

Macalester Environmental Review

Posted on June 1, 2000

Not All Are Created Equal: An Analysis of the Environmentally-Related Programs/Departments in U.S. Academic Institutions Until December 1999

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Abstract

Environmental-related programs, have traditionally lack definition of their nature and unifying principles. In order to ascertain how these programs are presently constituted in U.S. institutions of higher education, we surveyed 642 environmentally related programs/departments between September 1999 and January 2000. The states with the highest number of those programs/departments were California (57), New York (54), Pennsylvania (45), Ohio (29), and Texas (24), while those with the lowest numbers were Idaho and Wyoming (0), North Dakota, South Dakota, Missouri and West Virginia (1), and Hawaii, Oklahoma, Arkansas, Kentucky and Delaware (2). When the state population is taken into account, the number of programs per 1,000,000 inhabitants, the states with the highest number of programs/department per capita were Vermont (23.6), the District of Columbia (11.5), New Hampshire (10), Alaska (9.6) and Rhode Island (9.1) while at the bottom were Idaho and Wyoming (0), Missouri (0.4), Kentucky (0.5), Oklahoma, Alabama and West Virginia (0.6), and Arkansas (0.7).

The names Environmental Science and Environmental Studies are, by far, the most common ones, followed by Environmental Engineering (11%) and Biology/Ecology/Conservation (5.75%). The first two are more commonly used in college settings while Environmental Engineering is more common among universities ($p < 0.5$).

<http://www.macalester.edu/~envirost/MacEnvReview/equalarticle.htm>

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The vast majority of environmental programs fall within the natural sciences realm (58.57%). Only 23 (3.58%) are fully interdisciplinary by combining all areas of knowledge.

The mean number of degrees offered per institution was 1.230 for colleges and 1.921 for universities which was not statistically significantly different (t-test, $p < 0.5$). A total of 119 colleges offer an internship experience (required or not) vs. 263 universities doing so. Universities have a statistically significant higher number of programs that require internship opportunities vs. programs housed at 4-year colleges (t-test, $p < 0.5$).

Between 1900 (the year of the first program created) and 1958, only 14 programs were established. For the period 1959-1999, there is a dramatic increase in the number of programs being created. There are two big "waves" in the creation of programs: one between 1965 and 1976 (with a high peak in 1970) and another starting 1988 and, probably, continuing to this date, with a peak in 1997. It is unclear whether or not academic institutions were responding to needs from society in general or just from students' demands when creating those programs.

The high diversity of names and emphases found in this study is consistent with the premise that Environmental Studies is a field where there is a lack of unifying principles and a clarity of what environmental studies programs should be. This is a continuous project to be updated on a yearly basis.

Introduction

There is great uncertainty about Environmental Studies (ES) as an academic field and how to design environmentally-related programs for institutions of higher education (Soulé & Press 1998). In general, the status of ES programs (ESPs) is characterized by competing proposals. There is neither agreement as to the characterization of the domain nor a basis for identification and selection of accurate and appropriate subject matter of ESPs (Bennett 1996).

Traditionally, most ESPs have been envisioned as an integrating concept that draws elements from many traditional disciplines, but actual integration or synthesis of that knowledge has been difficult to define and/or achieve. Thus, it is not always possible to ascertain when that integration is accomplished. No consensus has been reached on whether ES Studies is a field that can be described as an area for professional and technical preparation, interdisciplinary, multidisciplinary, metadisciplinary or a discipline in itself (Caldwell 1983, Horning 1996, Jacobson & McDuff 1998, Mattes 1994, McLaughlin 1994, Newell & Green 1982, Schneider 1997, Wilke 1995). Furthermore, whether or not its teaching must include certain ethical values and what those values should be, have also been a source of discussion (Hunn 1996, Kim & Dixon 1993, Orr 1990).

Despite all these shortcomings, anecdotal evidence suggests that ESPs are increasing in number and importance among institutions of higher education (Kettl 1999). Yet, there has not been an extensive, in-depth survey of environmentally-related programs/departments

in U.S. academic institutions. Exact figures on their number in higher education has always been vague (e.g., Brough 1992).

The major goal of this paper is to survey as many environmentally-related programs as possible in order to analyze their following characteristics: 1) geographic distribution; 2) number of programs per institution; 3) how those programs define themselves by name (e.g., environmental studies, environmental science, etc.); 4) emphases of those programs by areas of knowledge (natural sciences, social sciences, humanities, interdisciplinary); 5) degree offered (B.A., B. Sc., Masters', Ph.D.); 6) whether internships and study away/abroad opportunities were offered and if any of those was required; 7) vital statistics (number of students enrolled, number of students graduated in 1998, last year for which full statistics were available, number of faculty involved in those programs and the status of those faculty, i.e., number of faculty that: a) were assigned to the environmental program/department, whether they were b) full-time, c) shared with other departments/programs, d) part-time faculty and, 8) year in which the environmentally-related program/department was created.

