the design of expeditions can consider addressing key concerns such as education, social relations, conservation, and sustainability. These concerns are often overlooked or underreported in the literature and during project planning (Gosliner & Burke, 2013). Researchers must also consider the ethical and logistical challenges that may arise during fieldwork and plan how to prevent or address them. Conversely, local communities should ensure that legal frameworks designed to minimize extractive processes and negative interactions do not unintentionally impede collaborative research due to overly stringent regulations, which might even affect scientists from the diaspora (Prieto et al., 2025). In this paper, we present key practices for ethical research focusing on the phases of scientific expeditions, summarized in Figure 1. For each phase, we outline the important practices within the research team, the local communities from the research site, and shared aspects important to both groups. Below, we describe the mechanics and the benefits of a knowledge co-production approach.

3 | KEY PRACTICES FOR ETHICAL RESEARCH DURING SCIENTIFIC EXPEDITIONS

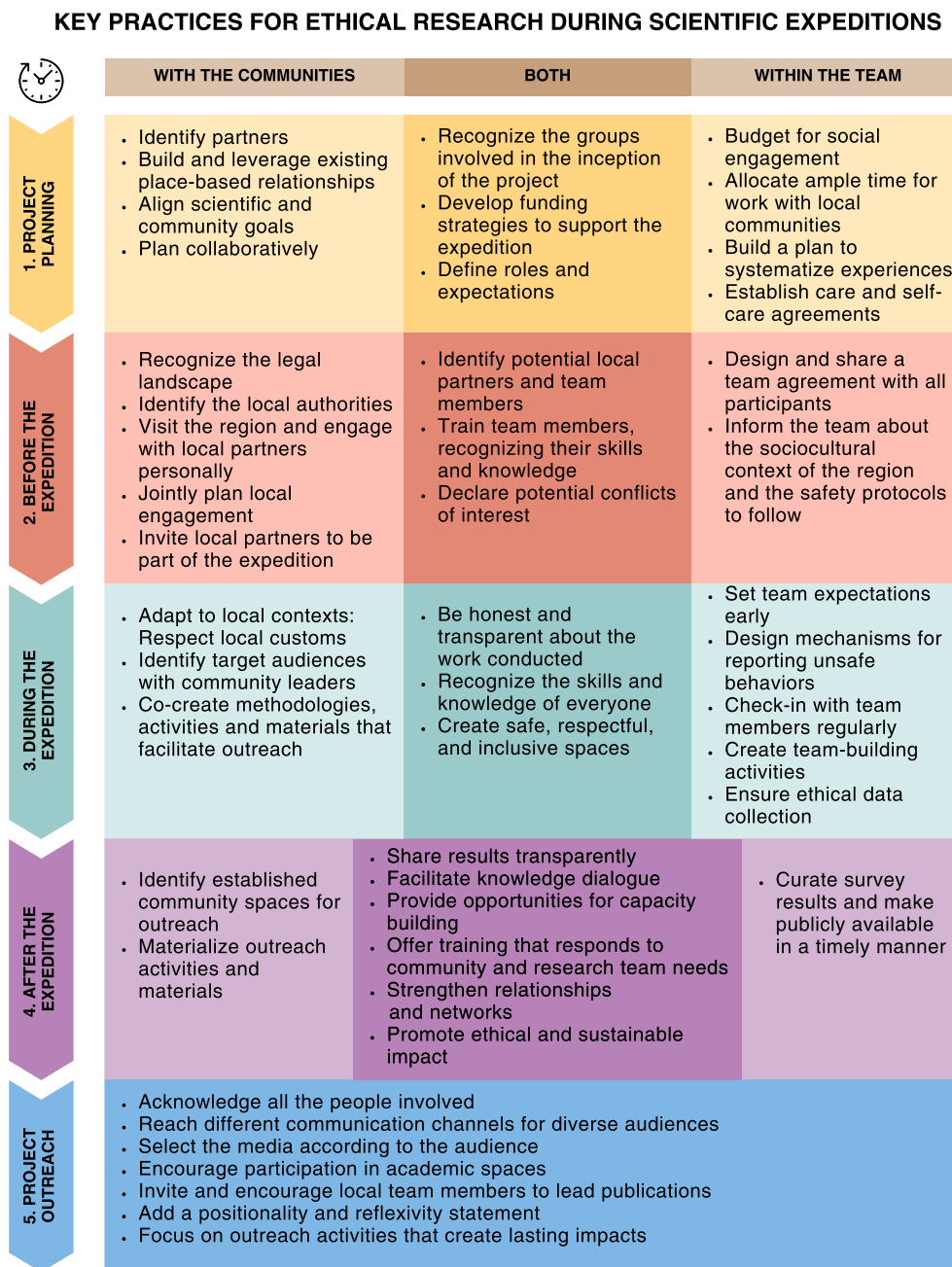
3.1 | Project planning

Effective and collaborative project planning is key to conducting ethical, impactful, and successful expeditions. Understanding that collaborative research involves

shared authority (Chambers et al., 2021), we consider the following types of scientific expeditions: (1) consultation, when external researchers or institutions plan the details of an expedition; (2) collaboration, when both external researchers and local partners collaborate to carry out an expedition, reflecting a shared priority; and (3) co-production, when an expedition arises from the priorities of local communities, who may reach out to external researchers for specific support, or from external initiatives in which local stakeholders become deeply involved. These approaches do not deserve equal treatment because their ethical implications and power asymmetries differ; thus, they should be addressed in a context-dependent manner. We recognize that co-production is not the most common type of expedition, and that existing barriers and different project goals prevent ubiquitous implementation of a knowledge co-production model. Given that most expeditions fall within the consultation and collaboration types and given that our personal experiences reflect these scenarios (Box 1), here we summarize and provide recommended steps for effective project planning during collaborative expeditions.

1. Identify partners: Assemble a diverse team, inviting researchers with local knowledge and experience. Prioritize building relationships with local researchers and value the community-based knowledge they contribute. Promote openness to inter- and trans-disciplinarity in the research team.
