Use of Science in Ecosystem Recovery Partnerships in the Puget Sound: A Survey Report for Stakeholders

February 2024

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Funding: This material is based upon work supported by the National Science Foundation under Grant No. 212247. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Image from Microsoft 365

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Study overview

Many complex environmental problems – such as climate change adaptation, habitat conservation, and water pollution – are managed today through voluntary partnerships of public agencies, nonprofit organizations, and private actors. In the 20th Century, it was common for public agencies to address environmental problems individually, with little assistance from other agencies and limited input from citizens and other actors. In the 21st Century, public agencies have increasingly participated in collaborative partnerships for managing environmental problems, as a means for sharing management responsibility across jurisdictions and involving non-governmental actors in developing plans and projects. This approach is known as collaborative environmental governance.

One aim of collaborative environmental governance is to include a wide range of information, including natural and social science, traditional knowledge, and experiential knowledge. In the Puget Sound ecosystem, scientific information has been documented for decades, but we know less about how such information is put into practice in collaborative plans and projects. For example, when do collaborative participants seek scientific information, and how do they find it and evaluate it? What makes a piece of scientific information useful? How do they apply it to their local context? In addition, what other kinds of information are valued by collaborative participants, and how do they weigh that relative to science?

The survey data in this report is part of a larger research project that included three phases: (1) building a catalog of collaborative environmental organizations in the Puget Sound region working on ecosystem restoration planning and projects; (2) interviewing members of several of these organizations; and (3), conducting a web-based survey of participants across all of these collaborative organizations. This summary report focuses on the third phase in reporting results from our survey, conducted in late fall 2023. The interviews and surveys have allowed the research team to compare how science is used in different types of partnerships, ranging from partnerships composed mainly of members operating at the local level to partnerships composed primarily of government agencies operating at larger scales. Within each partnership, surveys and interviews show how participants think about the role science should play, and does play, in their collaborative partnerships. The project seeks to contribute both to the academic literature on the science-policy interface in collaborative governance and to identify practical strategies to enhance links between the dissemination of science and collaborative environmental partnerships.

Purpose of summary report

This summary report shares the compiled results from a web-based survey administered to members of 54 ecosystem recovery partnerships in the Puget Sound Basin in 2023. The sections below include figures to visually represent patterns in the survey data. We hope these results inspire conversations about developing strategies to strengthen the dissemination and

application of science and other kinds of information in collaborative environmental partnerships.

Research design

Data gathering for this study began in 2021, when we developed a catalog of ecosystem recovery partnerships in the Puget Sound (Phase 1). We cast a wide net in this initial stage. Our team conducted internet research, using the search term "Puget Sound" with other terms, including "conservation", "partnership", "watershed groups", "watershed alliance", "collaboration", and "citizen groups". We also searched websites of organizations that aggregated partnership directories, such as Chambers of Commerce, the Washington State Recreation and Conservation Office, and the Washington Department of Fish and Wildlife. These web searches yielded 190 possible collaborative partnerships in the Puget Sound region.

Upon closer inspection of these 190 possible partnerships, we excluded groups that conducted citizen science for other organizations but did not themselves deliberate and plan as a collaborative entity. We also excluded advocacy groups that focused on a single issue such as saving orcas rather than bringing together place-based stakeholders with diverse viewpoints. In addition, we excluded groups whose mission was educational programming or support for a particular facility such as an arboretum, and land trusts that did not have a shoreline or estuary focus. The process of deciding which groups to exclude helped us hone our working definition of a partnership to be consistent with the aim of our study, which examines how science and other information is used in collaborative decision-making processes and that would be consistent with prior definitions in the literature (e.g., Koontz et al. 2004; Margerum 2008; Massaua et al. 2016; Sabatier et al. 2004; Ansell and Gash 2008; Emerson et al. 2012). Specifically, we define collaborative partnerships in our study as follows:

A collaborative partnership is a place-based organization whose members represent diverse interests across jurisdictions and engage in systematic deliberation to develop management plans, recommendations, and/or projects covering multiple social-environmental challenges.

Based on this definition, and our exclusion criteria noted above, our final catalog included 54 collaborative partnerships in the Puget Sound Basin that fit this definition. **We refer to these collaborative partnerships as 'ecosystem recovery partnerships' or as 'partnership(s)' in the remainder of this report.** While we recognize common association of this term with the Puget Sound Partnership (PSP), we use the term generically to refer to members' individual partnerships, not to the PSP. From this catalog, in Phase 2, we selected 9 partnerships of various types, from which we interviewed 39 members with different perspectives (e.g., varying in expertise, roles in their partnership, tribal affiliation,

We refer to these collaborative partnerships as **'ecosystem recovery partnerships'** or as **'partnership(s)'** in the remainder of this report.

While we recognize common association of the term 'partnership' with the Puget Sound Partnership (PSP), we use the term generically to refer to individual collaborative organizations, not to the PSP.

and home organization). These interviews were semi-structured and provided valuable information to help us develop the survey for Phase 3.

Survey to over 900 members across 54 partnerships

We developed the survey by drawing on responses from the preceding interviews, which we transcribed and coded to analyze response patterns. We also established an advisory board of three experts on the topic, two of whom work in the Puget Sound Partnership and the Washington Department of Fish and Wildlife, and a university-based researcher working on collaborative governance in the region. These advisory board members were helpful for ensuring that our survey questions resonated with partnership members on the ground, but they were not official members of our research team and were thus not involved in survey distribution.

Partnership coordinators were crucial for our survey distribution, by sending the survey directly to members and/or encouraging members to respond to our team's outreach. Our team reached out to all partnership coordinators to ensure that the link to the survey was distributed to all members of their partnerships, either by sending the link themselves or by providing email addresses for us to send the link. We included partnership members who served in subgroup categories like citizen committees, technical committees, executive committees, boards of directors, and staff. The survey was administered in fall 2023 via a web-based platform, Qualtrics. Partnership members received a pre-survey notice and three follow-up reminders from our team and/or their partnership's coordinator. In cases where a member was active in multiple partnerships, they were asked to respond with respect to their partnership where they were most active in decision-making processes.

We received a total of 292 viable responses across 51 partnerships (we received no responses from 3 partnerships) and estimate our response rate to be 31%[1]. Responses were determined viable if respondents identified themselves as a member of one of the 54 partnerships listed at the beginning of the survey and if we detected no signs that they were submitting a duplicate response. The sections below discuss the results from a sample of questions in our survey.

Survey results

The section below displays trends from the 292 survey responses that we received. In many cases, respondents skipped questions, meaning that the total number of responses for a given

[1] We cannot know the exact response rate because some partnership coordinators preferred to distribute the survey to partnership members instead of direct distribution through our research team. We therefore do not know exactly how many or who received our survey in these partnerships. We managed this uncertainty by using initial survey questions to determine their eligibility. We also developed a preliminary contact list of possible eligible members, based on coordinator-confirmed contacts and web-searches of each partnership's membership list. This preliminary list indicated that roughly 940 eligible members likely received the survey.

question is often lower than 292 (n < 292). We indicate the number of responses (n) in the caption for each figure. When applicable, we also indicate when questions allowed respondents to 'choose one' option or 'select all [options] that apply'. Personally identifiable information was not collected, and because some partnerships have few members, we also detach responses from partnerships' names to preserve respondents' anonymity. The figures below contain 'raw' results from a sample of survey questions, with no analysis of correlations among survey questions or breakouts by type of partnership or individual partnership. We will analyze the responses in these ways for papers, presentations, and articles subsequent to this report.

Many of the survey questions are about scientific information, which we defined repeatedly in the survey as *"any systematic collection of data or analysis of that data, whether produced by the [respondent's partnership] or found elsewhere".* This definition was thus broad enough to include social science information.

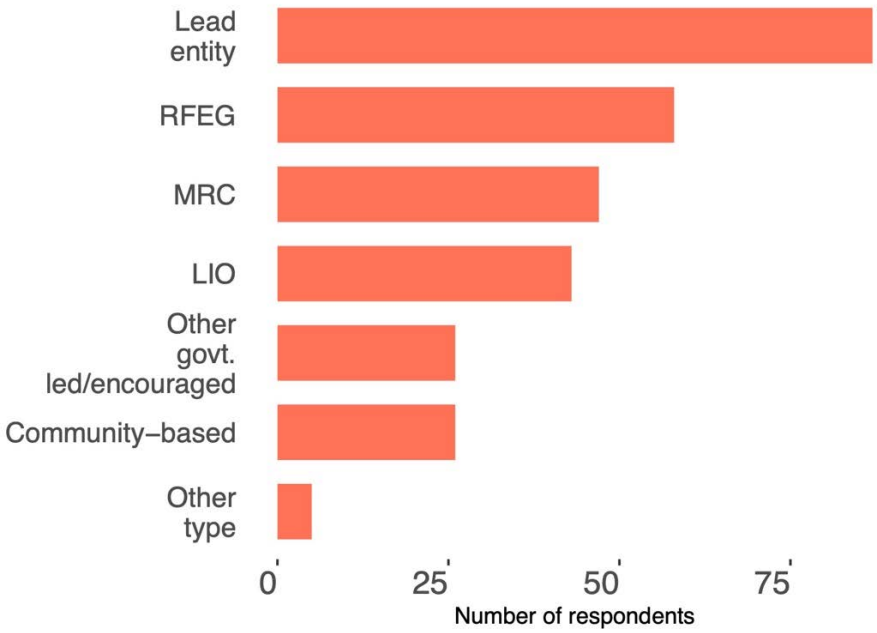
1. Who responded to the survey?

This section speaks to *who* responded to our survey, including graphs showing respondent demographics. The absence of data from non-respondents precludes us from making statements about the overall representativeness of this survey sample. We encourage readers to reflect on how their own partnership's composition may differ from the trends shown in figures 1-11. The level of similarity may provide insight on how generalizable the survey findings are to readers' own partnerships.

We began the survey by asking respondents to select the name of the partnership in which they are most active in decision-making. These partnerships included types that developed out of large-scale initiatives, such as Lead Entities, Local integrating Organizations (LIOs), Marine Resources Committees (MRCs), and Regional Fisheries Enhancement Groups (RFEGs). We consider these types as government led/encouraged, meaning that they receive substantial support from government bodies. We also surveyed other partnerships which were government led/encouraged but did not fall under one of these common types (i.e., not operating as an LIO, lead entity, RFEG, MRC). We also surveyed several community-based partnerships, referring to those that are primarily led by non-governmental members, such as nonprofits.

