



Reflections of a graduate student team on developing and implementing a transdisciplinary research project: Challenges, recommendations, and lessons learned

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Abstract

Graduate students can face difficulties collaborating across disciplines and outside of academia. Stakeholder-engaged research (i.e., research involving partners outside of academia) presents challenges for developing a project, finding collaborators, and co-creating knowledge. Past reflections on how to navigate stakeholder-engaged research assume a faculty member leads the project and do not often address implementation from a student-led approach. In this paper, we provide insight on our team science process from an applied, graduate student perspective. We reflect on the formation of our student team and the implementation of a tourism planning research project with community partners. We discuss challenges and focus on practical tips to overcome these challenges. Specifically, we include reflections on co-developing a research project, building authentic partnerships, negotiating power dynamics, and the role of institutional support. Lessons learned from this project can guide other graduate student teams working with stakeholders, as well as faculty seeking to train graduate students in stakeholder-engaged research.

Keywords Team science · Conservation · Participatory workshops · Tourism · Climate change

The 21st Century is characterized by rapid ecological changes entangling natural and social systems. To address socio-ecological system (SES) changes, we need scholars trained in natural and social sciences who can collaborate with non-academic practitioners. At the same time, scholars must democratize scientific inquiry so that research is less controlled by elites (e.g., the exclusive “Ivy Tower”) and more focused on co-producing actionable knowledge and solutions (Silka 2013). Stakeholder-engaged approaches acknowledge non-academic knowledge (e.g., local knowledge, traditional ecological knowledge) as a critical facet in creating locally relevant, actionable solutions to SES problems (Cundill et al. 2015). Importantly, stakeholder-engaged research involves an ongoing dialogue to create solutions that reflect the reality and lived experiences of stakeholders (Heiden and Saia 2021).

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Teams taking a stakeholder-engaged approach often face challenges related to differences in academic-practitioner methods and timelines, integrating stakeholders in a meaningful way, and finding institutional support (Lowry & Ford-Paz 2013; McGreavy et al. 2014). Graduate students frequently serve as boundary spanners that engage with non-academic partners, bridge disciplines, and connect faculty with stakeholders (Meyer et al. 2016). Additionally, graduate students are the “next generation” of researchers, whether they end up in academia or work outside the academy. Graduate student researchers trained to work with stakeholders have increased capacity for applied work, for crafting solutions to pressing SES challenges, for career preparation, and for mentoring future “generations” of scholars and researchers. Indeed, scholars have recently emphasized stakeholder engagement in the last several decades as research seeks to address pressing SES crises (Fischer et al. 2015); however, students can face additional challenges to stakeholder-engaged work due to their status as emerging scholars (Wilson et al. 2021). Graduate student perspectives are largely absent from the literature on stakeholder-engaged team science (Rissman and Barrow 2019; Wilson et al. 2021).

For this paper, we – a team of graduate student researchers – drafted a project and then sought stakeholder input to create a series of virtual participatory planning workshops to enhance tourism destination resilience to climate change. We sought out community partners at an early phase in the research to shape the purpose of the workshops, decide on participatory approaches, and plan recruitment of workshop participants. While we relied on stakeholder input and used participatory approaches during the workshops, non-academic partners were not involved in the earliest stages of project conception. We therefore use the term “stakeholder-engaged research” to describe our collaboration with non-academic practitioners to achieve a common goal (Heiden and Saia 2021). Below we describe our research project and consider issues related to team formation, collaboration with non-academic partners, negotiating power dynamics with faculty, adapting to unexpected challenges, the importance of honest team communication, and the role of institutional and program support in fostering stakeholder-engaged project opportunities. By reflecting on our process, we seek to inform the work of future graduate students and the development of effective stakeholder-engaged higher education programs.

1 Description of NRT program, process, and project

The University of Maine National Science Foundation National Research Trainee Program in Conservation Science and Practice (NRTCSP) aims to train the next generation of environmental leaders to address multiscale SES challenges (for further information, please visit <https://umaine.edu/conservationscience/about/>). Graduate students work in interdisciplinary teams (i.e., utilizing different knowledge areas and research approaches). This work is separate from a student’s thesis research. The NRTCSP engages a network of conservation professionals who participate as program partners. Partners interact with students in multiple ways, including classroom presentations, hosting internships, and acting as non-academic mentors. The NRTCSP also provides opportunities for student teams to develop formal collaborations with conservation professionals.

