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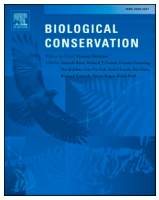

Perspective

Overcome imposter syndrome: Contribute to working groups and build strong networks

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ABSTRACT

Scientific working groups bring together experts from different disciplines and perspectives to tackle the "wicked problems" facing natural systems and society. Yet participants can feel overwhelmed or inadequate in groups within academic environments, which tends to be most acute at early career stages and in people from systematically marginalized backgrounds. Such feelings can block innovation that would otherwise arise from gaining the full spectrum of unique perspectives, knowledge and skills from a group. Drawing on personal experiences and relevant literature, we identify ten contribution strategies, ranging from generating ideas, analyzing data, and producing visuals to supporting facilitation. Next, we share approaches for an inclusive and supportive process, considering the roles of both participants and leads. Generating the most productive and relevant outcomes from working groups requires engaging the full team in a constructive and supportive environment. We advocate that adopting inclusive approaches that respect the diversity of personality types and perspectives will lead to more innovative solutions to achieve conservation and sustainability goals.

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1. Introduction

Late career-stage ecologists remember a time when graduate students in the fields of Biology, Ecology and Conservation would work with a sole supervisor to test a single hypothesis about a particular local system. Data were then analyzed using fairly straightforward statistics (note that computational power was often limited historically), which led to a manuscript written up for publication within a discipline-specific journal with the student as first author and the supervisor as the second and often only other author. Times have changed, the pace of research has accelerated, and the means to obtain scientific results have expanded. Large data sets are now collected in both time and space that greatly exceed what any one student could collect over the course of their degree, and advances in computing power have made advanced techniques and sophisticated tools more accessible. Platforms and centers for synthesis efforts have emerged to promote formal collaborations including face-to-face workshops, such as the National Center for Ecological Analysis and Synthesis (NCEAS) established in 1995 (Hackett et al., 2021). Many similar centers are now established across the world (see for a progression time and list: The International Synthesis Consortium, https://synthesis-consortium.org/). Many informal groups have also emerged with shared interests in solving global challenges. These groups often involve networks of experts that convene to make progress towards project goals. The environment for early career researchers (ECRs) has therefore shifted drastically in the past few decades, and working collectively in groups is an increasingly important ingredient for early career stage and even whole-of-career success (e.g., Li et al., 2019).

We suggest the mantra of "*Publish or Perish*" has naturally evolved to "*Partner or Perish*". Large collaborative team efforts are now a key part of building diverse and innovative thinking to solve problems that did not exist (or were not acknowledged) in the past (Hackett et al., 2021; Brasier et al., 2020; Read et al., 2016; Wuchty et al., 2007). Scientific working groups also provide immediate benefit to ECRs for developing methods to answer their current research questions and provide longer-term benefit by fostering relevant professional connections at a critical career stage. Similarly, working groups and the relationships, ideas, and collaborations that evolve can inject energy and momentum to more senior colleagues, inspire the rethinking of entrenched narratives and provide unique mentorship opportunities. In a time when many senior researchers are beleaguered by multiple demands on their time and cannot always find the time to learn how to use cutting-edge tools, working group participants can provide a willing and helping set of skilled hands.

Diversity within workshop teams (e.g., age, gender identity, experience, country of origin, culture, training, ethnicity, economic class, affiliation, employment, stakeholder and many other aspects of diversity) is a priority for the success and impact of collaborative research (Halpern et al., 2023; Cheruvelil et al., 2014). Diverse and disruptive thinking can inspire researchers to broaden their perspectives on potential avenues and approaches, subsequently enhancing overall creativity (Leung et al., 2008). Indeed, bringing interdisciplinary teams comprising diverse entities together will lead to more holistic solutions to support healthy natural systems, management and conservation targets, and thus create societal benefits (Shellock et al., 2023; Brasier et al., 2020; Pannell et al., 2019).