Our results show that most respondents are in partnerships that are government led or encouraged, including Lead Entities, RFEGs, MRCs, LIOs, and others. For several partnerships, we received zero responses, most of which were community-based. For this reason, government led/encouraged partnerships may be overrepresented in our sample.

*Figure 1. **Partnership type**: Type of partnership in which respondent participates and for which they answer the survey. Respondents were asked to choose the one partnership in which they are the most active in decision-making (choose one, n=292)*



Within partnerships, respondents held a variety of roles, indicated by their leadership status (figure 2), placement in partnership subgroups (figure 3), and volunteer status (figure 4). Overall, the respondents were largely active participants and formal leaders, most commonly served on technical or science committees, and were nearly evenly split between unpaid volunteers and participating as part of their job in a home organization.

*Figure 2. **Leadership status**: Leadership status that respondent has held (choose one, n=265)*

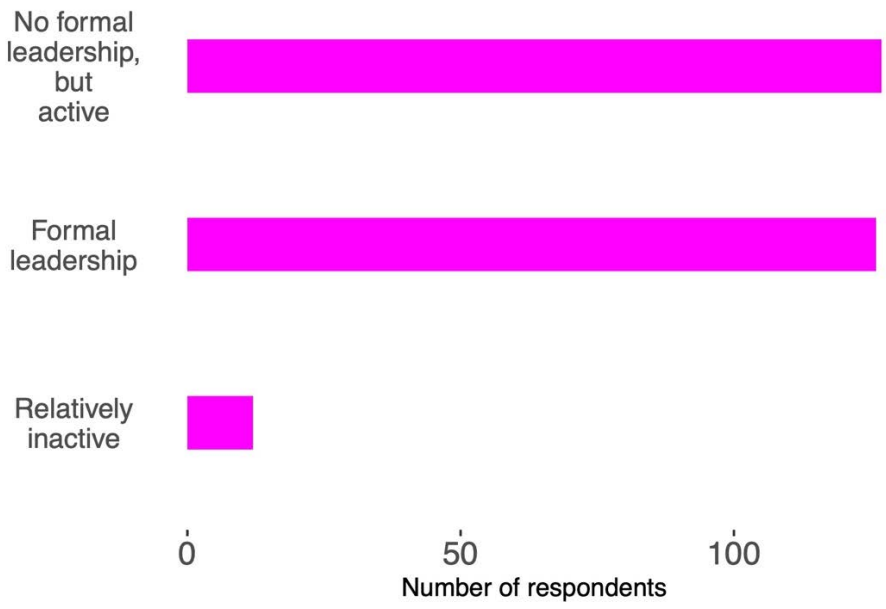


*Figure 3. **Subgroup**: Subgroup in which respondent has participated (select all that apply, n=199)*

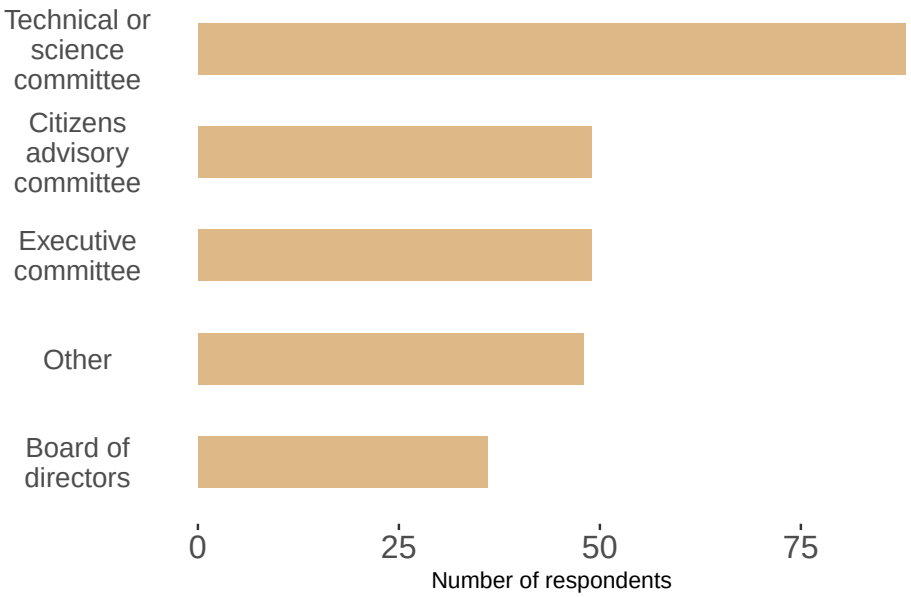


*Figure 4. **Volunteer status**: Whether the respondent receives compensation for their participation in their partnership (choose one, n=269)*

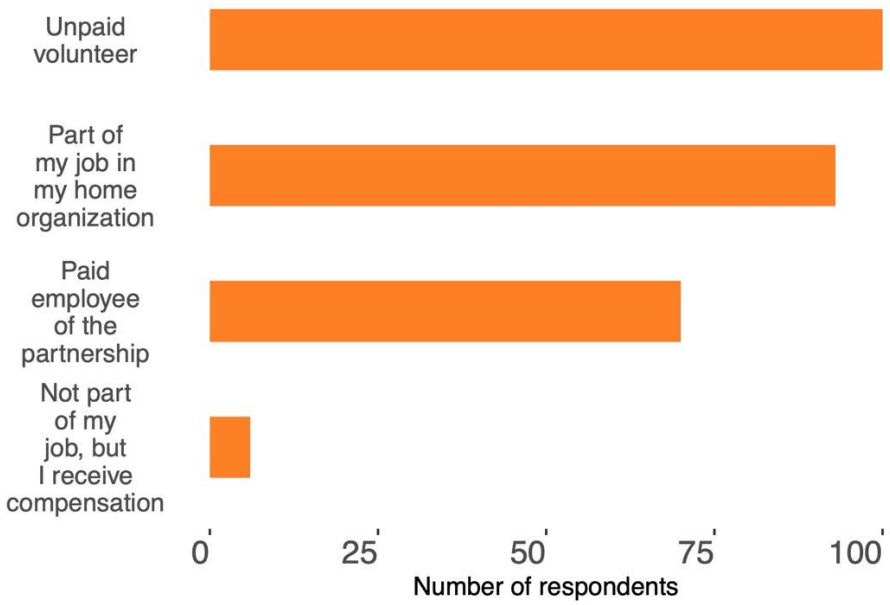
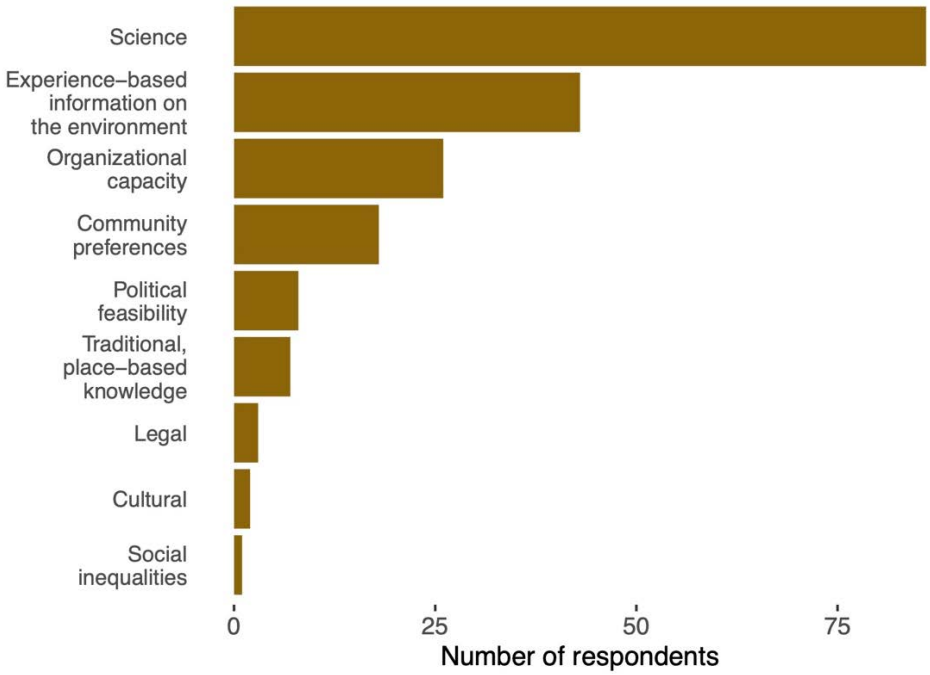


Figure 5. ***Primary expertise:*** *Primary expertise that respondent brings to their partnership (choose one, n=194)*



Respondents bring many types of expertise to their partnerships (figure 5). When asked to choose *their (one) primary expertise,* most respondents indicated science. However, results show that many other types of expertise are also represented. In addition to their partnership role, respondents hold a range of personal characteristics, such as those related to employment status (mostly employed full time - figure 6), education (most had a degree beyond bachelor's - figure 7), and the sector of their home organization in which they are employed outside their partnership (public agencies were most frequently mentioned - figure 8).

