



CONTRIBUTIONS

Advice to Master's Students for Successfully Navigating an Interdisciplinary Environmental Studies Program

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Introduction

Over 40 years ago, Stearns (1987) published a note in the *Bulletin of the Ecological Society of America* titled, “Some modest advice for graduate students,” prompting a playful rebuke by Huey (1987) titled, “Reply to Stearns: Some acynical advice for graduate students.” Since then, numerous additional papers have been published that describe the graduate education process, a few of which provide advice directly to graduate students. The majority of these papers target doctoral students, specifically those who ultimately seek academic positions (e.g., Baker and Lattuca 2009, Boden et al. 2011), despite that the rate of postdoctoral academic employment in U.S. physical and life science fields dropped by more than five percentage points between 2009 and 2014 (NSF 2015). Further, only a fraction of these papers describe the graduate education experience from the graduate student perspective, and those that do only address doctoral students (e.g., Graybill et al. 2006, Moslemi et al. 2009). In our review of the literature, we did not find any publications that address master's student education, despite that the great majority of US graduate students pursue master's—not doctoral—degrees. In 2016, 90% of first-time U.S. graduate students were enrolled in programs leading to a master's degree or graduate certificate, and 83% of graduate degrees awarded in 2015–2016 were master's degrees (Okahana and Zhou 2017).

Over the past 30 years, higher education programming in the U.S.A. and Canada has become increasingly interdisciplinary (CFIR 2005, NSF 2010). Rhoten and Parker (2004) found that 62% of graduate students from five university-based programs funded by the NSF Environmental Research and Education portfolio were involved in at least one interdisciplinary collaboration. As interdisciplinary undergraduate and graduate programs become more common, a vast body of literature has emerged in

which higher education researchers evaluate how effectively these programs train students to integrate and apply interdisciplinary content (Klein 1996, Weingart and Stehr 2000) and to conduct rigorous and meaningful interdisciplinary research (Metzger and Zare 1999, Rhoten and Parker 2004, Schmidt et al. 2012). Nonetheless, most of the literature about interdisciplinary graduate education, including all the “advice literature,” addresses programming at large to mid-sized traditional universities that have received NSF Integrative Graduate Education and Research Traineeship (IGERT) funding (e.g., Moslemi et al. 2009 [Cornell], Graybill et al. 2006, Schmidt et al. 2012 [University of Washington], Boden et al. 2011 [Eastern and Western State Universities], Collins 2002 [Arizona State University], Newswander and Borrego 2009 [two unspecified IGERT programs]). We are not aware of any literature about, for, or by interdisciplinary graduate students at small liberal arts schools such as ours, Antioch University New England in Keene, New Hampshire.

The unprecedented rate and spatial scale of human alteration of the environment (MEA 2005) and deeper appreciation for environmental complexity increasingly require environmental professionals to work across traditional disciplinary boundaries (Collins 2002, Wake 2008, Perz et al. 2010, Schmidt et al. 2012). Interdisciplinary education and training are necessary to effectively address complex, global, 21st century environmental problems (Palmer et al. 2005, Ehrenberg and Kuh 2009). It is no longer sufficient for graduates to be competent in their narrow environmental discipline; to be prepared for the technical, fast-paced, and interdisciplinary world of environmental management, students must also be strong science communicators and work effectively with disciplinarily and culturally diverse stakeholders (Reich and Reich 2006, Schmidt et al. 2012). Further, non-academic conservation professionals (e.g., land use and natural resource managers) must be able to move deftly among a wide variety of projects involving various ecosystems and taxa depending upon ever-changing conservation priorities, funding sources, and project collaborators.

In this paper, we discuss the unique challenges and opportunities of navigating an interdisciplinary environmental studies master’s program. Interdisciplinary master’s students have unique teaching, learning, and employment training needs that warrant special consideration in the literature. By focusing specifically on interdisciplinary master’s students who become professionals in non-academic environmental settings, we make a unique contribution to the “advice literature” that will be relevant to an increasing number of graduate students, particularly those at small liberal arts universities like ours. While this paper is structured as advice to master’s students in interdisciplinary STEM programs, our advice will likely also be useful to graduate students in other interdisciplinary master’s programs, doctoral students pursuing non-academic careers, and even interdisciplinary graduate faculty.

