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PERSPECTIVES AND NOTES

Conservation biology education at small liberal arts colleges: An opportunity for growth

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Abstract

Undergraduate education is a critical period for recruiting the next generation of conservation biologists and engaging a broader community of conservationists. As small liberal arts colleges (SLACs) can be particularly effective at meeting these goals, promoting conservation biology education at these institutions is essential. In this study, we paired a web review and e-mail questionnaire (46 respondents) to assess conservation biology coursework and faculty expertise at the top 100 SLACs in the United States. Our results highlight that there is very strong student interest in conservation biology coursework, and that maintaining faculty expertise in the discipline is a priority for those departments that currently have it. Nonetheless, 40% of these institutions lack faculty expertise and 26% lack any coursework in the discipline. Embracing this opportunity for growth will require engaging the broader educational community, with the goal of expanding faculty expertise, coursework, and general access to education in conservation biology.

KEYWORDS

conservation education, coursework, faculty, mentoring, undergraduate

Undergraduate education represents a uniquely important opportunity to expand public support for conservation institutions and policies, and to recruit the next generation of conservation biologists (Trombulak, 1994). Undergraduate coursework serves as the first exposure to the discipline for many students, improving their attitudes toward nature (Caro, Pelkey, & Grigione, 1994) and providing the necessary spark of passion to generate and sustain their interest (Fleischner, 1990). Assessments of the status of undergraduate education in conservation biology have typically focused on evaluating and improving the content of coursework and research in the discipline (e.g., White, Fleischner, & Trombulak, 2000). These are worthy exercises, but do not address the issue of access to education in conservation biology, without which the quality of the education itself is irrelevant.

Small liberal arts colleges (hereafter SLACs) promote breadth of experience and interdisciplinary thought, two characteristics that align well with the field of conservation biology. Another defining feature of SLACs is their emphasis on strong teaching and mentorship, with close faculty-student interaction in both coursework and research. As a likely result of this approach, SLACs—especially highly selective ones—tend to produce a disproportionately large number of graduates that subsequently earn doctoral degrees in the sciences (Cech, 1999). Promoting access to conservation biology

education at SLACs is thus integral to the discipline's continued growth and long-term impact.

However, the small faculty size typical of SLACs limits the breadth of expertise and coursework they can offer, which may reduce access to the discipline. At larger universities, conservation biology is nearly always represented by at least one course, and often much more (see Supporting Information). The same is not true of SLACs, which must meet core curricular needs with more limited faculty. Understanding the degree of this disparity will inform the expansion of conservation biology education to where it is most needed.

We sought to determine the accessibility of conservation biology education at SLACs in the United States. We limited our assessment to the top 100 ranked institutions, according to the 2020 U.S. News and World Report Best Colleges: National Liberal Arts Colleges ranked list. Although some dispute the validity and utility of this ranking system, it nonetheless provided an accessible list of institutions on which to focus our assessment. We excluded 8 of the top 100 institutions due to the nature of their curricula (including, alphabetically: College of the Atlantic, Soka University of America, St. John's Colleges, Thomas Aquinas College, and the United States Air Force, Naval, and Military Academies), and extended our survey to include the next 8 institutions in the ranked list. The 100 institutions included in our final survey (listed in Supporting Information) comprised a total enrollment of 185,610 students, with a mean enrollment of 1856 (median = 1818, min = 448, max = 3,597), and a mean number of Biology faculty members (including non-tenure-track faculty) of 13 (median = 13, min = 3, max = 24).

For each institution, we first visited the departmental website for Biology to assess: (a) faculty expertise and (b) specific coursework in the discipline. We then sent a tailored e-mail questionnaire to each department chair (see below). To determine faculty expertise, we reviewed the personnel description or webpage for every faculty member, searching for relevant keywords beginning with "conserv." Although the content of departmental personnel pages was variable, they typically included some combination of biographical information, self-identified areas of expertise, research summaries, teaching duties, and representative publications. Teaching duties in conservation, without any other reference to the discipline, was not sufficient to demonstrate expertise. Although we did not specifically review faculty in related departments such as Environmental Studies, we did include those that were identified secondarily either through our course search or questionnaire. There was little ambiguity in our assessment of faculty expertise, and in cases where there was (for example, the faculty member had apparent conservation expertise but their page did not explicitly include any "conserv" keywords), we opted to include the faculty member as having expertise in the discipline.

To assess coursework, we searched all offerings for the relevant keywords described above. With few exceptions, courses in the discipline were simply titled "Conservation Biology." In some cases, our review of coursework required consulting the institution-wide course catalog in addition to the department website. In cases for which our course search was limited to specific terms or years, we reviewed the last 2 years'-worth of course offerings.

Following our web review, we sent an e-mail questionnaire to the Biology department chair of each institution, consisting of three questions on coursework (focused on enrollment and student interest, course history, and other coursework with conservation themes), and two or three questions on faculty expertise (focused on hiring and retainment priorities, hiring likelihood, and barriers to hiring or maintaining faculty in the discipline). We used four versions of the questionnaire that differed slightly based on whether the department had existing coursework and/or faculty expertise in the discipline (see Supporting Information for the survey text). We received questionnaire responses from 46 of the 100 institutions surveyed.

