

Curriculum

8 INTERDISCIPLINARY COURSES ACROSS THE UNIVERSITY

Kiyoko A. Nakatsui

8.1 INTRODUCTION

Chapman University offers students the ability to create their own majors or minors and take experimental courses, yet few interdisciplinary courses are offered between the environmental science department and others. The 2013 Environmental Audit hopes to address the current curriculum and offer suggestions that could benefit the future student body. The Environmental Science & Policy (ES&P) program was established in 2009, with a curriculum that strives to create “scientists who can communicate with policy makers and future policy makers who understand science” (Chapman University).

As sustainability and environmental issues have been brought to the forefront of media and news it has become more apparent how they intermingle with so many other facets of society. Therefore, it will be beneficial to work with all departments to understand how to effectively integrate sustainability and environmental topics into their curriculum where applicable. In doing this, students will become well rounded and better prepared to address the effects our changing environment will have on their field of interest. Students can then become better prepared for post-graduation and for the job market.

8.2 THE SIGNIFICANCE OF SUSTAINABILITY AND ENVIRONMENTAL TOPICS

8.2.1 International Political Events

The crisis in Syria is one of the most serious matters the world is facing today. Overcrowded cities, corrupt leadership, and mass migration of refugees are just some of the struggles leaders face today. This crisis is impacting nations across the world and is becoming a global issue. However, most people do not know where this issue stems from. Syria is known as the breadbasket of the Middle East, but due to climate change they have been experiencing an unprecedented drought that decimated their crops. As a result, farmers could not sustain a living and in droves migrated to the cities that were not prepared for such an influx of people.

8.2.2 Disappearing Land

With warming temperatures snowcaps and glaciers are melting and the sea level is rising. As a result, islands and low-lying land is disappearing or is threatened. According to a report by CNN five of the Solomon Islands have completely disappeared. This rise in sea level will also impact places like, New Orleans, New York and Miami. Any place located on the coast will be vulnerable as the sea level keeps rising. Either new technology needs to be created to protect these area or measures need to be taken to mitigate the melting of snowcaps and glaciers.

8.2.3 Multinational Corporations

Some of the most recognizable brands are changing to become more sustainable and transparent about it. PepsiCo, Ikea, Google, Patagonia, Coca-Cola, and many others produce sustainability reports every year that are easily accessible on their websites. More and more companies are adopting ideals that stand to include environmentalism and sustainability to leave a smaller impact on our world. These show a growing intersection between science and business as well as the business sectors understanding of the importance of environmental sustainability.

8.2.4 Advertisement

Sustainability sells. One of the best examples of this is Patagonia's Don't Buy This Jacket campaign. The company ran this ad in The New York Times to discourage customers from buying their products on Black Friday. The ad discussed the company's initiatives to be more environmentally conscious, which resonated with people and led to high sales of the jacket. Some may dismiss Patagonia because it is the epitome of a sustainable environmentally conscious company, but they aren't the only company doing it. Coors brewing company's most recent commercials are all about their sustainable practices. The dialogue of one of their latest commercials titled, "Push Forward" is:

At Coors, our mountain is creating a more sustainable world.

It's why we pioneered the recyclable can, made our breweries landfill-free, and built the most powerful solar array at any one brewery in the country.

But our climb is far from over.

So, we keep pushing forward.

Coors Light. Whatever Your Mountain, Climb On.

The entire dialogue is about how the company is taking steps to become more sustainable and environmentally friendly. The title "Push Forward" indicates that this isn't just something they are doing right now, but something they are continuing to pursue.

8.2.5 Entertainment Industry

NBCUniversal is one of the largest entertainment and media companies in the world (NBCUniversal). They have an extensive initiative; Green is Universal (greenisuniversal.com), is a commitment to integrating sustainability across the entire company. It identifies specific ways in which the company can integrate sustainability across different aspects of their business in front of and behind the cameras. These initiatives extend to educating their consumers with environmentally themed programming. If you go on the aforementioned website there is information on how their films, TV, and theme parks are more sustainable.

The Producer's Guild of America has released two documents the "Unified Best Practices Guide" and "Going Green and Saving Green: A Cost-Benefit Analysis of Sustainable Filmmaking". These are guides available to the public that have guidelines to running a production in a sustainable manner. The second document shows that this does not have to be an expensive process, but instead can save money.