The interdisciplinary environmental studies master’s program at Antioch University New England

Collins (2002) defines interdisciplinary education as, “teaching, learning, research, or problem-solving that integrates several disciplines to create a unified outcome that is sustained and substantial enough to enable a new discipline to develop over time. Practically speaking, completing (the interdisciplinary project) requires the joint effort of investigators from two or more disciplines. Integrating the diverse expertise of the participants is the key to success” (p. 76). When professionals transcend disciplinary gaps, interdisciplinary collaboration can foster new insights and methodologies and “give birth to new hybrid disciplines that are more analytically sophisticated” (NIH 2005). Such is the field of environmental studies, a multidisciplinary, interdisciplinary academic field that explicitly addresses

human interactions with the environment to solve complex environmental problems. The field of environmental studies is distinguished from environmental science by its systematic integration of the life and physical sciences, social sciences, and humanities. Over the past 10 years, we have seen tremendous growth in the number of interdisciplinary undergraduate and graduate environmental studies programs throughout the USA and Canada.

Interdisciplinary graduate programs are structured in myriad ways. In a fully integrated, interdisciplinary program, students may be required to take foundational courses in life and physical sciences, social sciences, leadership development, and humanities. Most coursework includes exposure to knowledge and methods that cross disciplines, students from different disciplines take courses and conduct projects together, and faculty help students to integrate various disciplines (Newswander and Borrego 2009). In contrast, other interdisciplinary graduate programs may require students to take one or two interdisciplinary seminars that integrate disciplines, while the remainder of students' coursework is pieced together from traditional departments and programs at their university (Newswander and Borrego 2009). Many higher education researchers have described the attitudinal and logistical obstacles to interdisciplinary programming embedded in traditional university settings (e.g., Graybill et al. 2006, Moslemi et al. 2009, Newswander and Borrego 2009, Boden et al. 2011). For a discussion of the advantages and disadvantages of these contrasting interdisciplinary program structures, see Newswander and Borrego (2009).

Antioch University (AU) was founded in 1850 on the principles of social, economic, and environmental justice. Democracy, progressive education, and social justice remain at the core of programming at all five of our campuses (Yellow Springs, OH; Seattle, WA; Los Angeles and Santa Barbara, CA; and Keene, NH). Antioch University New England (AUNE) in Keene, NH, provides exclusively graduate education and is composed of five departments: Clinical Psychology, Applied Psychology, Education, Management, and Environmental Studies. The interdisciplinary values of the AUNE Environmental Studies (ES) Department are central to our mission, which states, "The Department of Environmental Studies educates visionary, pragmatic leaders in a collaborative interdisciplinary setting that is founded on academic excellence and the principles of environmental justice and sustainability." Students in the ES Master of Science Program can major in one of six concentrations: Advocacy for Social Justice and Sustainability, Conservation Biology, Environmental Education, Science Teacher Certification, Self-designed Studies, and Sustainable Development and Climate Change (Table 1). Full-time ("Core") ES faculty include four ecologists, one environmental manager, three environmental educators, three social scientists, two environmental creative writers, one physical geographer, and one environmental advocate. The faculty co-author of this paper (RT) is a soil and sediment ecologist, and the six student co-authors are ES master's students concentrating in Conservation Biology; AD studies terrestrial plants, BF studies sharks, JH studies aquatic plants, SL studies birds, and TM and RS study turtles.

Advice for navigating an interdisciplinary environmental studies master's program

Baker and Lattuca (2009) describe graduate education as a process of both knowledge and skills acquisition (professionalization) and professional identity development (socialization). Weidman et al. (2001) define graduate student socialization as "the processes through which individuals gain the knowledge, skills, and values necessary for successful entry into a professional career requiring an advanced level of specialized knowledge and skills" (p. iii). Thus, to optimize learning and professional preparedness,

graduate students must acquire knowledge and skills appropriate to their disciplines, invest time, energy, and esteem in their graduate programs, and involve themselves in the activities customary to their professions (Weidman et al. 2001, Austin and McDaniels 2006, Baker and Lattuca 2009, Newswander and Borrego 2009). Interdisciplinary graduate students must also develop cultural competence within and outside their disciplines, as well as within and outside their dominant social groups (Reich and Reich 2006). Thus, the advice we give here to interdisciplinary master's students includes both professionalization and socialization to help them optimize their graduate education and professional preparedness.