2. Align scientific and community goals: Co-design activities that align research objectives with the priorities of local communities, ensuring mutual benefits. For example, rather than focusing on presenting results as complex scientific analyses, a collaborative design should consider the best strategies for effective communication with communities, which may include tailored communication strategies for different experiences, cultural backgrounds, education levels, genders, and ages. This approach strengthens scientific outcomes while promoting mutual respect, shared goals, and open communication.
3. Fundraising and funding: Develop funding strategies to support the expedition through grants. Consider building connections with collaborators that help diversify funding opportunities. Think creatively and strategically to include funds for outreach, capacity-strengthening, communications, and dissemination of findings. Recognizing that knowledge co-production may involve more people than a traditional expedition, and plan accordingly. If several researchers contribute similar types of work, allocate the budget equally among them. Differences in compensation and working conditions between visiting and local

FIGURE 1 Key practices for ethical research within the team and with communities across all stages of scientific expeditions. Each phase outlines actionable steps to promote ethical engagement, capacity building, and knowledge sharing, from project planning to dissemination. The division between “team,” “community,” and “both” reflects scenarios where external researchers initiate contact, while recognizing that these boundaries may shift or overlap in community-led projects.



researchers reproduce extractive dynamics and limit the possibility of respectful collaboration (Ramírez-Castañeda et al., 2022; Trisos et al., 2021).

- Budget for social engagement: From the project's inception, allocate funding for social scientists (e.g., historians, anthropologists, and sociologists), science communicators, partnership coordinators, and materials to support community engagement. Ensure sufficient time for close collaboration with local communities, allowing for meaningful interactions, trust-building, and shared decision-making throughout the project. Considering the inclusion of social scientists will help the project consider socio-ecological systems

that align with its objectives, identify appropriate ethical protocols, and ensure that the dissemination of results is context-informed.

For example, the Colombia Resurvey Project compares historical and current bird communities and populations across Colombia to assess ecological, evolutionary, and conservation changes over the past century (Box 1). At its outset, the project had no budget allocation for community engagement or outreach. Once we recognized the negative effects of this oversight, we redirected funds from other project objectives to support a community engagement effort, and in subsequent expeditions we built the cost into the budget.