8.2.6 Major League Sports

The National Hockey League (NHL) has a program NHL Green that is committed to improving their environmental impact. On the title page of their website it states that,

“Major environmental challenges, such as climate change and freshwater scarcity, affect future opportunities for hockey players of all ages to take the game outside. This is why the NHL is committed to improving hockey's environmental impact - and to helping catalyze a larger movement toward a healthier planet.”

They are the first professional sports league to issue sustainability reports and are in their third consecutive year of using renewable energy certificates (RECs) and carbon offsets to counterbalance environmental impacts. The league is committed to the advancement and adaptation of new technologies and operations to increase sustainability.

8.2.7 Food Industry

Food waste is one of the biggest problems in the food industry. According to a TIME article, “by some estimates, a third or more of the food produced globally goes uneaten.” This adds up to hundreds of billions of dollars in waste. In response, the Ugly Food Movement was started to encourage consumers to buy foods that are often rejected based on appearance, like misshapen or bruised fruits and vegetables.

Food packaging contributes a lot to the waste created. In a study commissioned by the National Resource Defense Council (NRDC) the Tellus Institute found that 110,000 jobs could be created, if California increased its recycling rate to the goal of 75% by 2020 (NRDC). An estimated market value of \$11.4 billion of recyclable postconsumer packaging is thrown away instead of recycled (NRDC). The pollution from the packaging takes a toll on the environment and so innovations need to be made.

8.2.8 Farm Industry

Agriculture accounts for 80% of the U.S. ground and surface water use and 90% in many Western States (USDA). More efficient technologies and policies must be implemented to maintain profitability with increasingly limited and more costly water supplies. The excessive use of water supplies limits the amount available to the public for drinking, recreation, and other basic needs. The runoff and infiltration of pesticides, insecticides, and fertilizers has resulted in polluted and uninhabitable water bodies.

Hydroponics is a new and growing industry that allows farmers to grow more in a smaller area. This industry could be ideal for the growing urban world as hydroponics systems are perfect for the indoors. Conditions can be constantly controlled and maximum yields can be achieved in an efficient manner, resulting in high profitability.

8.2.9 Health

Policies and programs have been implemented in Los Angeles County to create cleaner fuels, newer and cleaner engines, as well as electric vehicles and ship at-port electrification (USCEHC, 2015). Air pollution levels of Oxides of Nitrogen, Reactive Organic Gases, Sulfur Dioxide, and particulate matter have all gone down, despite the increases in traffic, economy,

population, and port activity (USCEHC, 2015). This has resulted in decreased smog levels and improved respiratory health. This in turn allows people to spend more time outside and partake in physical activities, which improves overall health.