We developed a graduate student-led project which engaged with NRTCSP program partners and a local community to advance solutions for climate change. A NRTCSP program partner acted as a gatekeeper, ultimately connecting us with non-academic community partners to form a student-stakeholder team. Over six months, we co-developed workshops to support tourism adaptation planning as a team of nine (including four non-academic

community partners), hereafter called the planning committee (Fig. 1; Horne et al. 2023). The purpose of these workshops was to strengthen relationships across tourism stakeholders, develop collective strategies, and build capacity to address the uncertainty of climate change impacts to coastal tourism and outdoor recreation activities. We engaged with and addressed community goals, concerns, and potential action strategies to support successful, community driven climate change planning. Through a series of two virtual Zoom workshops, 12 participants identified and ranked top climate change concerns and opportunities, as well as strategies stakeholders within the destination could adopt to adapt to and/or mitigate climate

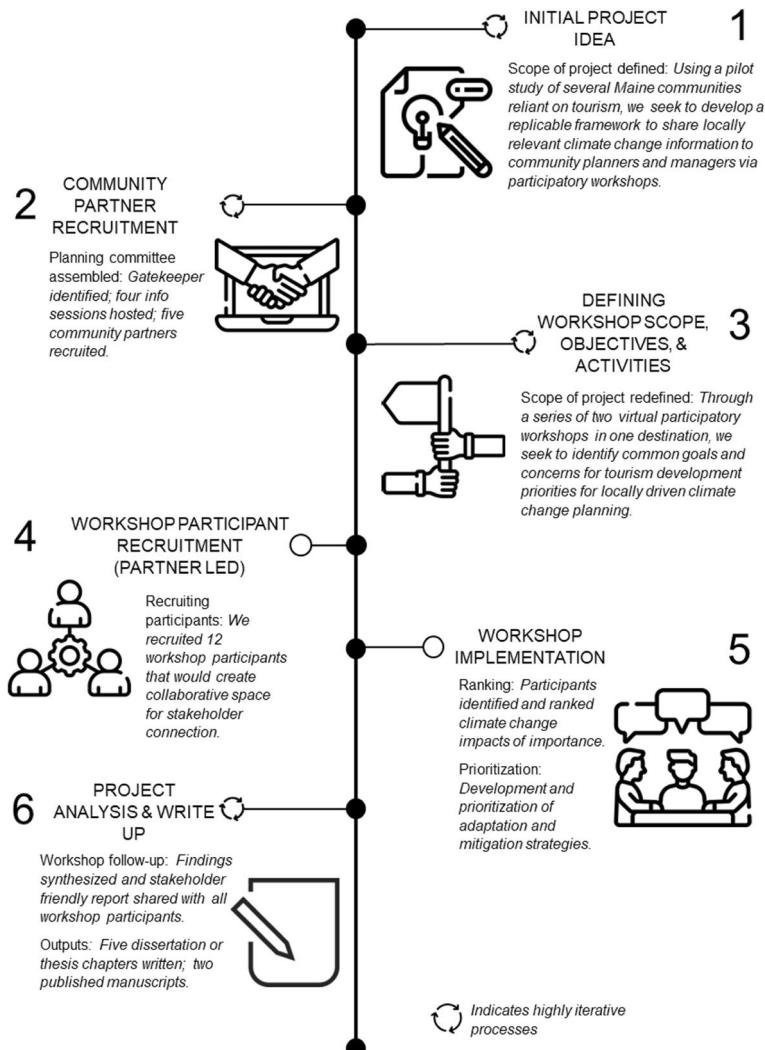


Fig. 1 This figure is a timeline of key steps from project conception by the student team, partner recruitment and project revision, workshop implementation, and the final analysis. At each step, key outcomes are listed. Circular arrows indicate steps that were highly iterative. Steps #1 and #6 involved only the student team, whereas the others involved student-stakeholder collaboration

change. The 12 participants included the four planning partners, as well tourism planners, business owners, non-profit workers, and Acadia National Park employees. Following the workshops, we sent a detailed report to all participants and elicited their feedback regarding workshop usefulness and design. In general, participants appreciated the opportunity to engage in discussions across organizations and to have a dedicated facilitated space to brainstorm planning strategies. Through the workshop, participants generated several priorities for climate change planning, as well as possible initiatives within the region.