Balance depth and breadth

By their nature, interdisciplinary programs are problem-based rather than discipline-based (Klein 2005). Because environmental problems are global and complex, traditional disciplinary training does not adequately prepare students to be effective environmental leaders and change agents (Campbell et al. 2005, NSF 2010). However, disciplinary depth is still necessary to identify and pursue relevant environmental questions and advance ecological understanding (Pickett et al. 2007). Thus, successful master's students cultivate depth while strategically seeking breadth. During the first year of your interdisciplinary program, read deeply and widely and pay attention to environmental problems and questions that resonate with you most deeply. Talk about these environmental problems and questions with anyone who will listen and provide feedback, and strive to understand who is involved in and affected by them. Use your capstone (e.g., thesis) requirement to explore your chosen environmental problem or question deeply; become an expert in your discipline. At the same time, strategically plan coursework, internships, course projects, and community involvement to help you understand a wide variety of systems, taxa, and stakeholders. It is also important to act strategically when you first begin researching graduate programs. Some graduate universities require prospective students to coordinate with professors and apply to a particular laboratory, whereas other schools, such as Antioch, have students apply to a preferred concentration rather than identify an advisor at the onset. The latter is particularly helpful if you are unsure of your desired field of study, as it allows you to develop a question in tandem with your first year of coursework. On the other hand, beginning your graduate career already belonging to a laboratory may provide more guidance in developing a research question; however, this approach may restrict your research options. Whichever approach you choose, pursue your passions but remain flexible; a wide variety of academic and professional opportunities may lead you down unexpected yet fulfilling paths.

Develop your leadership skills

Throughout your environmental career, you will work with government agency scientists and administrators, faculty collaborators, educators, community stakeholders, and students, technicians, and interns. Prepare yourself for the highly collaborative nature of environmental work. Use your interdisciplinary graduate program to learn about your leadership style and to practice collaborative problem-solving. Seek courses and trainings in leadership development that attract students from diverse disciplinary and cultural backgrounds. Many interdisciplinary programs will require (or at least provide) leadership-training courses, but if one is not available in your department, explore opportunities in business or management programs at your university or a nearby university. Take advantage of short-term (e.g., weekend) leadership development workshops, and leadership and science education workshops at conferences. You may also create your own leadership-training opportunities by introducing and coordinating courses (including Supervised Independent Study courses you design yourself), seminars, and events

TABLE 1. Summary of the interdisciplinary Master of Science Program in Environmental Studies at Antioch University New England (Keene, NH), including its five concentrations, degree requirements, and internal opportunities for interdisciplinary collaboration.

Concentration	Required concentration courses
Advocacy for Social Justice & Sustainability	Environmental Advocacy: The Essentials; Environmental Advocacy: Applied Methods
Conservation Biology	Conservation Biology; Biostatistics
Environmental Education	Program Planning & Design; Foundations of Environmental & Sustainability Education
Science Teacher Certification	Curriculum Design; Problem Solving and Inquiry-Based Science Teaching
Self-designed Studies	Determined by student
Sustainable Development & Climate Change	Climate Change Resilience, Adaptation & Mitigation; Watershed Science & Management
Additional requirements for students in all concentrations	
Core courses (3 of 4 required)	
Community Ecology of New England	Leadership for Change
Earth Systems Science	Political Economy and Sustainability
Methods courses (partial list; concentration courses listed above may be taken as methods courses by students in other concentrations)	
Adirondack Mountain Ecology (field study trip)	Mammalogy
Building Sustainable Organizations	Natural Resource Inventory: Wildlife
Coastal Geoecology (field study trip)	New England Flora
Conservation Psychology	Ornithology
Diversity, Justice & Inclusion	Proposal Writing/Project Mgmt
Environmental Communication in the Digital Age	Research Seminar
Educating for Sustainability	School Law
Ecology of the White Mountains (field study trip)	Soil Ecology
Financial Administration	Teaching Exceptional Children
GIS (introductory, advanced, and applied)	Wetlands Ecology
Herpetology	Wildlife Habitat Management
Urban Environmental Education (field study trip)	Land Use & Protection Techniques
Internship with an external organization	
Capstone (thesis, project, collaborative service initiative, or additional internship)	
Internal opportunities for cross-concentration/interdisciplinary collaborations	
Center for Tropical Ecology & Conservation	
Center for Climate Preparedness & Community Resilience	
Monadnock Ecological Research & Education Center	
Keene Community Garden Connections	
Student Alliance (cross-concentration)	
Student Government (cross-department)	
Collaborative Service Initiative projects	

in your department or on campus (Moslemi et al. 2009). For example, students in the AUNE-ES master's program regularly serve as teaching assistants in many of our master's courses, as well as research assistants on funded faculty projects. Teaching assistants frequently request the opportunity to deliver field and in-class lessons, and experienced students sometimes ask professors for opportunities to teach specific content to their peers. For example, co-author SL has offered GIS-based workshops that focus on the use of spatial analysis to improve conservation efforts, and he has instructed classes on avian sampling methods. Additionally, BS, TM, and BF have gained leadership experience and advanced their analytical skills during their time as teaching assistants for Biostatistics. BS and TM have obtained valuable field experience collaborating with Antioch faculty on wetlands-related research (e.g., turtle and shellfish ecology). These experiences foster leadership and identity development and allow you to practice indispensable professional skills.