Materials and Methods

We define as an environmentally-related program/department any of those that use the word environmental in their title, from the standard environmental studies, science, engineering to the less common environmental journalism, law. We also include those that although their name do not carry the word environmental, define themselves as environmental in nature in their publicity material.

Data collection was carried out between September 1999 and January 2000. To locate the programs/departments, we used online search engines such as Peterson's guide to graduate schools (www.petersons.com) and Peterson's *CollegeQuest* for undergraduate programs (www.collegequest.com). We also used other sites that carry extensive lists of higher education programs in the environmental arena, such as the web page of the Committee for the National Institute of the Environment (www.cnie.org) and Second Nature (<http://www.starfish.org>). Other programs were located through their web pages by typing in the words environment or environmental and matching those with the words program and/or department in the following search engines: Excite, HotBot, LookSmart, Lycos, Snap, About.com and Google. In order to locate programs/departments that were more recently created and for which information was not readily available in the sources cited above, we scrutinized the job advertisement for academic positions in the *Chronicle of Higher Education and Science* also from September 1999 to January 2000.

The web site of each school was consulted to get basic information on the name and type of degree, etc., as well as contact information for each program. Next, each program was contacted with an e-mail survey requesting information on the number of faculty, students, graduates, and information about study away and internship programs. Responses were compiled, but because only about half of the programs/departments contacted replied to our request for information, we based our results on their advertised information when first

hand information was not available. Each program was treated as an individual entry for statistical purposes even if there was more than one program for the same academic institution.

Results and Discussion

General: Results are compiled in Tables 1-1 through 1-7. A total of 642 programs/departments in 359 institutions of higher education were located. Of those, 297 (46.26%) responded to our survey. Those programs are listed alphabetically according to the name of the academic institution to which they belong. At the end of this Table we list the URL address from each program from which we obtained the initial information, whether or not people from that program/department responded to our survey, the name of the person we contacted or who at least appeared as responsible for the program/department based on his/her title (program director/coordinator, chair), and the email address of that program/department that we used or at least appeared to be the one for contact/further inquiry for that program.

Click here for [Table 1-1](#). *(on web, too large to print)*

Geographic Distribution: The second column on Tables 1-1 through 1-7, identified the location of the institution by state. The number of programs/departments per state are summarized in Table 2. In order to see whether these numbers really represent any level of interest for these kind of programs in the academic institutions of these states, they must be correlated to the population in those states. Using also U.S. Census Bureau data as for March 1, 2000, we divided the number of programs/department by the population of that state and region.

Table 2. Number of Environmentally-related programs/departments per state/population

Region (Total # of Programs)	State	# Programs/ State	Population (1999)	Programs/ 1,000,000
ALASKA/ HAWAII (8)	Alaska	6	619,500	9.6
	Hawaii	2	1,185,497	1.6
WEST COAST (121)	Washington	18	5,756,361	3.1
	Oregon	17	3,316,154	5.1
	California	57	33,145,121	1.7

ROCKY MOUNTAINS (44)	Arizona	7	4,778,332	1.4
	Colorado	16	4,056,133	3.9
	Idaho	0	1,251,700	0
	Montana	8	882,779	9
	Nevada	6	1,809,253	3.3
	New Mexico	4	1,739,844	2.2
	Utah	3	2,129,836	1.4
	Wyoming	0	479,602	0
MIDWEST (149)	Illinois	19	12,128,370	1.5
	Iowa	11	2,869,413	3.8
	Indiana	16	5,942,901	2.6
	Kansas	3	2,654,052	1.1
	Michigan	23	9,863,775	2.3
	Minnesota	15	4,775,508	3.1
	Missouri	7	5,468,338	1.2
	Nebraska	5	1,666,028	3
	N. Dakota	1	633,666	1.5
	Ohio	29	11,256,654	2.5
	S. Dakota	1	733,133	1.3
Wisconsin	19	5,250,446	3.6	
	Alabama	3	4,369,862	0.6
	Arkansas	2	2,551,373	0.7
	Delaware	2	753,538	2.6
	Dist. Columbia	6	519,000	11.5
	Florida	18	15,111,244	1.2

SOUTH (138)	Georgia	11	7,788,240	1.4
	Kentucky	2	3,960,825	0.5
	Louisiana	9	4,372,035	2.0
	Maryland	11	5,171,634	2.1
	Mississippi	1	2,768,619	0.4
	N. Carolina	14	7,650,789	1.8
	Oklahoma	2	3,358,044	0.6
	S. Carolina	5	3,885,736	1.3
	Tennessee	8	5,483,535	1.5
	Texas	24	20,044,141	1.2
	Virginia	21	6,872,912	3.1
	West Virginia	1	1,806,928	0.6
NORTHEAST (210)	Connecticut	13	3,282,031	4.0
	Massachusetts	37	6,175,169	6.0
	Maine	10	1,253,040	8.0
	New Hampshire	12	1,201,134	10.0
	New Jersey	15	8,143,412	1.8
	New York	54	18,196,601	3.0
	Pennsylvania	45	11,994,016	3.8
	Rhode Island	9	990,819	9.1
Vermont	14	593,740	23.6	