2 Strategies for successful student-led stakeholder-engaged research

In the following paragraphs, we describe specific strategies that we used in response to challenges. We believe these reflections will be useful for graduate student researchers and program designers in stakeholder-engaged programs of study. Here we discuss our reflections on honoring different types of knowledge, negotiating power dynamics with faculty, incorporating flexibility and transparent communication into the stakeholder-engaged research, and using institutional structures and program training for project support.

2.1 Focus on collaboration and team formation in the face of diverse stakeholder preferences and commitments

We collaborated with stakeholders with different backgrounds, opinions, and life experiences. We faced challenges finding community partners, incorporating them into the project while honoring desired levels of engagement, and negotiating student-stakeholder team dynamics. First, it is important to note that the student-stakeholder team inherently involved power differentials across individuals and groups. As a group of young, female, graduate student scholars, we questioned our expertise and legitimacy in developing a research project independently of faculty. Working on a planning committee with community members involved co-creation, iteration, and negotiating power dynamics. We wanted to present sufficient details to potential partners to ensure that the project would succeed but needed to be flexible enough to change the objectives and approach to incorporate feedback. We went through an awkward initial phase as a new student-stakeholder team where we (the student team) tried to judge partner's desired levels of engagement. We worried that no one would have the bandwidth to participate in a climate change planning project when the tourism industry was hyper-focused on the pandemic; however, many of the partners conveyed that the pandemic and climate change were similarly disruptive events to an already stressed system. Stakeholders acknowledged that the planning done to increase destination resilience to climate change would also bolster resilience to future pandemics.

To determine roles and levels of desired engagement with planning partners, we had conversations with each member during recruitment “info sessions” in which we explained the project goals and participatory approach. During these info sessions, we stated that community partners would set their own roles determined by their expertise, time availability, and what they felt they could or were most excited to contribute. Throughout the early phases of planning committee formation, we relied on honest and transparent communication regarding levels of expertise and ability to commit to the project in order to set expectations and ensure sustained engagement. We set participant roles in our first meeting as an entire student-stakeholder team. Partners viewed themselves as having experience

working within the community and expertise liaising between the planning committee and potential workshop participants; however, partners recognized their limited capacity for in-depth involvement in the planning phases. We jointly decided on a workflow model that removed the burden of workshop design from community partners but that incorporated their frequent feedback. Once a stakeholder-approved goal and scope for the workshops was set, the graduate student team developed detailed workshop facilitation outlines that community partners reviewed and revised at monthly meetings.

All student team members had opportunities to lead parts of the research process, resulting in a relatively egalitarian power structure. Additionally, we reflected that our shared status as emerging scholars and women and small group size all helped alleviate power differentials within the student team. When we incorporated community partners, we had a similar number of students and stakeholders. This was intentional as we wanted a relatively equal representation of ideas from within and outside of academia. While we did not encounter disagreements or conflicts during our project, the student team initially decided to vote on decisions, timelines for deliberations, and conflict resolution mechanisms (i.e., anonymous voting with a shared faculty co-advisor as the tie breaking vote). Even though we never encountered conflict, we benefited from having a plan that was intentional should we need this tool.

2.2 Negotiate power dynamics with faculty advisors early and often

Here we reflect on challenges and opportunities associated with a diverse group of faculty involved in the NRTCSP while providing suggestions for both students and faculty in similar programs.

To negotiate power dynamics and relationships with faculty, we defined their roles throughout the project. We viewed faculty as a support system for feedback on ethical procedures and protocols. We valued diversity in faculty expertise and hearing different perspectives to gain insights from a range of climate change researchers. Faculty and institutions looking to create an environment supportive of stakeholder-engaged graduate student research should initiate conversations with the students they are mentoring to help them define their role in collaborative, cross-boundary types of projects. Students might find it difficult to bring up this topic given power differentials. Faculty can initiate discussions to create space to negotiate roles so that all parties are satisfied with their contributions. For example, faculty should be open and honest regarding their desired level of input on all project components (e.g., research methods, stakeholder meetings, IRB development), and determine which parts of the project can be conducted with and without their approval.