Hone your communication skills

Interdisciplinary career paths can be less defined than disciplinary career paths; thus, interdisciplinary graduate students must become familiar with the broader professional landscape and develop skills to communicate their expertise to a variety of stakeholders (Boden et al. 2011). Environmental professionals must effectively communicate complex scientific concepts and decision-making processes to stakeholders and the public, as well as explain aspects of their discipline to project collaborators from other disciplines. Environmental professionals are frequently called upon to teach in formal (e.g., classroom presentations) and informal (e.g., interpretative walks) settings. Take the science education and communication aspects of your training seriously. During your master's program, create opportunities to practice and develop your communication skills via various outlets including blogs, white papers/internal reports, newspapers, and even big class projects that could become part of your job application portfolio. Give talks and posters at conferences and discuss your research informally with other conference attendees. Arrange informal monthly lunches with your peers to practice presenting your research ideas and to discuss challenging course content and new techniques in your field (e.g., statistics, new modeling and mapping techniques). Each time you talk about your ideas and research, you will become more articulate and clear.

Build relationships with your professors

Many master's students are intimidated by their professors, and, admittedly, some professors are more approachable than others. Much of this fear stems from student anxieties about seeming incompetent, being perceived as a nuisance by their professors, or being overlooked as just another face in the crowd in the halls of their university. However, most professors are welcoming and interested in supporting you; find those professors and make an effort to get to know them and learn what they care about, what they are working on, and how you might get involved. As importantly, allow your professors to know *you*, so they can better guide you toward specific coursework, workshops, conferences, internships, and community projects that will interest and benefit you. Further, knowing you well will help professors when they are inevitably asked to provide you with job references. If you still worry about being a nuisance, ask that expectations of both parties involved in this relationship be clarified. Choose an advisor-mentor with whom you feel comfortable and who supports but challenges you. In addition, seek out faculty in other disciplines to gain exposure to different knowledge, skills, and attitudes (Reich and Reich 2006). Consider seeking out faculty who are collaborating across disciplines and ask how you might get involved in their work. For example, RT, an ecologist, has collaborated with AUNE-ES

student and faculty environmental educators and science teachers to develop and implement ecology curricula and publish our curriculum ideas (Baum and Thiet 2016, Thiet and Karlan 2017). SL has participated in interdisciplinary collaborations that range from community mapping projects to academic research pending publication, and TM is collaborating with RT on her salt marsh invertebrate ecology research at Cape Cod National Seashore.

Connect with peers and professionals outside your discipline

The most effective interdisciplinary programs are participatory and provide students and faculty with diverse opportunities for interactive teaching and learning (Haworth and Conrad 1997). Learning is both cognitive and social, and graduate students must gain not only knowledge, but also identity and acceptance within their professional communities (Baker and Lattuca 2009). Think of your graduate program, department, and university as nested “communities of practice” (sensu Lave and Wenger 1991) with which to engage to gain the most from your graduate education; after you graduate, you may rarely again be part of such a rich intellectual community. Attend speakers and seminars, even if the topic does not seem directly related to your discipline, to learn new ways of knowing, new methodologies, and diverse ways of seeing environmental problems and solutions (Graybill et al. 2006, Reich and Reich 2006, Moslemi et al. 2009). Seek and attend seminars at nearby universities and community centers. For example, we attend seminars and talks on the AUNE campus, as well as seminar speakers at nearby Keene State College. BS took an opportunity provided by her advisor to attend the Blanding’s and Wood Turtle Conservation Symposium only a few hours’ drive from the AUNE campus.