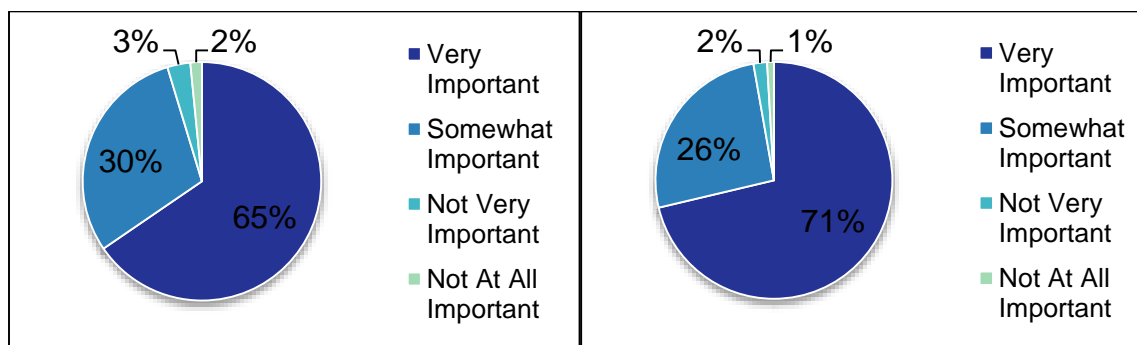
8.3 HISTORY OF ENVIRONMENTAL AND SUSTAINABILITY CURRICULUM

8.3.1 History of the Environmental Science and Policy Major

Chapman University offered a B.S. and B.A. in Environmental Science as early as the 2003/2004 catalog year. This major was not offered the following year, but returned in 2009 as a B.S. in Environmental Science and Policy. The major was spear headed by Dr. Chris Kim and Dr. David Shafie, who are bio-geochemists and political scientists respectively. Showing the interdisciplinary nature from its inception. In the same year, the Environmental Science minor and Environment cluster were created. Two years later, in 2011 the Environmental Studies minor was created. Since the creation of the major and minors, we have seen steady increases in enrollment.

8.3.2 Sentiment towards Sustainability and the Environment

Students are not the only ones who show interest in ES&P. The data collected in the 2013 Sustainability Audit showed that, 95.3% of faculty and staff believe that it is very or somewhat important for sustainability to be taught and promoted in higher education institutions such as Chapman. Although faculty and staff showed these sentiments, only 23% of students indicated that they had learned about sustainability in any of their courses. This is a rather large discrepancy that shows an area of curriculum that can be improved.



Figures 8.1 and 8.2 - “How important is it that sustainability is taught and promoted in higher education institutions, such as Chapman?” Faculty and Staff responses in 2013 (left, n=346) and 2017 (right, n=108)

8.3.3 Classes and Opportunities

In 2005, the term sustainability did not appear in course catalogs. That changed in 2007 with the creation of Philosophy 303: Environmental Ethics taught by Dr. Virginia Warren. Since then many more classes have been added because of the major and changing views of the topic. Besides classes other opportunities have been opened to students. These include work-study positions, like sustainability interns, habitat restoration coordinators, community garden managers, running the Green Initiative Fund, sustainability minded clubs, student led carbon

offset programs. These positions and groups allow students from all majors to engage in sustainability minded affairs across campus and beyond.

8.4 CURRENT STATUS OF INTERDISCIPLINARY CURRICULUM

8.4.1 Overview

The ES&P major includes three tracks, earth systems, ecology, and policy. Within these different tracks, you can take classes ranging from chemistry and biology to sociology and economics. If you look at **Table 8.1** below you can see the diversity of courses offered within the major. However, half of them are within the science department. There are many offerings from the political science department, but only one of these classes is explicitly about an environmental topic. Within the science department, aside from ES&P, most majors do not require you take courses outside of Schmid College and Crean College. As a result, there is a lack of communication and understanding between majors and departments.

Table 8.1 - Shows the different departments the electives from the ES&P major span across.

DEPARTMENT	COURSE NUMBER	COURSE TITLE
BIOLOGY	301/301L	PLANT BIOLOGY
	319/319L	ECOSYSTEM ECOLOGY
	324/324L	ECOLOGY
	333/333L	ANIMAL BEHAVIOR
	440/440L	MARINE BIOLOGY
ENVIRONMENTAL	490	INDEPENDENT INTERNSHIP
	491	STUDENT-FACULTY RESEARCH
	301	ENVIRONMENTAL GEOLOGY
	420	ENVIRONMENTAL HYGROLOGY
CHEMISTRY	325	ATMOSPHERIC CHEMISTRY
	326	AQUATIC CHEMISTRY
	327	ENVIRONMENTAL GEOCHEMISTRY
PHILOSOPHY	303	ENVIRONMENTAL ETHICS
	321	PHILOSOPHY OF SCIENCE
POLITICAL SCIENCE	320	INTERNATIONAL LAW, INTERNATIONAL ORGANIZATION AND WORLD ORDER
	335	POLITICAL ECONOMY
	346	ENVIRONMENTAL LAW
	376	ORGANIZATION THEORY
	378	SPECIAL TOPICS IN PUBLIC POLICY
SOCIOLOGY	335	SOCIETY AND THE ENVIRONMENT
ENGLISH	374	ENVIRONMENTAL RHETORIC
ECONOMICS	465	ENVIRONMENTAL AND NATURAL RESOURCES ECONOMICS

Outside of the ES&P major most majors within Schmid College do not include many courses from other colleges. Computer Information Systems, and Data Analytics all include courses from the business school, but the aforementioned major will no longer be offered and will be replaced by Data Analytics starting in the 2017-18 catalog year. This one major does include economics, managerial sciences, accounting, and an optional environmental science course, aside from computer science and math courses. Besides the Data Analytics major Biology students have the opportunity to take courses that pertain to sustainability and environmentalism, however it is also not required. Within other colleges there are not requirements to take environmental or sustainability courses, even though both topics have, or can have, an impact on them.