Working groups can be structured in a range of ways depending on the objectives and intended outputs. Yet even in the most supportive settings, it can be difficult to identify how to effectively contribute as an expert participant within a team comprised of supposedly outstanding minds and award winning colleagues, especially for ECRs who may feel overwhelmed in such settings (McGill et al., 2021; Chrousos and Mentis, 2020). The imposter syndrome, or imposter phenomenon, manifests as feelings of self-doubt in high-achieving and high-functioning individuals (reviewed in Huecker et al., 2024). The accompanying feelings of fear, doubt and anxiety are common among all races and genders (Bravata et al., 2020). Such unjustified imposter-type reactions are often tied to coping strategies that ultimately impede the ability of an individual to successfully contribute in group settings (Noskeau et al., 2021; Bravata et al., 2020). Due to their nature, working groups are a setting where participants may experience imposter feelings that may negatively impact interpersonal, competence and well-being related outcomes (Tewfik, 2022).

Here, we consider working groups aiming to produce typical scientific outputs, such as peer-reviewed manuscripts describing new methods and ideas, or testing hypotheses using data compiled and analyzed in novel ways. Our overarching objective is to offer supportive and actionable strategies to empower the upcoming generation of scientists to collaborate more effectively and to raise awareness of the importance of diverse perspectives among more established researchers (Specht and Crowston, 2022).

While we have tailored our manuscript to connect most closely with the perspective of ECRs during working group dynamics, we acknowledge that working group settings can be intimidating for all participants for many reasons. We therefore anticipate our suggestions will also resonate with a wide audience representing different positionalities and identities on diversity spectra, including senior experts. Our suggestions may also be more widely applicable to other formal or informal groups where diverse insights and skills are requested. Thus our goal is for ECRs to read this article, recognize that their feelings are not unique, and find ways to contribute meaningfully and effectively even when working group dynamics are not ideal. We also hope senior researchers will read this article, become more aware of the challenges facing ECRs, and adopt methods to foster inclusive and safe environments for innovation and synthesis. Moreover, if groups share this article broadly with many audiences, our paper may effectively socialize these ideas across different backgrounds and career stages. Finally, we hope those running synthesis centers will read the advice below and consider institutional strategies to bring these suggestions to their own participants.

We first identify strategies for possible contributions to an in-person working group, including specific tasks that are required to produce excellent scientific outputs, insights on how to engage with participants during in-person events, and how to follow up after the event. These work-focused strategies are relevant even when a group is not organized with inclusivity in mind, and thus may be even more important when feelings of overwhelm or inadequacy might otherwise block contributions or development of strong networks. Second, we offer general tips to make the most of a working group as a participant, considering different personality types, and help to create a positive dynamic. Third, we summarize key tips based on our collective experience (and failures) to facilitate an inclusive environment and generate the most productive outcomes for working group leads.

2. Get out of the way imposter syndrome: ten ways to contribute to working groups

To consider the various pathways that one can contribute to a working group even when the dynamic of the group could be improved, we suggest first recognizing the scientific, interpersonal, and collaboration strengths that different participants bring. Prior to the working group we suggest ECRs map out their skills and experiences, thus producing a useful reference when feelings such as self-doubt or imposter syndrome get in the way of their contributions. Some ECRs may struggle to build such a list, and if this is the case, ask for insights from colleagues or write down one's weaknesses (strengths will often be the flip side of weaknesses). For instance, "*I don't know much about sea urchins*" becomes "*I bring a new perspective to sea urchin science and my seemingly naive questions can sometimes reveal hidden assumptions*". Invest time into trying to understand any self-doubt triggers that arise and identify any beliefs that your abilities are innate and can't grow (Dweck and Yeager, 2019).

One's strengths in a working group may also be relative to the others. If there are numerous experienced participants with expert skills in, for

example, advanced statistical analysis, one could consider helping with time-consuming but nevertheless critical tasks like quantitative literature reviews (which can build one's knowledge base) or designing and creating figures. Remembering that expert thinking on a topic is often expressed in professional "echo chambers", which can prevent identification of flaws of logic or inconsistencies that are obvious to those with a fresh or less biased perspective. It is therefore worthwhile speaking up if there is something that emerges which is difficult to understand or if alternative perspectives come to mind.

