Science Societies

Professional Practice of Soil Science

October 1, 2024

James Hartsig taking a soil sample.

This month, I would like to focus the column on the work that practicing professional soil scientists do. As our world becomes more aware of the important role that soils play in climate change, water management, ecosystem health, food security, urban development and livability, and energy security, more and more jobs will open for qualified professional soil scientists. Often working with other professionals, they will be called on to evaluate specific sites or watersheds and to develop management or restoration plans that ensure the long‐term sustainability of soil resources.

As an academic, I have a fairly good idea about the work of soil scientists who conduct research, teach students, or extend soil science knowledge to the public. But I do not have the experience that many soil science professionals have. I have long admired soil scientists who work as consultants, land managers, farmers, planners, surveyors, assessors, and more—folks who, every day, integrate a broad knowledge of soils, ecosystems, plants, mineralogy, and hydrology into practical, environmentally appropriate, and economically sound outcomes at specific sites.

Of course, every practicing Certified Professional Soil Scientist (CPSS) will have a different experience and varied, insightful stories to tell about their work, but there are probably some common threads that run through all of those stories. I wanted to learn more about how the daily professional practice of soil science works, and I sought out a CPSS to bring me up to speed. What follows is my interview with SSSA member James Hartsig, and I hope you will find it as informative as I did.

Michael Thompson: James, who do you work for and what is your role in the company?

James Hartsig: I work for Invenergy, which is a privately held company with a >20‐year track record of responsibly developing, building, owning, and operating wind, solar, energy storage, and natural gas generation projects worldwide. My role at Invenergy is

on the Vegetation Management Team, which supports soil and vegetation management on our domestic renewable energy projects. Our team focuses on managing available soil resources to achieve specific vegetation goals and objectives that meet regulatory requirements, customer commitments, and internal best management practices. Our team currently oversees land management practices on our utility-scale solar projects on over 140,000 managed acres across the United States.

Thompson: Do you enjoy being a soil scientist?

Hartsig: I very much enjoy being a soil scientist. Given the increased popularity of regenerative agriculture, carbon sequestration, and soil health topics, the appreciation for soil scientists and how they bring value to multiple industries has made the enjoyment even more special.

Thompson: What is the most satisfying thing about your professional work?

Hartsig: The most satisfying part of my work is having the opportunity to assess a landscape, collect representative soil samples, analyze data, and make recommendations for a new and exciting industry. These are the core concepts of how soil scientists support clients, and we now have the ability to adapt those to the renewable energy industry.

Thompson: What kind of training was required for you to do what you do professionally today?

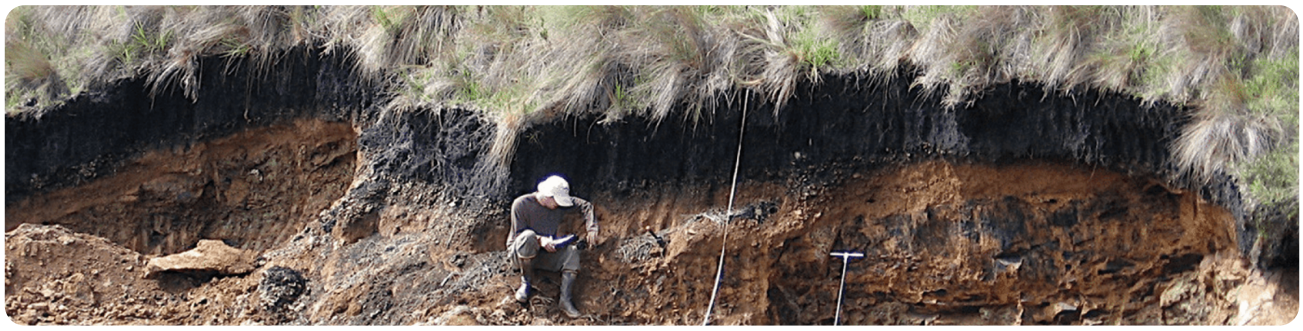
Hartsig: There wasn't any *required* training for my line of work, but it really helped having a M.S. and my Certified Professional Soil Scientist certification to emphasize my knowledge and experience working with soils. These two items can truly help individuals become more marketable in today's workforce.

Thompson: Do you supervise other soil scientists?

Hartsig: I manage a team of 10 individuals. There are two soil scientists on my staff. Our team also collaborates with several consultants nationwide that employ soil scientists, too. We prefer to work with firms that employ soil scientists to improve the plans we develop on a daily basis.

Thompson: What are the most common questions, problems, or projects that your clients ask you to deal with?

Hartsig: The most common problem that my clients ask me to deal with is how to improve soil conditions over the lifetime of our renewable energy projects. My company develops utility-scale solar projects on mostly agricultural land where landowners and regulatory agencies are concerned about the viability of farmland during and after the project's lifetime. Our solar projects are typically in operation for 20–30 years, which gives landowners and stakeholders the perception that the land may degrade over that period. In reality, we are building soil health over that timeframe by the promotion of a healthy vegetative community. Our goal is to return the land in a much better condition than what we started with in construction.



James Hartsig investigating an Andisol.

Thompson: Do your clients understand what you do or what kind of information you can supply?