NRTCSP students were often co-advised with one faculty member offering biophysical science expertise and the other offering social science expertise. Given the social science focus of our project, biophysical science advisors may not have felt their expertise was as valuable in our research context. In these instances, advisors did not actively contribute their expertise but were supportive of their advisees pursuing the project in addition to thesis research. We perceived our professional development goals (i.e., applying facilitation skills, publishing non-thesis manuscripts) as a unifying goal even where expertise and support for stakeholder-engaged work might have differed across advisors. Like with our student team building process, faculty must be forthright with their support and/or expertise in stakeholder-engaged work, a conversation that needs to be revisited regularly. Faculty also need to recognize the extra time and effort needed to carry out stakeholder-engaged research that may be supplemental to a student's core thesis requirements. Where extended

time and funds are not available, this must be communicated clearly at the initial stages of a project. Student teams must, in turn, recognize and incorporate these constraints into their goals. For example, if one of our team members had felt unable to participate in our project beyond the class requirements due to constraints in time, funding, or advisor interest, we could have included them in initial brainstorming activities but not extra-curricular project implementation.

2.3 Incorporate flexibility and open communication to remain adaptable

Several unexpected events influenced our project, including (1) the switch to a virtual format, (2) student career transitions, and (3) Wi-Fi connectivity issues. Successful graduate student teams will be resilient in responding to unforeseen circumstances by creating a shared project goal and sense of buy-in.

The COVID-19 pandemic, the addition of a new team member, and transitioning from an interdisciplinary student team to a student-stakeholder team shaped our iterative team formation process. To foster a sense of ownership, the student team engaged in honest and open conversations about our goals while incorporating team members' expertise and ideas to jointly re-envision a virtual project. Our team developed shared goals for the project (e.g., skill development, applied experience) and valued a stakeholder-engaged approach, both of which contributed to project longevity even as the modality adapted to changing realities. Additionally, we remained committed to the project even after student team members graduated as a result of these shared values and a shared vision. We suggest that having goals that extend beyond deliverables (e.g., course assignments, publications) is useful for long-term student success. Our team was motivated by goals of gaining experience with stakeholder-engaged research, practicing workshop facilitation, and publishing. As we saw within our student team, courses end and people graduate and leave academia. Academic deliverables that often drive graduate students, especially publications, were a product of our project but not the primary motivation. By centering motivations around skill development, we sustained our interest in the project by allowing team members who had migrated to non-academic positions to remain enthusiastic about the work without getting bogged down in the writing and publication process. While we equally shared project design, implementation, and analysis as the student team, we differed in our writing contributions based on availability, interest, and alignment with professional goals.

We purposefully shifted roles throughout the project (e.g., leadership, taskmaster, note-taker) to ensure all team members developed the necessary skills to execute all parts of the project. We discovered how essential rotating roles was when one team member lost Wi-Fi minutes before a workshop, requiring others to rapidly adjust their roles. This meant that all student team members developed robust and valuable skills throughout the project.

2.4 Create space for graduate student skill development in collaborative and stakeholder-engaged research

Students require institutional support to (1) receive training opportunities in the necessary skills for collaborative work, (2) adequately fund and incentivize stakeholder-engaged research, and (3) support participatory research endeavors.

Throughout the required NRTCSP core courses, faculty emphasized professional skills (e.g., teamwork) and theoretical frameworks (i.e., resilience) while recognizing the diversity of student needs and projects. Students benefited from the NRTCSP course structure,

which had minimal course requirements, a menu of course options to fulfill competency requirements (e.g., research methods, communication), and the flexibility to take research credits in place of courses. While this structure was likely most beneficial to students with longer timelines, we believe this setup rewards students for taking the risk of adding a stakeholder-engaged project to their program of study. Research credits built into programs provide an incentive for taking the risk of adding an additional research project to a student's workload, while ensuring students have some recognition of effort even when a project does not end in a tangible output (i.e., thesis or dissertation chapter, publication). The skills acquired from these collaborative projects are important even without publication, especially from a professional development perspective.