Deepen your cultural competence

To be an effective environmental professional requires you to develop cultural competence in both the culture of your professional discipline, as well as in our broader socio-political culture (Reich and Reich 2006). “Culturally competent interdisciplinary practice” (sensu Reich and Reich 2006) requires awareness of and reflection upon how the knowledge, attitudes, and skills of your discipline and social group affect your work and relationships. During graduate school, strive to understand the norms, perspectives, and methodologies of your discipline, as well as those of people in other disciplines and in underrepresented social groups. Set aside your ego; listen, watch, ask questions, and continually seek understanding of other ways of knowing, perceiving, and doing (Reich and Reich 2006). Initiate social and professional interactions with students from other disciplines and departments by spending time in shared spaces; these interactions will help you integrate disciplines and may lead to interdisciplinary peer-to-peer collaborations (Moslemi et al. 2009). Embracing disciplinary and cultural diversity will help you hone your professional identity, as you consider how your worldview and approaches to problem-solving compare and contrast with others’ (Reich and Reich 2006, Baker and Lattuca 2009). This is particularly critical for students from underrepresented groups (e.g., women, LGBTQIA, and people of color), whose persistence and professional identities improve when they engage with faculty, students, and professionals from non-dominant social groups (Antony and Taylor 2001).

Participate in external training opportunities

Although you may be happy and satisfied with your choice of graduate program, it may lack a critical training opportunity you want or need. Training and coursework outside your program or university

can complement and round-out your graduate training. These days, opportunities abound to take online courses with experts and students from widely varied backgrounds (e.g., Wagner et al. 2012). Consider taking an external course or intensive workshop and transfer the credits into your master's program. For example, co-author JH took a course in floating and emergent aquatic plants at Eagle Hill Institute (Steuben, ME) that he applied to his AUNE-ES master's program requirements, and all six student co-authors have conducted internships with local, regional, national, and international organizations for credit (a program requirement). Several AUNE-ES students have attended local permaculture and climate change advocacy workshops. Interacting with policymakers, natural resource managers, scientists, and community stakeholders will improve your understanding of your field, expose you to different points of view and approaches to solving problems, and improve your cultural competence (Reich and Reich 2006, Moslemi et al. 2009). Often these opportunities lead to job opportunities and additional project collaborations (Wagner et al. 2012). For students with travel limitations, attending online lecture series or webinars can also improve your learning experience by helping fill in potential curriculum gaps and allowing you to explore additional topics of interest (e.g., Wagner et al. 2012). For example, many Antioch students take advantage of the free lecture series provided by the New England Aquarium, which can be attended in person or accessed later online.

Master your discipline

Occasionally master's students entering the AUNE-ES Conservation Biology concentration are surprised to learn how much faculty expect them to read, write, and study. Their notion of an environmental master's degree is that all environmental teaching and learning is in the field. While our Conservation Biology master's concentration is indeed heavily field-based, students are also expected to learn the scholarly aspects of our profession by reading, writing, and thinking deeply, and by learning the analytical tools with which conservation biologists address complex environmental problems. Content learning and mastery include specialized terminology and methodological techniques that allow you to participate at a higher level in your professional communities (Baker and Lattuca 2009). Reading deeply and grappling with ideas are critical for understanding the most important and interesting environmental questions of our time. What's more, studying will help you understand and appreciate your field experiences more. There are manifold benefits of developing these skills, including the production of CV-worthy deliverables. For example, several co-authors of this paper have used written assignments produced for their graduate coursework as required writing samples for job applications. Our advice: relish your field days, and then hit the books.

Cultivate multiple mentoring relationships

Most research and advice literature about graduate education emphasizes the student–advisor mentoring relationship (Huey 1987, Stearns 1987, Baker and Lattuca 2009). While the importance of the student–mentor relationship cannot be underestimated, you will optimize your content learning and identity development by building a wide network of mentors, both internal and external to your university (Baker and Lattuca 2009). By engaging deeply with a wide and diverse professional network, you will gain the knowledge and skills to progressively engage more deeply with your field and thereby deepen your sense of identity within it (Baker and Lattuca 2009, Moslemi et al. 2009). Get involved in interdisciplinary project collaborations with local, regional, national, and international organizations. Consider getting involved in community projects, committees, and organizations. For example, some

AUNE-ES students are members of the Keene Cities for Climate Protection Committee or their town conservation commissions. Approach and seek collaborations with international mentors where appropriate. Co-author BF built relationships with mentors at a marine conservancy in the Caribbean that resulted in opportunities to conduct shark research and teach marine ecology programs. SL, BS, and TM collaborated with the American Turtle Observatory and Massachusetts Division of Fisheries and Wildlife, which provided them with wildlife ecology networking opportunities. Join the regional chapter of your national professional society and attend their regional conference each year. Invite faculty and doctoral students to be involved in your research, or even in your class projects where appropriate. Multiple mentoring relationships teach you how environmental decision-making occurs at various levels, expand your professional network, and often lead to job opportunities.