Figure 6. ***Employment status:*** *Respondent's employment status (select all that apply, n=200)*

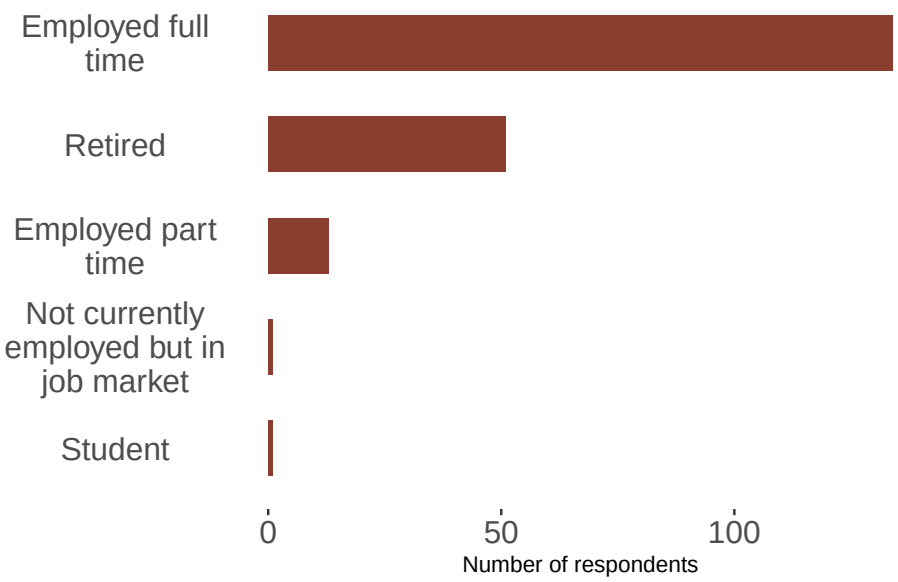


Figure 7. ***Education****: Respondent's most recent educational degree (choose one, n=198)*

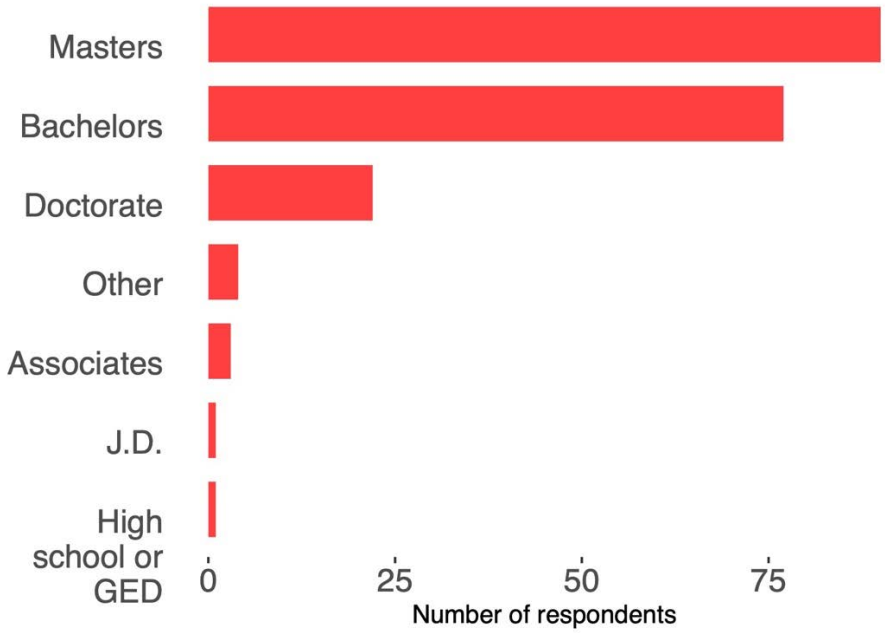
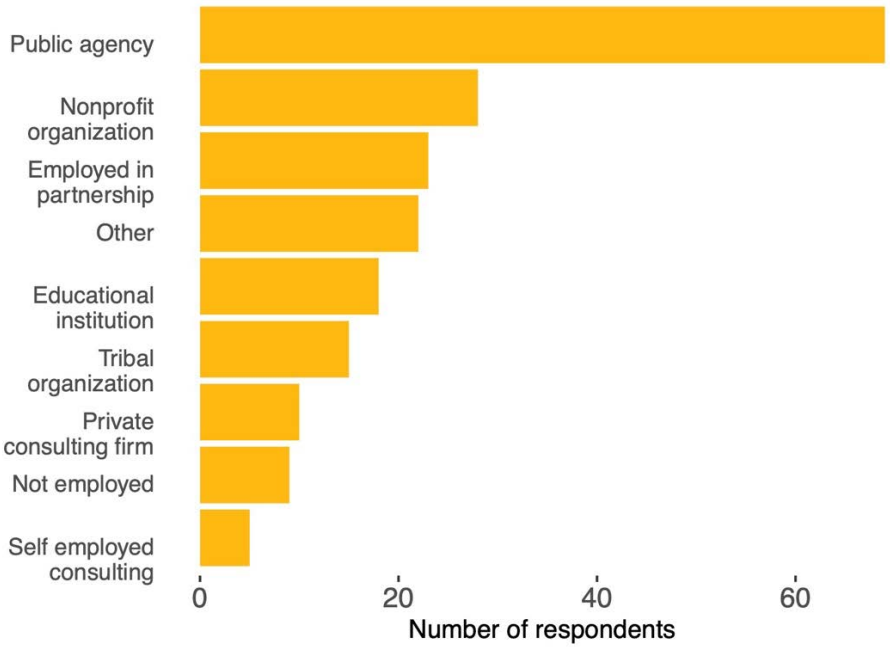


Figure 8. ***Home organization****: Respondent's home organization in which they are employed (choose one, n=199)*



Outside of their work in their partnership, respondents interact with science in different ways. Understanding respondents' relationship with science outside of their partnership provides insight into their familiarity with science and the exchange of scientific information via social networks. Figures 9-11 show the significant role partnerships play in knowledge diffusion.

Figure 9. ***Interaction with scientists outside the partnership****: Frequency of interacting with people who conduct scientific research, either in universities, other organizations, or through citizen science (No respondents indicated 'never') (n=198)*

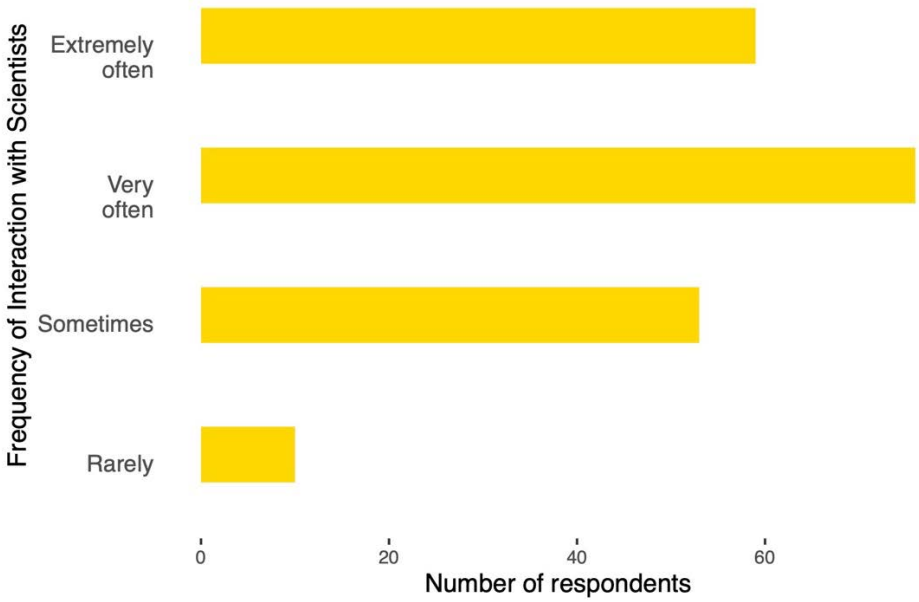


Figure 10. ***Use of science in their work outside their partnership****: Extent that respondent uses science in their work outside their partnership (n=196)*

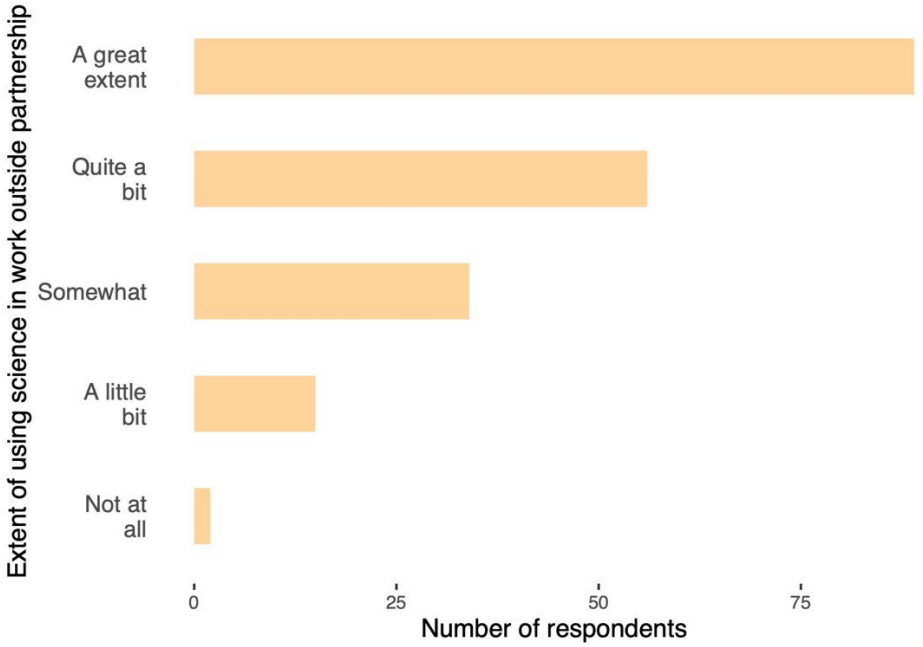
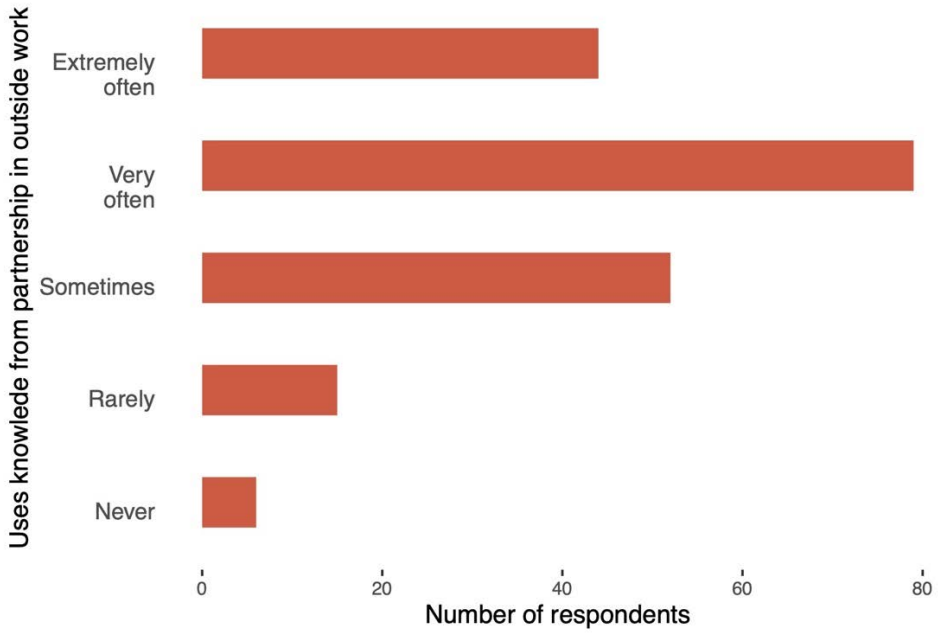