The NRTCSP program required a course on team science whereby students engaged in a mock grant proposal assignment. This was vital for several reasons: (1) the course was an introduction to team science from instructors engaged in applied research, (2) the course provided a safe space for students to explore team science and stakeholder-engaged research approaches with faculty support and low-stakes outputs (i.e., course assignments), and (3) the course encouraged the idea that students could implement a stakeholder-engaged project while also getting some credit (by including the project as a collaboratively written thesis or dissertation chapter). Our team benefited from the loose class structure that provided enough introduction to working with stakeholders but was flexible enough to be adapted to our interests.

3 Conclusions

Collaborations with non-academic stakeholders are essential to addressing pressing SES concerns, and higher education institutions are pivotal to training emerging scholars. Programs must balance disciplinary training, stakeholder-engaged research training, and applied skill development (e.g., facilitation, fostering open communication, collaboration with non-academic partners, interdisciplinary teamwork). We argue that creating spaces for graduate students to learn stakeholder-engaged research skills *and* opportunities to practice these approaches in applied settings is a critical component of program success. Without such opportunities, theoretical training in research has limited practical value. Faculty provided guidance in skill building and initial team formation. From there, we had the foundation to successfully navigate a project aligned with our skills, interests, and professional goals. This reflection can serve as a guide for other student teams, faculty advisors, and program developers looking to collaborate with stakeholders. In making some of our “hidden,” internal team processes explicit, we hope that other teams can learn from our experience.

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Data availability There is no dataset available for this paper.

Declarations

Competing interests To the best of our knowledge, no authors have any conflicts of interest.

Human subjects This study was approved by the University of Maine IRB (application # 2021–02-08).

References

Cundill G, Roux DJ, Parker JN (2015) Nurturing communities of practice for transdisciplinary research. *Ecol Soc* 20(2):22. <https://doi.org/10.5751/ES-07580-200222>

Fischer J, Gardner T, Bennett E et al (2015) Advancing sustainability through mainstreaming a social–ecological systems perspective. *Curr Opin Environ Sustain* 14:144–149. <https://doi.org/10.1016/j.cosust.2015.06.002>

Heiden T, Saia T (2021) Engaging stakeholders for research impact. *Am Ins Res* <https://ktdr.org/products/KTDRR-Stakeholder-Engagement-Brief-508.pdf>. Accessed August 15, 2023.

Horne L, DiMatteo-LePape A, Wolf-Gonzalez G, Briones V, Soucy A, De Urioste-Stone S (2023) Climate change planning in a coastal tourism destination, A participatory approach. *Tourism and Hospitality Research* 23(4):549–563. <https://doi.org/10.1177/14673584221114730>

Lowry KW, Ford-Paz R (2013) Early career academic researchers and community-based participatory research: Wrestling match or dancing partners? *Clin Transl Sci* 6(6):490–492. <https://doi.org/10.1111/cts.12045>

McGreavy B, Silka L, Lindenfeld L (2014) Interdisciplinarity and actionable science: Exploring the generative potential in difference. *J Community Pract* 22(1–2):189–209. <https://doi.org/10.1080/10705422.2014.901264>

Meyer SR, Levesque VR, Bieluch KH, Johnson ML, McGreavy B, Dreyer S, Smith H (2016) Sustainability science graduate students as boundary spanners. *J Environ Stud Sci* 6(2):344–353. <https://doi.org/10.1007/s13412-015-0313-1>

Rissman AR, Barrow L (2019) Characteristics of collaborative, interdisciplinary, and engaged research among graduate students in environmental conservation. *J Environ Stud Sci* 9(3):297–310. <https://doi.org/10.1007/s13412-019-00553-0>

Silka L (2013) “Silos” in the democratization of science. *Int J Deliberative Mech Sci* 2(1):1–14. <https://doi.org/10.4471/demesci.2013.06>

Wilson MN, Laufer AE, Howard EM, Wong-Ala JATK (2021) Lessons from the trenches: Students’ perspectives of their own marine transdisciplinary education. *Front Mar Sci* 7(January):592368. <https://doi.org/10.3389/fmars.2020.592368>

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