Be creative with resource acquisition

To be successful in graduate school, students have to focus deeply on their learning without excessive financial strain (Nettles and Millett 2006), and they need sufficient emotional and intellectual support (Graybill et al. 2006, Newswander and Borrego 2009). Be strategic in ensuring you have adequate resources to focus on your studies. Seek research advisers who have funding to support your research, and work with your peers and/or faculty to pursue grants; even small grants can fully support two field seasons of research. Further, do not be shy about applying for funding; apply sooner rather than later and apply often, as grantmaking is a slow process that can delay your research if not managed strategically. Explore alternative ways to support your research. For example, one U.S. high school science teacher has conducted interdisciplinary ecological research all over the world by taking free trips with lesser known environmental organizations (Wing 2018). Ideally, you will be able to attend national and international conferences in your field, but they can be expensive and time-consuming. Thus, consider attending local and regional conferences that do not require air travel and long hotel stays (e.g., in our case, the New England Chapter of the Society for Conservation Biology), and inquire about student travel grants to help defray travel costs. Connecting with local and regional networks is more likely to result in internship and job opportunities than big conferences where you may be just one of thousands of graduate students. To gain new skills, attend free training workshops at your university or nearby universities. For example, the AUNE-ES Department offers regular biostatistics and GIS workshops that students can attend for free to deepen their skills. Last, if you have student loans, explore student-loan forgiveness programs for federal agency and public service employees, as many of you will eventually work in federal agencies and non-profit environmental organizations (for more information: <https://studentloanhero.com/featured/student-loan-forgiveness-jobs/>).

Highlight the value of your interdisciplinary training

Despite the rise of interdisciplinary environmental studies programs, some employers may perceive interdisciplinary graduate training as a liability (Rhoten and Parker 2004). It is your job to show employers that interdisciplinary training is a professional asset by preparing job applications that highlight the advantages of your strong interdisciplinary training. Learning to clearly and meaningfully describe the strengths of your interdisciplinary education is as much a part of your graduate training as completing your coursework and thesis. Be prepared to strategically highlight your broad interdisciplinary skills for some jobs and your disciplinary depth for others (Graybill et al. 2006). Do not let interviewers underestimate the value of your interdisciplinary training. Emphasize your unique ability to integrate

different knowledge and methodological approaches, your communication and collaboration skills, and your willingness to work with colleagues from diverse disciplinary and cultural backgrounds. Seek feedback on your résumé and cover letter from trusted faculty, more experienced students, and alumni, and ask for specific feedback about how effectively you demonstrate disciplinary competence and interdisciplinary agility (Graybill et al. 2006).

Take care of yourself

Graduate students are notoriously busy and stressed. The most successful (and sane) graduate students exercise, eat well, sleep, maintain a positive attitude, and remain connected to their loved ones. For example, to build community and stay engaged with his favorite hobby during graduate school, co-author SL directs a bird club at AUNE that attracts students from different concentrations within the ES Department as well as students, faculty, and staff from other AUNE departments. JH leads weekly hikes in the spring and summer to explore different ecological communities in Berkshire County, MA. TM regularly attends meditation sessions held by students in other programs on our campus. In contrast, AD prefers to decrease stress through more solitary recreational activities such as solo hiking, sketching, and creative writing. Further, many co-authors find it rejuvenating to schedule one full day (or at least a half day) of rest each week on which they forbid themselves from working on assignments. Whatever your way of unwinding, strong time management skills allow you to prioritize these important activities.

Be kind

Individuals rely upon multiple, diverse relationships to navigate our professional lives (Baker and Lattuca 2009). Environmental conservation engages numerous stakeholders working together to move projects forward (Collins 2002, Schmidt et al. 2012). You will learn and contribute more to collaborations if you cooperate, share credit, and validate others' work and contributions (Graybill et al. 2006). For group projects during graduate school and interdisciplinary collaborations after your graduate, pull your weight, communicate, and respect your colleagues. Professionals talk with one another about job candidates, so cultivate a reputation for being cooperative, creative, competent, trustworthy, and kind.