It is also useful to identify and prioritize one's personal goals in being a part of the working group. For instance, an ECR may seek to achieve a dissertation chapter from the work (which will support their progressing towards a degree), identify members to serve on their graduate committee, gain useful skills or expertise (such as in coding or statistical analysis), become more knowledgeable about the topic(s) covered by the working group, identify solutions to a problem, and broaden professional networks. Being able to express one's top reasons for participation will help participants to prioritize time allocation during and after the meeting.

We propose ten approaches to contribute to working groups, overcome feelings of overwhelm or inadequacy, and promote innovation to enhance personal career satisfaction and success (Contribution strategies: Fig. 1a). These approaches cover a diverse set of tasks leveraging different skillsets and providing opportunities for supportive engagement.

2.1. Generate ideas

The process of generating ideas is crucial to workshop success and idea generation can occur at different moments throughout the working group process, including official and unofficial interactions. Workshop participants can leverage their individual strengths and collectively lead the group towards more relevant idea generation processes and present new ideas that emerge, even if those ideas are not ultimately used directly. New ideas are the core seeds of research which are then developed by diverse teams with different skills. For instance, a mathematical formula developed in a working group is a "new idea" that can advance an entire line of inquiry with a new analysis tool. Creating a conceptual figure (digitally, using a whiteboard, or pen and paper) to visually explain and organize ideas may act as a catalyst to connect ideas to a central concept and illustrate what is new about how a particular topic is pitched. It is important to remember that not every idea will succeed, but all thinking and discussion on a topic will strengthen the potential research output.

