AN EMPIRICAL ANALYSIS OF THE ROLE OF GEOGRAPHY IN SUSTAINABILITY EDUCATION

by

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Many within and outside of the discipline of geography see it as a highly appropriate home for sustainability studies. Despite a history of human-environment education within geography and support from professional research or education organizations, some studies show that geography has not developed a lead role in sustainability education. This study examines the role of geography in offering "Sustainability Focused" courses as reported by AASHE STARS institutions with geography programs. The results show that although geography departments are highly utilized when available at an institution –offering the highest proportion of sustainability courses, averaging 14% of "Sustainability Focused" curriculum– there is much room for improvement both within geography departments and campus-wide. Further, geography's weak standing in higher education may be a barrier in capitalizing on the growing sustainability curricula.

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CHAPTER 1

INTRODUCTION

1.1 Issue Background

Many believe sustainability to be a mere buzz-word; the latest in a long stream of environmental thought and jargon of the 20th century. In reality, the term sustainability can be found in literature dating back to the late 19th century, referring to political policy (Perkins 1876) and urban planning (Howard 1898). Today conversations of sustainability vary from references to environmental resources, human lifestyle, urban planning, and climate change. The modern question of sustainability is: "how can we meet the needs of the present without compromising the ability of future generations to meet their own needs?" (WCED 1987). The challenge of answering this question is seen by many as the pressing issue of our time (Cullingford 2004). Universities have a special responsibility to respond to societal movements and global challenges (Alshuwaikhat and Abubakar 2008; Basile in Sustainability 2012). George Basile, sustainability scientist and senior faculty at Arizona State University's School for Sustainability believes universities are unique in that they have the ability to solve "real world problems –sustainably— that cannot be addressed by other organizations" (Basile in Sustainability 2012, p. 218). Universities are being called to participate in the quest for a more sustainable future (Clark 1998; Mulkey 2012).

Since the creation of the Talloires Declaration in 1990—the first formal institutional commitment to university sustainability in physical operations and teaching— universities have focused on sustainable operations and sustainability education as a response to a.) Student and stakeholder demand and b.) The United Nations' continued push towards a more sustainable

future (Wright 2004). More recently however, universities have moved beyond institutional commitment to quantifying and ranking sustainable progress in operations, planning, administration, student engagement, and even courses and curricula focused on sustainable problem solving. Basile refers to this as a "quiet revolution in teaching and research in sustainability" (2011, 261).

This strengthening movement of sustainability education takes many forms, taught in business management, environmental science, engineering, conservation, and political policy. Although various definitions of "sustainability" exist, it is widely agreed that it is interdisciplinary in nature, and focuses on the interaction of humans (including both well-being and social structures, such as economy) and their physical environment and resources therein, efficiently balancing environmental, economic, and social concerns without the significant compromise of any one of those three "pillars." Because the WCED used the phrase "sustainable development" in 1987, this is a common title for sustainability studies, although more recently, "sustainability science," "resilience," and in some cases, "Earth-system science" may be considered synonymous with sustainability studies.

"Geography," too, is a well known word with many interpretations. Like sustainability, geography has a contested identity, often meaning a different course of study for different people. Geography serves as bridge between the physical and social sciences and therefore is interdisciplinary in nature, focusing on interactions and interconnections between humans and their environment at various scales (local, regional, global) at present and though time. In modern academia it can take many forms…economic geography, feminist theory geography, study of globalization, and the like; always chorological in nature, and more often utilizing spatial tools.

Many have noted that the theory and tools of geography translate well to sustainability studies (Manning 1990; McManus 2004; Gregory et al. 2002; Selby 2006; Liu 2011; Bennett 2013). The Environmental Protection Agency (EPA), National Council for Geographic Education (NCGE), National Research Council (NRC), The National Science Foundation (NSF), and other organizations have made calls for the inclusion of geographic theory, tools, and perspective in sustainability studies.

1.2 Problem Statement

Literature suggests that geography has not taken a significant role in sustainability education (Bednarz 2006, McManus 2006, Liu 2012, Bennett 2013). Although the connection to human-environment studies makes geography the ideal discipline to lead sustainability education, geographers are not taking a lead role in sustainability courses in the U.S.

1.3 Purpose and Scope

Universities are approaching sustainability education in two general ways: the inclusion of sustainability studies across the curriculum, incorporated into "core" or introductory courses; or through the implementation of sustainability theory via disciplinary knowledge (Appel et al. 2004). In a 2004 study of the implementation of sustainability foci within disciplinary education, Appel and colleagues concluded that implementation of new sustainability curricula must take place while "meeting the university structure," which in modern academia means working within existing disciplines (214). "Educating students for sustainable development," they continued, "means educating students in disciplinary knowledge. Offering a sustainability perspective within the disciplinary knowledge base is the first step in understanding the relevance of one's own discipline for sustainability and of sustainability for that discipline" (214).

The purpose of this study is to examine sustainability studies within disciplinary context, specifically evaluating the role of geography in offering sustainability courses. The scope of this research is universities that have self-identified as leaders in campus sustainability, using the Association for the Advancement of Sustainability in Higher Education (AASHE) Sustainability Tracking, Assessment, and Rating System (STARS) participation as an indicator. Further, because the focus is on the role of geography in offering sustainability curriculum, only universities with geography programs were examined. In addition to sustainability courses listed in STARS, the Association of American Geographers (AAG) Guide to Programs specializations is an indicator of sustainability-curriculum focus.

As a result, the following research questions emerged.

1. *What percentage of overall curriculum is devoted to Sustainability Focused courses at Gold, Silver, and Bronze awarded STARS institutions in the United States, and do Gold institutions teach a higher percentage of sustainability classes?*
2. *What departments within STARS universities offer sustainability curriculum?*
3. *At STARS institutions, what proportion of Sustainability Focused courses are taught in geography?*
4. *What is the current focus of geography departments at STARS institutions according to AAG Guide to Program Specializations?*

1.4 Justification of Study

Studying the role of geography in sustainability education is important for several reasons. First, creating courses focused on sustainability or sustainable problem solving, or implementing these themes more explicitly into existing courses, would allow geography

departments to capitalize on the growing field of sustainability studies (Liu 2011). Students are requesting this curriculum, and thus far, geography has not satisfied these requests. A study recently published by the National Council for Science and the Environment (NCSE) found that out of all 398 Sustainability Specializations and Concentrations offered in the United States, only 3% were housed in Geography units (Vincent 2012).

The obvious benefit is the ability to capitalize on a new student market. A more implicit benefit could be the strengthening of a discipline believed by some to be relatively weak (Bednarz 2006; Murphy 2007). The field of geography has strengthened somewhat in the last twenty years due to a shift in focus towards technology-based application of geographic thought through geographic information systems (GIS) and spatial studies (Liu 2011). Disciplines shift in response to two key factors: technologic advancement or discovery, and cultural pressure (Basile 2011). Geography has evolved in response to GIS technology and remote sensing breakthroughs. Alternatively, sustainability studies represent a shift in societal thinking. Just as modern technologies have led to a debate of the need for universal GIS course requirements for geography graduates, so now does societal necessity beckon the debate for universal sustainability course requirements (McManus 2004). Sustainability is a requested curriculum. As Liu stated in 2011, "if geography does not satisfy [the demand for sustainability courses], recent history suggests other that other academic units will move in to capture the market" (254).

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

The reviewed literature of this study addresses three main themes: sustainability and higher education, structure and trends of geography in higher education, and support of geography-led sustainability education. Journals most helpful in providing relevant research included *The Annals of the AAG*, *International Journal of Sustainability in Higher Education*, *Journal of Geography in Higher Education*, and *Sustainability*: *The Journal of Record*. Researchers who contributed significantly to this literature review included geographers such as Lee Liu, Robert Kates, Robert Bednarz, Billie Turner, and Daniel Edelson. Organizations that contributed to the literature review included The AAG, AASHE, NCGE, NCSE, National Geographic Society (NGS) and The NRC.

2.2 Sustainability

2.2.1 Defining Sustainability

As stated previously, the definition of sustainability is contested, though widely accepted to be interdisciplinary in nature, focused on problem solving, and concerning social, economic, and environmental issues (Sherren 2008; Davison 2009; Liu 2011). This is commonly referred to as the "three pillared approach," with the three pillars being "People, Profit, and the Planet."

Sustainability education in the United States is a strengthening movement with ties to business management, conservation, environmental science, engineering, and political policy. Universities are approaching sustainability education in two general ways, the inclusion of sustainability across the curriculum, incorporated into "core" or introductory courses; or through

the implementation of sustainability theory via disciplinary knowledge (Appel et al. 2004). It is becoming more widely established that sustainability studies are not limited to sustainable development, a term that was popularized by the 1987 U.N. World Commission on Environment and Development's (WCED) Bruntland Report, which promoted sustainability development as a problem solving tool for the 21st Century (McManus 2004; Liu 2011). Sustainable development is seen as a reactive response to the maladies of capitalism and development, and although some environmentalists have rejected the concept altogether (seeing it as weak sustainability and/or a contradiction in terms), sustainable development studies were not excluded in the literature reviewed (Jacobs 1999; McManus 2004; Davison 2009). In addition to ties to sustainable development, sustainability education is commonly accepted as synonymous with sustainability science and human-environment studies (Kates 2001; Clark and Dickenson 2003; Clark 2007; Kates 2011), and as will be shown later, has ties to Earth-system science. Because environmental science may not contain studies of human impact or economics, that form of study may not be considered synonymous with sustainability education.