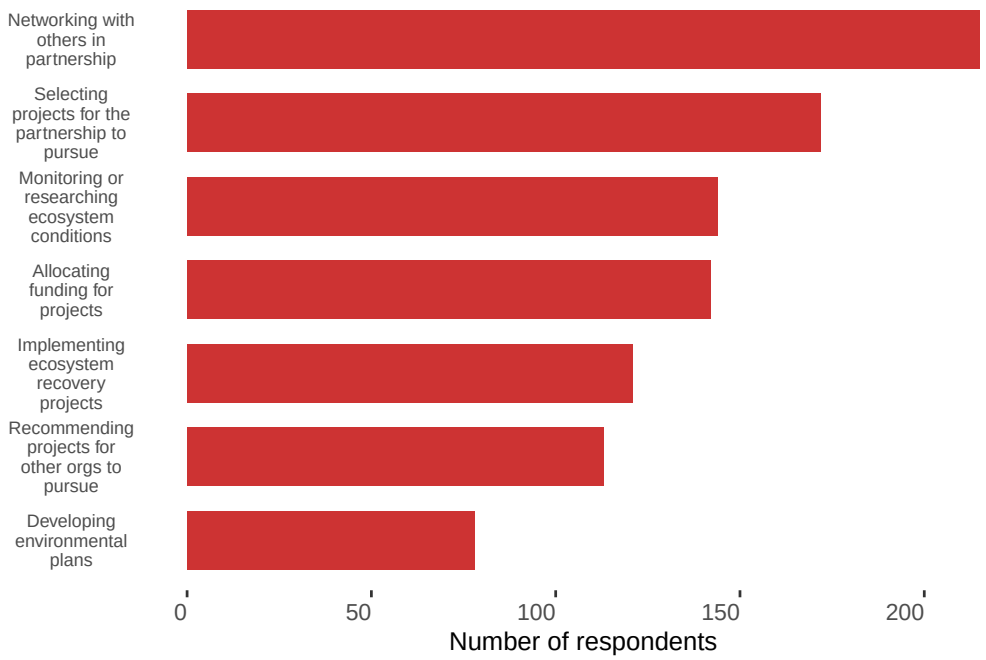
Figure 11. ***Knowledge diffusion****: Frequency that respondent takes knowledge gained from partnership-related work and uses it in their non-partnership-related work (n=196)*



2. What partnership activities do respondents participate in?

Respondents participate in a wide range of activities within their partnerships, shown in figure 12. Among the most frequent activities are networking with other partnership members and selecting projects for their partnership to pursue. Respondents indicate a variety of purposes for which they seek science, which most frequently include to understand problems and develop solutions (figures 13 and 14).

*Figure 12. **Partnership activities**: Activities that respondent participates in within their partnership (choose all that apply, n=292)*



Note on interpreting the following figures: The remainder of this report displays the results from questions that ask respondents to indicate their responses on an ordinal scale. Ordinal scales in this survey are 5-point and used to describe several concepts like frequency, level of importance, extent of agreement, and effectiveness. We draw on these scales to show the average or mean value for each of the following questions. To calculate these averages, we assign the weights to each scale point as shown in table 1.

Table 1. Ordinal scales used in this survey, with assigned weights for calculating the average value

Frequency • Extremely often = 4 • Very often = 3 • Sometimes = 2 • Rarely = 1 • Never = 0	**Level of importance** • Extremely important = 4 • Very important = 3 • Moderately important = 2 • Slightly important = 1 • Not important = 0
Extent of agreement • Strongly agree = 4 • Agree = 3 • Neither agree nor disagree = 2 • Disagree = 1 • Strongly disagree = 0	**Effectiveness** • Extremely effective = 4 • Very effective = 3 • Moderately effective = 2 • Slightly effective = 1 • Not effective = 0

In the below figures, average values are indicated by a shaded circle, corresponding to a statement in the right-hand legend. Tails are included in the figures to indicate the 95% confidence interval around that average value. We interpret these figures cautiously because of some limitations in our study, including lack of certainty on whether our respondents are representative, and thus generalizable, of all members in ecosystem recovery partnerships. It is important to remember that these figures depict averages across all the partnerships and thus we encourage readers to consider the unique context of their own partnership when interpreting them.

Figure 13. ***Purpose for seeking science****: Importance of purpose for which respondent seeks science in their partnership role, on a scale from 0 (not important) to 4 (extremely important) (n=215-220)*

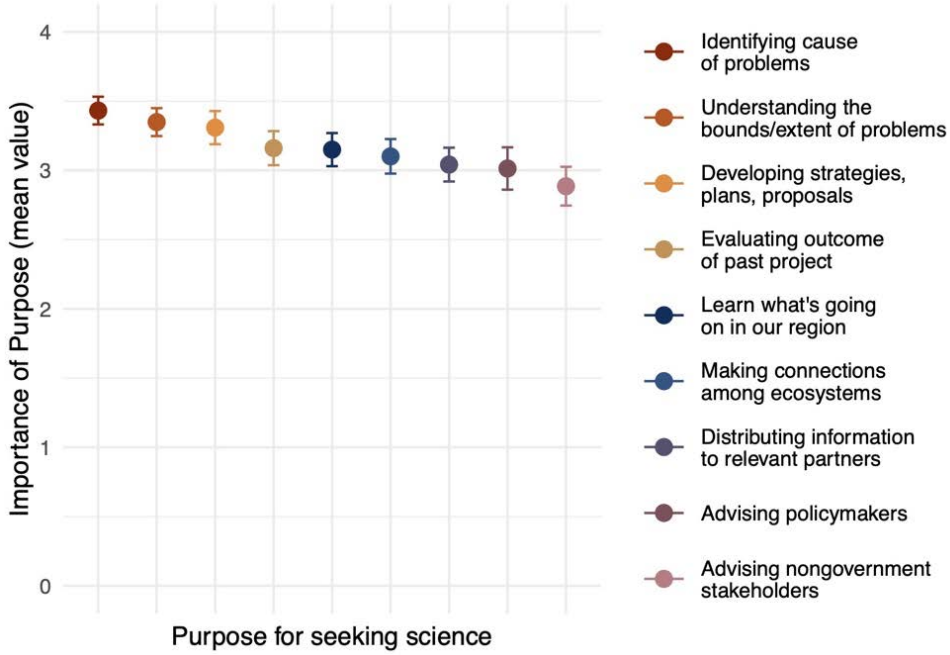
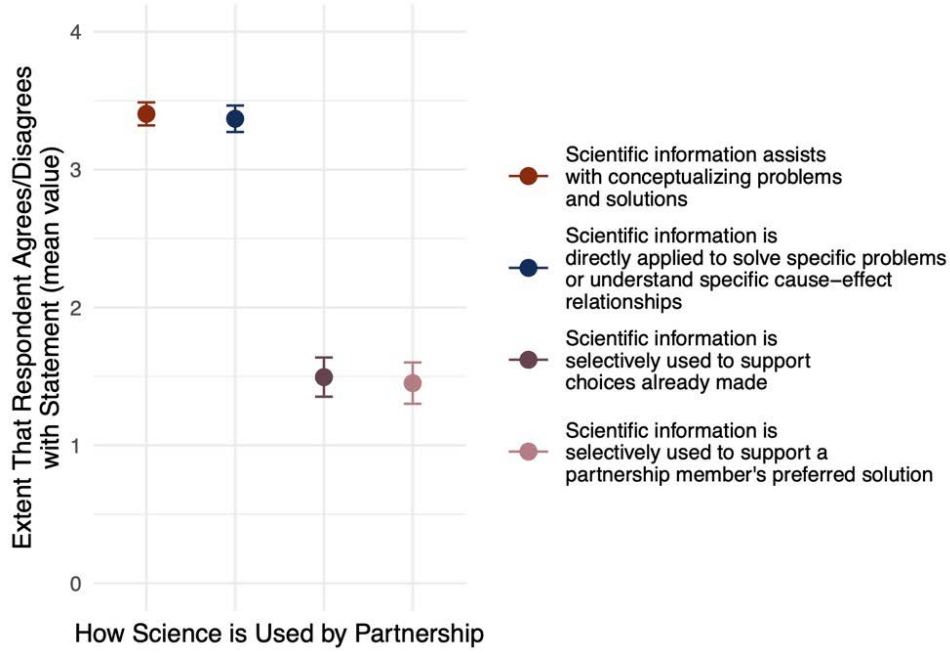


Figure 14. ***How science is used****: Extent that respondent agrees with the following statements about how science is used in their partnership, on a scale from 0 (strongly disagree) to 4 (strongly agree) and the midpoint is 2 (neither agree nor disagree) (n=195-198)*



3. How do respondents search for scientific information?

Results suggest that respondents use a variety of strategies to search for scientific information (figure 15). Relational strategies appear to be some of the most common, such as asking others within or outside of their partnership. Participating in events (e.g., conferences) also stood out as a relatively common strategy for seeking science. The strategies are further reflected in the sources that they seek (figure 16), which suggests that advice from knowledgeable people is the most sought source. Scientific information produced by government bodies also stands out as highly sought, compared to other sources like peer-reviewed journals.

