

4. Measuring Support for Climate Change Research at the University of Richmond.

By: Adam Forrer, Brianna Miller, and Hunter Payeur

Abstract:

This study investigated the possibility of hiring new faculty at the University of Richmond whose area of expertise incorporates climate change. The study used a survey of Richmond students to gauge interest in academic areas such as climate change classes and research with faculty. In depth interviews with faculty members from various departments within the University were also conducted. Further research showed that although 12 of the top 25 liberal arts schools in the United States offered two or more classes specifically on the issue of climate change, the University of Richmond intermittently offers one climate change class, located in the School of Continuing Studies. This study concluded that hiring climate change researchers and adding climate change coursework was strongly supported by students and interviewed faculty. Moving forward, this study concluded many recommendations for the University of Richmond, including hiring at least three new climate change faculty members to maximize their impact as well as diversifying course offerings to include classes on climate change in various schools.

Introduction:

Climate change has been recognized globally as one of the leading issues of our generation. In order for the United States to make an appropriate response to climate change there is a need to facilitate climate change research in institutions of higher learning. Making climate change research available to undergraduate students has the potential for positive results for the issue of climate change and the undergraduates who choose to participate in research (Seymour et. al. 2004). As an institution of higher learning, and with the resources at the University's disposal, the University of Richmond should be at the forefront of climate change research.

Education is a determining factor in adaptive capacity to cope with climate change (O'Neill and Oppenheimer 2002). The direct benefits of hiring a climate change research are providing knowledge on climate change risks and coping strategies for the future and improvements in adaptation technology (Fankhauser 1999). Students who take part in climate change courses, research, or who engage with faculty are benefitted by the ability to work on a relevant issue with potential for future job opportunities. The academic community would also benefit from any research that provides new information or technological innovation. The flow of information that higher education offers can be used to improve the lives of students, community members, and faculty alike.

Methods:

In order to measure the University of Richmond community's interest in acquiring climate change faculty and the potential to contribute to climate change research this study used an anonymous survey of Richmond students. Research of the top 25 liberal arts colleges and their course offerings, including Richmond's course offerings, were used to formulate the survey questions. A total of 15 questions were sent to 1,591 Richmond students. Students were selected by last names that started with the letters M-Z to allow other groups with surveys to have a student sample. The survey was open for two weeks and after the first week an email reminding students who hadn't taken the survey was sent to the same group of students. Results from the survey were analyzed to gauge student interest in academic areas such as adding classes on climate change, adding climate change faculty, and adding a climate change minor. In depth interviews with members of the University's faculty from various departments were also conducted in order to discover possible recommendations for incorporating both faculty and their research into the University's existing framework. The results from the interviews were consulted when constructing the discussion as well as the recommendations moving forward.

Results:**University of Richmond Currently:**

As a top liberal arts college, the University of Richmond has a unique opportunity to affect positive change in education and research on climate change. Currently, Richmond only offers one class specifically about climate change. The Global Impacts of Climate Change (ENVR 322) is a course offered in the School of Continuing Studies. It is only worth .86 of a unit and is not consistently offered semester to semester. Only offering one class out of Richmond's entire curriculum means that there are several academic sectors that have no climate change classes. Major areas within the University of Richmond such as the Robins School of Business and all of the natural science departments are currently without classes that focus on climate change, leaving what we believe to be a large hole in a comprehensive course offering by the University.

Faculty research on climate change is also lacking. On the University's website, no faculty members list climate change as one of their areas of research. Although their research may help with climate change, there is no specific mention of directly researching climate change or its effects. Within the field of climate change, there are many areas for academic research that cross departmental lines. Researching the economic effects of climate change, the efficiency of green energy sources, or big data modeling are all areas of climate the University could investigate given its current resources.

Leading Liberal Arts Colleges:

In an effort to gauge the University of Richmond’s placement among its’ competitors, this study analyzed the number of climate change classes offered by the top 28 liberal arts colleges. The number of classes offered by these schools ranges from 0-6, with the University of Richmond offering 1 course, ranking below many of the University’s top competitors (Figure 1). If the University seeks to maintain its’ competitiveness and be at the forefront of climate change course offerings, these findings suggest that more courses need to be offered. The other top leading liberal arts colleges offer classes spanning the societal impacts of climate change, foreign policy, and climate science and geology. Research results for the top 25 liberal arts schools, which includes 29 colleges and universities, showed that the University of Richmond is 1 of 13 schools that