2.2.2. Sustainability in Higher Education

Many see universities as accountable for modeling a sustainable future and leading sustainability education through both application and curriculum (Orr and Eagan 1992; Cortese 2003; Corcoran and Wals 2004; Alshuwaikhat and Abubakar 2008; Ferrer-Balasm et al. 2010; Basile 2011; Basile in Sustainability 2012). Some call for this leadership to take place in the physical operations of the campus, for others, the call focuses on education. Alshuwaikhat and Abubakar call upon universities to do both, referring to universities as "small cities" with "serious direct and indirect impacts on the environment" (1777), that furthermore "make a significant contribution to the development of our society, and therefore, have a special societal

responsibility, in particular with regard to youth training and public awareness about sustainability" (2008, 1779). The authors offer the definition of Velequez et al. for a sustainable campus, as an institution that:

> "as a whole or as a part…addresses, involve, and promotes on a regional or a global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfill its functions of teaching, research, outreach, and partnership, and stewardship in ways to help society make the transition to sustainable lifestyles" (2006, 812).

On the education side, much as been made of what sustainability education is and the appropriate pedagogy (Kates 1987; Becker and Jahn 1999; Filho 2000; Flint et al. 2000; Kates et al. 2001; Sterling 2001; Kates 2002; Clark and Dickson 2003; Appel et al. 2004; Corcoran and Wals 2004; Cullingford 2004; Clark 2007; Davison 2009; Wankel and Stoner 2009; Kates 2011; McFarlane and Ogazon 2011; Bartels and Parker 2012). Throughout the 20th Century, various international declarations inspired this push for universities to teach sustainability. In 1972, the Stockholm Declaration was the first formal reference to sustainability in higher education, calling for the need for sustainability education that would lead to protection and improvement of the environment (UNESCO 1972; Wright 2004). Wright points out that since then, resulting declarations of sustainability have made similar calls to higher education, including the Tbilisi Declaration in 1977, Talloires in 1990 (both UNESCO), and Agenda 21 (Chapter 36) in 1992 (2004). Appel et al. (2004) call for this education to take place within a disciplinary structure, Pappas (2012) calls for sustainability education in the contexts of social/cultural, economic, environmental, technical, and individual across all disciplines, and some call for the emergence of sustainability science as a metadiscipline (Milhelcic et al. 2003). Many, as will be stated later,

call for sustainability studies to be place-based with understanding of global implications (the old adage of the environmental movement "Think globally, act locally" comes to mind) – a geographic approach.

The increasing focus of sustainability in higher education in both the classroom and on the campus have led to assessment tools for measuring and ranking sustainability within and across universities. Little literature exists on these metrics, but the consensus is that as universities continue to rank and compare themselves to one another, it is important that we understand the implications of these rankings (Shriberg 2002; Shriberg 2004). The danger of such metrics, regardless of sector, be it higher education, business, etc., is that we have the impression of progress but little valid change (Onisto 1999). Wals and Jickling warn of the propensity of sustainability assessments to slip into Orwellian "doublespeak," whereby contradictory meanings and outcomes of the same word are accepted as truth, but nevertheless encourage universities to push on towards integrating sustainability on the university campus (2002). Currently, the Sustainability Tracking, Assessment and Rating System (STARS) produced by AASHE is the most widely used tool in the United States for tracking and comparing sustainability at universities across education and research, physical operations, and administration and planning. AASHE is the premiere professional organization for sustainability practitioners in higher education as well as sectors that work closely with universities and colleges. Although AASHE began as an organization for North America, it now has 825 higher education members and 194 business or non-profit members in North and Central America, Asia and the Middle East, Europe and the U.K., and Australia (AASHE 2014a). Yearly membership dues for a U.S. institution range between $280 and $1,935 depending on full-time equivalent

student enrollment. The cost for STARS is $1,400 for non-members and $900 for members (AASHE 2014b). AASHE first developed STARS in 2007, and describes the tool as follows:

> a voluntary, self-reporting framework for recognizing and gauging relative progress toward sustainability for colleges and universities. It is designed to:
>
> - Provide a framework for understanding sustainability in all sectors of higher education.
> - Enable meaningful comparisons over time and across institutions using a common set of measurements developed with broad participation from the campus sustainability community.
> - Create incentives for continual improvement toward sustainability.
> - Facilitate information sharing about higher education sustainability practices and performance.
> - Build a stronger, more diverse campus sustainability community (AASHE 2012).

Maragakis and van den Dobblesteen found that among sustainability practitioners and students worldwide, not only is STARS the most recognized university sustainability tracking tool, but it is considered by many to be the best available tool (2013). Still, the authors stress the need for further research on the validity of assessment tools like STARS, and call for a uniform ranking system. Similarly, Saadation et al. found STARS to be the most popular among sustainability professionals and in an evaluation of the strengths and weaknesses of sustainable higher education assessments, found that STARS, along with the Campus Sustainability Assessment Framework (independent, of Canada) scored highest for satisfaction of "criteria of novelty, comprehensiveness...[Theory of] TBL (Triple Bottom Line, "including ecological and social performance in addition to financial performance in a particular organization" 138, referencing Filho and Carpenter 2006) and [Theory of] TSJ (Avoiding Subjective Judgment)" (2011, 145). A recent (2012) partnership between STARS and the Princeton Review Guide to Green Colleges suggests that STARS status in the U.S. will continue to grow.

2.3 Geography

To provide further context on the intersection of geography and sustainability education in academia, the structure and trends of geography in higher education were examined for historical context. Much has been written concerning what geography is and what should be included in a geographic education.

2.3.1: Defining Geography

When the National Geographic Society formed in 1888, co-founder Alexander Graham Bell was asked what the geographic magazine, covering the research and adventures of professional and amateur geographers alike, would cover. He heartily responded, "the world and all that is in it" (Jenkins et al. 2003). In many ways this simple phrase, which would become the core of the mission statement of the organization, was both a reflection of the ambiguity surrounding the understanding of the discipline at the time, and a prophetic word for geography's future. As geographic knowledge has grown over time, so too has opinion of the subject and the word. "Geography" began as one's sense of place and has grown as our collective conscience of the world has grown (Relph 2011). Today geography stands as a contested subject, with many interpretations and definitions.

This contestation brings with it the desire to classify geography, to map its characteristics and purpose. Literature on the classification of geography, and where it belongs in secondary and post-secondary curricula, ranges from the early 1900s to present (Davis 1905; Murphy 2007). This pursuit of identifying concepts of modern geography had long been encouraged by both American and English geographic leaders, such as the AAG co-founder William Morris Davis who, in addressing the second meeting of AAG during one of his three terms as president, stated

in 1905 that a young geographer would "profit greatly" from pursuing the "philosophical view of the subject as a whole…early in his career" (Davis 1906).

Pursue it, they did. So much, in fact, has been made of the classification of geography, that in 1963 geographer Barry Floyd noted that "the mounting output of literature on the concepts of modern geography already threatens to outweigh in volume and verbiage the amount of published writings by geographers 'in action' in the field" (Floyd 1963, 117). Fifty years later, this appears to still be true. Turner (2002) notes that "perhaps more so than any other field of study with such a long and storied history, geography has invested large amounts of intellectual energy in search of its identity" and cites Freeman (1961), Golledge (1982), Hart (1982), and Abler (1987). The range of scholars who can be added to this group is great; Turner (2002) and Butzer (2002) provide excellent synopses from alternative viewpoints.

This body of literature has resulted in definitions of geography ranging from the bizarrely brief ("Geography is what I like" –Anon.) to the ambiguous ("Geography is the science with great ambitions" –F. Simiand; "geography is not so much a discipline…but a way of knowing" –B.L. Turner, II) to the fairly precise ("the study of places and the relationships between people and their environments" –National Geographic Education) (Floyd 1963; Turner 2002; NGS Education 2014). Not only were definitions provided, but also suggestions for the type of science geography should be. Geography has long been seen as a bridge between social and physical sciences, but this malleability has not always been an asset. Butzer describes the issue colorfully: "The healthy diversity of a big tent [has] given way to divisiveness and – as some would argue—polemic put-downs and blanket dismissals or caricatures of whole categories of research" (2002, 76).

This broad scope of geographic curricula has been both scorned (Keatinge 1901) and celebrated (Simiand n.d.; Wise 1977; Barnes 2011; Bennett 2013; Sheppard 2013), and as noted by Butzer above, has resulted in geographers creating hierarchies of geographic method (physical vs. social, spatial vs. environmental, for example).

Through it all, core traditions, or themes, have remained the same (Pattison 1963; Warman 1963; Bailey 1974; Graves 1975; Wise 1977; Yarnal and Neff 2004). Widely accepted traditions of geography include spatial analysis, area studies, the man/land relationship, and earth science; the origins of which were documented formally as early as the 225 BCE by the likes of (respectively) Claudius Ptolemy, Strabo and Herodotus, Hippocrates, and Aristotle (Pattison 1964; Relph 2001). The Geography Education National Implementation Project, which has defined the most widely used geographic standards for elementary and secondary education in the U.S., includes six key geographic skills: "1) The World in Spatial Terms; 2) Places and Regions; 3) Physical Systems; Human Systems; 5) Environment and Society; and 6) The Uses of Geography" (NCGE 2014). Turner summarizes even further, concluding there are only two themes of geography, the spatial-chorological identity and the human-environment identity (2002).

Like environmental sustainability, geography is interdisciplinary in nature and many of the tenets of geography may be found in other disciplines as well (Davis 1905; Bednarz 2006; Liu 2011). Geography has long held a special focus on conservation, and geographic publications in conservation date back as far as the inception of the word as it is understood today, in the mid-19th century by George Perkins Marsh (Marsh 1864). And finally, although geography has forever been associated with place and cartography, it is has only fairly recently used this tradition as a means of increasing its student base by focusing curricula towards technology-

based application through GIS and spatial studies (Liu 2011) which has proved to be a marketable field for graduates (Butzer 2002).

2.3.2: Geography In Higher Education

Perhaps not surprisingly, this misunderstanding of what geography is and what it does (and perhaps the lack of understanding of what one does with a *degree* in the subject) has led to a relatively weak standing in higher education. Geography at Harvard, for example, was famously dropped in 1948, citing the lack of clarity of geography's identity and contribution to higher education (Smith 1987). Several universities would follow in the years to come (Smith 1987). Geography departments tend to be small; the subject is only offered at one Ivy League school (Dartmouth); and only 62% of departments are housed independently, the remaining joint units with other disciplines such as geology or anthropology (Turner 2002, Yarnall and Neff 2004, Bednarz 2006, Murphy 2007).