8.4.2 General Education

The current general education (GE) program’s mission is to provide its students with a personalized education of distinction that leads to inquiring, ethical, and productive lives as global citizens (Chapman University). Within this there is no requirement for students to take a course pertaining to environmentalism or sustainability. There is also no real definition for global citizen. Since sustainability and environmentalism is a global phenomenon and has implications that do not stay within boundaries it would make sense to include these two concepts within the global citizens requirement. Currently, there are eight classes that fulfill a GE requirement that discuss environmental or sustainability topics. Of the approximately fifty Freshman Foundation Courses (FFC), three courses talk about these topics totaling thirteen sections.

8.4.3 Schmid College Grand Challenges Initiative

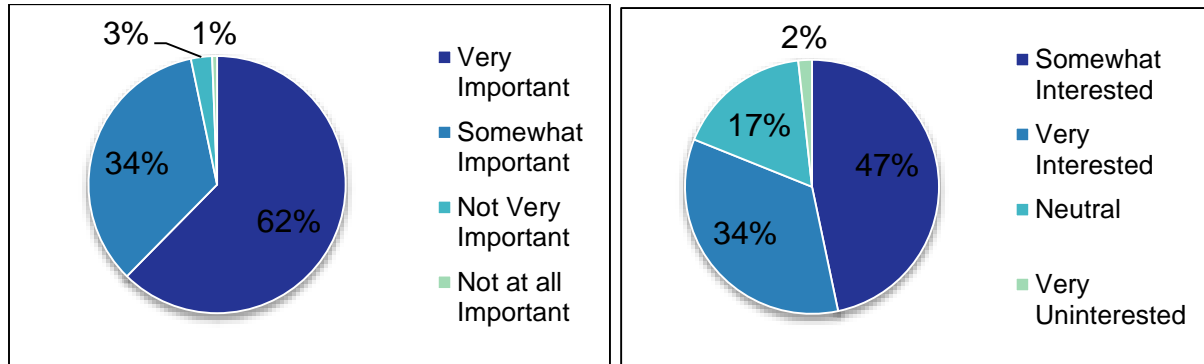
Ten of the FFC sections are a part of the new Grand Challenges Initiative for Schmid College of Science and Technology. There are some seats left open in this course to allow for students of other departments to share their ideas and contribute to the team dynamic with their skills. This creates a collaborative interdisciplinary environment where students will be able to learn from their peers and develop the skills to better communicate across disciplinary boundaries. This class does not explicitly discuss sustainability and environmental topics, however they can be chosen as the topic for the Grand Challenge the students will tackle. This is a big step forward in creating interdisciplinary curriculum and in introducing sustainability and environmental topics to more students.

Table 8.2 - Shows the GE and FFC courses that discuss environmental or sustainability topics.

GENERAL EDUCATION		
CLASS	TITLE	INQUIRY FILLED
CHEM105	CHEMISTRY OF ENVIRONMENTAL ISSUES	NATURAL SCIENCE
ENV103	INTRODUCTION TO EARTH SYSTEMS	NATURAL SCIENCE
FSN120	INTRODUCTION TO FOOD SCIENCE	NATURAL SCIENCE
HON389	SCIENCE BLENDER	NATURAL SCIENCE, QUANTITATIVE
POSC/PCST 120	INTRODUCTION TO INTERNATIONAL RELATIONS (if taught by Crystal Murphy)	GLOBAL CITIZEN, SOCIAL
POSC110	INTRODUCTION TO AMERICAN POLITICS (if taught by Ahmad Montameni)	GLOBAL CITIZEN, SOCIAL
SOC335	SOCIETY AND THE ENVIRONMENT	GLOBAL CITIZEN, SOCIAL, VALUES AND ETHICS
ECON200	PRINCIPLES OF MICROECONOMICS	SOCIAL
FRESHMAN FOUNDATION COURSE		
CLASS	TITLE	
FFC100-07,08	SURFING INDUSTRY	
FFC100-11-20	GRAND CHALLENGE INITIATIVE	
FFC100-47	TAUGHT BY DR. EL-ASKARY	

