



The crucial but underrepresented role of philosophy in conservation science curricula

David Saltz ^{1*}, James Justus,² and Buddy Huffaker³

¹Mitrani Department of Desert Ecology, The Swiss Institute for Dryland Environmental and Energy Research, Ben-Gurion University of the Negev, Sde Boqer Campus 8499000, Beersheba, Israel

²Department of Philosophy, Florida State University, 641 University Way, 154 Dodd Hall, Tallahassee, FL 32306, U.S.A.

³Aldo Leopold Foundation, P.O. Box 77, Baraboo, WI 53913, U.S.A.

Introduction

Sciences are often categorized as basic or applied. The former focuses on explaining processes and generating knowledge and the latter on harnessing that knowledge for practical applications. The applied sciences can be further divided into those fields shaped significantly by ethical values and those that are not. Ethically driven sciences, such as medicine, welfare economics, clinical psychology, and conservation science, generate knowledge mainly for diagnosis, prevention, and treatment of harm, dysfunction, or other negative outcomes. As such, these fields must confront difficult questions about what has value, what is considered harmful or dysfunctional, and why, when, and how prevention and treatment should occur. These questions have strong ethical and normative underpinnings.

For practitioners in applied ethically driven sciences, exposure to philosophical work done on the ethical issues at their foundations and the contentious contemporary controversies they generate is essential to responsible decision making. These decisions often simply cannot be made without addressing the deep and difficult question: What is good and bad, right and wrong? These fields are also typically marred by multifactorial complexity, limited and incomplete field data, and weak inference and limited predictive capabilities, which further complicate decision processes. The benefits of formal training in philosophy, ethics in particular, is well documented in medicine and social work (Lehmann et al. 2004; Grady et al. 2008) and is gaining recognition in environmental

sciences (Hall et al. 2017), biotechnology (Berry et al. 2013), and engineering (Herkert 2005). Conservation science would benefit from a similar recognition. We examined the need for teaching philosophy and ethics in conservation science by surveying conservation-science faculty. We also devised a template for a course on conservation philosophy and ethics.

Methods

We surveyed 50 graduate programs offering degrees in conservation science and the like (e.g., wildlife management, conservation biology, etc. [Supporting Information]) in 8 countries to assess the prevalence of philosophy courses, ethics in particular, within these programs. Programs were identified using a common internet search engine to search for the key phrase *graduate program conservation biology* (list of the universities in Supporting Information). We selected 1 faculty member (prioritizing directors, chairpersons, heads of department, etc.) from each program's website. If the website did not identify such a figure, we studied the sites of the program's various faculty members and selected those who described themselves first and foremost as conservation biologists.

Each faculty member selected was then sent an email with a list of 5 questions: Do you offer a graduate course in the philosophy or ethics of conservation? Is it mandatory? If it is not mandatory, how many students take it (<25%, 25–75%, >75%)? If you do not offer such a course, do

*email dsaltz@bgu.ac.il

Article impact statement: Normative scientists must be trained in current thinking of the philosophy that underlies their fields, an issue not fully realized in conservation.

Paper submitted January 16, 2018; revised manuscript accepted June 8, 2018.

you personally think such a course should be offered? Do you think such a course should be mandatory? If no answer was received, a reminder followed a few weeks later. If no response was received to the second query, we emailed an additional and final faculty member from the same program.

Results

We received 32 replies from the 50 graduate programs, of which 22 (69%) reported no course was offered. Five (15%) offered a regular course dedicated to the philosophy and ethics of conservation, of which only 2 were mandatory. Of these, only 3 replies provided the number of students attending the nonmandatory course, and all estimated it was <25% of the students in the program. Of the remaining 5 replies, one reported such a course was offered irregularly, and for the remaining 4, the course was broadly titled Environmental Philosophy, making it uncertain whether they would directly advance students' ability to navigate the specific ethical frontiers of conservation work. Of the faculty members of the 22 programs that did not offer a course in the philosophy of conservation, 14 (64%) thought such a course should be offered, 1 thought it should be mandatory, and 3 were unsure.