2.4 Geography-Led Sustainability Education

2.4.1 Support for Geography-Led Sustainability Education

As stated previously, literature within and outside the discipline of geography sees it as a highly appropriate home for environmental education and research and sustainability studies (McKeown-Ice 1994; Gregory et al. 2002; Wescoat 2002; McManus 2004; Bednarz 2006; Lee and Williams 2006; Moran 2010; Barnes 2011; Liu 2011; Rohli and Rogge 2012; Bennett 2013). Not only is geography relevant for teaching sustainability, but according to Thrift, "geography is a peculiarly relevant discipline at this point in time" and "the world is becoming doubly geographical," citing geopolitical conflict, easy-access to GIS technology, and a decentralized world (2002, 294).

Yarnal and Neff summarize the state of this body of literature as follows: "despite the richness of the literature on human-environment geography and the various theoretical approaches framing the literature, the literature on human-environment pedagogy is relatively weak" (2004, 30). They further call upon geography to take the lead or a significant role in studies of the intersection of humans and their resources because "geography is fundamentally interdisciplinary in nature: that is, it has biophysical, socioeconomic, and technological sides, and it stresses synthesis" (29). Throughout the literature, authors point to the long tradition of the human-environment identity of geography, offering this as the baseline for sustainability studies. It is important to note, however, an alignment with the human-environment tradition needn't exclude spatial studies, and many authors stress the need for spatial tools in sustainability problem solving (Turner 2002; McManus 2004; Pitman 2005).

Indeed, the geographic human-environment identity has served as an excellent foundation for sustainability studies and sustainable problem solving for many years in the U.S. and abroad. As Turner (2002) points out, geographers in the French tradition, especially, have long seen the benefit in using place-based and chorological information to understand the effect of human choice on the environment (Church 1951; Robson 1981). Turner draws attention to the shift of geography departments from the human-environment tradition to the spatial tradition and calls for a marrying of these two identities as French geographers have done, referencing the weak state of geography in higher education in stating "the moment for human-environment-science has arrived" (62) and "if geography is to gain a full seat at the academy's head…it must seek to reunite its two main identities [human-environment and spatial] in a way that is congruent with the prevailing logic by which the academy partitions knowledge" (Turner 2002, 63). The French are not the only geographers pursuing place-based sustainability studies. President of the

Canadian Association of Geographers Edward Manning, who believes geography failed to lead the environmental movement of the 1960s, urged his colleagues at his presidential address in 1990 to pursue sustainable development education via the discipline (Manning 1990). Bednarz points out that U.K. geographer Huckle, in response to Agenda 21, likewise encouraged his colleagues, "geography has been given the major responsibility for delivering education for sustainable development" (Huckle 2002, 64 quoted by Bednarz 2006, 239). Bednarz also references Kasimov et al. in stating that environmental studies in Russia are divided between the disciplines of geography and engineering (Kasimov et al. 2005; Bednarz 2006).

Where the above authors speak of the sustainability-geography intersection taking place in the longstanding human-environment tradition of geography, Pitman likewise echoes this ideology, but introduces a new pedagogical lens: Earth-system science. Pitman defines Earth-system science as "the study of the Earth as a single, integrated physical and social system…based on the new understanding of the processes, non-linearities and feedbacks" (2005, 139). This is different than traditional "Earth Science" in that "the addition of 'system' fundamentally changes the focus…studies the functioning of, and interactions between human…and biophysical systems…via biogeochemical cycles" (2005, 139). Whereas the biophysical sciences examine humans as an ancillary factor to ecosystem science and Earth science, Pitman understands, as do all geographers, that "man is everywhere a disturbing agent" (Marsh 1864) and therefore must be considered in special context. Pitman points out that the fact that humans play a significant role and have a significant impact on Earth as a system is common knowledge for geographers but seen as a revelation for non geographers (2005). Again, Pitman does not use the term "sustainability," but the connections between the tenets of Earth-system science, geography, and sustainability are clear. Pitman lists the unique contributions of

geography to this field, and again echoes the "think globally, act locally" mentality in stating that present and future sustainability problems, understanding emission scenarios, for example, "require information on how populations might change the future, the types of economic growth that may occur, the rate of economic development and the nature of technological change. This information is required at regional detail for the entire globe" (2005, 143). Pitman believes Geography is the only discipline that can adequately supply this information.

It is important to note that these sentiments are not entirely contemporary. Warman in 1963 stated, "geographers have one of the most creative and most efficient fields for learning how to deal with the environment of human beings and human needs of today (296)" Likewise, Robert Harper, former AAG-NCGE committee member, in a 1966 piece on geography's unique contribution to education, stated:

> "The new opportunity that geography is being given to show its wares is, in large part, a chance to prove for the first time in many years that it can provide a meaningful perspective of the world that is relevant to all citizens…The need, then, is not simply for more geography, but for better geography. The new geography is essentially a search for a new perspective that meaningfully comes to grips with the real world of today and presents insights into the pressing problems that concern all citizens" (177-178).

His words still have relevance 48 years later, perhaps even more so today as geography examines the opportunity that sustainability education represents.

2.4.2: Support From Professional Organizations

Support for sustainability curriculum is present at the organizational level as well. Bednarz gives evidence of support from The EPA, NCSE, and NSF (2006).

In 2003, NCSE published "Recommendations for Education for a Sustainable and Secure Future," which Bednarz says "could hardly be more supportive of geography" (2006, 240). NSCE states that sustainability curriculum should be at all levels of education and should "emphasize systems and human-nature interactions," which fits well within geography (NCSE 2003, 6, quoted by Bednarz 2006, 239). Bednarz also notes that this report quotes then-Assistant Administrator for Research and Development at the EPA calling for "sense of place" (NCSE 2003, 8) –a famously geographic ideology—used in environmental problem-solving. Finally, the report includes an entire section focused on geography teacher resources for sustainability and environmental education, titled "Geographic Learning: Designing National Programs for Local and Global Impacts" (NCSE 2003, 28-29).

Finally, Bednarz references the 2003 NSF Committee for Environmental Research and Education (ERE) report "Complex Environmental Systems: Synthesis for Earth, Life, and Society in the 21st Century," which makes a strong case for geography's role, and makes special mention of geography and the tools it brings, including GIS (Pfirman and the AC-ERE 2003, 5; Bednarz 2006).

Skole also makes note of the shifts in NSF ERE and states, "one thing is clear, whether geography chooses to take a leadership role is almost irrelevant to the fact that change is emerging in the way science is done" (2004, 742). Special attention is placed on the push from NSF for interdisciplinary work, which Skole believes geography will lead as an "integrative discipline" (739) that will "attract new members from other disciplines, discourses, and methods

seeking a ‘safe haven’ in geography…in an otherwise disciplinary-focused academy that is hostile to integrative work…” (2004, 741).

European organizations are also encouraging an approach environmental problem solving that Pitman identifies as a good foothold for geography, referencing the International Geosphere Biosphere Program as calling for collaborative work between the social and natural sciences, aiming, according to Pitman, “independent of geography to do what geography has and continues to do” (2005, 144). Pitman also references the social science component at the core of the Potsdam Institute for Climate Research in Germany, which he sees as an excellent fit for geography’s contribution.

The National Geographic Society approaches sustainable problem solving with a model that is uniquely geographic. NGS provides resources to educators following the human-environment theme, calling the special context that geography provides to sustainability and environmental problem solving “geo literacy” (Edelson 2011). NGS, in partnership with the Environmental Systems Research Institute (ESRI), promotes geoliteracy as a means for exploring the interactions, interconnections, and implications of sustainable problem solving at a local and global scale (Edelson 2011). NGS believes that to solve important challenges of our time, one must first have a global perspective and be geo-literate.

The National Research Council’s Geographical Sciences Committee (NRC 2010 vii, quoted by Barnes 2011, 333) likewise states:

> *“In the years ahead, geographical tools and techniques will be of vital importance to the effort to monitor, analyze, and confront the unprecedented changes that are unfolding on Earth’s surface.”*

2.4.3 State of Geography-Led Sustainability Education

Clearly there are connections between sustainability and geography education. Evidence for geography-led sustainability education, however, is less clear.

Liu (2011) examined recent developments in sustainability studies, drawing on surveys from twenty-six sustainability degree programs in the United States and found that only 34% of programs had geography programs at their institution, 15% required a geography class, and 21% required a geography elective class. Liu presented calls within the discipline for more involvement in sustainability education and offered hypotheses for why geography is not more involved in sustainability studies. Key conclusions of Liu's work are that geography courses are not strongly represented in sustainability curricula, and should the discipline seek to capitalize on the growing student market interested in sustainability, they can do so by creating courses, integrating sustainability into existing courses, or adopting existing courses as sustainability curriculum. Finally, Liu urges the geographic community that sustainability studies offer an opportunity to recruit and retain students seeking such programs.

Where Liu focused on sustainability education trends reported by a national sustainability group, Bednarz (2006) focused on departmental trends reported by the AAG. Bednarz found that, by most accounts, geographical research of sustainability issues is strong. Evidence for geography-led sustainability courses, however, is weaker. Bednarz examined the reported program specialties of all AAG geography departments at time of publication and found, not surprisingly, that most departments are focusing on the spatial identity of geographic thought rather than the man-land or human-environment identities, which might better represent sustainability (2006).

A study recently published by the National Council for Science and the Environment found that out of all 398 Sustainability Specializations and Concentrations offered in the United States, only 3% were housed in Geography units (Vincent, 2012). The largest grouping, 24%, belonged to Business Administration units, 15% to Engineering, and 14% to Interdisciplinary Environmental Studies (Vincent 2012).