8.4.4 Current Student Opinion

Of the current student body 96% believes that it is very or somewhat important for sustainability to be taught and promoted in higher education institutions. This shows that students recognize the importance of sustainability. In addition, 81% of students are very or somewhat interested in learning about sustainability. Although students are interested in these topics, these feelings are not reflected in the classes that they are offered.



Figures 8.3 and 8.4. Respectively show, “how important is it that sustainability is taught and promoted in higher education institutions such as Chapman?” (n=489) “How interested are you in learning about sustainability?” (n=489)

8.5 COMPARISON TO OTHER INSTITUTIONS

8.5.1 Aspirational Institutions

Chapman University has a list of aspirational institutions that include: Claremont McKenna College, Gonzaga University, Occidental College, Seattle University, Tufts University, University of Redlands, and the University of San Francisco. We compare ourselves to these institutions in order to measure our growth and how we should grow. Each of these institutions has a degree, minor, and/or emphasis in Environmental Science or Studies, except for Claremont McKenna College. Claremont McKenna offers an Environment, Economics, and Politics (EEP) Major and an Environmental Analysis Program (EAP) Major. At these institutions, these environmentally minded courses are available to non-majors. Prerequisites may exist, but conceivably these courses have potential to influence the rest of the student body. Having courses that expand beyond the sciences shows these institutions understanding of the interdisciplinary nature of the environment and sustainability.

8.5.2 Claremont McKenna College

Their EEP and EAP programs are both designed to be interdisciplinary. Beyond the biology, chemistry, and physics courses the EEP program includes courses in economics, policy, and leadership. The ways in which the various disciplines inform each other in environmental decision-making settings is part of the program emphasis (Claremont McKenna). Within their EAP program there is a science and a policy concentration. The science concentration requires students to take an environmental justice course, although the rest of the courses are heavily science based. The policy requires core science courses, but also includes economics and

politics. The EAP program is a five-College collaboration that prepares students for careers in law, policy, medicine, chemistry, conservation, global climate change, urban planning, and resource management, while also providing a solid background for careers in environmental education and community environmental action (Claremont McKenna).

8.5.3 Gonzaga University

The Environmental Studies major emphasizes the humanities and social sciences with core classes in Environmental Politics and Policy, Human Ecology, Environmental Chemistry, Case Studies in Environmental Science and Environmental Ethics (Gonzaga). There is also the option of taking upper division lab science courses in conjunction with humanities and social sciences.

8.5.4 Occidental University

Although the Environmental Science major is tailored toward scientific endeavors, students are still required to take economics (Occidental).

8.5.5 Seattle University

The foundational courses include biology, chemistry, physics, statistics, and environmental engineering. They employ an integrated education system that creates opportunities to examine environmental issues from multiple perspectives that are emphasized within the core curriculum, which includes philosophy, literature, economics, and law (Seattle University).

8.5.6 Tufts University

With one of the most extensive Environmental Studies majors it includes five tracks and an option for a self-designed major with an advisor. The different tracks are, Environmental Science, Sustainability, Policy, and Equity, Environmental Communication, Food Systems, Nutrition and the Environment, and Environmental Humanities (Tufts). Students are all required to take core curriculum courses that help students to master basic scientific principles of environmental processes, to examine interactions between technology and the environment, and to explore the societal context for implementing environmental policy (Tufts). The aforementioned tracks expand across many different departments and are very interdisciplinary. There is also a minor that requires just as many courses across disciplines.

8.5.7 University of Redlands

There is a heavier focus on the sciences, however their learning outcomes specify having the ability to integrate social and environmental science to critically evaluate complex environmental problems or opportunities, emphasizing social sciences, ethical dimensions, and/or the humanities (University of Redlands).