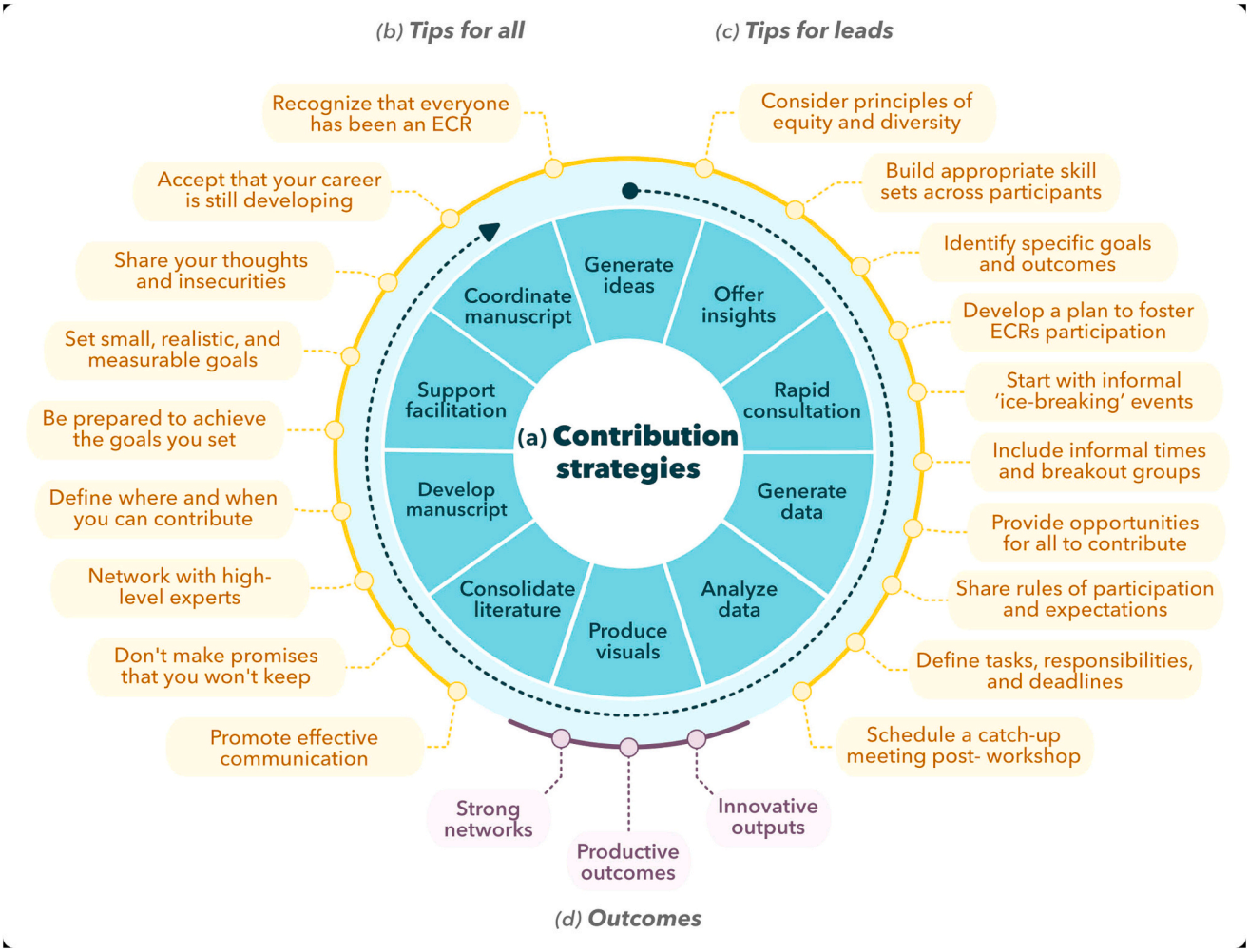

Fig. 1. General strategies for meaningful contributions to scientific working groups. Here we start with an inner circle (a. green) that depicts suggested pathways through which individuals can contribute to working groups (even when suffering from imposter syndrome). Outside the inner circle are additional practical tips for working group participants with a focus on early career stages (b. left yellow) and workshop leads (c. right yellow), both before entering a working group and throughout its duration. We advocate that by adopting this comprehensive approach, outcomes (d. purple) will be stronger through collaborative engagement and higher productivity when inadequacy or imposter syndrome is diminished, ultimately leading to greater innovation. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

2.2. Offer insights

Problem-solving in groups represented by participants that combine non-experts and experts creates the "assembly bonus effect", where greater performance occurs within a team versus individual performance (Jackson, 1996). All working group participants can make valuable contributions beyond specific ideas by enriching the workshop outcomes with different insights and alternative viewpoints (Jackson, 1996). For instance, summarizing or resolving perspectives in the room and emphasizing a missing point or an area where further exploration or investigation are important contributions. Even simply identifying confusing points, terms, or ideas within the discussions and materials generated is helpful. By highlighting areas of confusion, participants help foster clarity and understanding, ensuring the objectives of the workshop are communicated effectively.

2.3. Be available for rapid consultation

Workshop participants can benefit from consultation with a dedicated team that will prioritize providing expert guidance on specific topics and exploring potential solutions to problems. Supporting strategic and impromptu one-on-one and small group consultation/breakout sessions is one tangible way to encourage rapid progress. Agreeing to consult can involve targeted feedback, trouble-shooting issues that arise and block progress, and bouncing ideas to identify the best path forwards. For instance, participants can provide valuable feedback on conceptual frameworks, visuals, data analyses or the design of sensitivity tests, and thus help to refine assumptions and identify potential weaknesses and gaps.

2.4. Generate data

Data generation is a critical way to contribute to a workshop. Consider producing or consolidating data or data layers by analyzing datasets that are brought to a working group, filling data gaps by adding to and scoring new datasets, and performing error checks to ensure the accuracy and completeness of data. New data products can also arise as a specific product from a working group, such as when experts input knowledge and together complete steps required to generate new information for many species or regions. For instance, taxonomic experts might convene to score species traits and build a database on the biological characteristics of many species.