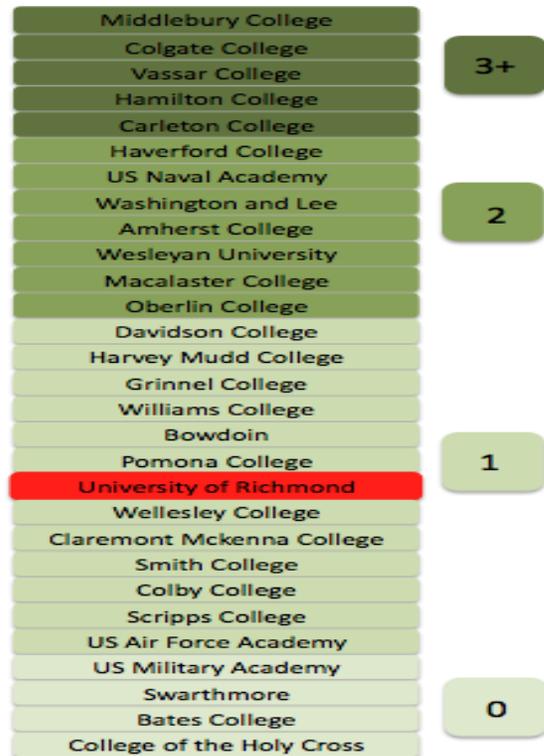


Figure 4.1. Number of climate change courses offered at the top 25 liberal arts colleges. offered 1 climate change course. There were 4 schools that had 0 courses, 7 schools that offered 2 courses, and 5 schools that offered 3 or more courses (Figure 1; For full list of courses see Appendix A).

Survey Results:

Survey results for question 8 revealed that 37.10% of students agreed and 20.43% of students strongly agreed that they would be interested in a climate change and society course (Figure 2). The results for question 10 were also supportive of climate change courses with 86.34% of participants that said yes when asked if they think the University of Richmond should have climate change courses (Figure 3). Questions regarding different climate change opportunities than courses also show student support, but to a lesser degree than question 8 and 10. For example, question 13 asked whether students were interested in a climate change minor in which most students disagreed (38%). There was still support for this as 20% agreed and 8% strongly agreed. Also, question 15 asked students if they would be interested in doing research with a professor focused on climate change and 27% disagreed, 21% agreed, and 9% strongly agreed (See Appendix B).

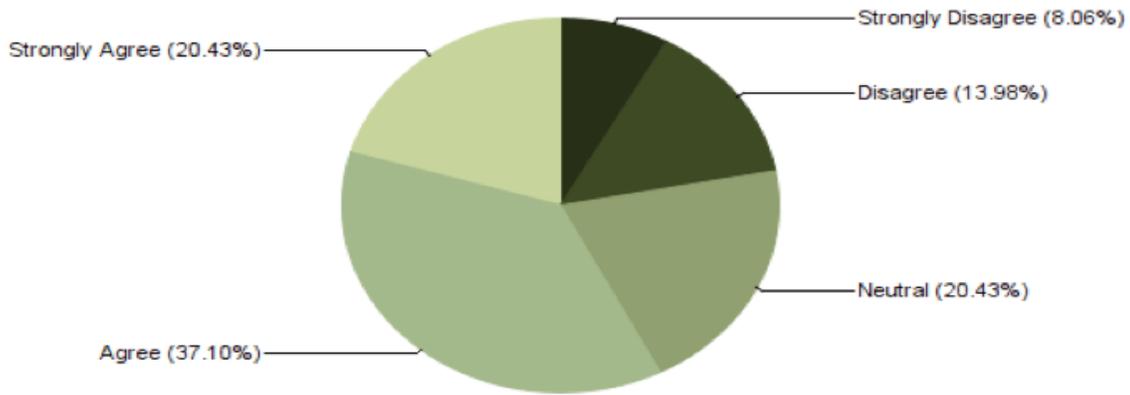


Figure 4.2. Results of 186 responses for question 8: I would be interested in taking a class on climate change and society.