Trust in impermanence

This is the Zen Buddhism school of surviving your graduate education. Cultivate intellectual, emotional, and professional flexibility. A master's degree can be completed in two years (sometimes less), and the experience is intense. Co-author BF describes graduate school as "strenuous and seemingly life-consuming, but temporary." Your master's work lays the foundation for your career; it is not the be-all and end-all of your career—not by a long stretch. The process of completing a master's degree takes you from being a novice to a full-fledged member of your professional community (Baker and Lattuca 2009, Boden et al. 2011). The process has distinct emotional and intellectual phases that culminate in deeper and more confident engagement with your discipline (Weidman et al. 2001, Graybill et al. 2006). An effective interdisciplinary program is scaffolded (Schmidt et al. 2012), so give yourself time to learn your discipline, integrate other disciplines, and develop your professional identity. Accept imperfections and recognize that it takes years in any profession to refine your craft.

Conclusions

Interdisciplinary master's students have unique academic and professional training needs. Although each environmental organization has its unique culture, all environmental work has become increasingly complex and technical, while also necessitating excellent communication and collaboration skills. To optimize their learning and prepare themselves adequately for environmental work, interdisciplinary environmental studies master's students must be strategic in their approach to graduate education and professional training. We hope our advice will help interdisciplinary master's students to get the most out of their interdisciplinary education and training, as environmental conservation needs environmental professionals who are deeply competent in their disciplines and eager to transcend rigid disciplinary boundaries and dominant cultural norms.

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Literature Cited

- Antony, J. S., and E. Taylor. 2001. Graduate student socialization and its implications for the recruitment of African American education faculty. Pages 189–210 in W. G. Tierney, editor. *Faculty work in schools of education: rethinking roles and rewards for the 21st century*. State University of New York Press, Albany, New York, USA.
- Austin, A. E., and M. McDaniels. 2006. Preparing the professoriate of the future: graduate student socialization for faculty roles. Pages 397–456 in J. D. Smart, editor. *Higher education: handbook of theory and research*. Springer International, Cham, Switzerland.
- Baker, V. L., and L. R. Lattuca. 2009. Developmental networks and learning: toward an interdisciplinary perspective on identity development during doctoral study. *Studies in Higher Education* 35:807–827.
- Baum, J., and R. K. Thiet. 2016. Using soil organisms to explore ecosystem functioning, services, and sustainability. Pages 97–103 in L. B. Byrne, editor. *Learner-centered teaching activities for environmental and sustainability studies*. Springer International, Cham, Switzerland.
- Boden, D., L. Newswander, and M. Borrego. 2011. Student socialization in interdisciplinary doctoral education. *Higher Education* 62:741–755.
- Campbell, S. P., A. K. Fuller, and D. A. G. Patrick. 2005. Looking beyond research in doctoral education. *Frontiers in Ecology and the Environment* 3:153–160.
- Collins, J. P. 2002. May you live in interesting times: using multidisciplinary and interdisciplinary programs to cope with change in the life sciences. *BioScience* 52:75–83.
- Committee on Facilitating Interdisciplinary Research (CFIR), National Academy of Sciences, National Academy of Engineering, Institute of Medicine. 2005. *Facilitating interdisciplinary research*. National Academies Press, Washington, D.C., USA.
- Ehrenberg, R. G., and C. V. Kuh. 2009. Looking to the future. Pages 259–262 in R. G. Ehrenberg and C. V. Kuh, editors. *Doctoral education and the faculty of the future*. Cornell University Press, Ithaca, New York, USA.