Figure 15. ***Strategies for seeking science****: Frequency of using the following strategies to search for scientific information, on a scale from 0 (never) to 4 (extremely often) (n=217-221)*

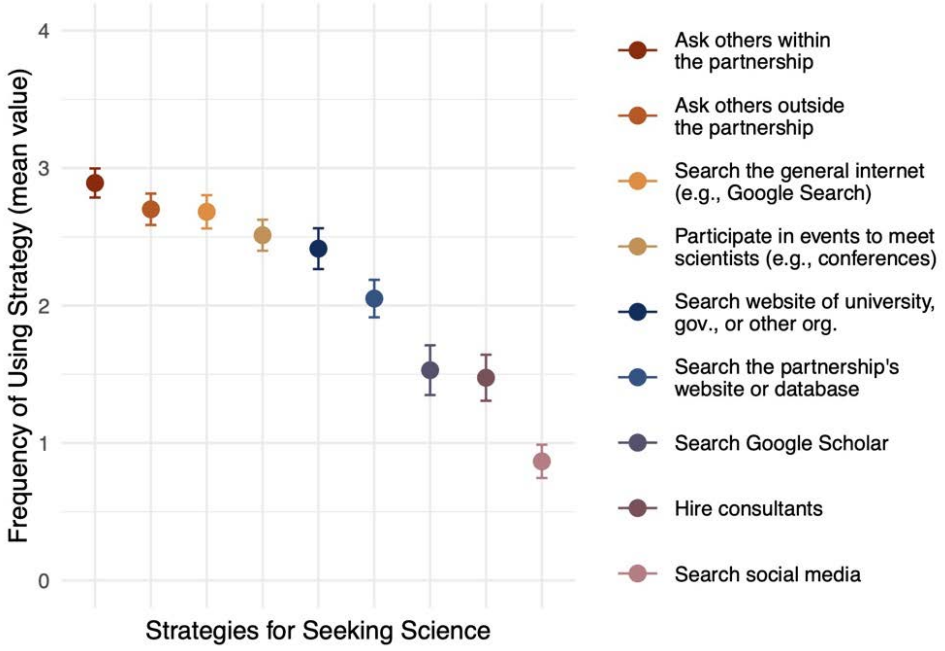
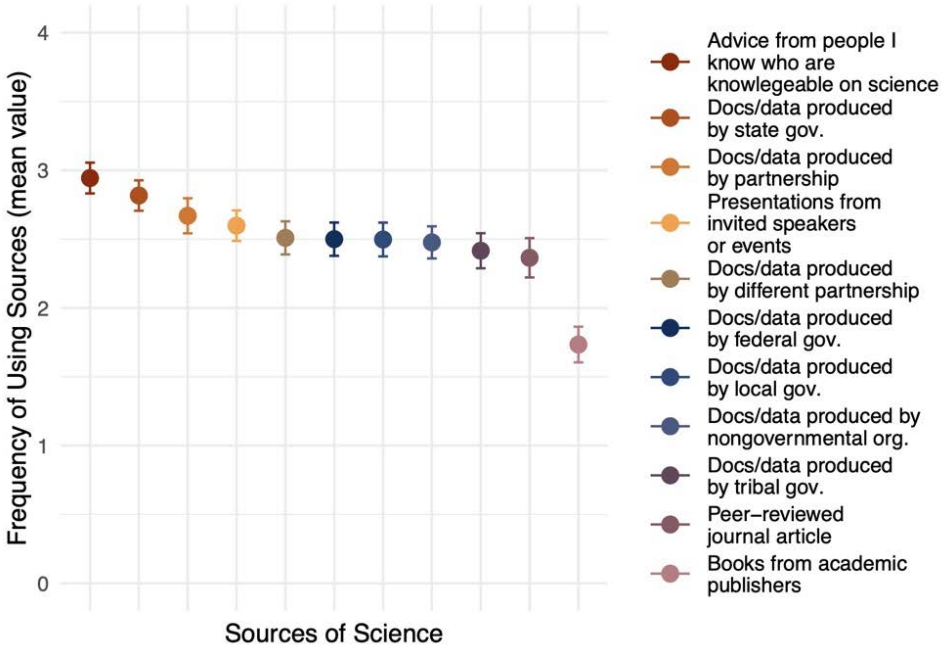


Figure 16. ***Sources of science****: Frequency of searching for the following sources of science, on a scale from 0 (never) to 4 (extremely often) (n=211-214)*



Respondents encountered a variety of obstacles to finding science, such as time constraints, too much data to sift through, and missing data (figure 17). In overcoming these obstacles, they again turned to their networks, most often requesting help from others within or outside their partnership (figure 18). For those who relied on their networks, these relational strategies were reported as more effective than other strategies (figure 19).

Figure 17. ***Obstacles to finding science****: Frequency of the following obstacles to finding scientific information, on a scale from 0 (never) to 4 (extremely often) (n=203-207)*

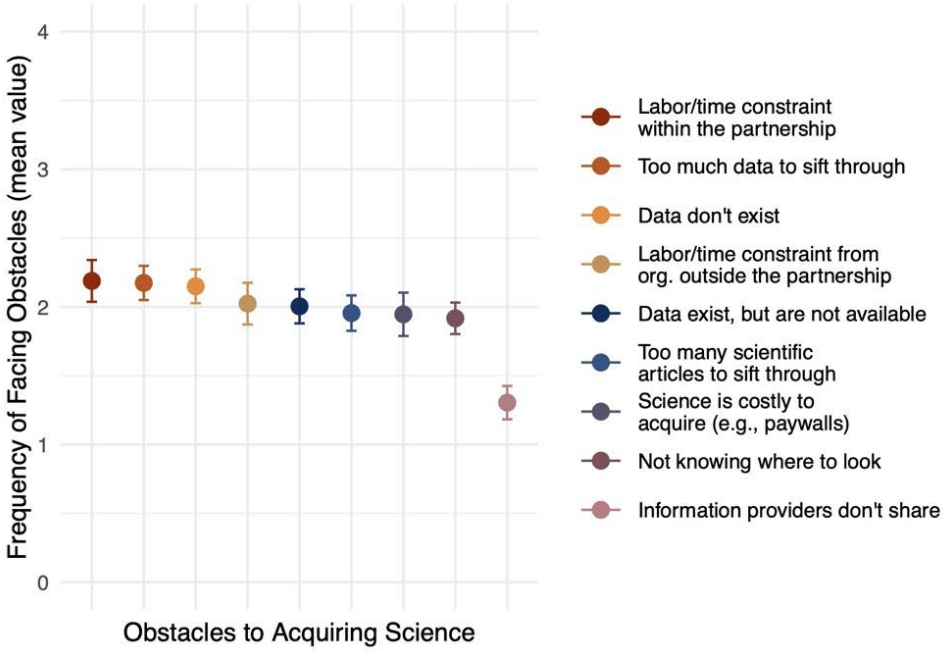


Figure 18. ***Bridges to overcome obstacles****: Frequency of using the following strategies (bridges) to overcome obstacles to finding science, on a scale from 0 (never) to 4 (extremely often) (n=207-209)*

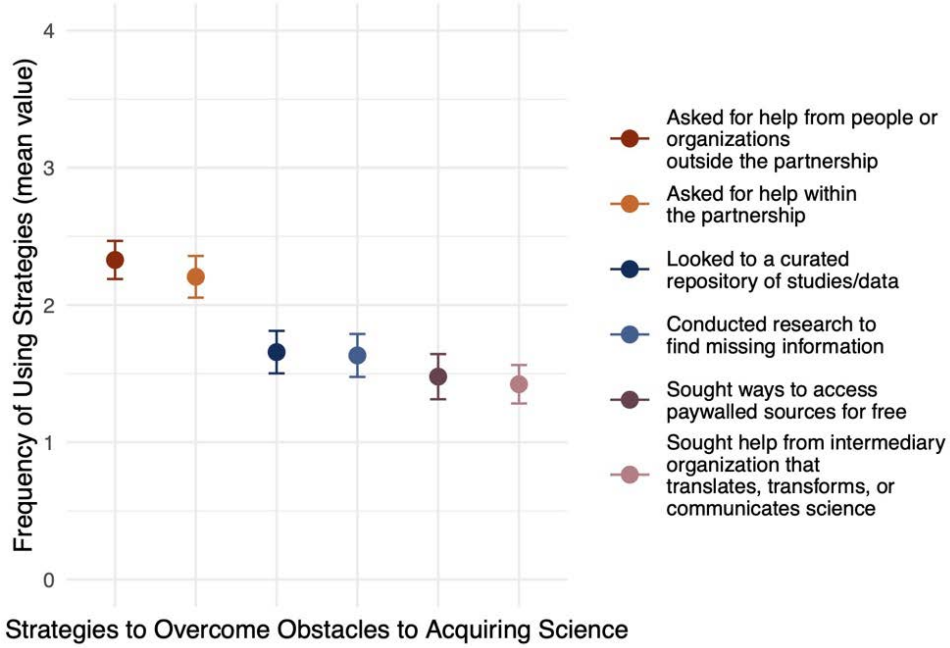
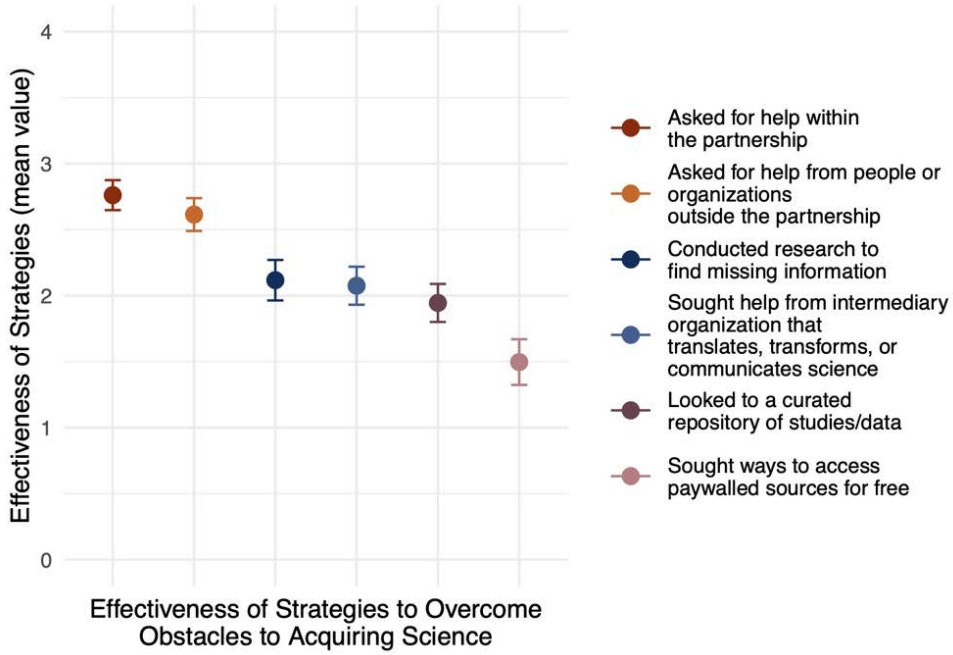