2.4.4 State of Geography-Led Sustainability Research

Bennett completed a simple analysis of the presence of the words "sustainable" and "sustainability" in titles, abstracts, or keywords in geography journals between 2000 and 2011 and found "the two most prominent disciplinary journals within geography, *Annals of the Association of American Geographers* and *The Professional Geographer*, utilized these words the least (2013, 105). Bettencourt and Kaur analyzed journals publishing works of sustainability science and examined the contribution of political geography, the only geography focused discipline or sub-discipline the authors examined (2011). They found 32% of publications to be from the social sciences, 23% from biology, and 22% from engineering. Of the 32% from the social sciences, only 5% were political geography (Bettencourt and Kaur 2011). Bennett points out the fact that political geography was the only sub-discipline related to geography and believes this "furthers the case that geography as discipline is not widely recognized as a major contributor to sustainability science" (2013, 105).

Still, Bennett points out that the geography-sustainability research landscape sometimes shows contradictory views, and points out that there is a great body of sustainability-focused research coming from geographers. Robert Kates, the preeminent

leader of sustainability science is a geographer, for example. Thrift (2002) and Bennett (2013) provide synopses of geography-led sustainability work; Thrift citing examples from the U.K. and Bennett from the U.S. Both cite paleoclimatology, ethnography, and agricultural research. McManus points to the long history of geographers studying social-justice issues like environmental justice, and lists researchers of Marxist approaches who have studied regulation theory, political ecology, "cultural perceptions of the environment," environmental history, and environmental management (2004, 221). McManus also references Gregory et al. who have noted the significant impact of physical geographers, especially, in environmental research (McManus 2004; Gregory et al. 2002).

Bennett additionally shows an increase in the use of "sustainability" and "sustainable" as keywords in AAG Annual Meeting programs from 2005 to 2013. The 2014 meeting, for example, had an entire session devoted to "Scale and Sustainability" (AAG 2014). Bennett concludes that "some geographers were actively engaged with sustainability science during its emergence but their contributions were largely occurring in publication venues outside geography (105)… [however] many geographers have come late to sustainability science" (2013, 107).

2.4.5: Theories Concerning Why Geography Has Not Developed A Stronger Role In Sustainability Education

With the wide body of literature on the connection between sustainability studies and geography and research suggesting that geography has not taken a leading role in teaching sustainability, all against the backdrop of a growing student market for sustainability studies,

why have geography departments not capitalized on this opportunity? McManus, Liu, and Yarnall and Neff offer some insight.

As McManus points out, perhaps geographers are not embracing sustainability studies because they interpret it to be a "universal [approach]" (223), or "one environmental philosophy among competing environmental philosophies" (2004, 222). Furthermore, as geographic research and education are often divided between human geography and physical geography, each "side" sees sustainability as the other's to teach. Yarnal and Neff echo this sentiment, believing physical, human, and GIS geographers often do not understand one another's "corner of geography," and therefore do not combine their skills in a unified sustainability-focused curriculum that draws upon tools from each "corner" (2004, 29).

Add to this the profound impact GIS has had on the discipline, and the considerable demand of the GIS job market. McManus concludes that "competing demands" and a tight fiscal climate have "limited the possibilities for the expansion of work on sustainable development [within geography programs]" (2004, 224).

Liu reiterates Sneddon (2000) who suggests geographers may be participating in sustainability studies through research or teaching but not labeling their work as such.

2.5 Summary

Environmental sustainability has claimed a firm foothold in higher education, and its influence continues to grow. Assessment tools and literature concerning assessment tools are emerging. At present, the most well known and most expansive assessment tool, STARS, is our best indicator of the state of sustainability education.

Many have recognized the unique contribution of geography in sustainability studies, and many have remarked that sustainability studies is a continuation of geography's human-environment studies tradition with a new goal in mind. Despite this and promptings from professional organizations, geography has not emerged as a leader in sustainability curriculum.

In general, the literature echoes Harper, calling not for a "new geography" per se, but a "better geography" (1963). One that aligns more closely with the human-environment tradition, not turning its back on GIS, but rather utilizing these tools in sustainable problem solving. Many authors stress the marrying of physical and social geography, an exodus of geographers from their "corners" to participate jointly in sustainability research and teaching (Yarnall and Neff 2004). The authors referenced agree that this is an important time for geography, and its relevance for society is clear.

CHAPTER 3

METHODS

3.1 Overview and Research Questions

The central issue explored in this study is the role of the discipline of geography in sustainability education in universities which have self-identified as sustainability leaders. It has been suggested that geography has focused on the spatial-studies tradition and ignored emerging opportunities to teach in the human-environment tradition focused on sustainability. The purpose of this research is to determine the role of geography departments in sustainability education at institutions that self-identify as sustainability leaders. Universities examined in this study are participants in Association for the Advancement of Sustainability in Higher Education Sustainability Tracking, Assessment & Rating System (AASHE STARS) that have received a sustainability ranking of Bronze, Silver, or Gold.

The following research questions were used:

1. *What percentage of overall curriculum is devoted to Sustainability Focused courses at Gold, Silver, and Bronze awarded STARS institutions in the United States, and do Gold institutions teach a higher percentage of sustainability classes?*
2. *What departments within STARS universities offer sustainability curriculum?*
3. *At STARS institutions, what proportion of Sustainability Focused courses are taught in geography?*
4. *What is the current focus of geography departments at STARS institutions according to AAG Guide to Program Specializations?*

3.2 Sample and Data Collection

In the study, AASHE STARS data were used because STARS is the most comprehensive collection of university sustainability characteristics. STARS 1.0 reports sustainability characteristics in four main categories (Education and Research; Operations; Planning, Administration, and Engagement; and Innovation) that contribute to the final score. Universities are then "ranked" by score to indicate progress. A score of 85 or above merits a Platinum ranking, a score of 65 or above a Gold rating, a score of 45 or above a Silver ranking, and a score of 25 and above a Bronze ranking. An excerpt of the STARS 1.2 Technical Manual showing a table of ranking categories, sub categories, and credit tiers is found in Appendix B.

This research focused on Category 1, Education and Research; Credits 5: Sustainability Course Identification; 6: Sustainability-Focused Courses; and 7: Sustainability Related Courses. Definitions and Reporting Fields of Sustainability Focused and Sustainability Related Courses are as follows:

> ER6 **Sustainability Focused Courses** Definition: "This credit recognizes institutions that offer academic courses focused on sustainability. Sustainability-focused courses provide valuable grounding in the concepts and principles of sustainability. These courses educate students about how different dimensions of sustainability relate to and support each other in theory and practice. In addition, these courses help equip students with the skills to weave together disparate components of sustainability in addressing complex issues.
>
> Reporting Fields: The number of sustainability-focused courses offered (A course may be either sustainability-focused or sustainability-related, not both; a course should be counted only once.)
> - The total number of courses offered
> - An indication of whether data cover one, two, or three years
> - A list of sustainability-focused courses offered OR the website URL where the publicly available sustainability course inventory containing a list of sustainability focused courses is available
> - An affirmation that the submitted information is accurate to the best of a responsible party's knowledge and contact information for the responsible party.

- The responsible party should be a staff member, faculty member, or administrator who can respond to questions (AASHE 2012, 43-44).

ER7 **Sustainability Related Courses** Definition: This credit recognizes institutions that offer courses related to sustainability. Sustainability-related courses help build knowledge about a component of sustainability or introduce students to sustainability concepts during part of the course. They may complement sustainability-focused courses by providing students with in-depth knowledge of a particular aspect or dimension of sustainability (such as the natural environment) or by providing a focus area (such as renewable energy) for a student's sustainability studies, or they may broaden students' understanding of sustainability from within different disciplines (AASHE 2012, 46).

Because Sustainability Focused courses offers a more specific definition, and because some in the sustainability community have criticized STARS for the breadth of courses included in the Sustainability Related category, only course data from the ER6 category Sustainability Focused Courses was used.

Data from 2010-2013 participants were used from STARS 1.2, and although version 2.0 was published during the time of this study, all terminology used in this study follows the STARS 1.2 language.

The purpose of the study was to specifically examine the role of geography in sustainability education, therefore only universities with geography departments were examined. To determine if a university had a geography department, the AAG 2010-11 Guide to Programs was consulted. Canadian institutions and community colleges were omitted. For a complete list of universities examined, see Appendix C.

Using the public online STARS database, the selected universities were examined in the Gold, Silver, and Bronze categories. If universities had participated in the STARS assessment more than once, the data from the most recent year were used.

The selected universities were listed with the following information accounted for:

1. Presence of Geography Department
2. Year assessment was completed
3. Overall score—The score that represents ranking.
4. Education Score—Shown in STARS as a % of 100
5. Curriculum Sore—Shown in STARS as a figure out of 55 possible points. If a certain scoring item was not applicable for a university (graduate program in sustainability, for example, which is worth 4 points), STARS omits that from the total curriculum score. Therefore, for universities with a score out of total that is less than 5, a relevant ration was recorded. For example, a university receiving a Curriculum score of 28.29/51 was recorded as 30.51/55. A note was made in the analysis spreadsheet for these unique scores, showing the original score.
6. Focused Courses—Shown as a score out of 10
7. Related Courses—Shown as a score out of 10

Because the data are self-reported, certain reporting inconsistencies necessitated data cleaning. Some universities identified that they were "Not Pursuing" a Sustainability Focused Courses score and thus could not be included in this study. Universities had the option of embedding their data into the STARS website, linking to their own data on their website, including a downloadable document of data, or all three. Most universities utilized all three options to report their data. Some universities included download links or links to their websites with data. Some of these links were broken and consequently, these universities were omitted. A total 60 Gold, 160 Silver, and 67 Bronze universities are ranked in STARS. Of those, 24 Gold, 43 Silver, and 12 Bronze institutions had geography programs. Eight Gold, seven Silver, and six

Bronze universities were omitted due to incomplete data. Thus, a total of 57 universities were examined, 15 Gold, 36 Silver, and 6 Bonze, which have both a geography department and complete data (Table 3.1).