This table shows that in absolute numbers, the states with the highest number of programs/departments are California (57), New York (54), Pennsylvania (45), Ohio (29), and Texas (24), while those with the lowest numbers are Idaho and Wyoming (0), North Dakota, South Dakota, Missouri and West Virginia (1), and Hawaii, Oklahoma, Arkansas,

Kentucky, and Delaware (2). However, when the state population is taken into account and the number of program per 1,000,000 inhabitants is calculated, the results vary greatly for the ones that were at the top in absolute numbers but remain basically the same for those that were at the bottom in absolute number. Thus, the states with the highest number of programs/ departments per 1,000,000 inhabitants are Vermont (23.6), the District of Columbia (11.5), New Hampshire (10), Alaska (9.6), and Rhode Island (9.1) while at the bottom we find Idaho and Wyoming (0), Missouri (0.4), Kentucky (0.5), Oklahoma, Alabama and West Virginia (0.6), and Arkansas (0.7).

Of the above, the data for the District of Columbia needs to be qualified. The reason is that we can assume that a large number of people enrolled in these type of programs in D.C. institutions are actually residents of either Maryland or Virginia.

We produced four maps: the first indicates the absolute number of programs/ departments per state (Fig. 1). The second (Fig. 2) represents the number of programs per region of the United States. Those regions were defined using the U.S. Census Bureau definition for states comprising six U.S. regions: Northeast, South, Midwest, West, West Coast, and Alaska and Hawaii (www.census.gov) (Fig. 2). We also produced a third map (Fig. 3) in which the number of programs/ departments are shown in relation to 1,000,000 people for each state.