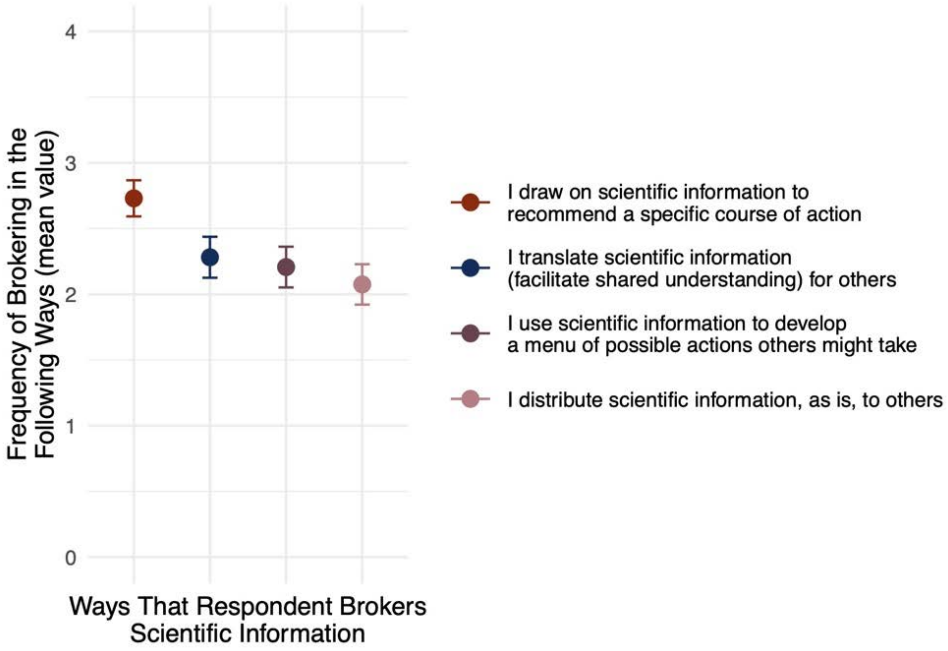
*Figure 19. **Effectiveness of bridges**: Effectiveness of the above strategies (bridges) to overcome obstacles, perceived by respondents who indicate that they use them, on a scale from 0 (not effective) to 4 (extremely effective) (n=141=184)*



4. How do respondents broker science in their partnership role?

Respondents most often draw on scientific information to recommend a specific course of action. Results suggest that they sometimes broker scientific information by translating it and using it to develop a menu of possible actions (figure 20).

Figure 20. ***Ways of brokering scientific information:*** *Frequency of brokering scientific information in the following ways, on a scale from 0 (never) to 4 (extremely often) (n=198-200)*



5. What makes scientific information useful?

Figures 21-24 address characteristics that make scientific information useful, including relevance, credibility, alignment with other information, and its mode of communication and production. Prior research indicates scientific information is likely to be more useful when it scores higher on these dimensions (Cash et al., 2002). Figures 21-24 provide a closer look at how respondents evaluate these dimensions. Results indicate that when assessing usefulness, respondents place high value on qualities (i.e., indicators) such as relevance (figure 21), whether it comes from a reputable source (figure 22), is produced transparently (figure 23), and to a lesser degree, aligns with other research and preexisting data (figure 24).

*Figure 21. **Indicators of relevance**: Importance of the following indicators to the usefulness of science, related to relevance, on a scale from 0 (not important) to 4 (extremely important) (n=208-210)*

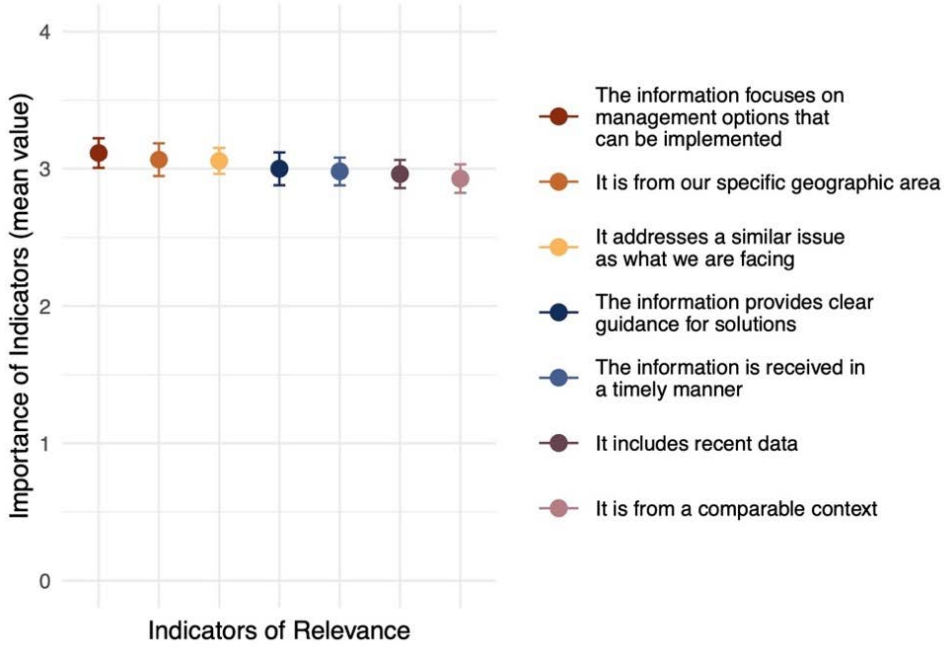


*Figure 22. **Indicators of credibility**: Importance of the following indicators to the usefulness of science, related to credibility, on a scale from 0 (not important) to 4 (extremely important) (n=207-211)*

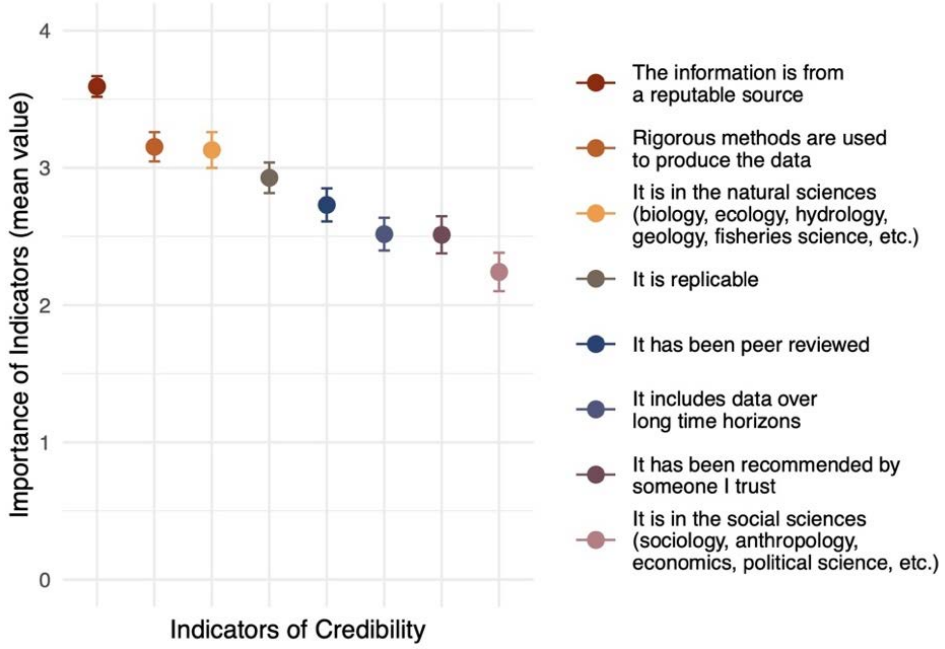


Figure 23. ***Production & communication of science****: Importance of the following indicators to the usefulness of science, related to the production & communication of science, on a scale from 0 (not important) to 4 (extremely important) (n=204-207)*