The majority of responding conservation-biology graduate programs (69%, with 95% confidence interval of 53–85%) did not offer a course in the philosophy and ethics of conservation, but in those programs, most respondents thought such a course should be offered but not mandatory. Of those stating a reason for making such a course nonmandatory, all suggested that coursework was already too demanding (interestingly, the same reason is given in medical programs lacking a medical ethics course [Lehmann et al. 2004]).

Discussion

A lack of exposure to philosophy serves the discipline poorly. Most conservation issues are fractious or wicked problems that may have many valid perspectives. Solutions therefore require substantive and systematic dialogue among managers, decision makers, politicians, and stakeholders (Jonassen & Cho 2011; Ramaley 2014). That dialogue, in turn, is most likely to succeed when clarity exists about the possible ethical bases of conservation.

Conservation science's principal objective is to ensure the continued functionality of natural ecosystems and the flourishing of the species in them. It is therefore a mission-driven science that generates knowledge for diagnosis, prevention, and treatment of an ethically important problem. Thus, Soule (1985) suggested conservation science shares many features with medicine. But in contrast

with medicine, where something resembling a rough consensus has emerged about the relevant ethical goals, (what constitutes human health, unwarranted harm, etc.) a similar consensus about an ethical basis for conservation has yet to emerge (Callicott 2009). Many key issues are contentious and remain unresolved (Steverson 1995; Minter & Manning 2003) and many normative concepts are not well-defined or unquantifiable (Callicott et al. 1999). Successful conservation requires navigating these conflicts and weaknesses by becoming, at a minimum, familiar with the best philosophical work addressing them.

The philosophical literature devoted to the ethics of conservation is rich and diverse. Hundreds of books and thousands of papers addressing the topic span more than half a century. Yet the formal training of conservation biologists does not require students to engage with this literature, despite it being safe to assume that many of these students will have to make decisions with significant ethical implications during their careers. Without exposure to the relevant philosophy they will do so in ignorance of much of the most rigorous argumentation and guidance on these very difficult issues. Knowledge of the arguments made within contrasting ethical theories—understanding of their strengths and weaknesses in particular—will substantially aid conservation practitioners in decision making and efforts to solicit action by decision makers (e.g., those with political powers).

In contrast with other applied mission-driven sciences (e.g., criminology, medicine, and social work), where ethical training is commonly integrated into academic programs (Lehmann et al. 2004; Grady et al. 2008), our survey indicates a serious deficiency in this respect in the training of conservation scientists. We encourage including at least 1 mandatory ethics of conservation course in graduate conservation programs. Such a course should introduce students to current debates about philosophically salient conservation-related issues (theoretical and applied). Such a course would focus on the basis for conservation, the issue of the uniqueness of conservation as an applied science, the origins of contemporary thinking in conservation, the multiple schools of thought, and the issues of convergence, ethics, problematic definitions, interpretations of key concepts, and the many vague benchmarks. Ideally, beginning graduates would have been exposed to an undergraduate course in environmental ethics. Based on a brief review of undergraduate conservation programs, however, only about half the programs list a course in environmental ethics, and in the majority of cases merely as an elective.

The template in Table 1 is a suggested structure for such a course. It is intended as a starting point that can be modified, supplemented, or improved upon to better serve the objectives of the individual instructor or general program.

Table 1. A template of a suggested course structure on the philosophy of conservation science.