Figure 1: Environmentally-Related Programs by State

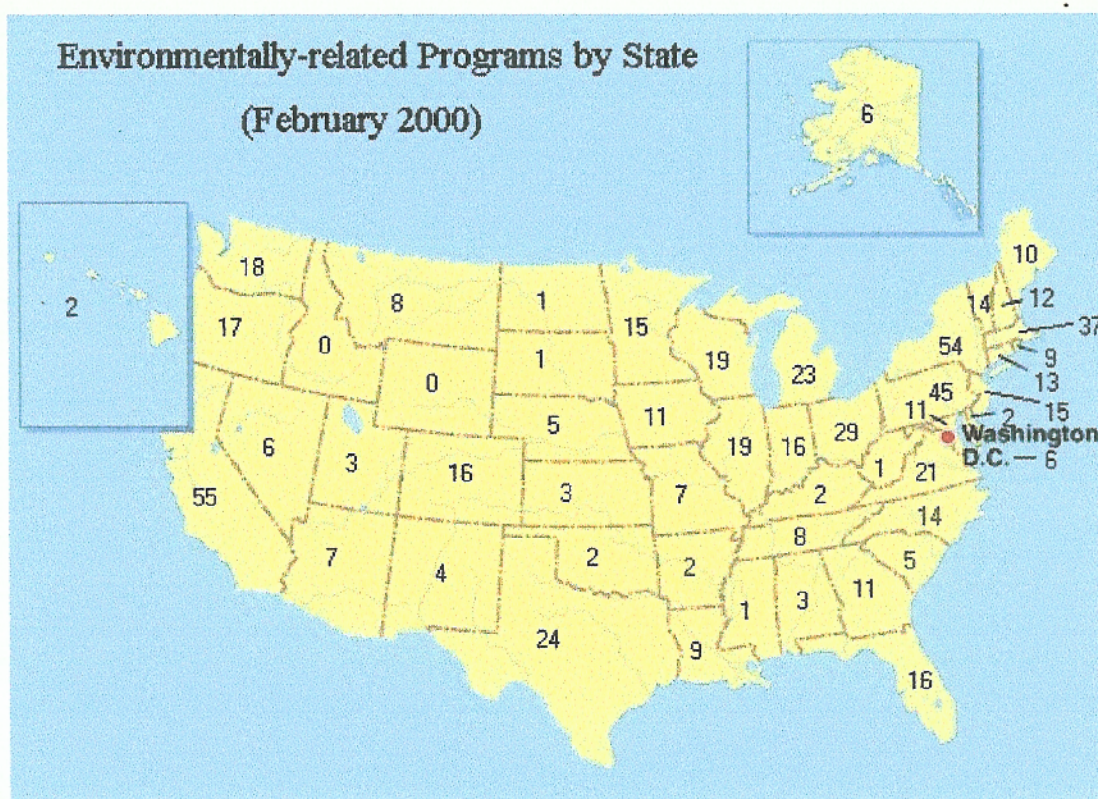


Figure 2: Environmentally-Related Programs by Region

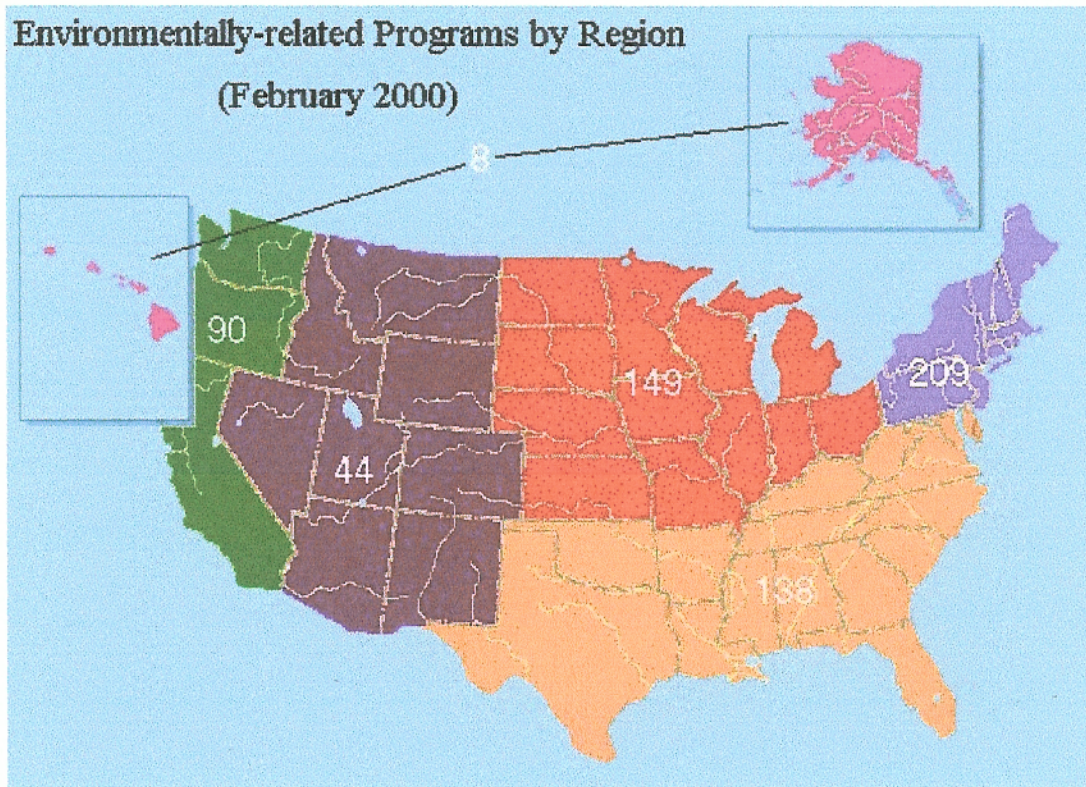
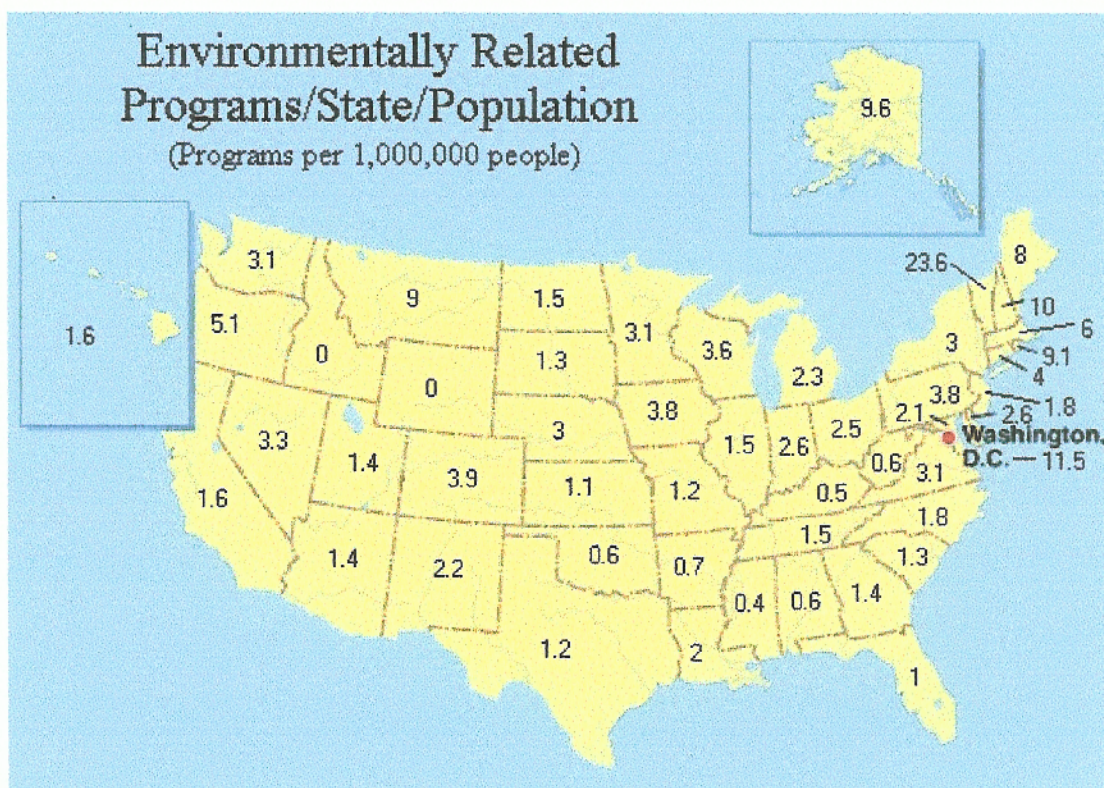