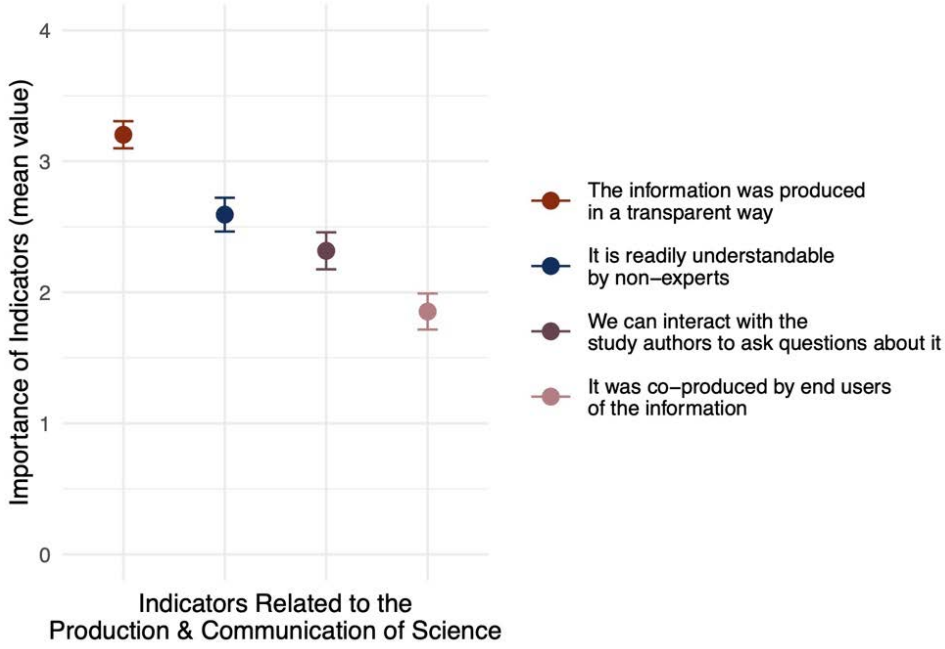
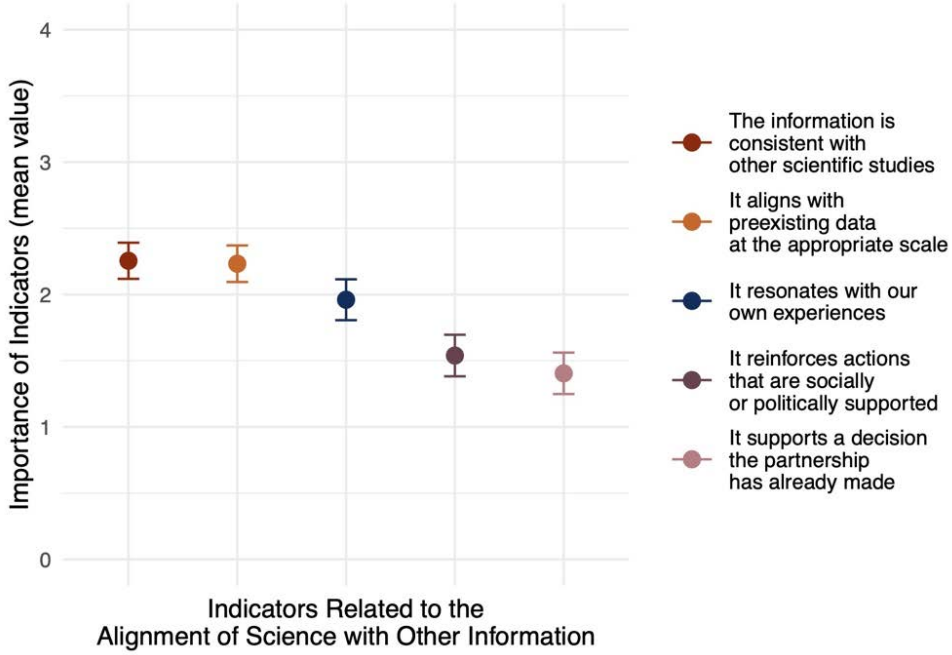
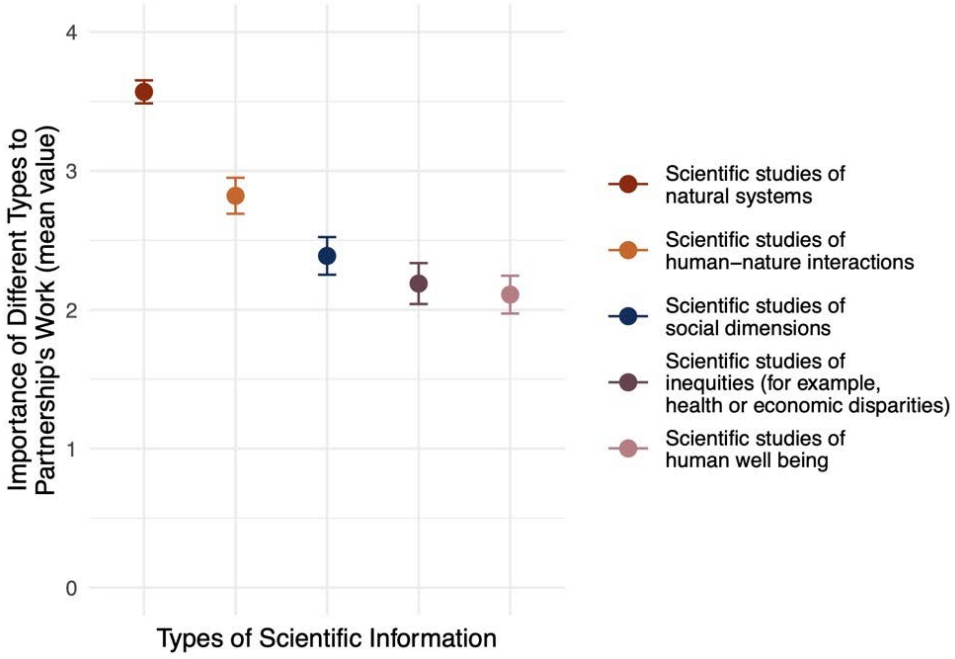


Figure 24. ***Alignment of science****: Importance of the following indicators to the usefulness of science, related to alignment of science with other information, on a scale from 0 (not important) to 4 (extremely important)*



Scientific information can come from many different fields of study. Respondents feel that scientific studies of natural systems are most important to their work, compared to other fields like human well-being and other social aspects.

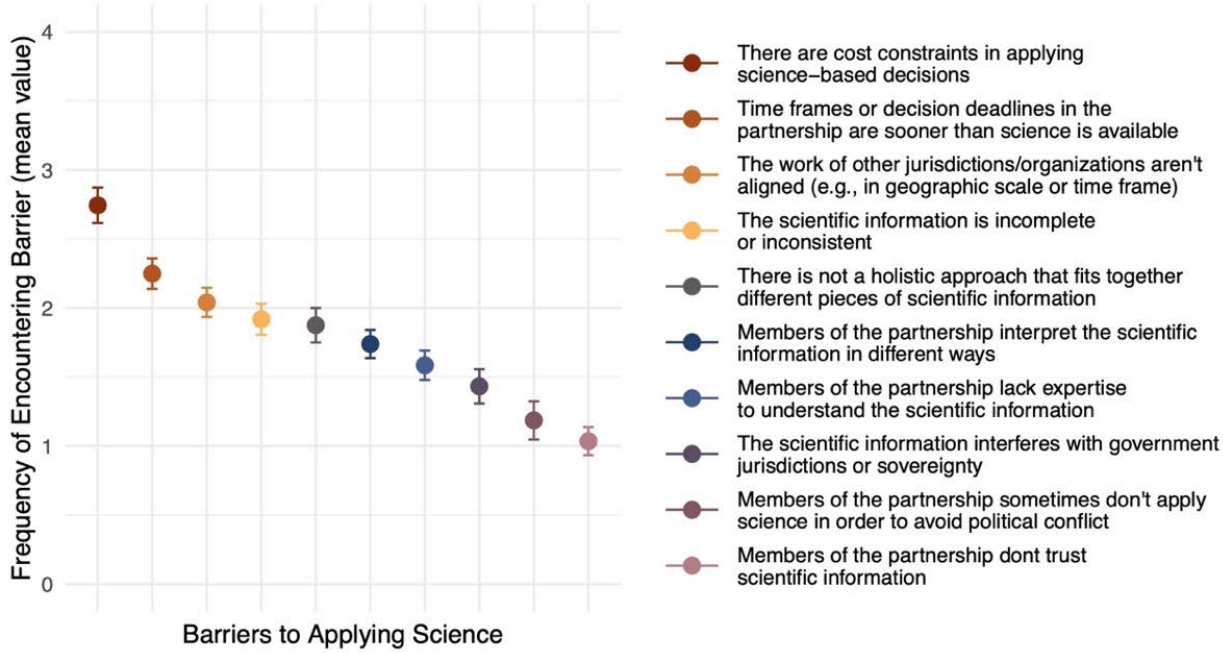
Figure 25. ***Types of scientific information****: Importance of the following types of scientific information to their partnership's work, on a scale from 0 (not important) to 4 (extremely important) (n=201-202)*



6. What are barriers to applying scientific information?

This study treats 'applying' science as distinct from 'finding' science, explored in an earlier section. Applying science pertains to the process of transforming scientific information into actions that can be implemented on the ground, such as plans or policy recommendations. Respondents suggest that logistical constraints, such as cost and decision deadlines, are the most common barriers, with political conflict and distrust in scientific information the least common barriers to applying science (figure 26).

Figure 26. ***Barriers to applying science****: Frequency of challenges to applying science, on a scale from 0 (never) to 4 (extremely often) (n=192-200)*



7. How do partnerships work with other types of information alongside science?

While most questions in this survey asked about 'scientific information', we were also interested in 'other types of information', which we defined as "beyond scientific information (for example experience-based or place-based knowledge)". Results suggest that other types of information are generally considered important. Respondents place relatively high value on information about organizational capacity; traditional, place-based knowledge; and experience-based information about the environment (figure 27). Respondents report a range of obstacles to finding other information, but generally agree that the most frequent obstacles relate to having insufficient time or labor to find it (figure 28).

*Figure 27. **Other types of information**: Importance of other types of information to their partnership's work, on a scale from 0 (not important) to 4 (extremely important) (n=199-201)*