<i>Topic</i>	<i>Subtopic</i>
General background	What is philosophy (epistemology; ethics; metaphysics; objectivity, subjectivity and relativism; fact and values, etc.)? What is ethics (meta-ethics, normative ethics [deontology, consequentialism, contract theory, virtue ethics], communitarian ethics, applied ethics, monism vs. value pluralism, etc.)?
The sand clock of why conservation	Romantic-transcendental preservation ethic vs. resource-conservation ethic Current conservation ethics Cornucopians vs. doomsday outlook
The value of natural entities	Theories of natural value: individualism, holism, anthropocentrism, sentientism, biocentrism, ecocentrism Aesthetic, instrumental, intrinsic, and transformative value of natural entities Animal liberation and conservation ethics; the ethics of culling; compassionate conservation Philosophical challenges to environmentalism
Nature and naturalness	What is natural and does it matter? Exotic, introduced, invasive, naturalized: the ethical status of species classifications; Restoration ecology and reference state-problems in conservation Restoration ecology vs. ecosystem creation; historical vs. novel ecosystems What exactly is biodiversity?
Divergent goals, pluralistic perspectives	Wilderness vs. wildness Wilderness preservation vs. biodiversity conservation Deep vs. social ecology The old and the new conservation What exactly is sustainability?
Rethinking rationality to save species	Tragedy of the commons Lifeboat ethics Precautionary principle Statistical inference in conservation biology: ethical inputs into null-model hypothesis testing and multi-model inference, evidence-based versus evidence-informed practices Managing uncertainty in decision and game-theoretic conservation contexts
Conservation biology as an ethically driven science	Conservation triage and conservation biology as a “crisis” discipline Role of epistemic values in ethically driven sciences
Climate-change ethics	The ethics of assisted migration and de-extinction
The land ethic	Aldo Leopold Pragmatism as an environmental ethic Convergence in the philosophy of conservation

Conclusions

Modern conservation practices are informed by a multitude of ethical perspectives (e.g., anthropocentric, sentientist, and biocentric), all of which influence policy formulation. The right formulation and implementation of these efforts requires an understanding of the natural sciences and an in-depth comprehension of the philosophical issues that bear on them. It seems indisputable that professional conservation scientists should not make decisions regarding the future well-being and existence of living things (and some nonliving) on this planet without

thoroughly understanding the ethical ideas that should guide those decisions. We encourage graduate programs in conservation biology to include a mandatory course on the philosophy of conservation.

Acknowledgments

We thank the anonymous reviewers for the helpful comments, and we especially thank handling editor B. Callcott for his help along the way. This is publication number 979 of the Mitrani Department of Desert Ecology.

Supporting Information

A list of graduate programs we surveyed (Appendix S1) is available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

Literature Cited

- Berry RM, Borenstein J, Butera RJ. 2013. Contentious problems in bio-science and biotechnology: a pilot study of an approach to ethics education. *Science and Engineering Ethics* **19**:653–668.
- Callicott JB. 2009. The convergence hypothesis falsified: implicit intrinsic value, operational rights, and de facto standing in the endangered species act. Pages 142–166 in Minter BA, editor. *Nature in common? Environmental ethics and the contested foundations of environmental policy*. Temple University Press, Philadelphia.
- Callicott JB, Crowder LB, Mumford K. 1999. Current normative concepts in conservation. *Conservation Biology* **13**:22–35.
- Grady C, Danis M, Soeken KL, O'Donnell P, Taylor C, Farrar A, Ulrich CM. 2008. Does ethics education influence the moral action of practicing nurses and social workers? *The American Journal of Bioethics* **8**:4–11.
- Hall TE, Engebreston J, O'Rourke M, Pizo Z, Whyte K, Valles S. 2017. The need for social ethics in interdisciplinary environmental science graduate programs: Results from a nation-wide survey in the United States. *Science and Engineering Ethics* **23**:565–588.
- Herkert JR. 2005. Ways of thinking about and teaching ethical problem solving: Microethics and macroethics in engineering. *Science and Engineering Ethics* **11**:373–385.
- Jonassen DH, Cho YH. 2011. Fostering argumentation while solving engineering ethics problems. *Journal of Engineering Education* **100**:680–702.
- Lehmann LS, Kasoff WS, Koch P, Federman DD. 2004. A survey of medical ethics education at U.S. and Canadian medical schools. *Academic Medicine* **79**:682–689.
- Minter BA, Manning RE, editors. 2003. *Reconstructing conservation: finding common ground*. Island Press, Washington, D.C.
- Ramaley JA. 2014. The changing role of higher education: Learning to deal with wicked problems. *Journal of Higher Education Outreach and Engagement* **18**:7–22.
- Soule ME. 1985. What is conservation biology? *BioScience* **35**:727–734.
- Steverson BK. 1995. Contextualism and Norton's convergence hypothesis. *Environmental Ethics* **17**:135–150.