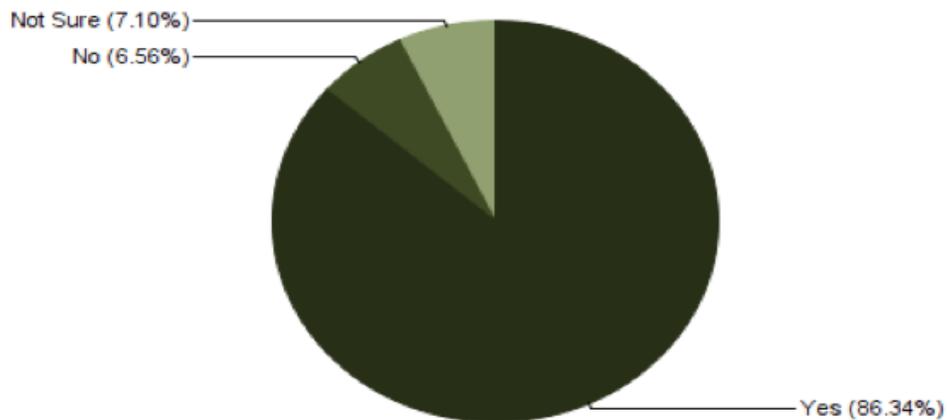


Figure 4.3. Results of 183 responses for question 10: Even if you are not interested in taking a class on climate change, do you think the University should offer a class on this topic?

For informational data, we asked participants' gender, class year, and major. Participants were well distributed across class years with juniors making up the most at 32% and sophomores consisting of the least at 15%. Participants' majors were not well distributed, with business majors being the most represented at 27% of responders and biology second most at 9%. Gender was the most notable difference with 61% female and 39% male (See Appendix B) but these results were not significant (Binomial Probability 2-Tail Test, $p = .126$).

Discussion:

The results of the survey support this study's proposal that the University of Richmond should offer more climate change classes and hire a climate change researcher. The survey

found that a course specifically focused on climate change and its relationship with society was supported by the survey respondents (Figure 4.2). This suggests that the humanistic effects of climate change may draw more interest from students than the environmental effects. The awareness and interest in climate change courses may vary between participants' interests and major-specific courses. Business majors had the highest participation rate with 27% of total responses. The greatest participation from a natural sciences departments was biology with 9% of total responses. Regardless of personal background or education interests, students strongly support the University of Richmond offering climate change courses (Figure 4.3). Educating students about climate change is an important tool for spreading awareness. Survey results suggest that minors, concentrations, and research opportunities centered on climate change may not draw enough interest from students. In order to gain interest in these climate change options, several classes need to be offered in various majors. The possibilities for minors, concentrations, and research may follow once people express more interest in committing more time to climate change studies. There are a number of professors at the University of Richmond currently offering classes that incorporate some information on climate change. According to faculty interviews, the resources for climate change courses, faculty, and research are currently available at the University of Richmond. Climate change involves many areas of academia, which will attract a diverse collection of faculty who will be able to capitalize on the University's resources. The community in general will also benefit from this research as hired faculty and resources are committed to inquiries into the effects of climate change on communities. The University of Richmond has the opportunity to become a prominent leader in the global struggle with climate change.

University of Richmond has faculty support for climate change options. Dr. David Kitchen, the associate dean of the School of Continuing Studies, pointed out that the University currently has the necessary faculty to implement a climate change minor. Allowing students to gain valuable expertise on climate change would be a significant step from the one class currently offered. The minor would consist of six classes that all deal with climate change, society, and the resulting impacts. Dr. Kitchen would teach two of the classes while the other four classes would have to be added to other professors course offerings. The University has professors in each school that are interested in climate change that could all take on one class to make this minor a feasible reality. Although the framework is in place for adding a climate change minor, there are substantial costs that are associated with a departmental change of this magnitude. If a professor decides to teach another or different class, then they would have to get approval from their department chair. The department would incur the costs of the extra classes, which may deter departments from incorporating new classes on climate change into their respective curriculums. However, adding classes is still the most viable option for the University. The costs of adding climate change classes would be minimal compared to other steps the University could take to incorporate climate change into the academic catalog. If the

department decided to incorporate a new faculty hire into their minor, they would have to incur the costs of the new professor's salary and potential research costs. While adding researchers and courses may incur initial costs, the potential for the investment to be lucrative in the future is strong enough to provide incentive to hire a climate change researcher. The support from faculty exists but the University may not be willing to invest in an entire department or line of faculty unless the students show a considerable amount of interest in climate change. As the survey suggests, student and faculty support is evident at the University and should be utilized to advance climate change research goals.