5. Schedule thoughtfully: Consider local festivities, holidays, and culturally important dates when planning fieldwork. Be mindful of local community schedules and availability. Apply a gender-diverse, intergenerational, and intersectional perspective, which considers how multiple social identities (e.g., gender, race, and sexual orientation) overlap and influence individuals' experiences
6. Define roles and expectations: Establish clear roles, responsibilities, and expectations through a team agreement that includes conflict-resolution mechanisms and data-sharing protocols (see Perry et al., 2024, Rule 6). Include care and self-care agreements.

For example, in the Colombia Resurvey Project we developed a team agreement built on five pillars: (1) respecting diversity of worship, beliefs, ethnicity, and gender; (2) valuing other knowledge systems; (3) acting with prudence and discretion regarding political or violence-related issues in the territories; (4) being transparent with the communities about the work being carried out; and (5) promoting the cultural, economic, environmental, and social integrity of the territories. The agreement also assigned roles that reflected a genuine distribution of responsibilities, identifying the people responsible for ornithological surveys, social work, and logistics. Although the researchers' contributions overlapped, it was important to define each individual's primary tasks. The agreement provided a framework for addressing misunderstandings before they escalated into conflicts and helped create an equitable working environment across all project stages.

7. Build a plan to systematize experiences: Create mechanisms to document the project's progress, including strengths and limitations, to reassess and adjust during and after the expedition. Openly discuss any shortcomings to learn from past experiences. This approach enhances a healthy work environment and should span the entire project timeline. Most existing guidelines center on principles that lack a reflective evaluation.

3.2 | Before the expedition

The pre-expedition phase is crucial for building strong relationships, making logistical arrangements, and establishing mutual understanding necessary for expedition success.

1. Identify the main actors: Build a list of actors in the region of interest (e.g., environmental monitoring

groups, universities, and national parks), acknowledging that this will not be an exhaustive list and that other interested actors may emerge throughout the process. The list can be compiled using online resources and by consulting individuals who have previously worked in the region.

2. Engage local authorities and leaders: Identify local authorities and community leaders and inform them about the project, outline its objectives, potential benefits, methods, data management and accessibility, and plans for two-way communication. Be open about the origin of funds for the expedition and which budget elements might create opportunities for paid local involvement. Collaborate with community leaders to identify priorities, address concerns, and integrate local perspectives into the expedition plan.
3. Recognize the legal landscape: Secure all required legal permits and ethical approvals at national, regional, and community levels. When working with permit-holding local scientists or organizations, ensure that local community approval is not ignored or minimized. Even when environmental or academic authorities approve, engaging with the local community must be a priority to ensure a clear understanding and consent for fieldwork. Especially in expeditions that involve a large team, make sure to maintain a role that helps coordinate all aspects of the group while navigating field sites at a regional scale, potentially involving multiple environmental permit-holders.
4. Declare potential conflicts of interest: Reflect on potential conflicts of interest and how to manage them with all parties' consent. Share those conflicts of interest among team members and work collectively to determine how to keep them from negatively impacting the expedition.
5. Train team members: Provide training that complements team members' existing skills and knowledge: training field crew members ensures understanding of protocols, boosts confidence, and improves data accuracy (Perry et al., 2024). Practicing data collection beforehand helps identify issues and enhances consistency during the actual fieldwork.
6. Arrange logistics: When feasible, visit potential study sites with community members, researchers, and local authorities to evaluate logistical feasibility. Confirm arrangements for transportation, accommodation, permits, and safety measures. Hire local businesses whenever possible to support the local economy. Establish contingency plans for potential challenges.
7. Prepare the expedition team: Inform the team about the sociocultural context of the study region and the safety protocols (including care and self-care agreements). Train the team to remain open to dialogue

and value different types of knowledge. Build team cohesion by organizing pre-expedition activities, such as workshops and meetings, to discuss roles, responsibilities, and conflict resolution strategies. Pre-expedition training worked best for us when it included sociocultural context alongside field protocols—a combination we rarely found in existing frameworks.