Figure 3: Environmentally-Related Programs/State/Population

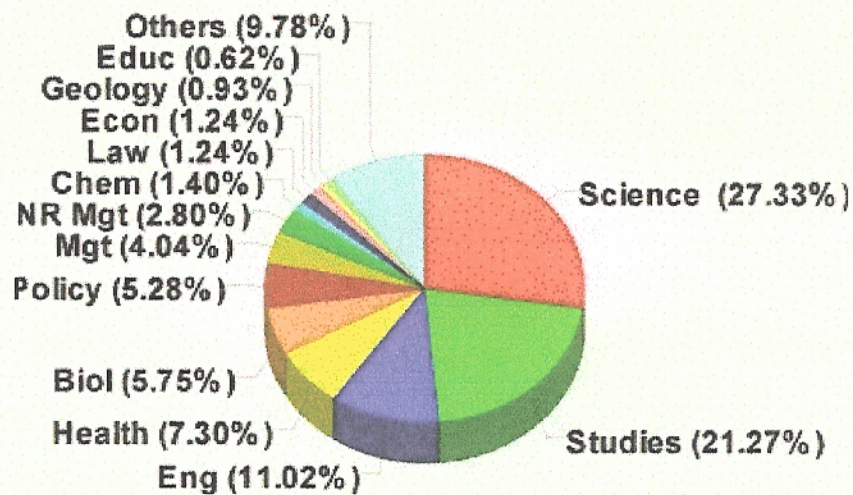


Programs by name: We compiled the programs/department names based on the ones for which there were three or more using a particular denomination. They were: Environmental Studies, E. Science, E. Engineering, E. Biology/Ecology/Conservation Biology, E. Health/Toxicology, E. Policy/Analysis/Planning, E. Management, E. Law, E. Chemistry, E. Education, Natural Resources/Management, E. Economics/Economics Management, E. Geology. When the name of the program was dual (e.g., Environmental Science/Studies), we used the most inclusive denomination (Environmental Studies) unless they had two clearly distinct tracts (e.g., environmental science and environmental engineering). We created a column for "others" when there were fewer than four carrying a particular name. The results of programs according to their name are summarized in Table 3 and represented in Fig. 4.

Table 3. ESPs/Departments according to their own denomination.

Program Name	Number
Science	174
Studies	137
Engineering	71
Health/Toxicology	48
Biology/Ecology/Conservation	37
Policy/Analysis/Planning	35
Management (i.e., business management perspective)	26
Natural Resource Management	18
Chemistry	9
Economics	8
Law	8
Geology	6
Education	4
Others	63
TOTAL	644

Figure 4: Environmentally-Related Programs (U.S.) - February 2000, n=644



The total number (644) differs from the 642 given earlier because two of the programs had dual names. The names Environmental Science and Environmental Studies are, by far, the most common ones being, between the two of them, 48.22% of the program names. They are followed by engineering (11%) and Biology/Ecology/Conservation (5.75%). Although the number for "Others" seem high, the reason is the huge diversity of names given to many programs.

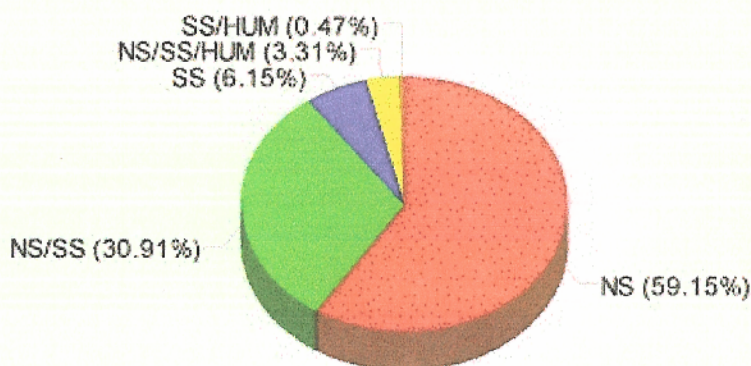
In order to determine if there is dependence between the name of the environmentally-related program and the nature of the institution, a chi-square test was performed. The null hypothesis was that the names given to environmental programs are independent of the type of academic institution in which they are found. We found that the names "Environmental Studies" and "Environmental Science" are much more commonly used in college settings while "Environmental Engineering" is more common among universities ($p < 0.5$).