Hartsig: Yes, my clients do understand what information they can expect to receive when we collaborate. In my line of work, we have to meet often rigorous levels of

regulatory requirements by providing site-specific data related to soils and vegetation. When communicating with regulatory agencies, I can point to methodologies, soil sampling data, soil scientists affiliated with the project, and the interpretation of the results to come up with the appropriate steps needed to address those requirements. Those clients can trust what I do, knowing that this information is coming from experienced soil scientists and restoration ecologists with scientifically sound solutions for those projects.

Thompson: How do you get your clients to trust you and your recommendations?

Hartsig: In order to build trust with my clients and customers, I first have to demonstrate a fundamental understanding of a project's ecosystem. Soil scientists must recognize the constraints and challenges that are presented when working in areas that may be new to them. When faced with new challenges regarding soil systems, I like to turn to a team of soil scientists that will help support these efforts to assure the clients that the solutions presented have been discussed and carefully evaluated before implementation. Not only do our clients and customers receive the diligence from my team, but they also get the field-level data from soil scientists local to those projects who have demonstrated experience in those environments.

Thompson: Do you sometimes offer soil interpretations or recommendations to clients that conflict with those of other experts? If so, what strategies do you use for communication?

Hartsig: Soil interpretations can often present conflicting recommendations and solutions when multiple professionals are involved on a project. The strategy that I've found most effective is framing the soil as a living system that is the foundation for healthy vegetation. I don't need to view soil as a structural or geotechnical component to the landscape. If the solution to healthy, desirable vegetation is the soil (which is my goal on projects), I can promote a solution and message to the responsible parties that

my interpretation is scientifically sound and does not need to conflict with others who view soil differently.

Thompson: How often do you encounter soils and soil-related problems that that go beyond your knowledge? What do you do?

Hartsig: My team encounters new and challenging soil ecosystems regularly. The renewable energy industry is exploring other land uses to develop projects in settings other than agricultural settings, where the public, landowners, and counties are starting to push back. We now have to consider working in forested landscapes, flooded areas, saline-sodic areas in the West, and arid environments (with little to no vegetation) in the Southwest. It really helps to have a network of soil scientists with years of experience in these regions to formulate the best management plan to promote vegetation and to build soil health. Since the soil science community is relatively small, it gives individuals like me the opportunity to network efficiently across the country by knowing just a handful of soil scientists. I've met these soil scientists at SSSA meetings, state soil scientist meetings, and through other soil scientists that I work with.

Thompson: What are the most important things to do to communicate with and collaborate with other professionals working on a large project?

Hartsig: In my experience, the most important method for communicating with others on a large project is to bring them together to discuss interpretations. This actually happens frequently in my line of work, and it has proven to be beneficial to finding resolutions for those projects. Soil and vegetation management can often involve varying recommendations, so evaluating soil data, assessing landscape conditions, and exploring proven solutions with others is welcome to determine best plans moving forward.

Thompson: What kind of communication skills do you use most in your work?

Hartsig: The most valuable communication skills that I've recognized are to acknowledge the audience, whether the audience is engineers, regulatory agencies, or customers, and to speak to the points that are most relevant to them. Not all those audiences speak in soil science terms, so I have to create analogies for them to better understand how we can provide resolutions to the challenges facing our projects.

Thompson: How much do you travel away from home?

Hartsig: I typically travel to project sites bimonthly to get a better understanding of those projects' constraints and conditions. I focus on projects that are either in close proximity to my home in Denver (AZ, CO, WY, NE, KS, and OK) or that can present very challenging recommendations in unique ecosystems (LA, OR, WI, and VA). Those site visits typically include one or two days in the field with half days needed for travel.

Thompson: How much of your work is in the field vs. the lab or office?

Hartsig: I manage a team of soil scientists and restoration ecologists, so my time is 80% in the office and 20% in the field. Others on my team spend up to 50% of their time in the field to better manage their projects.

Thompson: What kinds of business skills does a soil scientist need?

Hartsig: Business skills are critical for soil scientists as the data being ascertained on a project must be presented in a manner that clients and customers can understand. This involves presenting your proposed method for assessing soil systems so that your services can be utilized, interpreting your results so that recommendations can be evaluated and implemented, and collaborating with other professionals to provide value to the project at hand. These business skills are developed and refined over time during one's career.

Thompson: How important is professional certification to your work?

Hartsig: I strongly believe that having the Certified Professional Soil Scientist certification benefits an individual when marketing and presenting to other licensed professionals, regulatory agencies, and clients/customers. Having that certification brings a level of authenticity and credibility to those audiences that ensures your interpretations will be accepted.

Thompson: James, thank you very much for sharing all this information about your work. It's really appreciated!

Cross-Divisional Symposium in San Antonio: Career Opportunities in Soil and Environmental Science

If you are a graduate student, an early career professional, a practicing professional (well, basically, if you are reading this), you may be interested in attending the Cross Divisional Symposium in San Antonio: Cultivating Careers: Exploring Opportunities in

Soil and Environmental Science (https://bit.ly/3XnxsmF). There will be presentations about the varied activities of consulting soil scientists, navigating job opportunities, and developing educational programs for students interested in professional soil science careers outside of academia.

The symposium will be on Tuesday, Nov. 12, 2024, 10 am–12 pm.