8.5.8 University of San Francisco

All of the core required courses are hard science based, biology, chemistry, and physics. However, the elective courses range from science and engineering to economics, politics, law, social justice, and ethics (University of San Francisco). The curriculum is trying to prepare students for not only scientific endeavors, but political, social and other related fields as well.

8.5.9 Overview

Chapman's environmental curriculum is more interdisciplinary than some of the aforementioned institutions. However, there is plenty to learn and take from each. Tufts University and Claremont McKenna College both have very interdisciplinary majors with courses that expand across multiple departments. This has given the greater student body the opportunity to learn about environmental and sustainability topics. Students can then have a deeper understanding of how these topics impact themselves, as well as how these topics can apply to their field of interest.

8.6 SUSTAINABILITY AND THE ENVIRONMENT IN EDUCATION

8.6.1 Overview

In a paper titled, "Sustainability & Liberal Education: Partners by Nature" by Neil B. Weissman quotes then former President of Cornell University Frank Rhodes who proposed that "the concept of sustainability could provide a new foundation for the liberal arts and sciences", in the *Chronicles of Higher Education* in 2006. Rhodes argued that there is an integral connection between education for sustainability and liberal learning, after he labeled sustainability "the ultimate liberal art" (Weissman). Since Rhodes expressed these sentiments in 2006 there has been an increase in attention to sustainability and environmental topics. This movement, like many others, has been led by Colleges and Universities.

Environmentalism and Sustainability find their initial focuses in the hard sciences, like biology, chemistry, earth science, or physics. However, these issues spill over into economics, social impact, and policy formation. This makes sustainability and the environment well suited for the liberal arts curriculum.

In the Association of American Colleges & Universities (AACU) paper, *Recent Trends in General Education Design, Learning Outcomes, and Teaching Approaches*, 325 Chief Academic Officers or designated representatives of AACU member institutions were surveyed to explore how higher education institutions today are defining common learning outcomes and to document priorities and trends related to general education, equity, and emerging teaching practices. Among all the surveyed institutions, as of 2015, 23% of institutions require students to have knowledge of sustainability (AACU, 2015). This does not seem like a high percentage; however, it was a 5% increase from 2008 (AACU, 2015). Seeing this increase shows that universities are becoming more aware of the need for their students to understand sustainability and its implications on them.

8.6.2 Possibility for Integration into General Education

Chapman currently has a Global Citizens Cluster within its GE program. This cluster is ideal for integrating environmental and sustainability topics because both are global issues. The AACU released a document, *General Education for a Global Century*, that gives a framework for developing a GE program based on our global society. The framework they present is consists of three sections: Diversity, Democracy, and Global Emphases, Scientific Literacy, and Advanced Integrated Inquiry (AACU, 2014). Chapman can modify the Scientific Literacy

section to be Environmental and Sustainability Literacy, since there is already a Natural Science Inquiry. This will provide the student body with a chance to understand the implications of sustainability and environmental topics on not just a local, but global scale. Students can then see how these topics impact them, their major, and their future career goals.

8.7 RECOMMENDATIONS

8.7.1 Low Cost/Effort

Creating a comprehensive list of all courses, outside the ES&P major, that discuss sustainability and environmental topics. This would mean finding GE and FFC courses that do not count toward the major. This list of courses could then be made easily accessible to all students of any major, by listing them on the ES&P webpage, listing GEs thematically, and/or making it easier to search for key terms on My.Chapman.

8.7.2 Medium Cost/Effort

Environmental and sustainability topics can be integrated into the GE program currently in place by changing one of the three areas of the Global Citizens Cluster. Currently there are the Global Studies, Community, Citizenship, and Service, and Language requirements. The Global Studies area could be modified to be Environment and Sustainability at a Global Scale. There is also the option of modeling the Global Citizens Cluster after the aforementioned AACU model. This would include the areas of study: Diversity, Democracy, and Global Emphases, Environmental and Sustainability Literacy, and Advanced Integrated Inquiry.

8.7.3 High Cost/Effort

As demonstrated by section 8.2 of this chapter environmental and sustainability topics can apply to many various aspects of society and in turn curriculum. The last recommendation is to create a plan to slowly integrate a required sustainability and environmental curriculum across all departments. This would involve changing the learning outcomes to include these topics in a way that is pertinent to the department.