2.5. Analyze data

Many ECR participants possess strong analytical skills and a passion for data-driven research. Data analyses are a key area where participants may contribute. This could involve helping to design and code analyses, conduct sensitivity tests, manage data repositories, and produce reproducible scripts for publication purposes. Coding, modeling, and reproducibility will make sure that the working group outputs are based on robust and defensible analyses, ultimately increasing the value and impact of the research and meeting the requirements for open science (McKiernan et al., 2016). Independent analyses are extremely useful as a validation tool when dealing with large datasets, where a slight coding error can potentially result in erroneous output.

2.6. Design and produce visuals

Graphic and information design are increasingly important in science communication (Polman and Gebre, 2015). Indeed, learning and retention of new information is more efficient and effective when text is combined with visuals, compared to text alone. Therefore presenting complex information, data and insights in a way that is most effective in supporting learning and recollection is a critical skill (Dunlap and Lowenthal, 2016). Those with a creative eye or experience in graphic design and coding may be particularly well-suited for producing science-related visuals and playing important roles in working groups. Participants can develop representations of the data, graphs, or tables that help to communicate key pieces of information. Diagrams, infographics, or art that summarize key points or highlight important themes discussed in the workshop are valuable outputs. Creating visuals not only supports visual learners but also produces lasting materials that can be easily shared on social media to reach larger audiences.

2.7. Consolidate literature

Literature consolidation is a crucial process that involves searching for relevant papers, curating them in an accessible library, and distilling the key and pertinent aspects of their messages (Ivey and Crum, 2018). By actively engaging in literature consolidation, participants play a vital role in synthesizing existing knowledge and identifying key insights that can inform the workshop's objectives and methodologies. As a co-benefit, such searches can also be an enjoyable learning experience full of surprises that open new research fields. Moreover, paper citations are well known for biases, such as self-citations and favouring authors from more privileged, developed countries. Thus efforts to reduce biases through more systematic and inclusive literature searches are a fundamental activity that contributes to cultural change within the academy (Davies et al., 2021; Chakravartty et al., 2018).

2.8. Develop manuscript framework and text

ECRs in a working group can play many crucial roles in contributing to the production of a scientific manuscript framework and text development. During the working group, tasks include providing input on the overall manuscript structure, defining key research questions, and outlining the main objectives and hypotheses. For instance, helping to develop a table highlighting the group's hypotheses or extracting case studies that support a central aim and providing feedback on the coherence of the manuscript while ensuring that the scientific content is presented accurately, represent significant contributions. Overseeing the writing process of specific subsections during a working group meeting when work flows are intense, and integrating feedback from co-authors, is another key area that will help move a paper forwards more efficiently.

2.9. Support facilitation

Academic working groups often do not have the budget for professional facilitators, but still require a 'guide' to make sure everyone in the room gets heard, ensure that ideas and assumptions are properly interrogated, and clearly identify the actionable ideas. Facilitation often falls on the workshop organizers, which can be exhausting and may not leave a lead with the bandwidth to critically engage with some of the ideas generated. Offers to facilitate a session from a prepared ECR who has read about different types of facilitation practices (e.g., Honey-Rosés et al., 2020; Papamichail et al., 2007), and has built key facilitation skills (e.g., Cameron, 2005) will likely be very well received. If taking center stage by facilitating during a session is daunting, offer to help with record keeping. Traditional note-taking and posting main points ensures all voices are recorded, and actionable items highlighted, to make everyone feel included, and can also be instrumental in supporting post-workshop products. Another facilitation option that might be better suited to some personality types could be to organize a social event (such as music, sports, quiz, an adventure), which is both fun and builds networks.