Area of Knowledge: In order to ascertain the particular area of knowledge on which different programs could be placed and whether or not they have any degree of interdisciplinarity, we analyzed their course requirements. If 75% or more of the courses required were within a particular area (natural sciences vs. social sciences vs. humanities) then the program was categorized as belonging to that area of knowledge. Otherwise they were categorized as belonging to two or more areas of knowledge, but also using the 25% of courses within a particular area as the litmus test. Thus, programs that were classified as fully interdisciplinary were those that contain at least 25% from each of those fields of knowledge. For the accounting of courses, courses that by itself were interdisciplinary in nature such as capstone seminars, were not assigned as belonging to any particular area of knowledge. The results of this analysis are summarized in Table 4 and Fig. 5.

Table 4. Programs by actual area of knowledge they emphasize.

Area of Knowledge	Number of Programs
Natural Sciences	376
Social Sciences	43
Natural Sciences/Social Sciences	197
Social Sciences/Humanities	3
Natural Sciences/Social Sciences/Humanities	23

Figure 5: Environmental Programs Emphases - January 2000



Again, the vast majority of environmental programs fall within the natural sciences realm (58.57%). There are 223 programs (34.73%) interdisciplinary in nature because of combining two or all three areas of knowledge, but only 23 (3.58%) are fully interdisciplinary by combining all areas of knowledge.

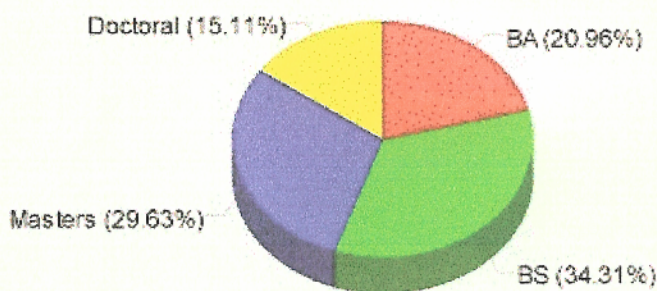
By degree offered: Results of compiling information about degree offered are summarized in Table 5 and Fig. 6.

Table 5. Number of programs according to the degree they offer

Degrees Offered	Number of Programs
Bachelor in Arts	183
Bachelors in Science	296

Masters'	255
Ph.D./Doctoral	131
TOTAL	865

Figure 6: Degrees Offered - January 2000



As suspected from the high number of natural sciences-based programs, the larger proportion of undergraduate programs offered a Bachelor's in Science degree. Notice that the sum is higher than the number of programs identified for this study. The reason is that many programs offer more than one degree. Also, this figure is not complete, since we did not receive explicit information from some programs regarding the degree they offer and, thus, they were left in blank.

When analyzing the number of degrees per type of institution (4-year college vs. university offering either a master's degree, a doctorate or both), we found that in terms of absolute numbers the total number of degrees offered by colleges is 146 while by universities is 496, which is consistent with the fact that unlike 4-year colleges, universities can offer both undergraduate and graduate (masters' and doctorate programs) simultaneously. Yet the mean number of degrees offered per institution was 1.230 for colleges and 1.921 for universities which was not statistically significantly different (t-test, $p < 0.5$).

Internships/Study Away-Abroad Programs: Results of the survey are summarized in Table 6.

Table 6. Programs according on whether they offer/require internships and study away opportunities.

Program Type	Number
Internships (required or not)	301
Required Internship	104
Study Away/ Abroad	186
TOTAL (Internships + Study Away/ Abroad)	487

The figures shown in Table 6 represent a lower number of the actual internships and study away/abroad programs offered at those institutions because a number of program did not return our surveys in that regard. Yet, it is safe to assume that most programs include internships opportunities and that about one third of them require that internship to be completed as part of the graduation requirements. Study away/abroad opportunities also seem to be fairly common. We could not find any single program that requires to take such opportunities as their graduation requirements.

We analyzed whether or not the type of the institution affected the fact that an internship was offered. A total of 119 colleges offer an internship experience (required or not) vs. 263 universities doing so. Universities have a statistically significant higher number of programs that require internship opportunities vs. programs housed at 4-year colleges (t-test, $p < 0.5$).

Demographics: Table 7 summarizes the demographics for those programs that responded to our request for information in this area. It includes number of students enrolled, number of graduates in 1998, number of full-time faculty involved in the program, number of faculty assigned to that program and/or department, number of faculty shared with other department/program, and number of part-time faculty working in that program/department. For this compilation, we used data only from the 297 programs that responded to our survey.

Table 7. Some overall vital statistics of those programs/departments that responded to our survey.

Data	Number
Number of Students	30,495
Number of 1998 graduates	7,217
Full-time faculty	4,881

In Department/Program	1,874
Shared	3,123
Part-time	2,908

These are, by far, the most problematic statistics to obtain. First, the data depend entirely on feedback from the person in charge from the program. Those statistics are highly variable because of the continuous flow in the number of students and faculty assigned to a program at a particular time. Finally, the interpretation of what means "shared" faculty with "full-time" (tenure track or none-tenure track?), part-time (for the program itself or for the entire institution?) varies drastically among institutions. Given than less that the programs responded to our survey, they could safely be extrapolated multiplying them by two, yet taking into consideration the above-referred shortcomings. It seems that the only way to obtain more accurate statistics in this regard is via phone interview where the meaning of our categories can be better explained.