8. Share the team agreement: Discuss the team agreement with all participants to align expectations and responsibilities and make it openly available to everyone on the team.

The Colombia Resurvey Project exemplified careful pre-expedition planning (Box 1). The project's initial phase integrated the aforementioned steps for social engagement (Figure 1), demonstrating a pre-expedition planning effort. For more details, please refer to Gómez et al. (2022).

3.3 | During the expedition

The fieldwork phase requires following an established plan while maintaining adaptability, clear communication, and commitment to ethical practices.

1. Practice transparent communication: Communicate openly about the project's progress, challenges, and goals within the team and with the local community. Regular updates help to align expectations and build trust. Involve local collaborators and community members in ongoing discussions, ensuring they are informed and valued as active participants in decision-making. Use the local language whenever local participants are present and avoid side conversations in foreign languages which may exclude members of the group. When feasible, reach out to translators or use translation devices.

Be mindful of communication nuances. Communication is always culturally and contextually mediated. The same word does not necessarily mean the same thing to people from different backgrounds, and it may have different connotations across contexts. Researchers should have a genuine willingness to acknowledge communication challenges and the skills to adapt their communication strategies, employing flexible and creative approaches to overcome them across diverse contexts.

2. Respect contributions: Acknowledge the expertise and knowledge of all team members and collaborators.
3. Adapt to local contexts: Respect local customs and collaborate closely with partners to address immediate needs and opportunities.

4. Encourage safe environments: Create safe, respectful spaces where all participants feel comfortable sharing ideas, concerns, and feedback. Develop mechanisms and require personnel to report and address unsafe or inappropriate behaviors promptly (Ramírez-Castañeda et al., 2022; Sharp & Kremer, 2006).
5. Foster team cohesion: Conduct regular check-ins to discuss progress, resolve conflicts, address concerns, and adjust plans as needed. As with the pre-expedition activities, incorporate team-building activities during the expedition.
6. Ensure ethical data collection: Practice transparency and respect for people and the environment during research. Follow animal care and safety protocols, ensure regular data backups, and maintain confidentiality. Uphold research integrity by avoiding falsification or misrepresentation of data. Prioritize the well-being of both human and non-human participants in all aspects of data collection, for example, FAIR and CARE principles regarding data sovereignty. FAIR Principles include Findable, Accessible, Interoperable, and Reusable data landscape. CARE Principles refer to Collective benefit, Authority to control, Responsibility, and Ethics of Indigenous Data Governance (Carroll et al., 2021).
7. Identify target audiences: During the expedition, interact with community leaders to identify target audiences for outreach, such as residents of diverse ethnic groups, policymakers, educators, conservation organizations, or broader academic and public communities.
8. Co-create outreach activities and materials: Work with local communities to design outreach methodologies and activities that align with their priorities and needs, including language translation.

The Hearst Philippine Biodiversity Expedition provides an exemplary model for best practices during a research expedition (Box 2; see also Gosliner & Burke, 2013). Filipino and U.S. researchers collaborated to explore the Philippines' natural resources and design conservation strategies. The team documented over 500 undescribed species by cataloging biodiversity across various habitats. The project addressed all phases of social engagement (Figure 1) and is a good example for this expedition phase.

3.4 | After the expedition

In the post-expedition phase, collected data and information are cataloged and analyzed, and key discoveries are synthesized. A truly collaborative effort should involve local partners in this process and create strategies to

BOX 2 Hearst Philippine Biodiversity Expedition

The 2011 Hearst Philippine Biodiversity Expedition, led by the California Academy of Sciences, set out to explore the rich biodiversity of the Philippines while finding ways to conserve it. Scientists described over 500 new species to science while addressing urgent environmental issues, such as coral bleaching and harmful fishing methods. Their findings reached diverse audiences through public talks, workshops, and media coverage, connecting scientific discoveries to real-world conservation action (summarized in Gosliner & Burke, 2013).

Collaboration between foreign US scientists and their Filipino peers, educators, and local communities was central to the expedition's success. This partnership helped make the project more impactful and respectful of local culture. Through workshops with teachers and community outreach, researchers shared why protecting nature matters and how everyone can help. By recommending more protected areas for marine life, the team demonstrated their commitment to positive environmental impact.