2.10. Coordinate support for manuscript completion

Starting papers is relatively easy, but finishing papers is difficult against a backdrop of other tasks. Recognize that most participants will

find it difficult to follow through post-workshop once they return to their lives and re-assume their myriad responsibilities. To nudge the progression of papers one can connect with paper leads after the workshop and ask if there are tasks that need to be completed such as managing communications to a large authorship team, coordinating revisions to the manuscript, or helping with a cover letter before submission. Some tasks such as completing references or finalizing co-author lists are difficult to prioritize for lead authors, but are straightforward to complete and are thus invaluable. As manuscripts progress, even simply reviewing drafts quickly when asked will support lead authors working with large coauthor teams. Being prompt and communicative can embed one's contributions deeply, and lead to invitations for future efforts.

3. General tips to make the most of a working group

There are some common pieces of advice for both ECRs and leads to make the most of a working group - promoting a constructive and respectful environment is everyone's job (Fig. 1b).

As human beings, we want to engage with people who make us feel good, not just informed or knowledgeable. Being a positive presence will make the strategies above that much easier to implement, and distinguish a participant as a key person for future collaborations. We also possess our privileges and biases, many of which we remain woefully unaware of. Strong team players will reflect before and during the workshop on how to support and respect fellow participants. Interpreting others through the lens of positive intent (i.e., assuming good intentions of one's colleagues) tends to translate to a more positive experience. Likewise, to be present in the activities developed during the working group and keep curious about every idea exposed is essential to promote positive relationships among all participants.

While there are many actions participants can undertake to support others, two concrete actions emerge as being particularly simple and easy to implement. First, it is important to recognize one's role as an "ally" and act accordingly: it may be tempting to be the "smartest" or "loudest" voice in the room. Yet shaping a rewarding experience for all often requires remembering to be quiet and listen, support others to share their ideas, and allow space in between the progression of thoughts in a group. Second, an inclusive dynamic is damaged when participants do not accurately attribute ideas to those who formulated key input and concepts. As a participant, remembering to mention "Person A and Person B both had a great idea and I would like to pick up that idea…." is surprisingly effective at creating a very positive and supportive dynamic for all.

3.1. I'm an early career researcher: help me!

Yet even in the most supportive groups, being surrounded by seemingly brilliant, experienced, and knowledgeable colleagues can induce feelings of inadequacy. Recognize that everyone passes through the ECR stage at one point in their academic careers and that their skills, knowledge, and expertise have been developed over time. Share thoughts and insecurities with other ECRs, postdocs and colleagues, as appropriate within a professional setting. It might be surprising, and reassuring, to discover how many colleagues, even those in senior positions, have experienced similar feelings throughout their careers. Many senior academics still can feel inadequate at times, and yet it has not hindered their career progression, although it may have impacted how much they have enjoyed their path. Setting small, realistic, and quantifiable personal goals for interaction can build towards overcoming imposter syndrome, e.g., "I will try one time today to overcome my nerves and contribute one point during today's discussion". Indeed, most people underestimate their capacity to change through time (Quoidbach et al., 2013), but imposter syndrome is not part of one's DNA, it is something one can overcome by adopting a learning mindset (Noskeau et al., 2021) and through building confidence and experience.

A benefit to participating in working groups at early career stages may be developing fruitful and long-term connections. Indeed, working groups are an opportunity to access new mentors and develop one's network. Many working groups are organized with purposeful social time where participants can discuss and share ideas, and ask questions. Being supportive and curious towards others means that one will develop new relationships and is a skill that can be developed simply by asking questions. Investing effort in social interactions within the working group will increase your interpersonal effectiveness and can be a positive way to overcome imposter thoughts (Tewfik, 2022). Additionally, new mentorship relationships and valuable professional relationships can evolve. For instance, senior collaborators often write job references for candidates - a reference from an international professor can be influential as it builds a case for breadth and impact, and a broad collaborator network. Thus, we recommend making sure to communicate effectively and enjoy the interactions with one's colleagues as they unfold during a working group.