Among the top 100 SLACs in the United States, 40% lack faculty expertise in conservation biology, and 26% lack any specific coursework in the discipline. Both conservation biology faculty expertise and coursework were significantly positively associated with total student enrollment (Generalized Linear Models: $p = .03$ and $p < .01$, respectively; see Supplementary Information for more detail), but neither were significantly associated with institutional ranking (Generalized Linear Models: $p = .79$ and $p = .36$, respectively; see Supplementary Information for more detail). The disparity between conservation biology faculty expertise and coursework represents cases in which a faculty member is evidently comfortable enough to teach a class, but does not list the discipline among their areas of expertise. This is not unusual for SLACs, given the breadth of teaching required in departments with relatively few faculty members. However, the result is that among the top 100 SLACs that do offer coursework in conservation biology, 20% of these courses are taught by faculty with no self-identified expertise in the discipline.

The institutions that offer a conservation biology course have done so for a mean of 14 years (range: 5 to 25 years), motivated by a combination of student interest (66% of responses), individual faculty interest (66% of responses), and/or institutional support for the discipline (31% of responses). The mean student enrollment in

conservation biology courses was 22, which is remarkably large for an upper-level course at a SLAC. Many respondents noted that their course regularly reaches the enrollment cap, and is sometimes allowed to exceed it due to strong and growing student demand. Among institutions that do not offer a specific course in conservation biology, 88% of respondents believed that such a course would generate sufficient student interest if added to the curriculum. Despite the lack of specific coursework, many respondents noted that conservation themes do receive some secondary attention in other courses, particularly those in ecology, animal behavior, and global change biology.

Of the institutions with faculty expertise in conservation biology, 93% stated that it was a departmental priority that they maintain that expertise in the future. Regardless of current faculty expertise, many respondents noted the challenges inherent to faculty staffing at SLACs, including small departmental size and the need to represent core areas of biology in teaching and research.

SLACs represent a substantial population of students with potential interest in conservation biology, many of whom are currently receiving little to no academic exposure to the discipline. U.S. News and World Report has identified 223 liberal arts colleges in the United States, which comprise a total enrollment of more than 350,000 students. Across just the top 100 SLACs included in our assessment, a total of 66,019 students lack access to faculty expertise in conservation biology, and 39,314 lack access to coursework in the discipline. Given that we found no significant trend in access to conservation biology across institutional rankings, these deficiencies likely extend to other SLACs. This suggests that across all 223 institutions, there may be nearly 150,000 students without faculty expertise in conservation biology, and more than 85,000 without any available coursework in the discipline. Although a relatively small proportion of these students would actually make use of conservation biology expertise and coursework if available, this nonetheless represents a significant opportunity for growth.

Growth in conservation biology is dependent on introducing new students to the discipline. For undergraduate students, this is best facilitated by offering coursework and faculty research expertise at their own institution. SLACs can be particularly good incubators of future conservation biologists, because they emphasize undergraduate research and mentorship, both of which are important predictors of future career success in the sciences (Thiry, Laursen, & Hunter, 2011), especially for underrepresented groups (Chang, Sharkness, Hurtado, & Newman, 2014). Expanding coursework and faculty expertise at SLACs could attract future conservation professionals, and promote a better understanding of—and support for—conservation causes among graduates who pursue other fields.

The most direct way to increase access to conservation biology at SLACs is to encourage faculty hiring that explicitly seeks expertise in the discipline. Although there are many factors that drive the process of faculty hiring, an essential step toward this goal is to appeal broadly to colleagues at SLACs on the merits of hiring in the discipline. As an inherently interdisciplinary field, conservation biology is a natural complement to other areas of expertise seen as essential even to small departments, including ecology, evolutionary biology, taxon-focused expertise such as plant or vertebrate biology, and a broad range of sub-disciplines within environmental studies. SLACs with the potential to hire in any of these areas can thus readily meet their needs of core faculty expertise while promoting a discipline that attracts strong and growing student interest. As the number of graduate degree programs in conservation biology has increased rapidly since the formal development of the field in the mid-1980s (Bonine, Reid, & Dalzen, 2003; Jacobson, 1990), there is now a large community of doctoral graduates in the discipline, many of whom seek positions in academia.

Conservation biology is a relatively young discipline, and change in academia can be slow. However, after nearly 35 years of growth from its first formal definition (Soulé, 1985), conservation biology has achieved a level of significance—for undergraduate students, for higher education broadly, and for the public at large—that warrants better representation on SLAC campuses. To meet this goal will require engaging with the broader community in the biological and environmental sciences, in order to expand faculty expertise and coursework at SLACs, and to continue to improve access to education in conservation biology.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: Cooper Rosin and Paul H. Zedler. Data collection: Cooper Rosin and Paul H. Zedler. Data analysis: Cooper Rosin. Original draft writing: Cooper Rosin. Review and editing: Cooper Rosin and Paul H. Zedler.

DATA AVAILABILITY STATEMENT

Survey details and web-based project data are included in the Supporting Information. Questionnaire response data with the identifying characteristics removed can be obtained by contacting the author, in compliance with IRB protocol.

ETHICS STATEMENT

Data collection and all related research activity were compliant with institutional ethics guidelines and procedures.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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