Speaking out: weighing advocacy and objectivity as a junior scientist

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Ecologists wear many hats, and some fit better than others. One hat sure to provoke controversy, especially when worn by students, is that of an advocate. Ecologists become advocates when they go beyond objective research and actively champion particular viewpoints. The role of advocacy in science has stimulated considerable discussion over the past several years, particularly among conservation biologists (eg Shrader-Frechette 1996; Strong 2008). I argue here that students have a unique role in this discussion. Our position as junior scientists affords special challenges, risks, and rewards when engaging in advocacy. I highlight these tradeoffs and offer suggestions for how to identify and avoid some of the pitfalls, drawing from my own brief experience as an ecologist-in-training.

What is advocacy, and why is it controversial? Advocacy occurs when, during the process of communicating research results, ecologists use scientific facts to shape an argument relevant to a particular policy goal. Often, this argument reflects some value that the scientist holds: for example, that we should conserve biological diversity. Because ecological research often has a direct bearing on conservation, human health, or land-use decisions that will influence people's lives, including our own, some scientists believe that we have a right, or even an obligation, to advocate for particular views and courses of action (Strong 2008). However, although these views may be well informed and may even represent the personal opinion of most members of the scientific community, many scientists feel that it is inappropriate to mix advocacy and science (Shrader-Frechette 1996). They argue that this can too easily lead to dogmatism, hidden agendas, and biased interpretations. These "evils", whether perceived or real, can diminish the credibility of scientists in the eyes of policy makers and the general public. Not surprisingly, most graduate programs in ecology and evolution teach a narrow doctrine of scientific objectivity.

The hazards of practicing advocacy as a student are numerous. Students often have little experience engaging policy makers or communicating science to the public. We also generally lack experience in weighing the strength of scientific evidence for or against particular courses of action (Ludwig *et al.* 1993). This deficiency in experience amplifies the potential to misjudge a situation or mangle an effort to influence political decision making. It may also reduce our ability to engage in future decision making, so that the original act of advocacy ends up being counterproductive. Without an established track record, advocating a view on our own may quickly call into question the reliability of our data and analyses. As junior scientists, we need to be especially sensitive to this particular risk, as a lack of credibility has the potential to limit our future job prospects and funding opportunities.

With so many potential pitfalls, should students avoid all forms of advocacy? Regardless of where we are in our careers, the principal risk of not engaging in advocacy is that our scientific findings may never reach the proper hands or might be wrongly interpreted. Because methodologies and analyses can be technical and because information sharing can be difficult in some countries, the potential for misinterpretation or lack of interpretation can be great. Indeed, graduate students may actually be in the best position to advocate, because we spend relatively long periods of time in the field and may be especially well informed about the details of a particular policy tradeoff. On a more practical level, practicing advocacy during graduate school may provide real-world experience and help employment prospects by raising the profile of our work. Several young biologists have emerged as influential figures in conservation biology, on account of their willingness to risk advocating controversial solutions to real-world problems (eg Donlan *et al.* 2005).

I wrestle with these ideas in my own work. I study a declining wildebeest (*Connochaetes taurinus*) population in Tanzania. Several general management options are available for counteracting this decline: increasing land protection in the calving grounds, establishing movement corridors between dispersal areas, or increasing the frequency of anti-poaching patrols. As I near completion of my thesis, I feel that I have more and more to say about which option I believe will lead to the recovery of the wildebeest population. While there is political will to conserve the migratory populations in this area, the lack of formal channels for information-sharing reduces the probability that science will play a role in the decision-making process. To counteract this, I feel that I must be vocal about my view of the situation. My decision to advocate is influenced by the urgency of the population decline and the high value that I place on biodiversity conservation, as well as on other ecological, economic, and aesthetic grounds. However, this decision is tempered by uncertainty regarding my research results and my lack of knowledge about the human or economic implications of the different management strategies.

Students who choose to engage in advocacy can use a variety of strategies. One sensible option is to enlist the help

of senior scientists and policy makers, who will provide expertise and add credibility to the cause. Their experience can be a fitting complement to our energy and ideals. Additionally, many of the problems that arise from advocacy are simply the result of poorly communicated messages, or messages that are unsuited to the audience. Graduate school offers countless venues for honing these communication skills: departmental lectures, teaching assistantships, graduate workshops, oratory clubs, newsletters, and so forth. Each provides a different context and a new opportunity to practice the art of sharing information and honing your message. Finally, student advocates need to be particularly rigorous in understanding the sources and meaning of uncertainty in their analyses. Although general courses in frequentist statistics lay the foundation for this understanding, several modeling frameworks – namely, adaptive management and structured decision making – now provide model-based approaches for dealing with uncertainty in the context of natural resource management. Few graduate programs offer full courses in these emerging fields, but many workshops and short courses can be found throughout the year, varying in their degree of specialization.

In short, graduate students in ecology must think strategically before engaging in advocacy. Despite the hazards, they have an opportunity to take a leading role in using ecology to inform and shape policy decisions and influence public opinion. As ecological research, and the sources that fund it, become increasingly channeled toward understanding the growing environmental and climate crises of this century, these opportunities will only grow more numerous.

Faculty response

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In my view, ecology has become broadly relevant to society, but we remain unsophisticated in bringing our science to practice. I avoid the word "advocacy" because it can imply chaining oneself to a tree, which I cannot recommend as a career move. However, I strongly encourage interested young scientists to be aggressive by bringing powerfully relevant science to environmental decision making.

Powerful science begins with a powerful question. If you seek applied relevance, choose research questions that inform important, malleable decisions, are soluble through scientific inquiry, and address theoretical principles broader than your system. Study the business of those who implement resource management decisions, and the perspectives of those who influence decisions and are influenced by them. Go to their meetings. Read their literature. Cultivate collaboration. Try out your research questions on them and favor those that most interest them. Ensure that your research plans could produce different possible results that would support different decisions. Avoid research plans that can only support one model for management. Be able to justify your proposed research in terms of new basic knowledge and help debunk the misconception of a tradeoff between basic and applied research.

Powerful science is interpreted with clear and strong arguments. Avoid being too cautious in pursuing relevance, in which case the science could be misunderstood and underused by society, but also avoid being too aggressive in pressing tenuous conclusions, which compromises the credibility of the science. Without being either too timid or too forceful, one can express with more or less certainty scientific inferences that are more or less consequential if true. Explore different formulations of statements to maximize the objective leverage of your work for decision making. Embrace decision theory, which considers (1) the benefits of a decision if the premise is correct versus the costs if the premise is incorrect, and (2) the parallel benefits and costs of an alternative decision favored by an alternative premise. Avoid conflating scientific inference with contextual values. Make use of the construction, "If one's management goal is (contextual value) X, then our results favor decision A over decision B". Avoid unconscious bias that leads to the omission of inconvenient interpretations; if one result would have had applied value, the alternative must have value.

Disseminating powerful science is founded on publishing engaging papers in top journals. Conveniently, this is also how to succeed professionally and expand your beneficial impacts. Beyond publishing, seek to bring your science to the managers, decision makers, and stakeholders who cannot possibly stay on top of all the potentially relevant technical literature. Send them your papers. Go to their meetings. Have coffee with them. Consider publishing accessible, non-technical summaries and be alert to calls for public input during the development of environmental policy. Finally, I encourage readers to follow Tom's lead in promoting continuing serious discussion about how ecology and ecologists can meet the challenge of accelerating social relevance.

References

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