Table 3.1 STARS Institutions 2011- November 2013

Ranking	Total Number of Ranked Institutions	Institutions With Geography Department (% of total)	Institutions in this Study (% of total)
Gold	60	24 (40%)	15 (25%)
Silver	160	43 (27%)	36 (23%)
Bronze	67	12 (18%)	6 (9%)
Total	287	79 (28%)	57 (20%)

3.3 Method of Data Analysis

The three key areas of focus for the AASHE data were: total sustainability curriculum, geography's contribution to Sustainability Focused curriculum, and the distribution of other disciplines used to deliver sustainability focused curriculum.

It was first necessary to create discipline parameters. Forty-three department titles were identified as relevant classifications, and one department category labeled "Other" to place university-specific departments or departments otherwise not identified in the forty-three classifications. Parameters for each department classification were identified (Table 3.2), STARS Sustainability Focused course lists were examined for each university, and the courses were listed according to department parameter.

Table 3.2: Discipline Abbreviation Key

Department Classification	Parameters
ACCT	Accounting
AGCS	Agriculture, Crop Science, Ag. Rangeland Mgmt., Ag. Economics
ANTH	Anthropology
ARTD	Art and Design
BIOL	Biology, Plant Biology, Biological Engineering
BUSI	Business, Administration, Management
CHEM	Chemistry, Chemical Engineering
COMM	Communication
EART	Earth Science and Unclassified Earth Science (eg. "Geoscience")
ECON	Economics
EDUC	Education
ENGL	Literature, English, or Rhetoric
ENGR	Engineering: Environmental, Mechanical, Civil
ENVS	Environmental Science
FIRS	First Year/ Freshman Experience
FISH	Fish and Wildlife
FORL	Foreign Language
FORS	Forestry
GEOG	Geography
GEOL	Geology
GOVT	Government, Political Science
HEAL	Health, Nutrition, and Medical
HIST	History
HNRS	University Honors
HORT	Horticulture
INTL	International, Global Studies (Includes Global Health/Medical)
JUST	Justice or Criminology
LAW	Law
MARI	Marine or Ocean Studies
MATH	Mathematics
MINS	Minority Studies (Women and non-Anglo groups)
MRKT	Marketing
NREM	Natural Resource or Environmental Management
OTHR	Other (University-specific department or otherwise unlisted)
PHIL	Philosophy
PHYS	Physics
PLAN	Planning
PSYC	Psychology
SDVP	Sustainable Development
SOCI	Sociology
SOCW	Social Work
SUST	Sustainability
TECH	Technology
UCOL	University College

To find total sustainability curriculum, Sustainability Focused and Sustainability Related courses were tallied and then calculated as a percentage of total curriculum at each university using the total course offering figures provided by each STARS participant. The correlation between total sustainability curriculum and Focused curriculum was calculated using Pearson product moment coefficient. Mean total sustainability curriculum and mean Sustainability Focused curriculum were calculated for Gold, Silver, and Bronze institutions, and then for the entire sample.

After tallying courses by department for each university using the parameters above, these figures were converted to percentages using Sustainability Focused course totals to find department proportion of total sustainability curriculum. The mean proportion of departmental contribution was then calculated for the entire sample to find Geography's total contribution to Sustainability Focused course listings.

The presence of course data for each department at each institution was assessed to find how often each department were used to deliver Sustainability Focused courses. This was completed to see how often Geography departments were used to offer courses in comparison to other departments.

To answer question four, "What is the current focus of geography departments at STARS institutions according to AAG Guide to Program Specializations?" the universities in the study sample were listed and the AAG 2011-2012 Guide to Programs in the Americas was referenced to find the self-reported program specialty of each department. AAG offers 34 program specialties for departments to choose from. Departments may choose as many specialties as are relevant for their department. Because Bednarz (2006) identifies "Conservation, Land Use, Resource Management" and "Environmental Studies" to be the two specialties with the greatest

relevance to environmental and sustainability specialties, and because other literature suggests that geography departments have ignored sustainability studies to instead focus on GIS studies, these three specialties were the focus of this portion of the analysis. The program guide was referenced for the universities in this sample, and the proportion of universities in the sample that identify as specializing in these three categories was calculated, as was the total proportion of involvement in these specialties for all AAG geography departments. This showed whether or not geography departments in the STARS sample were more likely to focus on sustainability-related specializations. Additionally, because Bednarz completed the same analysis in 2006 using 2002 AAG data, this allowed a comparison to be made between 2002 and 2012 data.

3.4 Limitations of the Method

The two data-sets that were referenced, AASHE STARS and AAG Guide to Programs were both self-reported sets from 2010-2013. Self-reported datasets have inherent limitations, as data can be inconsistent and reports subjective. Such were the limitations of this study. Whether or not a university geography department reports specialization in "Environmental Studies" is a subjective decision, and likewise, the identification of a course focused on sustainability holds some measure of subjective decision making. Still, the AASHE STARS and AAG Guide to Programs are the best collections of data concerning sustainability in higher education and higher education Geography department profiles, respectively.

A second limitation to this study was data reporting inconsistencies. As previously stated, 22 universities (28% of the available sample) were omitted from this study because their reported data, or the method in which the data was reported, was inconsistent or unavailable in STARS.

Finally, this study focused on a small sample of 57 universities. Only universities with Geography departments were examined. The study provides a snapshot of sustainability

education at institutions with geography departments. It does not provide an understanding of sustainability education at universities teaching without Geography departments.

CHAPTER IV

RESULTS

4.1 Total Sustainability Curriculum At STARS Institutions

The participants of the STARS assessment self-identify as leaders or pursuers of campus sustainability. Using data from ER 6 and ER 7, Sustainability Focused and Sustainability Related Courses, respectively, total sustainability curriculum was calculated as a percentage of total curriculum at each university with a geography program. Then, because the focus of this study was on Sustainability Focused courses, this component was also calculated as a percentage of total courses offered (Table 4.1).

Total sustainability curriculum within the university sample ranged from 1% of the total curriculum (Pennsylvania State University) to 63% of total curriculum (Western Washington University) (see Appendix D for complete list). On average[1], Gold universities reported that 17% of their total curriculum has a sustainability component, 4% of which are Sustainability Focused courses (Table 4.1). Silver universities report 8% of their curriculum to have a sustainability component, 2% of which are Sustainability Focused courses. Bronze universities report 7% of their curriculum to have a sustainability component, 1% are Sustainability Focused courses.

Correlation between total sustainability curriculum and Sustainability Focused courses offered was calculated using Pearson product moment correlation coefficient, which showed a positive relationship between total sustainability curriculum and Sustainability Focused course offerings (r=.50).

[1] Herein, “average” refers to arithmetic mean.

Table 4.1 Average Sustainability Curriculum at STARS Institutions Sampled

Ranking	As % of total curriculum	
	Total Reported Sustainability Curriculum	Sustainability Focused Courses
Gold	17%	4%
Silver	8%	2%
Bronze	7%	1%

4.2 Role of Geography in Sustainability Focused Curriculum

To answer Research Question 2, "At STARS institutions, what proportion of Sustainability Focused courses are taught in Geography?" Geography courses were calculated in proportion to all Sustainability Focused courses across all schools, and mean course offerings were calculated. Results showed that Geography departments teach the largest proportion of sustainability courses, averaging 14% of Sustainability Focused Curriculum (Table 4.2).

Table 4.2: Average Proportion of Sustainability Focused Curriculum By Discipline

Discipline	Average Proportion of Sustainability Focused Curriculum
Geography	14%
Environmental Science	10%
Biology	7%
Engineering	5%
Economics	4%
Architecture	4%
Agriculture and Crop Science	3%
Business	3%
Health, Nutrition, and Medical	3%
Sustainability	3%
Planning	3%

Note: Data shown includes figures one standard deviation (0.02623) above the mean (0.02000). List of all disciplines and their sustainability focused course contribution is found in Appendix E.

The occurrence of Sustainability Focused courses being taught in each discipline was examined across all schools. Geography departments are offering sustainability focused courses at 83% of universities, the highest occurrence across all disciplines (Table 4.3).

Table 4.3: Frequency of Sustainability Curriculum By Discipline Across All Schools

Department	Number of Universities Present	Percent of Total
Geography	48	83%
Economics	44	76%
Biology	43	74%
Environmental Science	38	66%
Engineering	33	57%
Anthropology	32	55%

Note: Data shown includes figures one standard deviation (11.961) above the mean (16.546). Complete list of frequency of sustainability curriculum by discipline across all schools is found in Appendix F.

4.3 AAG Program Specialties

Finally, to determine the department specialties of geography programs at STARS universities, the AAG 2011-2012 Guide To Programs was referenced to determine if Conservation, Land Use, Resource Management; Environmental Studies, and GIS were listed as

specializations. Total number of universities in the sample claiming sustainability-related specializations was recorded, and the proportion was compared to specialization listings for all U.S. geography programs (Table 4.4), and the results of the Bednarz 2006 study (see discussion). For a complete list of the above specialty listing for each university in sample, see Appendix G.

Table 4.4 AAG 2011-2012 AAG Program Specialty of Sampled Universities

	Conservation, Land Use, Resource Management	Environmental Studies	GIS
Number of Universities in Sample That Claim This Specialty	39	46	55
Percent of Sample (n = 57)	68%	81%	96%
Percent of all U.S. AAG Geography Listings (n = 218)	66%	73%	95%

CHAPTER V

DISCUSSION

5.1 Total Sustainability Curriculum at STARS Institutions

The results showed that even though the universities sampled self-identify as committed to sustainability or even leading in campus sustainability, a very small proportion of their total curriculum is devoted to sustainability studies.

