



An ecologist's guide to careers in science policy advising



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From 2007 to 2009, I (LEP) was conducting my postdoctoral research in Florida's Apalachicola Bay, a Gulf Coast estuary that was being subjected to severe drought and upstream water withdrawals. My days consisted of field research on oysters within the Apalachicola National Estuarine Research Reserve and lab experiments in a hot and humid trailer. I manipulated temperature, salinity, and predators, trying to gain insight into oyster declines. Out on the water, I would watch the commercial harvesters pulling up smaller and smaller numbers of oysters. I wanted to get to know these people and understand what they were experiencing. I attended meetings of the fishermen and seafood industry representatives and became their science advisor. I translated and shared my findings and those of my colleagues, but more importantly, I listened. I listened to their insights, concerns, and challenges – economic hardships, regulatory constraints, and threats to culture and livelihoods. I also began to feel powerless. I could collect data to show that the drought was affecting oysters, but I couldn't influence upstream water management decisions, which were caught up in a long-term, tristate water war. How could I better engage across the science–policy divide? I decided to apply for an American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellowship and swapped out my mud boots for a power suit. Little did I know that my first Fellowship assignment would be to develop a Regional Drought Early-Warning System for the Apalachicola watershed, or that I would eventually end up working in the White House, developing science-based policies to enhance the nation's climate resilience.

A science policy advisor provides scientific information and insights to support decision making and the development and implementation of public policies. “Decision makers” aren't just members of Congress or the President of the United States. They are companies enhancing the sustainability of their practices, non-governmental organizations (NGOs) identifying priority conservation areas, local governments improving stormwater management, federal or state agencies managing landscapes, and individual consumers increasing home energy efficiency. These people and organizations are looking to the scientific community for leadership and guidance.

Do you have what it takes to be a science policy advisor? Ask yourself: Do you relish finding solutions to

applied ecological problems, especially those considered highly challenging and complex? Do you like working with diverse, collaborative groups and forming partnerships with both scientists and non-scientists? Do you enjoy communicating with and interpreting scientific information for different audiences? Do you find the life of the academic researcher to be a little too disconnected from the “real world”? Are you a patient person with a sense of humor and tolerance for a diversity of perspectives? If you've answered “yes” to these questions, then read on. You too can be a science policy advisor!

These positions have many different names and flavors. Many science policy positions require a graduate degree and a certain number of course credits in ecology or other scientific disciplines; while a PhD is typically not required, it is often a helpful credential. Agencies and NGOs will typically seek candidates with a solid track record of research experience, especially applied research, and publications. While not required, professional certification (eg through ESA or another professional science organization) can also help to establish credibility. Contrary to popular belief, time spent in Washington, DC, is not necessary, but can be useful in some cases.

What often matters most is a demonstration of leadership ability, skilled communication, and engagement in connecting and translating science. These skills can be gained through volunteering for leadership positions in professional societies, universities, and communities. Ecologists can serve on advisory boards for federal agencies, NGOs, or companies. Researchers at all career stages can seek opportunities to better connect ecology and society and to become more effective communicators (Lowman 2006; Eisenhauer and Nicholson 2007). Rather than relying on peer-reviewed publications as the sole or primary mechanism for communicating science, ecologists can share knowledge through social media, blogs, articles in magazines, and public talks. Policy advising requires the ability to speak to a wide range of scientific issues. For example, while our backgrounds are in the physiological ecology of marine invertebrates (LEP) and fire and wildlife ecology (MDM), we are asked to work on policy issues as diverse as climate impacts on national security, flood risk management, and forest management and restoration. This means growing a broader and more diverse knowledge base, as opposed to more thoroughly developing one's expertise in a specific area of scientific inquiry.



Figure 1. Science policy advisors can help inform decision makers on a variety of challenging and complex issues, as shown in this field demonstration of the long-term effects of fuel treatments on carbon stocks and emissions at the Teakettle Experimental Forest in California. Two decades of applied ecological research at this experimental forest have provided opportunities for student engagement in forest management and policy issues.

Many scientists learn best through hands-on experiences. To build skills in connecting science and policy, ecologists can engage in “use-inspired research” (that is, research designed around the articulated needs of stakeholders; Stokes 1997), and work hand-in-hand to co-produce knowledge. Engagement should be done early (while formulating your research questions) and often, fostering iteration (eg Dilling and Lemos 2011) and ideally building a sustained relationship between the scientists and decision makers (eg Enquist *et al.* 2017). Ecologists can collaborate with agency scientists and managers, particularly when conducting research in or near government-owned lands or waters (Figure 1). This increases the visibility and relevance of their work for integration into decision making.

There are a number of internship and fellowship programs – directed at scientists who want to work in policy – that may offer useful opportunities. The AAAS Science & Technology Policy Fellowship, John A Knauss Marine Policy Fellowship, and Jefferson Science Fellowship Program provide federal agency immersion experiences in Washington, DC. The Pathways Program, which includes the Internship Program, Recent Graduates Program, and Presidential Management Fellows Program, offers federal internship and employment opportunities. The Christine Mirzayan Science & Technology Policy Graduate Fellowship Program brings early-career individuals to the National Academies. There are also programs at the state and local level, such as the California Council on Science and Technology (CCST) Science & Technology Policy Fellowship Program, which places scientists in the California legislature. Not all of these opportunities are limited to early-career scientists, so it is never too early or too late to engage.

Finding a job as a science policy advisor takes persistence and an open mind. Conduct “informational interviews”

with people who have positions that seem interesting, to learn more about their organization and how they got to where they are; this also helps grow your professional network. Read up on agency or organizational missions, job opportunities, position requirements, and science needs. Be on the lookout for job announcements, and apply often. Not all relevant positions would be advertised as an “ecologist”, so launch a broad search, and look at opportunities with position titles such as botanist, soil scientist, physical scientist, or social scientist. Become familiar with the online job announcement and application systems – and their many quirks. Don’t be surprised if there are delays in the processing of your job applications and if there is high competition for desirable positions, as both are common. Perhaps most important of all, don’t give up! Patience, flexibility, and careful preparation do pay off.

Scientists have an obligation to connect their work to society, to conduct research that is inherently useful, and to practice clear and effective communication (Lubchenco 1998). Universities can build programs and courses focused on policy, interdisciplinary studies, sustainability, and applied ecology. For instance, Arizona State University’s Consortium for Science, Policy, & Outcomes explores links between public policy, scientific research, and societal outcomes. Students and faculty can engage in the policy process by providing public comment on draft policies issued through the *Federal Register*. Ecologists can visit their local natural-resource managers, government officials, state and municipal agencies, or conservation organizations to learn about their work and exchange information. Universities can foster partnerships with governmental and management entities to create internship and science engagement programs. For scientists who aren’t interested in leaving academia or changing careers, there are many opportunities to engage in policy advising – eg through serving on National Academies panels, conducting briefings for Congressional representatives, or participating on Science Advisory Boards for natural-resource management agencies. Importantly, non-academic careers, including science policy advising and many others, should not be seen as an “alternative career” or “fallback option”. These careers need the best and the brightest. Many students are now entering school with the goal of moving into non-academic positions; they deserve support and guidance. Today’s challenges require a strong cadre of trained ecologists willing to engage with decision makers to support the development, implementation, and protection of science-based policies.

Science and policy resources are available at <https://www.aaas.org/page/stpf/fellowship-resources>. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of their agencies.

References and author biographies may be found in the online version of this article at <http://onlinelibrary.wiley.com/doi/10.1002/fee.1761/supinfo>

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