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- Graybill, J. K., S. Dooling, V. Shandas, J. Withey, A. Greve, and G. L. Simon. 2006. A rough guide to interdisciplinarity: graduate student perspectives. *BioScience* 56:757–763.
- Haworth, J. G., and C. E. Conrad. 1997. Emblems of quality in higher education: developing and sustaining high-quality programs. Allyn and Bacon, Boston, Massachusetts, USA.
- Huey, R. 1987. Response to stearns: some acynical advice for graduate students. *Bulletin of the Ecological Society of America* 68:150–153.
- Klein, J. T. 1996. Crossing boundaries: knowledge, disciplinarity, and interdisciplinarity. University Press of Virginia, Charlottesville, Virginia, USA.
- Klein, J. T. 2005. The discourse on transdisciplinarity: an expanding global field. Pages 35–44 in K. T. Klein, W. Grossenbacher-Mansuy, R. Haberli, A. Bill, R. W. Scholz, and W. Welti, editors. *Transdisciplinarity: joint problem solving among science, technology, and society: an effective way for managing complexity*. Birkhauser Verlag, Basel, Switzerland.
- Lave, J., and E. Wenger. 1991. *Situated learning: legitimate peripheral participation*. Cambridge University Press, New York, New York, USA.
- Metzger, N., and R. N. Zare. 1999. Interdisciplinary research: from belief to reality. *Science* 283:642–643.
- Millennium Ecosystem Assessment (MEA). 2005. *Ecosystems and human well-being: current state and trends*. Island Press, Washington, D.C., USA.
- Moslemi, J. M., K. A. Capps, M. S. Johnson, J. Maul, P. B. McIntyre, A. M. Melvin, T. M. Vadas, D. M. Vallano, J. M. Watkins, and M. Weiss. 2009. Training tomorrow's environmental problem solvers: an integrative approach to graduate education. *BioScience* 59:514–521.
- National Institutes of Health (NIH). 2005. NIH Roadmap: accelerating Medical Discovery to Improve Health. <https://searchworks.stanford.edu/view/10951572>
- National Science Foundation (NSF). 2010. Integrative graduate education and research traineeship program plan (IGERT). National Science Foundation, Arlington, Virginia, USA.
- National Science Foundation (NSF). 2015. Doctorate recipients from US Universities: 2014. National Center for Science and Engineering Statistics Directorate for Social, Behavioral, and Economic Sciences, Arlington, Virginia, USA. <https://www.nsf.gov/statistics/2016/nsf16300/digest/nsf16300.pdf>
- Nettles, M. T., and C. M. Millett. 2006. *Three magic letters: getting to Ph.D.* The Johns Hopkins University Press, Baltimore, Maryland, USA.
- Newswander, L. K., and M. Borrego. 2009. Engagement in two interdisciplinary graduate programs. *Higher Education* 58:551–562.
- Okahana, H., and E. Zhou. 2017. US Council of Graduate Schools Graduate Enrollment and Degrees: 2006–2016. http://cgsnet.org/ckfinder/userfiles/files/CGS_GED16_Report_Final.pdf
- Palmer, M. A., E. S. Bernhardt, E. A. Chornesky, S. L. Collins, and A. P. Dobson. 2005. Ecological science and sustainability for the 21st century. *Frontiers in Ecology and the Environment* 3:4–11.
- Perz, S. G., S. Brilhante, I. F. Brown, A. C. Michaelsen, E. Mendoza, V. Passos, R. Pinedo, J. F. Reyes, D. Rojas, and G. Selaya. 2010. Crossing boundaries for environmental science and management: combining interdisciplinary, interorganizational and international collaboration. *Environmental Conservation* 37:419–431.
- Pickett, S., J. Kolasa, and C. Jones. 2007. *Ecological understanding: the nature of theory and the theory of nature*. Academic Press, Elsevier, Burlington, Massachusetts, USA.
- Reich, S. M., and J. A. Reich. 2006. Cultural competence in interdisciplinary collaborations: a method for respecting diversity in research partnerships. *American Journal of Community Psychology* 38:51–62.
- Rhoten, D., and A. Parker. 2004. Risks and rewards of an interdisciplinary research path. *Science* 306:2046.
-

- Schmidt, A. H., A. S. T. Robbin, J. K. Combs, A. Freeburg, R. G. Jespersen, H. S. Rogers, K. S. Sheldon, and E. Wheat. 2012. A new model for training graduate students to conduct interdisciplinary, interorganizational, and international research. *BioScience* 62:296–304.
- Stearns, S. 1987. Some modest advice for graduate students. *Bulletin of the Ecological Society of America* 68:145–149.
- Thiet, R. K., and J. Karlan. 2017. Sabotaging presentations to generate fundamental questions and integrate theory and practice. *American Biology Teacher* 79:769–773.
- Wagner, H. H., M. A. Murphy, R. Holderegger, and L. Waits. 2012. Developing an interdisciplinary, distributed graduate course for twenty-first century scientists. *BioScience* 62:182–188.
- Wake, M. H. 2008. Integrative biology: science for the 21st century. *BioScience* 58:349–353.
- Weidman, J. C., D. J. Twale, and E. L. Stein. 2001. Socialization of graduate and professional students in higher education: A perilous passage? ASHE-ERIC Higher Education Report 28, no. 3. Association for the Study of Higher Education, Washington, D.C., USA.
- Weingart, P., and N. Stehr, editors. 2000. Practising interdisciplinarity. University of Toronto Press, Toronto, Ontario, Canada.
- Wing, M. R. 2018. A scholar, but not a professor. *The Chronicle of Higher Education* (11 January 2018). <https://www.chronicle.com/article/A-Scholar-but-Not-a-Professor/242214?cid=wcontentgrid>