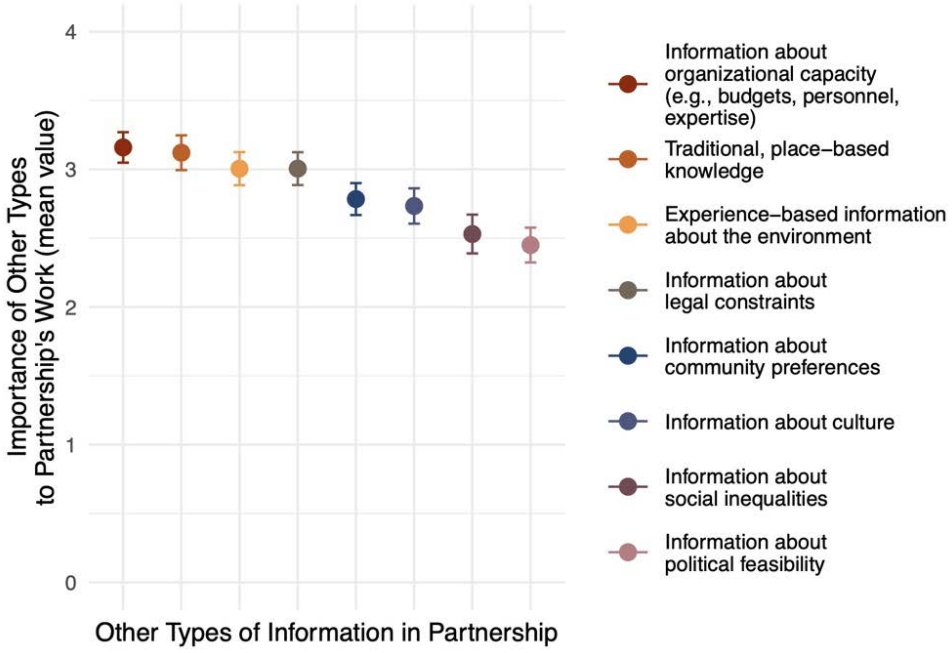
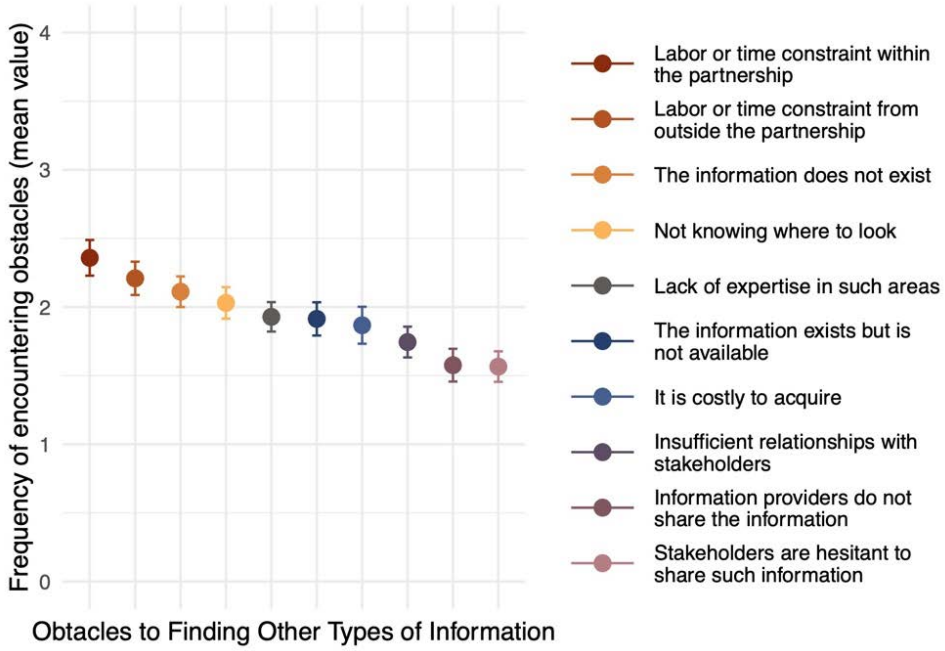


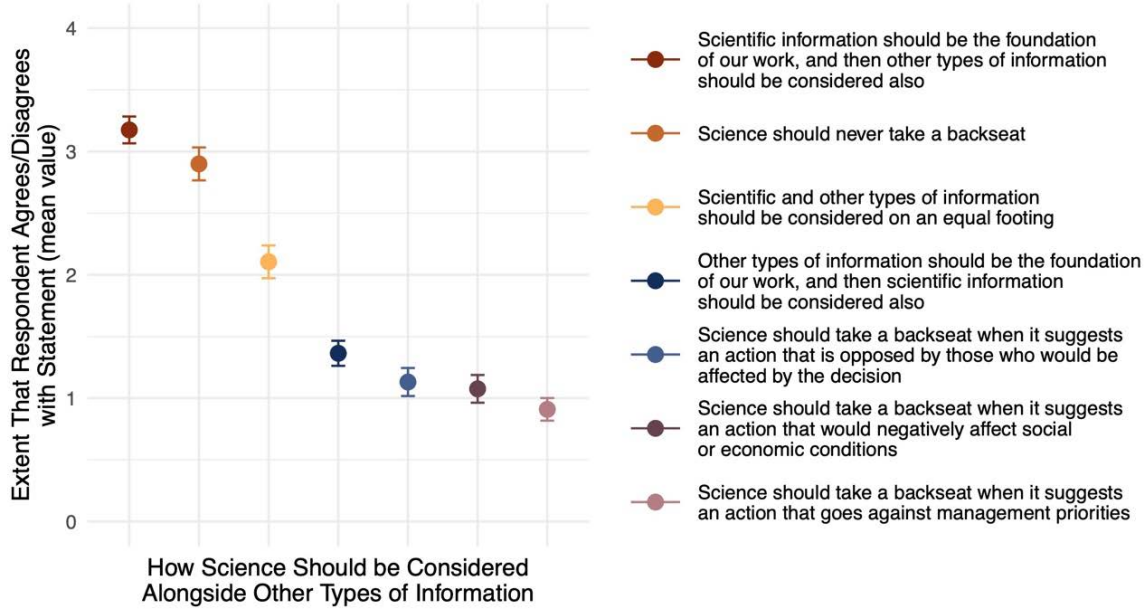
*Figure 28. **Obstacles to finding other types of information**: Frequency of encountering obstacles to finding other types of information, on a scale from 0 (never) to 4 (extremely often) (n=196-198)*



In considering how scientific information should be considered relative to other types of information, respondents generally feel that scientific information should be the foundation of their work, followed by other types of information (figure 29). To interpret figure 29, it is especially useful to review the weights that we assign to our ordinal scale (see box). A value below 2 indicates that respondents disagree with the statement. Results therefore suggest that respondents generally feel that science should never take a backseat to other information, even if it goes against management priorities, negatively affects economic or social conditions, or is opposed by those who would be affected by the science-based decision.

Strongly agree = 4
Agree = 3
Neither agree nor disagree = 2
Disagree = 1
Strongly disagree = 0

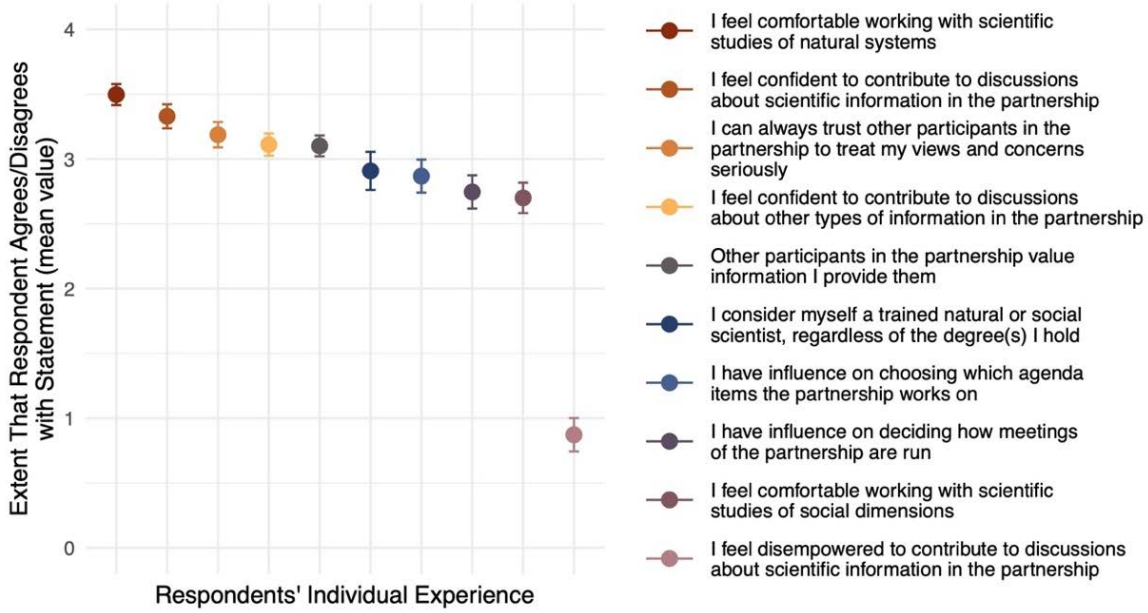
Figure 29. ***Relationship between science and other information****: How respondent feels that other types of information should be considered alongside science, on a scale from 0 (strongly disagree) to 4 (strongly agree) (n=198-200)*



8. How do respondents feel about their own participation in partnership activities?

Figure 30 considers how respondents perceive their individual experience in their partnership's activities, especially how they feel working with scientific and other types of information. Participants generally feel confident working with various types of information and indicate positive experiences in decision-making processes.

*Figure 30. **Individual participation experience**: Extent that respondent agrees or disagrees with the following statements, on a scale from 0 (strongly disagree) to 4 (strongly agree) (n=196-197)*



Conclusion

This report includes the raw findings from a sample of questions in our study's survey, examining the use of science and other kinds of information by ecosystem recovery partnerships in the Puget Sound region. Members were identified as eligible for our survey if they indicated participating in decision-making activities within one of the partnerships in our sample[2]. These raw findings provide insight on many questions related to the use of science and other information. We are eager to look closer at this data, such as examining correlations among responses, whether responses differ by partnership type or individual expertise, and whether the survey responses are consistent with our prior interview responses.

We hope these results will inspire conversations about the nuances that underlie these trends, along with opportunities to strengthen the use of various kinds of information in collaborative processes. As a reminder, these findings indicate averages across all survey respondents from a variety of partnerships. They do not necessarily reflect the particular experience of a given partnership or its members. We therefore encourage readers to reflect on their unique experience and how these questions might be answered within their own partnership. Please

[2] Eligibility was determined by selecting the activities shown in figure 12. Respondents to later questions do not include individuals who indicated that they participated in 'networking with others in their partnership', but no other activities related to decision-making.

feel free to contact our research team with comments and questions. We are happy to hear from interested readers.

Acknowledgements

Our research team is extremely grateful to those who took the time to respond to our survey, along with over 33 partnership coordinators who helped us administer it. The help of coordinators was critical to our study, not only with survey distribution, but also providing valuable information to ensure a smooth experience for respondents. We would also like to thank our study's advisory board, along with other practitioners who examined the survey and provided important advice. We also thank Trevor Helgeson, Natalie Horn, and Megan Trainham, who served as undergraduate research assistants from the University of Washington, Tacoma. We also acknowledge the National Science Foundation (grant #212247), which provided funding for this research.

Funding

This material is based upon work supported by the National Science Foundation under Grant No. 212247. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

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