Year of creation: Based on the information provided by those who responded to our survey, we used the year in which the program/department was created by the academic authorities irrespective of whether the program was initiated in effect that very same year.

To see if there is any historical patterns in the creation of those programs, we displayed the number of programs/departments created per year in two figures. Fig. 7 shows the number of programs/departments created between 1900 (the first year for which a program was created) and 1958. Fig. 8 shows the number of programs/departments created between 1959 and 1999. The cut-off date of 1959 was selected because before that year very few programs/departments were created and they appeared very parsimoniously while beginning in 1959 at least one program/department was created every year. We did not find information about programs that after being created may have been eliminated and, thus, if that has been the case, those possible programs have not been taken into consideration.

Figure 7: Chronological 1900-1956



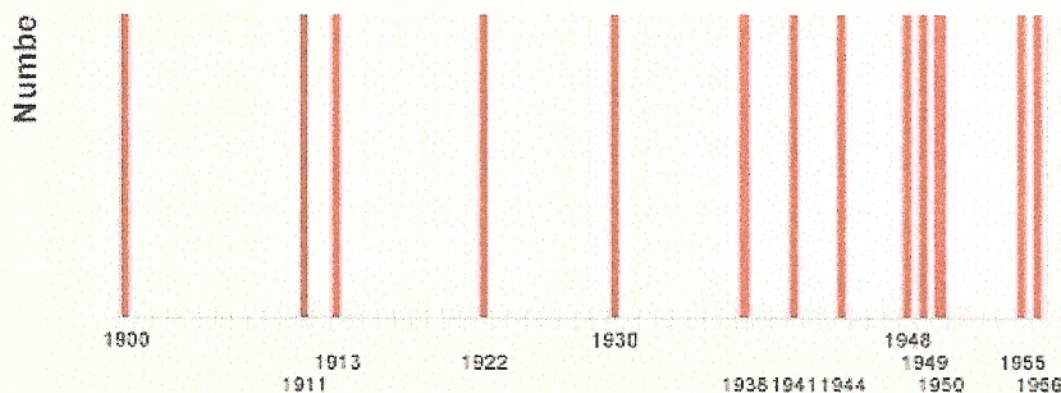
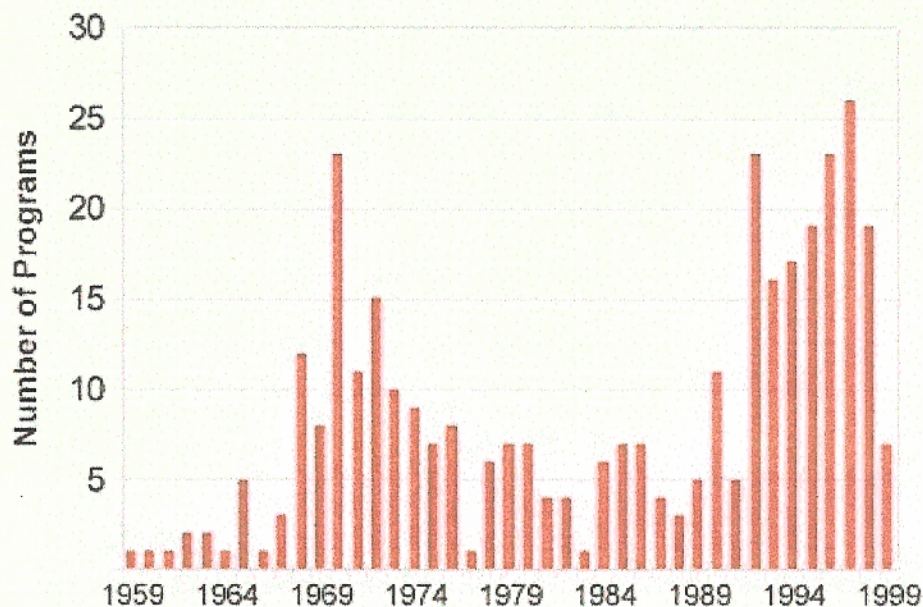