This project has become a powerful example of how research, education, and teamwork can create meaningful change (Gosliner & Burke, 2013).

share expedition findings with all interested participants. An evaluation of the expedition's accomplishments and goals should also be conducted.

1. Develop outreach activities: Work with the local communities to create outreach materials, following ideas discussed in earlier phases, above. Promote collaborations with teachers and local leaders and use existing spaces, such as schools or cultural centers, to make outreach activities accessible and familiar to the community, attempting, as much as possible, to align key messages with local forms of knowledge and the cultural frameworks that underpin them.

For example, in the later stages of the Colombia Resurvey Project (Box 1), we created a short film, titled "*Mingoya*", featuring local community leaders and the scientific team. The film, narrated by a local researcher, provided information to broad audiences about the expedition, birds, people, culture, and landscape of a Colombian rainforest. The film has been screened in several regions of Colombia and internationally, and the local researcher has participated in discussions with diverse audiences across these presentation spaces.

2. Prioritize knowledge sharing: Present findings to local collaborators and communities in accessible and culturally appropriate ways. For example, this might include presentations, workshops, or written materials in local languages. Effective knowledge sharing involves more than literal translation; whenever possible, activities and materials should be adapted to local ways of understanding, interpreting, and communicating knowledge. Researchers can enhance equity and justice by collaborating with native speakers to access and interpret literature in diverse languages and local contexts (Droz et al., 2023). Ensure that local participants have access to and understand the collected data. Share knowledge, not just surface-level information. Be mindful that people might be interested in details such as the methods and analysis of the results and do not assume they lack interest or will not understand; strive to instead communicate these details in accessible and creative ways (Smith, 2012).
3. Facilitate knowledge dialogue: After presenting survey results, encourage dialogue between other community knowledge systems about the process and the phenomena being studied. Reflect collectively on the knowledge that emerges from this dialogue.

4. Build capacity through training and knowledge exchange: Organize, provide, and fund workshops, training sessions, and educational resources that allow communities to learn new skills, strengthen knowledge, and foster long-term engagement (Odeny & Bosurgi, 2022). Partnerships with local schools, universities, or community organizations may also help to connect with future members of the project.

For example, the Colombia Resurvey Project (Box 1) co-created workshops with local environmental entities aimed at the ornithological community and environmental monitoring staff in two regions of Colombia. The main objective of these workshops was to enable participants to apply and share the acquired knowledge, thus strengthening bird research capacity nationally.

5. Strengthen relationships and networks: Maintain open communication with local collaborators and partners to nurture long-term relationships through project updates and future collaboration opportunities. Support local initiatives by connecting community members to external resources, funding sources, or academic networks. Encourage students to use the data gathered during the project for future research and conservation efforts (Odeny & Bosurgi, 2022; Valdez et al., 2024).
6. Promote ethical and sustainable impact: Reflect on the expedition's overall community and environmental impact. Address any adverse outcomes and ensure that the positive contributions are sustained. Encourage local leadership in applying research findings to long-term projects, ensuring community ownership of outcomes.

3.5 | Project outreach

Outreach ensures that research findings are communicated effectively to diverse audiences, enhances knowledge exchange, builds public trust, and amplifies the project's impact. We differentiate project outreach from post-expedition because outreach activities can be initiated early in the execution of the project and then persist long after the expedition concludes

1. Design accessible communication strategies: Share findings through multiple formats, such as publications, presentations, workshops, videos, news bulletins, and blog posts. Create culturally relevant materials that are easy to understand and available in local languages (Droz et al., 2023; Valdez et al., 2024). Use digital platforms like social media and open-access repositories to reach broader audiences while considering digital access limitations in remote rural

areas. For example, the Karuk Tribe's "Intentional Fire podcast" demonstrates how Indigenous governance can guide decisions about what information to collect and how stories can be communicated, prioritizing community-led formats (Murveit et al., 2023).

