



Working at the Interface of Integrative Research, Conservation Practice, and Cultures

Navigating Muddy Waters

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The *Bat-Agave-People Team*.... That's what I call myself and my collaborators on my dissertation research that focuses on conserving the endangered Mexican long-nosed bat (*Leptonycteris nivalis*) in northeast Mexico. As the name implies, our work spans the gamut of bat biology, plant population biology, and social science; all in the name of learning how best to protect this endangered species.

The bats, agaves, and people are part of a complex social-ecological system, in which both the bats and local communities rely on agaves as an important natural resource. The bats feed on the nectar of the agave flowers during their long-distance migrations from central Mexico to northeast Mexico and the U.S. Southwest. At the same time, Mexican farmers and rural communities harvest agaves for a wide range of cultural products like alcoholic drinks, food, and fibers. During harvest, the agave plant is prevented from growing its enormous flowering stalk, therefore removing the food resources for the bats.

Recent conservation efforts have begun focusing on ways to encourage local communities to adopt “bat-friendly” agave management practices (e.g. allowing some agaves to flower or replanting wild agaves) and understanding how to implement these practices in ways that are most beneficial to nectar-feeding bats.

Identifying potential motivations and/or barriers to adopting “bat-friendly” practices and determining the optimal “design” of these practices to maximize benefit to the bats and communities are the two main objectives of my dissertation research. Specifically, I am working near two important roosting caves in northeast Mexico to examine the social, political, and economic contexts of local communities and their current agave management practices, and to conduct foraging studies of the bats. As part of the University of Georgia’s Integrative Conservation (ICON) program, my dissertation research spans boundaries between the natural and social sciences in an effort to integrate approaches to address the complexities and nuances of the bat-agave-people conservation challenge.

A typical day (and night) in the field involves setting up infrared cameras to monitor the



bats foraging on flowering agaves, sitting with these cameras for six hours each night, conducting agave/plant surveys at each of the monitoring sites during the morning/mid-day, and conducting several semi-structured interviews with community leaders and agave harvesters in the afternoon and evening. And repeat.

This juggling between natural science and social science field work means having to mentally switch gears throughout the day as I’m a bat biologist one minute, a field botanist the next, and an anthropologist the next. But as anyone trained in the natural sciences attempting to work (and not just dabble) in the social sciences (or vice versa) can attest to, this often translates into feeling like a Jack-of-all-trades, master of none.

Feelings and thoughts like “Am I sacrificing rigor and depth in order to gain a more nuanced understanding of the system and conservation challenge?” and “Am I gaining a smorgasbord of skills but not truly mastering any of them?” come up quite often, especially as a graduate student.

Mental exhaustion is a challenge, particularly while in the field and trying to juggle the day-to-day logistics of coordinating such different types of field work. These experiences are not unique to me, and seem to be par for the course among graduate students involved in integrative research.

However, spanning disciplinary boundaries is only one part of integrative graduate programs like UGA’s ICON program. It is equally as important to cross the academic-practice divide if the research is to have real-world applicability to on-the-ground conservation efforts.

Switching gears as a bat biologist (opposite, top), field botanist (opposite, middle), and anthropologist (opposite, bottom). Mexican long-nosed bat feeding (right, top). Group of flowering agave (right, bottom). Photo credits: I. Castrejon, A. Castaneda Aguilera, J. Juan Flores Maldonado.

I have spent three summers working and collaborating with a local conservation organization in northeast Mexico, *Especies, Sociedad y Habitat, A.C. (ESHAC)* in an effort to ensure that my work directly contributes to their conservation efforts.

Members of ESHAC have been invaluable collaborators in the development of the research and its implementation in the field. They help me navigate the culture of the Mexican government to obtain permissions to do the field work, teach me local customs of the communities in which I’m working, and provide valuable insights into the logistics of doing field work in the region (including whether or not certain areas are safe).

My goal is that through our collaborations, I can directly contribute my skills and research to further their mission, even after completion of the field work.