Each university in the sample was claiming a higher proportion of *total* sustainability courses– that is Sustainability Focused and Sustainability Related– than Sustainability Focused. The Pearson coefficient analysis compared the total reported curriculum and Sustainability Focused course data percentages and found that a higher proportion of total sustainability curriculum was positively related to a higher percentage of Focused curriculum. Sustainability Focused course data is the best indicator of sustainability course offerings at a university, and these figures were quite low. Gold, Silver, and Bronze universities were only offering 4%, 2%, and 1% of their classes in sustainability-focused arenas. This shows that even though literature suggests an increase in sustainability education in the United States, these fifty-seven campus sustainability champions are offering a very small number of courses and there is much room for improvement. It is possible that universities without geography programs are teaching a much higher percentage of sustainability-courses in other departments: environmental science, engineering, or architecture, for example. Future analysis of course offerings at *all* STARS rated universities is needed to gain better understanding of the state of sustainability education. Still, literature shows a consensus that geography is the best discipline by which to engage in interdisciplinary studies and teach all three pillars of sustainability (economic, social, and

environmental). Therefore, as will be discussed later, if sustainability studies are indeed taking place outside of geography departments at the universities not sampled, perhaps these students are not receiving an education grounded in interdisciplinary problem solving, or an education that examines both social and physical issues.

5.2 Role of Geography in Sustainability Focused Curriculum

The central focus of this study was the role of geography departments in sustainability course offerings. Other studies that have examined sustainability programs from all disciplines have shown only 3% were housed in geography units (Vincent, 2012). The largest grouping, 24%, belonged to Business Administration units, 15% to Engineering, and 14% to Interdisciplinary Environmental Studies (Vincent 2012). This study, however, found that geography departments are housing the largest proportion of Sustainability Focused courses at 14%, followed by Environmental Science at 10%. In comparing the leaders of the Vincent study with data from this study, we see less involvement from Business Administration (3%) and Engineering (5%). This suggests that in universities that have geography programs, these departments are likely to offer sustainability courses. The literature suggests this is because geography departments are best suited for this curriculum, and have long been teaching sustainability themes.

Not only did the geography departments in this study teach the highest proportion of Sustainability Focused courses, but they taught such courses most often across the sample. Meaning, out of the total 57 universities studied, 48, or 84%, of universities offered some proportion of Sustainability Focused courses in geography. It is interesting that not all geography departments taught sustainability focused courses. The reasoning for this is unclear, especially

considering four of the nine university geography programs that did not offer Sustainability Focused courses *do* claim program specialties, which Bednarz claims lend themselves to sustainability studies (2006). Table 5.1 shows the AAG program specialty of geography programs *not* claiming STARS Sustainability Focused courses. Bednarz identifies Conservation, Land Use, and Resource Mgmt. and Environmental Studies to be the AAG Specializations best-suited to sustainability classes. With the exception of American University and Ball State University, each of the geography programs not teaching a course identified by the STARS assessment to be focused on sustainability self-reports at least one environmental sustainability related program specialty. This could speak to the subjectivity of the datasets

Table 5.1 Universities in Sample That Do Not Teach Sustainability Classes in Geography

		AAG Program Specialty *(X indicates specialty is claimed, 0 indicates specialty is not claimed)*	
University	STARS Ranking	Conservation, Land Use, Resource Management	Environmental Studies
American University	Gold	0	0
Ball State University	Gold	0	0
Oregon State University	Gold	X	X
Auburn University	Silver	0	X
Florida International University	Silver	X	X
Louisiana State University	Silver	X	X
Utah State University	Silver	X	X
University of Louisville	Silver	0	X
Old Dominion University	Bronze	0	X

5.3 AAG Program Specialties

To determine if the geography programs at the STARS ranked universities were more focused on sustainability, the program specialties of each university in the sample was examined using the *AAG Guide to Programs*. Because Bednarz (2006) identified Conservation, Land Use, Resource Management and Environmental Studies to be the specialties most likely used in human-environment focused courses, and suggests they may be foregoing sustainability courses to offer GIS courses, these were the specialties examined.

Results showed that 68% of the programs sampled report a focus of Conservation, Land Use, Resource Management, which is slightly higher than the national average of 66%. Eighty-one percent of the programs sampled report an Environmental Studies specialty, whereas only 73% of AAG programs nation-wide report this specialty. GIS listings for both groups were close to equal, with 96% of the sample and 95% of programs nationwide (see Figure 5.1).

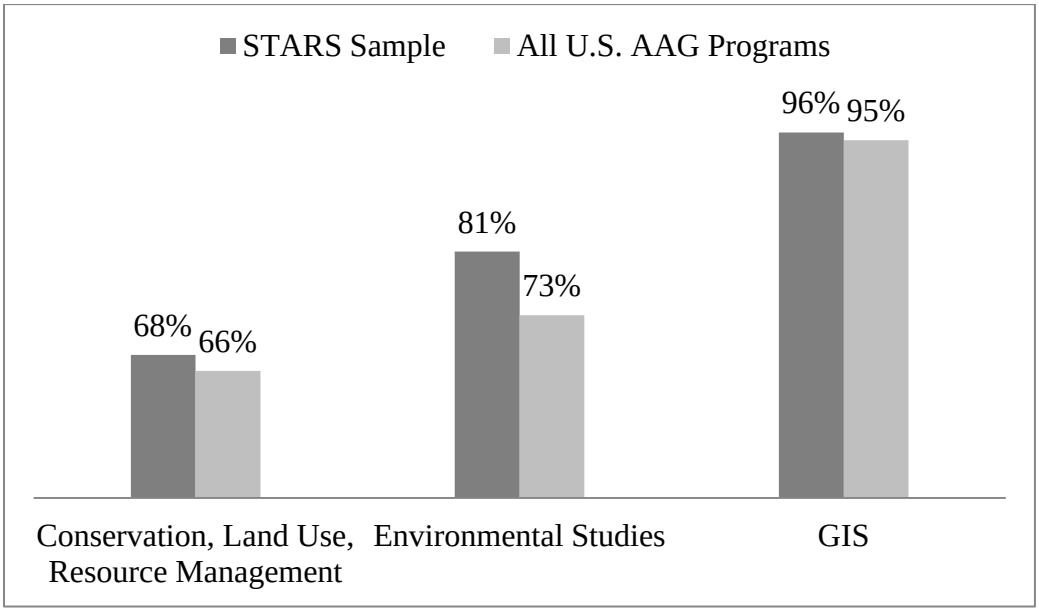

Figure 5.1: Geography Program Specialties in Sample, All U.S. AAG Programs

Additionally results showed that since Bednarz's 2006 study using 2002 AAG data, there has been in increase in human-environment specialties reported by geography departments (Figure 5.2). Conservation, Land Use, Resource Mgmt. program specialties increased from 59% of departments reporting the specialty in 2002 to 68% in 2012. Environmental Studies increased from 66% of departments reporting the specialty in 2002 to 81% in 2012. This aligns with other evidence that sustainability and human-environment courses are on the rise (Clark and Dickson 2003; Bennet 2013).

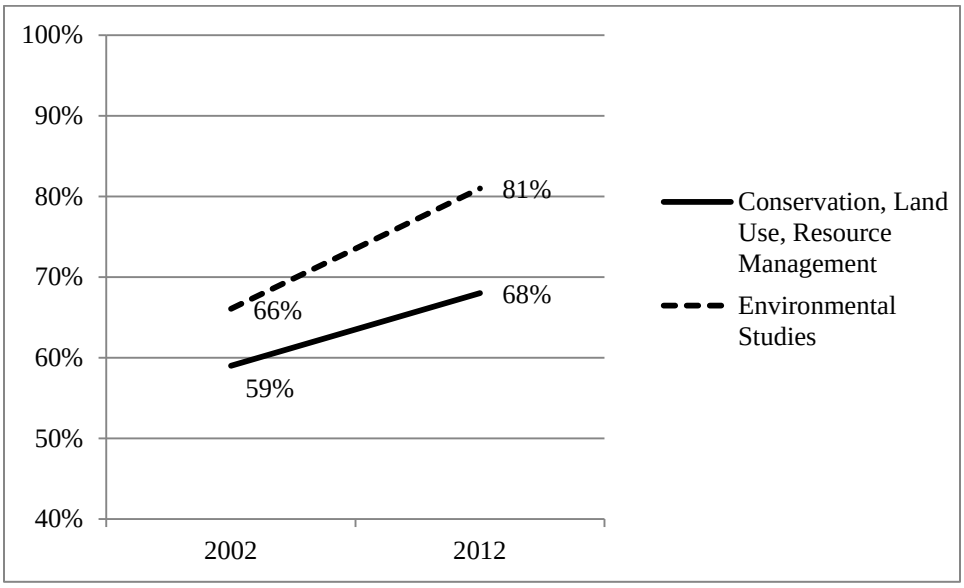

Figure 5.2: AAG Program Specialties Claimed by U.S. Geography Departments 2002-2012

5.4 Applicability of STARS as a Research Tool

This study also revealed the utility of STARS as a research tool. Although STARS is the most recognized campus sustainability metric, and by some accounts the best tool, little research has emerged on the effectiveness of STARS or using data reported by STARS. Although STARS 1.2 and 2.0 (launched fall 2013) were created using input from multiple campus sustainability

stakeholders, this study reveals that perhaps further development is needed in the Education and Research category.

Out of the sample available for study (79 universities with geography programs), 28% (22 universities) had to be omitted because of missing data, broken links to data, or data in formats that could not be used for this study (a list of course titles, for example, but not including which disciplines the courses were from). Several universities had "Not Pursuing" listed in place of any information in the ER6 and ER7 categories, including at least one university at the Gold level. Education and research are the mission and purpose of colleges and universities, so it seems inconceivable that a university would be awarded a Gold ranking in STARS without including any information on their approach to educating students for sustainability. Several universities in the omission group are perceived as leaders in sustainability, including the Global Sustainability Institute at Arizona State University, and it is unfortunate that their approach to sustainability education could not be quantified in this study.