Although the most obvious department for climate change faculty to originally be placed in would be the natural sciences, the most feasible option for the University of Richmond to start implementing climate change faculty would be the Robins' School of Business. A significant portion of students choose majors located in the business school which will likely experience growth as the University acquires more students. Realistically, if the University wants to implement climate change faculty within the next few years, the business school will be a likely place to hire in order to coincide with the schools' growth. According to faculty interviews, the greatest potential for hiring professors is currently located in the Business School. Therefore it would make the most sense to focus hiring efforts there.

Although some faculty in the business school may not feel that a climate change course is going to benefit their students as much as other topics, the survey results suggest the students would find it beneficial to their education. While only obtaining one climate change professor will not have the desired impact, it is a necessary starting point for the University and positive reactions to the faculty hire would only further suggest that more faculty should be added to increase their collective impact. Together multiple research faculty researchers can provide beneficial research opportunities to students at the University of Richmond. While adding extra courses to departments may increase costs in the short term, the long term benefits of research opportunities for students and the University are incomparable.

The survey sample size was only 186 students representing approximately 5% of the total student body. Extrapolating their responses to the survey indicates that the support for climate change faculty and research is even greater. Our survey is biased because a plurality of the participants were business majors. This may be the cause behind the positive response for the climate change and society course as opposed to a more science based course on climate change. Business majors may find it easier to relate to topics that incorporate societal factors than the natural science majors would cover. The lack of participation by natural science majors in the survey leaves a hole in the data needed to demonstrate the school the true importance of climate change. More time consuming commitments, such as a major, are not currently supported at the University of Richmond. Students will have to work together to demand these opportunities which will likely gain momentum as faculty hires inspire the campus community to become involved with climate change. The implementation of more climate change courses,

faculty, and research at the University of Richmond may not happen this year, but the foundation already exists. The University of Richmond has the chance to become a climate change leader in the academic community but they need to be expedient in order to not fall farther behind other top liberal art colleges.

Recommendations:

The following recommendations have been determined as a result of this study. The University of Richmond should hire at least three new faculty members with a climate change research focus. Three faculty members will be able to have a greater impact on the climate change community through collaboration and their status as faculty at a premier institution. Furthermore additional faculty members will aid the University of Richmond in moving towards establishing itself as a leading climate change research institution. In order to be respected in the climate change arena research should span across disciplines and schools. For this reason and due to the current conditions of the University this study has found that hiring in the Robins School of Business would be an appropriate place to begin hiring. As hired faculty are spread out across campus, the variety of courses with a climate change focus should simultaneously span departments. The interdisciplinary nature of climate change lends itself to infiltrating most departments at the University. In the same light, research should correspondingly spread through departments to promote the integration of climate coursework and further the University of Richmond's standing in the community and climate change world. The vast resources available at the University of Richmond should be utilized in their full capacity to contribute to research goals and course offerings to the benefit of students, faculty, and staff. Course offerings should diversify in an effort to cover the many subjects related to climate change. Climate change is not simply a natural science but instead penetrates most areas of society and for that reason courses outside of the natural science should be incorporated into the course catalog every semester.

Acknowledgments

We would like to thank Dr. Peter Smallwood, Dr. David Salisbury, Dr. Timothy Hamilton, Dr. Con Beausang, Dr. David Kitchen, Dr. Malcolm Hill and Professor Joel Eisen for their support and contributions to this project.

Works Cited

Fankhauser, S., J. B. Smith, and R. S. J. Tol. 1999. Weathering climate change: some simple rules to guide adaptation decisions. *Ecological Economics* 30:67-78.

O'Neill, B. C., and M. Oppenheimer. 2002. Dangerous Climate Impacts and the Kyoto Protocol.

Science 296:1971-1972

Seymour, E., Hunter, A.-B., Laursen, S. L. and DeAntoni, T. (2004), Establishing the benefits of research experiences for undergraduates in the sciences: First findings from a three-year study. *Sci. Ed.*, 88: 493–534