8.8 CONTACTS

Dr. Jason Keller, jkeller@chapman.edu

Dean Lisa Sparks, sparks@chapman.edu

Dean Andrew Lyon, lyon@chapman.edu

Mackenzie Crigger, crigger@chapman.edu

8.9 REFERENCES

Sustainability Curriculum in Higher Education: A Call to Action (AASHE Report)2013 Campus Sustainability Audit <https://www.chapman.edu/academics/general-education/>

Dewan, A. (2016, May 10). Five Solomon islands swallowed by the sea. Retrieved May 08, 2017, from <http://www.cnn.com/2016/05/10/world/pacific-solomon-islands-disappear/>

Don't Buy This Jacket, Black Friday and the New York Times. (2016, November 18). Retrieved May 08, 2017, from <http://www.patagonia.com/blog/2011/11/dont-buy-this-jacket-black-friday-and-the-new-york-times/>

Pushing Forward, Coors Light, Online Video, YouTube, 01 Feb. 2017, 07 April 2017, from <https://www.youtube.com/watch?v=KjJ1ZXtC8OQ>

About Us. (n.d.). Retrieved May 08, 2017, from <http://www.reenisuniversal.com/>

NHL Green. (n.d.). Retrieved May 08, 2017, from <https://www.nhl.com/info/nhl-green>

Mitchell, D. (2015, March 27). Why People Are Falling in Love With "Ugly Food". Retrieved May 08, 2017, from <http://time.com/3761942/why-people-are-falling-in-love-with-ugly-food/>

Hoover, D. (2016, December 15). New Report Suggests Packaging Sustainability Improvements for Fast Food, Beverage, and Consumer Goods Companies. Retrieved May 08, 2017, from <https://www.nrdc.org/experts/darby-hoover/new-report-suggests-packaging-sustainability-improvements-fast-food-beverage>

Background. (2017, April 28). Retrieved May 08, 2017, from <https://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use/background/>

Infographic: Did Policy Changes Lead to Cleaner Air? (n.d.). Retrieved May 09, 2017, from <http://envhealthcenters.usc.edu/infographics/infographic-did-policy-changes-lead-to-cleaner-air>

Environment, Economics, and Politics (EEP). (n.d.). Retrieved May 08, 2017, from http://catalog.claremontmckenna.edu/preview_entity.php?catoid=14&ent_oid=573&returnto=1103

Environmental Analysis. (n.d.). Retrieved May 08, 2017, from http://catalog.claremontmckenna.edu/preview_entity.php?catoid=14&ent_oid=574&returnto=1103

Gonzaga University, Spokane Washington. (n.d.). Retrieved May 08, 2017, from <http://www.gonzaga.edu/Academics/Colleges-and-Schools/College-of-Arts-and-Sciences/Majors-Programs/Environmental-Studies/>

Environmental Science. (n.d.). Retrieved May 08, 2017, from <http://www.oxy.edu/environmental-science>

University, S. (n.d.). BS in Environmental Science. Retrieved May 08, 2017, from <https://www.seattleu.edu/scieng/cee/programs-of-study/bs-in-environmental-science/>

Curriculum. (n.d.). Retrieved May 08, 2017, from <http://as.tufts.edu/environmentalStudies/curriculum/>

Program Learning Outcomes. (n.d.). Retrieved May 08, 2017, from <http://www.redlands.edu/study/schools-and-centers/college-of-arts-and-sciences/undergraduate-studies/environmental-science/program-learning-outcomes/>

Weissman, N. B. (2017, March 10). Sustainability & Liberal Education: Partners by Nature. Retrieved May 08, 2017, from <https://www.aacu.org/publications-research/periodicals/sustainability-liberal-education-partners-nature>

Recent Trends in General Education Design, Learning Outcomes, and Teaching Approaches. (2016, January 19). Retrieved May 08, 2017, from <https://www.aacu.org/publications-research/publications/recent-trends-general-education-design-learning-outcomes-and> Conducted on Behalf of the Association of American Colleges & Universities By Hart Research Associates

Fournier@aacu.org. "General Education for a Global Century." Association of American Colleges & Universities. N.p., 18 Dec. 2014. Web. 08 May 2017.