Because STARS is a live, searchable database of sustainability initiatives, it is important that the information within and links to external information is credible, transparent, accurate, and complete. The newly released STARS 2.0 claims additional accountability features, including "periodic audits of data submitted by all institutions," which, if "inconsistencies or outliers" are found, would result in an inquiry of accuracy by STARS staff to the institution's STARS liaison (AASHE 2013, 7). If the institution liaison is unresponsive to "repeated communications" AASHE staff may then "flag" the credit in question to alert viewers that a possible error exists (AASHE 2013). Still, AASHE has not announced how often these "periodic audits" will occur or the depth and breadth of the audits. All flags are placed "at the discretion of AASHE staff," and there is no mechanism or protocol for STARS website viewers or researchers

to flag missing data, inconsistencies, broken links, etc. Finally, the effectiveness of the random audits and flagging feature is questionable, as 655 institutions are currently participating in STARS as either a ranked university or a university pursuing ranking, and AASHE employs only three non-conference "program" staff, which includes STARS, AASHE publications, and AASHE resources (according to AASHE website, April 2014).

Other accountability features of 2.0 include a pre-publication entry-verification of all Platinum ratings, and post-publication review of the president's or chancellor's letter of authenticity, review of innovation credits, and review of one additional randomly selected credit item for all other entries (AASHE 2013). Additionally, STARS 2.0 includes more robust definitions of sustainability courses, including the titles "Sustainability Courses" and "Courses that Include Sustainability" to replace Sustainability Focused and Sustainability Relate course terminology.

These improvements to STARS are in the right direction. Still, reinforcement by AASHE staff, increased entry spot checking, and data upload consistency are needed to further improve STARS credibility and applicability as a research tool. Currently, data are reported in STARS by embedding it directly in the website, or including download links in Microsoft Excel, Word, or PDF formats. To further encourage cross-institutional comparisons and research, STARS should encourage a consistent data reporting format, perhaps by supplying Microsoft Excel templates. The vast amount of data contained in the STARS database has the potential to result in research concerning best practices for sustainability, cross-institutional comparisons, comparisons across university systems, and as STARS grows, comparisons of campus sustainability between various countries. Still, much work is needed to make STARS a reliable, time efficient, and accurate research tool.

5.5 Conclusion

This study revealed that, where geography departments exist, they are taking the lead in offering sustainability curriculum. On average, geography programs are teaching the highest proportion of sustainability focused courses. Literature from both within and outside the discipline of geography suggests that it is a highly appropriate discipline for the increase of sustainability curriculum. Geography is inherently interdisciplinary, has a long history of examining human-environment interactions, and offers tools to examine environmental and human phenomenon spatially.

Still, the figures in this study are revealing of the vulnerability of geography's place in sustainability education.

Currently, only a small proportion of university curriculum is focused on sustainability (between one and four percent). Of that, geography is only involved in 14% of courses. And finally, only 28% of the 287 ranked STARS participants are four-year institutions offering geography. Sustainability curriculum and geography's role therein clearly have room to grow. The bigger problem, however, seems not to be the appropriateness or the ability of geography to teach this curricula, but the availability of geography on a university campus. At the end of the day, the ability for geography to teach to sustainability is irrelevant if the departments do not exist.

This author echoes Murphy (2007), drawing attention to "the larger issue: many in the U.S. academic elite [have] come to view geography as a dispensable subject in institutions of higher learning" (124). Pitman (2005), Skole (2004), Liu (2012), and Bennett (2013) all speak of missed opportunities of geography for teaching emerging human-environment curriculum and

issue a warning call to geography departments that this curriculum will be offered elsewhere in other departments should geography not respond. Skole references the absence of a geography program at Harvard, responding to the long-asked question of whether or not Harvard would ever reinstate geography. “The answer is simple,” claims Skole, “Yes they will, but will the new unit be called geography?” (742). Pitman seems to agree, and references geographic education not labeled as such (2005).

Through its history of “competing demands” (McManus 2004) and large amounts of “intellectual energy” (Turner 2002) in search of its identity, it is unclear if geography will respond to this growing demand for sustainability curriculum as another demand among many or as an opportunity for growth and strengthening of a relatively weak discipline (Smith 1987, Turner 2002, Yarnall and Neff 2004, Bednarz 2006, Murphy 2007). If geography does respond, students will be awarded an interdisciplinary education focused on environmental problem solving, the ability to understand human-environment phenomena at the local and global level, the aptitude to anticipate and recognize interconnections and implications, an ever growing array of spatial tools, and a rich disciplinary history that encourages its student to imagine worlds not yet realized then to boldly set-out for them. Indeed, geography has much to offer the sustainability student and our world in these dire times.

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APPENDICES

Data Use Guidelines

AASHE believes that transparency is a key component in communicating sustainability claims. As a result, STARS data are made publicly available through individual STARS reports and through some STARS Data Displays. STARS data can be used in research and other publications, outside of what is produced by AASHE, provided that the following guidelines are met:

- STARS ratings are based on the overall submission and should always be communicated in that manner; fractions of scores cannot be published on their own without the overall score
- AASHE does not rank institutions but recognizes that STARS data may contribute to rankings done by other organizations. These rankings, as well as the methodology for evaluating and scoring, are not endorsed by AASHE
- Any reference to STARS data must be attributed to AASHE
- AASHE does not verify the accuracy of the data submitted through STARS
- STARS data cannot be changed or used for-profit
- AASHE encourages individuals and organizations to use STARS data in a professional and respectful manner that captures the intent of being transparent with sustainability claims

If you have a need that falls outside of these requirements, please contact stars@aashe.org.

Appendix B: STARS 1.2 Scoring Categories (page 17-19 Technical Manual)

Category 1: Education & Research (ER)		
Credit Number	**Credit Title**	**Possible Points**
Co-Curricular Education		
ER Credit 1	Student Sustainability Educators Program	5
ER Credit 2	Student Sustainability Outreach Campaign	5
ER Credit 3	Sustainability in New Student Orientation*	2
ER Credit 4	Sustainability Materials and Publications	4
Tier Two	*Co-Curricular Education Tier Two Credits*	2
Curriculum		
ER Credit 5	Sustainability Course Identification	3
ER Credit 6	Sustainability-Focused Courses	10
ER Credit 7	Sustainability-Related Courses	10
ER Credit 8	Sustainability Courses by Department*	7
ER Credit 9	Sustainability Learning Outcomes*	10
ER Credit 10	Undergraduate Program in Sustainability*	4
ER Credit 11	Graduate Program in Sustainability*	4
ER Credit 12	Sustainability Immersive Experience*	2
ER Credit 13	Sustainability Literacy Assessment	2
ER Credit 14	Incentives for Developing Sustainability Courses	3
Research		
ER Credit 15	Sustainability Research Identification*	3
ER Credit 16	Faculty Engaged in Sustainability Research*	10
ER Credit 17	Departments Engaged in Sustainability Research*	6
ER Credit 18	Sustainability Research Incentives*	6
ER Credit 19	Interdisciplinary Research in Tenure and Promotion*	2
Total		**100**

* credit does not apply to all institutions

Category 2: Operations (OP)		
Credit Number	**Credit Title**	**Possible Points**
Buildings		
OP Credit 1	Building Operations and Maintenance	7
OP Credit 2	Building Design and Construction*	4
OP Credit 3	Indoor Air Quality	2

Climate		
OP Credit 4	Greenhouse Gas Emissions Inventory	2
OP Credit 5	Greenhouse Gas Emissions Reduction	14
Tier Two	*Climate Tier Two Credits*	0.5
Dining Services		
OP Credit 6	Food Purchasing*	6
Tier Two	*Dining Services Tier Two Credits*	2.5
Energy		
OP Credit 7	Building Energy Consumption	8
OP Credit 8	Renewable Energy	7
Tier Two	*Energy Tier Two Credits*	1.5
Grounds		
OP Credit 9	Integrated Pest Management*	2
Tier Two	*Grounds Tier Two Credits*	1.25
Purchasing		
OP Credit 10	Computer Purchasing	2
OP Credit 11	Cleaning Product Purchasing	2
OP Credit 12	Office Paper Purchasing	2
OP Credit 13	Vendor Code of Conduct	1
Tier Two	*Purchasing Tier Two Credits*	0.5
Transportation		
OP Credit 14	Campus Fleet	2
OP Credit 15	Student Commute Modal Split*	4
OP Credit 16	Employee Commute Modal Split	3
Tier Two	*Transportation Tier Two Credits*	3
Waste		
OP Credit 17	Waste Reduction	5
OP Credit 18	Waste Diversion	3
OP Credit 19	Construction and Demolition Waste Diversion*	1
OP Credit 20	Electronic Waste Recycling Program	1
OP Credit 21	Hazardous Waste Management	1
Tier Two	*Waste Tier Two Credits*	1.5
Water		
OP Credit 22	Water Consumption	7
OP Credit 23	Stormwater Management	2
Tier Two	*Water Tier Two Credits*	1.25
Total		**100**

Category 3: Planning, Admin. & Engagement (PAE)		
Credit Number	**Credit Title**	**Possible Points**
Coordination and Planning		
PAE Credit 1	Sustainability Coordination	3
PAE Credit 2	Strategic Plan*	6
PAE Credit 3	Physical Campus Plan*	4
PAE Credit 4	Sustainability Plan	3
PAE Credit 5	Climate Action Plan	2
Diversity and Affordability		
PAE Credit 6	Diversity and Equity Coordination	2
PAE Credit 7	Measuring Campus Diversity Culture	2
PAE Credit 8	Support Programs for Underrepresented Groups	2
PAE Credit 9	Support Programs for Future Faculty	4
PAE Credit 10	Affordability and Access Programs	3
Tier Two	*Diversity and Affordability Tier Two Credits*	0.75
Human Resources		
PAE Credit 11	Sustainable Compensation	8
PAE Credit 12	Employee Satisfaction Evaluation	2
PAE Credit 13	Staff Professional Development in Sustainability	2
PAE Credit 14	Sustainability in New Employee Orientation	2
PAE Credit 15	Employee Sustainability Educators Program	5
Tier Two	*Human Resources Tier Two Credits*	0.75
Investment		
PAE Credit 16	Committee on Investor Responsibility*	2
PAE Credit 17	Shareholder Advocacy*	5
PAE Credit 18	Positive Sustainability Investments*	9
Tier Two	*Investment Tier Two Credits*	0.75
Public Engagement		
PAE Credit 19	Community Sustainability Partnerships	2
PAE Credit 20	Inter-Campus Collaboration on Sustainability	2
PAE Credit 21	Sustainability in Continuing Education*	7
PAE Credit 22	Community Service Participation	6
PAE Credit 23	Community Service Hours	6
PAE Credit 24	Sustainability Policy Advocacy	4
PAE Credit 25	Trademark Licensing *	4
Tier Two	*Public Engagement Tier Two Credits*	0.75
Total		**100**