Appendix A: Climate change classes offered at top 25 liberal arts schools as of 2014

| | | |
|---|------------------|--|
| 1 | Williams College | ENVI/GEOS215- Climate Changes |
| 2 | Amherst College | GEOL109- Climate Change, Global Warming and Energy Resources CSI149 (International Relations) Hot War: The Impact of Climate Change on International Peace and Security |

| | | |
|----|--------------------------------|--|
| | | Five College Certificate in Sustainability Studies |
| 3 | Swarthmore College | None Listed |
| 4 | Bowdoin College | 1090 INS. Understanding Climate Change |
| 5 | Middlebury College | ENVS0240: Global Climate Change ENVS 1003A: Social Movement/Climate Change GEOG1003A: Cartography of Climate Change SPAN1005A: Language and Climate Change GEOL1012: Geologic Record Climate Change ENVS0240: The Science of Climate Change |
| 6 | Pomona College | GEOL152: Climate Change |
| 7 | Carleton College | GEOL115: Climate Change in Geology ENTS287: Climate Science ENTS288: Abrupt Climate Change |
| 8 | Wellesley College | ES102: Environment and Society: Addressing Climate Change |
| 9 | Claremont McKenna College | EA100: Global Climate Change |
| 10 | Davidson College | ECO 236 Growth and Sustainable Development |
| 11 | Haverford College | Earth's climate/Global Warming PHYS 024-DirRdg: Climate Justice |
| 12 | United States Naval Academy | SO445 Global Climate Change Climatology |
| 13 | Vassar College | ES 151 Earth, Environment, and Humanity ENV100 Earth Resource Challenges ENV107 Global Change and Sustainability ENV 335 Paleoclimatology: The History of Climate |
| 14 | Hamilton College | ENVS221 Global Warming GEOS222 Earth's Climate: Past and Future GEOS285 Antarctica and Global Change |
| 15 | Washington and Lee University | GEOL141 Global Climate Change BIOL330 Experimental Botany:Global Climate Change |
| 16 | Harvey Mudd College | PHYS80 Global Warming and Climate Change |
| 17 | Grinnell College | ENV261 Climate Change, Development and the Environment |
| 18 | United States Military Academy | None Listed |
| 19 | Wesleyan University | Bio 220: Conservation Biology E&ES 380: Volcanology |

| | | |
|----|---------------------------------|--|
| 20 | Colgate University | 123S Climate Change and Human History 128S Global Change and You 163S This Old Earth: Scientific and Cultural Perspectives on the Discovery of Deep Time 166S The Air Up There 205 Climate and Society 329 Environmental Security |
| 21 | Smith College | GEO 104 Global Climate Change: Exploring the Past, the Present and Options for the Future |
| 22 | Bates College | None Listed |
| 23 | Colby College | Impact of Climate Change on Ocean Life ENVR287 GE115f Extinction: Earth's Lessons |
| 24 | Macalester College | ENVI 202 – Sustainability and the Campus Oceans and Climate :Seminar |
| 25 | College of the Holy Cross | None Listed |
| 26 | Oberlin College | ENVS 219 - Climate Change HIST 382 - Seminar: Climate Change and Disaster in History |
| 27 | Scripps College | EA 100L KS - Global Climate Change |
| 28 | United States Air Force Academy | Meteor 352-Climateology |
| 29 | University of Richmond | ENVR 322 The Global Impacts of Climate Change |

Appendix B

- 1) Gender
- Female
 - Male
 - Transgender
 - Other
 - Prefer not to answer

2) Year

- First Year
- Sophomore
- Junior
- Senior

3) What is your major?

- Art
- Biology
- Business
- Chemistry
- Computer Science
- English
- Environmental Studies
- Foreign Language
- Geography
- History
- International Studies
- Leadership
- Music
- Math
- Physics
- Psychology
- Political Science
- Sociology
- Theater
- Other

4) How important of an issue is climate change to you?

Not important

Somewhat important

Neutral

Important

Very important

5) Are classes about climate change currently being offered in your major? If so, list them.

yes

no

unsure

6) I would be interested in taking a class within my major focused on climate change

Strongly Disagree

Disagree

Neutral
Agree
Strongly Agree

7) I would be interested in taking a class focused on Climate Change and Society.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

8) How often is climate change incorporated into classes unrelated to natural sciences?

Never
Rarely
Somewhat
Often
Always

9) Even if you are not interested in taking a class on climate change, do you think the University should offer a class on this topic?

Yes
No
Not Sure

10) I would be interested in a track within my major that focuses on climate change.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

11) I would be interested in a major or minor that is focused on climate change.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

12) I would be interested in a Climate Change minor.

Strongly Disagree
Disagree
Neutral
Agree

Strongly Agree

13) My research would benefit from a climate change researcher, even if it is not the focus of my research.

Strongly Disagree

Disagree

Neutral

Agree

Strongly Agree

14) I would be interested in doing research with a professor focused on climate change.

Strongly Disagree

Disagree

Neutral

Agree

Strongly Agree