Participants should also refrain from making promises for contributions that they cannot keep, or that will ultimately compromise other higher-priority aspects of their other work. Saying "no" in a working group can be difficult due to inherent power imbalances. For instance, it might feel difficult to decline when a senior scientist or mentor asks an ECR to lead a specific output of a workshop, even though answering positively to such requests is not an obligation. Considering one's priorities, whether the output aligns with one's career priorities, and identifying if one has enough time to complete an output, are important when deciding what tasks to take on. Although it may be difficult for ECRs to gauge the workload involved in different outputs, being transparent about availability to avoid committing to tasks that cannot be completed is important. If one finds they have over-committed and are unable to complete an output or promised task, honest communication with the team they are working with or to the working group organizers (as appropriate) to update the group on their availability is all that is needed. Effective communication means redundancy in teams can be drawn upon to fill gaps while failing to communicate often means papers or other outputs are significantly delayed with consequences for the entire team.

3.2. I am a working group lead, how can I promote an inclusive dynamic?

While clearly identifying opportunities and responsibilities of working group participants is less emphasized, much has been written on how leads can structure working groups for positive outcomes including principles of inclusive leadership (Randel et al., 2018). Here we draw on both the literature and our collective experience to highlight recommendations that have emerged as reliable strategies to generate successful outcomes and productive/respectful spaces across many different working groups (Fig. 1c).

Before the workshop starts, consider the principles of equity and diversity (Orth et al., 2022). Maximize the diversity of invited participants in terms of their perspectives and lived experiences where possible. Build appropriate skill sets across the full set of potential participants and identify and fill any gaps by inviting contributors with complementary expertise and experiences. A balance of participants is needed; people who can provide strong intellectual input, but who lack the time to lead new papers, researchers with ideas and motivation to grow their publication record, and who may hope to hone and communicate their ideas more eloquently through collaboration.

Given that imposter syndrome is now well recognized as blocking contributions in group settings, as discussed above, working group leads can open the workshop to reduce such feelings. Consider sharing any experiences of imposter syndrome with ECRs that are relevant, including from the literature (Chrousos and Mentis, 2020). Discussing the different contribution pathways (described above, Fig. 1a) that are relevant for a particular working group, and ensure that alternative platforms for input are available (such as shared documents or online chat options).

Also take time during the workshop with ECRs, as appropriate, to provide positive feedback and to ask if any accommodations are needed to ensure contributions are maximized.

Schedule time at the start for informal 'ice-breaking' events and introductions - this step is critically important, appears in all working group guidelines, yet is often overlooked. For instance, use sticky notes or a digital whiteboard to identify key interests and contributions from participants or invite participants to share a fun fact, request introductions through a favorite organism, memorable scientific failures or most "useless" talents. Responses can show that it is safe to fail while generating some laughter, help all to associate names with new colleagues, and give a sense of what roles participants may play. Such thoughtful introductory activities and approaches will break down perceived and real barriers for engagement and participation. Fear of failure is considered one of the most important achievement constructs driving imposter feelings (Ross et al., 2001). Devising activities that show everyone has setbacks that require effort to overcome can normalise these fears and highlight the value of a learning mindset in advancing through your scientific career (Noskeau et al., 2021). "Fun" built into workshop schedules can further develop a sense of commitment and reduce interpersonal tension (Orth et al., 2022; Fine and Corte, 2017). Shared work can also break down hierarchies, such as when everyone stays and cooks together. Structuring schedules to include informal time and break-out groups so all participants have the opportunity for interactions outside of group settings will encourage the sharing of ideas to the group or initiate private conversations to ask for advice from colleagues. For ECRs, having their intellectual hero take an interest in them may also be a workshop highlight, and help them see themselves as a senior researcher one day.

After introductions, it is typical to discuss the working group objectives at the start of a meeting, but often the central concept may have already been established through a funded proposal process. All participants will likely not have had the opportunity to contribute to this document. As a result, it may be useful for group leaders to open each workshop session with an opportunity for feedback and input into the direction of the group's research and synthesis, and encourage exploration among participants where useful. Workgroups can be catalysts for related ideas to achieve widespread consensus and yield valuable if unanticipated, outputs.