2. Reflect on the materials created: Co-design engaging and versatile materials that serve multiple purposes and address social needs, including an intersectional view of the results.
3. Highlight local contributions: Acknowledge local collaborators in outreach materials. Feature participants' stories, experiences, and insights. Invite local team members to co-lead outreach efforts.
4. Foster academic participation: Provide opportunities for local collaborators to contribute to publications as co-authors, ensuring their expertise and perspectives are represented (Cockle et al., 2025; Ramírez-Castañeda et al., 2022). Provide opportunities for co-authoring conference talks and posters. Scientific contributions with large and diverse author lists should be commonplace in situations of knowledge co-production.
5. Include positionality and reflexivity statement: Acknowledge diverse team backgrounds and contributions in publications through positionality and reflexivity statements, detailing how justice was promoted during research and publication (Cockle et al., 2025). Where feasible, aim for multilingual dissemination, ensuring that research outputs are accessible to diverse audiences (Droz et al., 2023, see Appendix S1 for a Spanish translation of this manuscript).
6. Sustain long-term engagement: Focus on outreach activities that create lasting impacts, such as educational programs, community resource guides, and support for local initiatives inspired by the research findings. For example, in the Colombia Resurvey Project (Box 1), local students and community members have used the project's data to investigate species of interest in their territories (e.g., Ortiz Fernández, 2023).

4 | CONCLUSION

Scientific expeditions have historically been shaped by power relations and institutional structures that determine the distribution of participation, recognition, and benefits. To move beyond colonial legacies of parachute science, researchers should embrace a spectrum of collaborative approaches, ranging from consultation towards collaboration and co-production, fostering transparent, authentic, and long-lasting partnerships (Figure 1). The collaborative approaches that we have summarized here offer the opportunity to implement a dynamic framework that allows scientists to respond and adapt to the

changing contexts relevant to each project they undertake. Recognizing the systemic challenges of current academic structures, such as short funding cycles and high-pressure publication environments, we present guidelines for the co-design of methodologies and shared decision-making during expeditions, which remain essential for building community trust and enhancing research impact. We acknowledge that the publish-or-perish mindset may stand in opposition to slower, relational work on which our proposed framework depends. We therefore encourage researchers to advocate within their institutions for evaluation criteria that recognize collaborative, community-engaged work as scholarly output and to seek funding that supports co-produced projects. These practices should be viewed as flexible tools that researchers can consider in specific social environments, requiring reflexivity and openness to diverse ways of building knowledge.

POSITIONALITY AND REFLEXIVITY STATEMENT

Most authors are Colombian researchers trained in national (public and private) and international institutions. We offer diverse perspectives drawn from our professional experiences working directly with local communities through regional, national, and international collaborations in the natural and social sciences. Our positions bridge local knowledge experiences with global academic practices, and we recognize that this creates opportunities and limitations in our approach to scientific expeditions. Through our past experiences, particularly with the Colombia Resurvey Project, we critically examined how our academic training and institutional affiliations shaped our perspectives on knowledge co-production. While our roles within universities, museum collections, and academic and non-governmental organizations provide valuable insights, we acknowledge that they may restrict our comprehensive understanding of the complex realities of the communities and areas where we conduct our work. Our experiences have demonstrated the value of strongly advocating for collaborative partnerships while remaining open to refining our approaches based on feedback and self-reflection. We have shared some of these reflections during national presentations and on social media, and we will continue to share them in Spanish and English across national and international platforms.

AUTHOR CONTRIBUTIONS

Nelsy Niño-Rodríguez and Natalia Ocampo-Peñuela conceived the idea and drafted the first version of the manuscript. Nelsy Niño-Rodríguez, Camila Gómez, Juliana Soto-Patiño, Andrés M. Cuervo, Andrés Sierra-Ricaurte,

Natalia Pérez-Amaya, Carlos Daniel Cadena, Jessica Díaz-Cárdenas, David Ocampo, and Natalia Ocampo-Peñuela are part of the Colombia Resurvey Project and actively contribute to the discussion on the importance of having a knowledge co-production approach in scientific expeditions. Carlos Del Cairo, Carolina Soto-Vargas, and Daniel J. Mennill provided invaluable insights into the manuscript. All authors have reviewed, contributed, and approved the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The authors have nothing to report.

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