Appendix C: List of Universities in Sample

Rating	Institution
Gold	American University
Gold	Appalachian State University
Gold	Ball State University
Gold	Middlebury College
Gold	New Mexico State University
Gold	Northern Arizona University
Gold	Oregon State University
Gold	Portland State University
Gold	The University of Arizona
Gold	University of Colorado at Boulder
Gold	University of Iowa
Gold	University of Denver
Gold	University of New Hampshire
Gold	University of Northern Iowa
Gold	University Wisconsin Stevens Point
Silver	Auburn University
Silver	Boston University
Silver	California State Polytechnic University, Pomona
Silver	California State University, Fullerton
Silver	Colgate University
Silver	Florida International University
Silver	George Mason University
Silver	Indiana University-Purdue University Indianapolis
Silver	Louisiana State University
Silver	Macalester College
Silver	Miami University
Silver	Michigan State University
Silver	Mount Holyoke College
Silver	Pennsylvania State University
Silver	San Diego State University
Silver	SUNY Geneseo
Silver	Texas A & M University
Silver	University at Albany
Silver	University at Buffalo
Silver	University of Arkansas
Silver	University of Colorado Colorado Springs
Silver	University of Colorado Denver

Silver	University of Kentucky
Silver	University of Louisville
Silver	University of Minnesota, Twin Cities
Silver	University of Missouri, Kansas City
Silver	University of North Carolina at Chapel Hill
Silver	University of North Texas
Silver	Southern Illinois University
Silver	University of Oregon
Silver	University of Tennessee
Silver	University of Wisconsin Milwaukee
Silver	University of Wisconsin River Falls
Silver	Utah State University
Silver	Western Kentucky University
Silver	Western Washington University
Bronze	Hawaii Pacific University
Bronze	Old Dominion University
Bronze	Towson University
Bronze	University of Alaska Anchorage
Bronze	University of Texas at San Antonio
Bronze	Weber State University

Appendix D: Sustainability Curriculum Proportions By Discipline for Entire Sample

Ranking	Institution	Total Sustainability Curriculum	Sustainability Focused Curriculum
		As percentage of total curriculum	
Gold	American University	17%	5%
Gold	Appalachian State University	27%	4%
Gold	Ball State University	1%	0%
Gold	Middlebury College	24%	4%
Gold	New Mexico State University	29%	19%
Gold	Northern Arizona University	17%	6%
Gold	Oregon State University	15%	2%
Gold	Portland State University	2%	1%
Gold	The University of Arizona	15%	1%
Gold	University of Colorado at Boulder	9%	3%
Gold	University of Iowa	8%	2%
Gold	University of Denver	25%	5%
Gold	University of New Hampshire	19%	1%
Gold	University of Northern Iowa	18%	4%
Gold	University Wisconsin Stevens Point	23%	8%
Silver	Auburn University	9%	4%
Silver	Boston University	7%	2%
Silver	California State Polytechnic University, Pomona	15%	2%
Silver	California State University, Fullerton	6%	3%
Silver	Colgate University	6%	2%
Silver	Florida International University	9%	0%
Silver	George Mason University	1%	1%
Silver	Indiana University-Purdue University Indianapolis	3%	3%
Silver	Louisiana State University	7%	2%
Silver	Macalester College	15%	2%
Silver	Miami University	2%	0%
Silver	Michigan State University	7%	1%
Silver	Mount Holyoke College	6%	4%
Silver	Pennsylvania State University	1%	0%
Silver	San Diego State University	6%	2%
Silver	SUNY Geneseo	6%	3%
Silver	Texas A & M University	13%	2%
Silver	University at Albany	3%	1%
Silver	University at Buffalo	9%	1%
Silver	University of Arkansas	2%	1%
Silver	University of Colorado Colorado Springs	9%	2%

Silver	University of Colorado Denver	1%	1%
Silver	University of Kentucky	7%	1%
Silver	University of Louisville	7%	2%
Silver	University of Minnesota, Twin Cities	8%	2%
Silver	University of Missouri, Kansas City	4%	2%
Silver	University of North Carolina at Chapel Hill	3%	0%
Silver	University of North Texas	5%	1%
Silver	Southern Illinois University	26%	3%
Silver	University of Oregon	4%	0%
Silver	University of Tennessee	3%	1%
Silver	University of Wisconsin Milwaukee	4%	1%
Silver	University of Wisconsin River Falls	9%	3%
Silver	Utah State University	5%	1%
Silver	Western Kentucky University	4%	1%
Silver	Western Washington University	63%	2%
Bronze	Hawaii Pacific University	12%	3%
Bronze	Old Dominion University	3%	0%
Bronze	Towson University	2%	0%
Bronze	University of Alaska Anchorage	17%	5%
Bronze	University of Texas at San Antonio	2%	0%
Bronze	Weber State University	9%	0%

Appendix E: Sustainability Focused Curriculum Proportion By Discipline For Entire Sample

Discipline	Average Sustainability Focused Curriculum
GEOG	14%
ENVS	10%
BIOL	7%
ENGR	5%
ECON	4%
ARCH	4%
AGCS	3%
BUSI	3%
HEAL	3%
SUST	3%
PLAN	3%
NREM	3%
EART	3%
ANTH	2%
GEOL	2%
INTL	2%
HIST	2%
FORS	2%
GOVT	2%
PHIL	2%
SOCY	2%
FISH	1%
EDUC	1%
HNRS	1%
CHEM	1%
LAW	1%
TECH	1%
ENGL	1%
SOCW	1%
MARI	1%
PSYC	1%
UCOL	1%
MINS	1%
HORT	1%
PHYS	1%
ARTD	0%
FIRS	0%

Discipline	Average Sustainability Focused Curriculum
COMM	0%
ACCT	0%
SDVP	0%
FORL	0%
MRKT	0%
JUST	0%
MATH	0%

Appendix F: Frequency of Sustainability Curriculum By Discipline For Entire Sample

Discipline	Number of Universities Teaching Sustainability Focused Courses in This Discipline	Percentage of total (n= 57)
GEOG	48	84%
ECON	44	77%
BIOL	43	75%
OTHR	43	75%
ENVS	38	67%
ENGR	33	58%
ANTH	32	56%
GOVT	28	49%
HIST	27	47%
PHIL	27	47%
SOCI	27	47%
BUSI	26	46%
GEOL	26	46%
HEAL	25	44%
ARCH	22	39%
EDUC	19	33%
AGCS	17	30%
ENGL	16	28%
CHEM	15	26%
EART	15	26%
PLAN	14	25%
INTL	13	23%
HNRS	13	23%
MINS	12	21%
PHYS	12	21%
ARTD	11	19%
FORS	11	19%
TECH	11	19%
PSYC	10	18%
SUST	9	16%
FISH	8	14%
HORT	8	14%
LAW	8	14%
ACCT	7	12%
COMM	7	12%
MARI	7	12%
NREM	7	12%
SOCW	7	12%
FIRS	5	9%

UCOL	5	9%
FORL	4	7%
JUST	4	7%
MRKT	4	7%
MATH	2	4%
SDVP	1	2%

Appendix G: AAG Program Specialty Listing For Entire Sample

Institution	Program Specialty		
	Conservation, Land Use, Resource Management	Environmental Studies	GIS
American University			
Appalachian State University	X	X	X
Ball State University			X
Middlebury College		X	X
New Mexico State University	X	X	X
Northern Arizona University	X		X
Oregon State University	X	X	X
Portland State University	X	X	X
The University of Arizona	X	X	X
University of Colorado at Boulder	X	X	X
University of Iowa	X	X	X
University of Denver	X	X	X
University of New Hampshire	X		X
University of Northern Iowa			X
University Wisconsin Stevens Point		X	X
Auburn University		X	X
Boston University		X	X
California State Polytechnic University, Pomona	X	X	X
California State University, Fullerton		X	X
Colgate University			X
Florida International University	X	X	X
George Mason University	X	X	X
Indiana University-Purdue University Indianapolis	X	X	X
Louisiana State University	X	X	X
Macalester College		X	X
Miami University	X	X	X
Michigan State University			X
Mount Holyoke College	X	X	X
Pennsylvania State University	X	X	X
San Diego State University	X	X	X

SUNY Geneseo	X	X	X
Texas A & M University	X	X	X
University at Albany	X	X	X
University at Buffalo	X	X	X
University of Arkansas	X		X
University of Colorado Colorado Springs	X	X	X
University of Colorado Denver	X	X	X
University of Kentucky		X	X
University of Louisville		X	X
University of Minnesota, Twin Cities	X		X
University of Missouri, Kansas City	X	X	X
University of North Carolina at Chapel Hill	X	X	X
University of North Texas	X	X	X
Southern Illinois University	X	X	X
University of Oregon	X	X	X
University of Tennessee		X	X
University of Wisconsin Milwaukee	X	X	X
University of Wisconsin River Falls	X	X	X
Utah State University	X	X	
Western Kentucky University	X	X	X
Western Washington University	X	X	X
Hawaii Pacific University			X
Old Dominion University		X	X
Towson University	X	X	X
University of Alaska Anchorage		X	X
University of Texas at San Antonio	X		X
Weber State University		X	X

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