Proactively provide opportunities for everyone to contribute to group discussion and develop an ongoing workflow to facilitate this objective, carefully considering how to gain insights from naturally "shy" participants. Strong facilitation is needed. First, have experienced facilitators seek out input and moderate participation, rather than allowing a dominant few to speak unchecked. Actions can include supporting those in the group who may not find contributing easy by reminding dominant voices to pause and openly inviting contributions from all. Second, alternative platforms for input can be effective in engaging contributions, such as anonymous polls or digital communication platforms where a name is not associated with a comment. The ideas and comments can then be used as a basis to bring up discussion topics for the entire group. Third, relying on small break-out groups and keeping plenary sessions to a minimum can encourage more even contribution from all because is often easier for shy individuals to speak up in smaller groups than larger ones. Indeed, ideal numbers for workshops are 12 and even smaller groups are needed to engage all participants in discussion, depending on personalities (Krueger and Casey, 2009).

Clearly communicate any working group rules of engagement and expectations during and after the event. Ensure all participants are aware of what the authorship policy will be and develop this authorship policy early. Use guidelines to set the tone for appropriate practice. For instance, the Committee on Publication Ethics (COPE) (https://publicationethics.org/authorship) offers key considerations for authorship, and the Vancouver Guidelines (many institutions now recommend this) set criteria for good practice (https://www.icmje.org/recommendations/). Co-authorship charters based on these principles, such as those produced by synthesis centers (https://www.idiv.de/en/groups-and-people/core-groups/molecular-interaction-ecology/default-270edabc4d.html) converge on guidelines: just being present at a workshop does not justify authorship. Here we identify "Contribution strategies" (Fig. 1) that represent tangible inputs to scientific publications. When followed up with manuscript revision and final approval prior to submission for publication, the typical requirements for meeting the expectations of co-authorship are met. Setting clear expectations during the workshop can not only help identify opportunities for co-authors and prepare them for what work is to come and when but is advised to prevent conflicts that may arise. Clear expectations on author roles will ensure assumptions are not made about who has ample time to lead ideas proposed during a meeting (i.e., lead author), and that contributions are clearly defined (such as who will be the senior author). Use time on the final workshop day to discuss and develop post-workshop plans. Write out tasks that remain open, map out collaborators whose inputs are required for each task, and decide on timelines for each task. Establish what will happen if timelines are not met. For instance, if a paper with a designated lead author is not published or continuing to progress after a certain time period, then identify if the topic will be open for others to take leadership on. We further suggest communicating clearly if there will be flexibility around co-author position if the degree of contribution evolves. Gather contact information for all paper contributors and schedule a tentative time to catch up post-workshop to provide updates on progress and outline next and final stages. Agree on and commit to realistic timeframes for providing input and feedback during post-workshop activities.

4. Towards integrative synthesis benefiting conservation science and people

ECRs have an enormous amount to contribute to scientific working groups and can play a significant role in providing support, energy, up-to-date skills and momentum for later-stage scientists who are overwhelmed with tasks but nevertheless still eager to learn and explore. ECR thinking can be less entrenched in particular paradigms, thus bringing fresh outlooks, novel ideas, and the most up-to-date quantitative or technological approaches to an ecological or conservation challenge (Fig. 1d). Overall, we expect outcomes will be stronger when working groups are planned with inclusive practices at the forefront.

Participating in an academic working group may also be a turning point in ECRs careers because of the opportunities to build professional networks beyond their usual small team (Fig. 1d). Sharing ideas in a workshop setting and working with a large authorship team is perhaps one of the most valuable forms of networking, offering a deeper level of engagement and relationship building that will likely lead to future opportunities. Ultimately, we should strive for a productive and enjoyable atmosphere in working groups: we have a job to do, but if we are uncomfortable or miserable while doing it, the quality and impact of our work will suffer. We hope the ideas we have shared here on how to contribute to working groups will help to achieve this goal.

CRediT authorship contribution statement

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Declaration of competing interest

The authors do not have any declarations of interest.

Data availability

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