Up to this point, I have been talking about the challenges of doing integrative graduate research. But what happens when you factor in the added challenge of doing graduate research internationally, in a different language and cultural context? Doing international research brings in a whole other suite of challenges related to logistics, including getting equipment to and from the field, getting the necessary permits, and traveling in areas with different traffic laws and customs. Then there is the language barrier. For me, this has been the biggest challenge, especially when combined with the mental gymnastics that integrative research requires.

Going into my first season of field work in the summer of 2015, I had a relatively intermediate Spanish-language background, with over 8 years of formal training in school. However, practice makes permanent, and I had not practiced my Spanish skills in a long time. I spent my first summer in Mexico feeling quite isolated, even when among a group of people, because I could not fully comprehend what was going on or being said around me. Luckily, that first summer I was just completing an internship with ESHAC and was not actually leading any field work.

However, my second summer I conducted a pilot study with the bat-agave monitoring and the community interviews, which required a bit more from my language skills. I managed to get by, even though I often felt like I couldn't fully communicate with our field team while doing field work. Then this past summer was my first full field season, complete with my own field vehicle and money to travel to the field where and when I needed. Coordinating field trips with the team, figuring out logistics, and even communicating via walkie-talkie at night really put my language skills to the test!

I realized that the more we did our bat monitoring, agave surveys, and community interviews, the more we fell into a routine as a team and the easier “work-related” conversation

became. Of course, there were still times when frustrations boiled to the surface under the hot, beating sun or after a night of little sleep; communicating your frustrations in a second language is no easy task. It was often impossible for me to communicate exactly how I was feeling or exactly what I was thinking. However, this is all part of learning a new language in any context, and patience is key. Communication is never perfect, even in your native language, but research and collaboration is still possible!



Part of the 2017 Bat-Agave-People field team (above). Showing how to set up the infrared cameras to monitor the agaves (below). (Photo by Bernardo Marino)



Many of these experiences are probably familiar to graduate students doing integrative research, especially in a foreign country and language. For any student interested in or currently involved in this kind of work, I hope that the following “words of wisdom” will be useful.

Doing an integrative research project:

- Remind yourself that you do not have to address every aspect of your study system or conservation challenge. Wanting to do everything to fully address all the nuances of the system is a common theme among graduate students attempting integrative research. Remember that your work is only one piece of the puzzle!
- Be kind to yourself. Remember that you are pushing your boundaries doing integrative research and that you come from a particular background. Your Ph.D. is a learning process; you are not expected to (and cannot) be “perfect”! There will be times parts of your project take precedence over others. This does not mean that you are neglectful; each part will get its day in the sun.
- Imposter syndrome is real. Talking to others about their experiences can help you realize most graduate students experience the same thing!
- You have many voices helping you through your program but you will have to make the ultimate decision on much of your work. Listen to your voice and stand up for what you think is best.

Crossing the academia-practice divide:

- Make connections outside of academia! Networking has been an immensely helpful “tool”. It will serve you well, too, especially if considering a career outside of academia.
- Maintain open and continued communication with collaborators. This can be difficult: schedules get busy, priorities shift, and other things change. However, if your research is going to have real-world impact, you need to communicate with your collaborators outside academia and understand their perspective and needs.

Working in a foreign country and language:

- Do not feel restricted to doing your research in your native country. While working in another country adds another layer of complexity and difficulty, it has probably been one of the



The endangered Mexican long-nosed bat (*Leptonycteris nivalis*)

most rewarding parts of my graduate work. It can help you push your boundaries, learn new skills, and expand your professional network.

- Accept the fact that you will not understand everything that is going on around you. Make sure to communicate the vital things well, and don't fret the chitchat. That kind of understanding comes with practice and exposure.
- Accept having “off” days in your language ability. I have compared my Spanish language ability to a roller coaster: some days I feel fantastic and confident, and I can speak and listen well. Other days I feel like I cannot comprehend or say anything right. This is a normal part of the language-learning process. It DOES get easier with time and practice!

Navigating muddy waters between integrative research, conservation practice, and cultures is not a straightforward task. It requires persistence and optimism. If you are willing to push your personal and professional boundaries and are comfortable with discomfort, the path will be full of rewards. □

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