Figure 8: Chronological 1959-1999



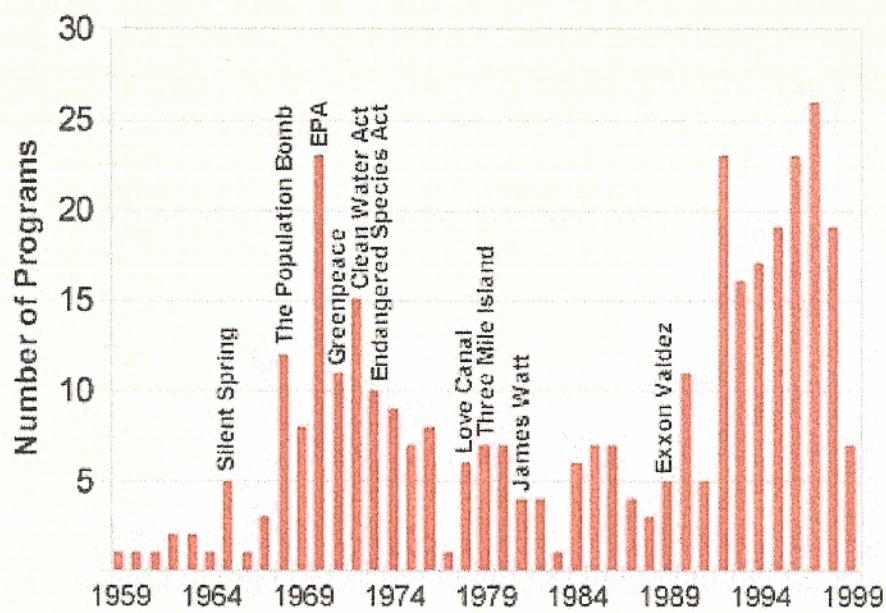
Although they represent less than half of all the programs, patterns are clearly defined. For example, between 1900 (the year of the first program created) and 1958, only 14 programs were created. Only one year, 1944, shows more than one being created the same year. Only between 1948 and 1950 and between 1955 and 1956 we see programs being created in consecutive years.

For the period 1959-1999, there is a dramatic increase in the number of programs being created. There are two big "waves" in the creation of programs: one between 1965 and 1976 (with a peak in 1970) and another starting in 1988 and, probably, continuing to this date, with a peak in 1997. The lower number of programs reported for 1999 is probably lower than the actual number since more recent programs are more difficult to locate. The publicity material is less noticeable; some may not have even developed a web page of their own.

Is there any explanation for this swing in the creation of programs? Fig. 9 points out to <http://www.macalester.edu/~envirost/MacEnvReview/equalarticle.htm>

major events that took place in environmental issues per year. The first peak (1965) coincides with the publication of Rachel Carson's *Silent Spring*. The next one, 1968, with the publication of Paul and Anne Ehrlich's *The Population Bomb*. The big peak for 1970 coincides with the creation of the Environmental Protection Agency (which was also the year of the enacting of the Clean Air Act and the creation of the League of Conservation Voters). There is a dramatic drop for 1971 (the year Greenpeace was formed) and a resurgence for 1972 (the year of the enacting of the Clean Water Act, the Coastal Zone Management Act, the Marine Mammal Protection Act, and the publication of Club of Rome's *The Limits of Growth*). It drops again for 1973, the year of the enacting of the Endangered Species Act, and from then on there is steady decline with a low for 1977. Until virtually 1992, the creation of new programs seem to be stabilized despite big ecological news in the media in 1978 (Love Canal), 1979 (Three-Mile Island), 1988 (Exxon Valdez), and the public uproar by the policies implemented in 1982 by Ronald Reagan's Interior Secretary James Watt. The latter should not be underestimated because that triggered an exponential increase in membership among environmental organizations.

Figure 9: Chronological 1959-1999 with Major Events



However, these data may lead to false conclusions such as that the creation of the EPA convinced college and university administrators about the need of offering careers to would satisfied public sector demand for those professionals. Although that might have been the case for some institutions, the decision on commitment of faculty, staff, and financial resources is not something that takes place within a few months period in academic institution given the complex governance system (i.e., multiplicity of committees with a say in such matters, approval by the board of trustees, etc.) that operates in most of them.

A much safer parsimonious interpretation is that those were the years of rise in

environmental awareness and that colleges and universities were competing for students with expectations to graduate with a degree in that area. The low plateau reached between 1977 and 1991 coincides with the country's preoccupation on other matters (Watergate, the U.S. hostages in Iran, the more conservative views in government during the Reagan administration). The resurgence observed from the early 1990's may well be explained by two factors: 1) the increased respectability of environmental careers as a source of professionals needed not only in government but also in the private (e.g., consulting firms, in-house environmental professionals) sector as well as in the increasingly professionalized non-profit organizations; 2) Interdisciplinary programs became more and more acceptable, particularly among Liberal Arts Colleges.

Yet, we will not fully understand the reason behind the creation of these programs unless interviews are conducted with those involved in the creation of those programs which is outside the realm of this paper.

Conclusions

The high diversity of names and emphases found in this study is consistent with the premise that this is a field where there is a lack of unifying principles and a clarity of what environmental studies programs should be. Based on the limited information we have been able to access, we suspect that patterns regarding graduation requirements (e.g., number of courses) and tracks (majors, minors, cores, etc.) are even more diverse which reflects the lack of consensus of what are/should be environmental studies in general as a discipline.

We plan to continue this study every year not only aimed to maintain information current, but also to improve the quantity and quality of information as discussed about by conducting phone interviews with those responsible of programs.

We encourage our readers not only to forward their general comments on this article, but also to update the information we have on their academic institution.

Acknowledgments

We thank all the faculty/administrators who responded to our request for information about their programs/departments. Their names can be found in Table 1. Joshua Young and Amanda Stern of Macalester College provided help with the statistical analysis. Ann Esson prepared the manuscript in its current web format.

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