1-1-2011

Trash Talk: A Case Study of Waste Analysis at Pomona College

Char Miller
Pomona College

Bowen Close
Pomona College

Recommended Citation
Trash Talk: A case study of waste analysis at Pomona College

Purpose: This paper presents the pedagogical initiatives associated with and the practical outcomes of a multi-student independent study that analyzed the campus waste stream and developed real-world solutions in accord with the college’s sustainability commitments and goals.

Design/methodology: The paper reviews the course structure, presents research findings and the individual student-developed solutions, and assesses their ability to reduce the campus’s waste stream.

Findings: Developing a class to audit the campus waste stream offers students an unusual educational opportunity to apply theoretical insights to and test these against a real-world problem; their analyses and projects also have helped the college more sustainably manage its waste stream.

Originality/value: This paper identifies the practical and educational advantages for participating students; and the particular benefits the institution will derive from their waste-stream research.

1. Introduction

At the September 2006 opening convocation at Pomona College, President David Oxtoby posed a number of critical questions about the global economy and mass consumerism that he hoped the class of 2010 would wrestle with over the next four years. "Is growth in and of itself desirable?" he asked rhetorically. "Are there limits to growth? Can we begin an urgently needed dialog on the move toward a sustainable world?" (Oxtoby, 2006). His queries were not unique; many around the world had been raising similar concerns about the consequences of and limits to growth, particularly in light of the scientific evidence connecting human behavior to global warming and climate change (Creighton, 1998; Stern, 2007). Indeed, President Oxtoby, an environmental chemist, was well aware of the global dimension of these dialogs, noting that Jared Diamond's recently published book, Collapse, revealed that some "societies learned to live with their local resources and have persisted to the present day, while others drove themselves into extinction." He brought the international situation home to Pomona by suggesting that many of the disciplines these students would explore offered ways to assess the possibilities of creating a more sustainable and just society. He left his audience with a mutual dare: "I look forward to exploring with all of you in the years ahead how Pomona College can become a leader in educating students for a sustainable world" (Oxtoby, 2006; Oxtoby, 210).

President Oxtoby's challenge was heightened in April 2007 when he signed the American Colleges University Presidents Climate Commitment (ACUPCC), which currently includes more than 670 signatories. Its "commitment text" requires these institutions, among other obligations, to identify the sources of their greenhouse emissions; develop and implement a plan by which to reduce them; integrate sustainability into the curriculum; and make accessible all reports related to its efforts (ACUPCC - http://www.presidentsclimatecommitment.org/about/commitment). Like its peer signatories, Pomona College has adopted new environmental and sustainability policies and has created an organizational infrastructure to develop and accomplish its declared sustainability goals (Pomona College, 2010; Pomona College 2009; President's Advisory Committee, 2007a). After signing the ACUPCC, President Oxtoby charged the newly formed President's Advisory Committee on Sustainability (PACS) with generating ideas for how to move forward. Its initial recommendations lead to the establishment of a full-time Sustainability Coordinator position, which quickly transitioned into the creation of the Sustainability Integration Office (SIO). The SIO has utilized student interns and researchers to audit the college's greenhouse emissions, energy flows, paper usage, water consumption, and other environmental impacts (Pomona College, 2007b); it has also generated short- and long-term goals and strategies in the form of the college’s First Sustainability Action Plan (release forthcoming).

One aspect of this critical work that had not been sufficiently addressed was the campus waste stream. Although previous data collection had demonstrated the extent of the waste stream and its costs (Table 1), no research had been done on its constituent elements. In response, in Spring 2010, the director of the Environmental Analysis Program and the director of the SIO co-taught a semester-long, five-student independent study focused on identifying the sources and composition of the campus’ waste. Entitled EA 199: Greening the Waste Stream, it introduced the class to the history and present state of waste management globally; presented them with strategies other campuses in the United States have employed to “green” their waste streams; and gave them training in the techniques available to audit, analyze, and reconfigure Pomona College’s system of trash collection and management. From this emerged significant baseline data that will further the college’s efforts to reduce, reuse, and recycle its waste, fulfilling a key element in its ACUPC-determined commitment to sustainability (http://www.presidentsclimatecommitment.org/about/commitment).

Table 1. Pomona College waste volume and hauling costs, 2006-2010[1] [2]

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Landfill TONS</th>
<th>Recycling COST</th>
<th>Recycling TONS</th>
<th>Composting TONS</th>
<th>Green Waste TONS</th>
<th>Hazardous TONS</th>
<th>Ewaste TONS</th>
<th>TOTAL TONS</th>
<th>DIVERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-07</td>
<td>699</td>
<td>$38,166.32</td>
<td>480</td>
<td>20</td>
<td>84.5</td>
<td>55</td>
<td>1,289</td>
<td>45.8%</td>
<td></td>
</tr>
<tr>
<td>2007-08</td>
<td>655</td>
<td>$35,755.63</td>
<td>480</td>
<td>25</td>
<td>84.5</td>
<td>5</td>
<td>1,251</td>
<td>47.6%</td>
<td></td>
</tr>
<tr>
<td>2008-09</td>
<td>686</td>
<td>$58,123.38</td>
<td>480</td>
<td>28</td>
<td>84.5</td>
<td>5</td>
<td>1,284</td>
<td>46.5%</td>
<td></td>
</tr>
<tr>
<td>2009-10</td>
<td>544</td>
<td>$66,329.57</td>
<td>504</td>
<td>29</td>
<td>112</td>
<td>2</td>
<td>1,192</td>
<td>54.4%</td>
<td></td>
</tr>
</tbody>
</table>

1. Pomona College

The founding member of the Claremont University Consortium, which includes five undergraduate colleges and two graduate institutions, Pomona College (est. 1887) is a private, residential, liberal-arts institution located in Claremont, California. It enrolls approximately 1,540 undergraduate students and employs 254 faculty and 473 staff, all of whom live, study, teach, research, and/or work on a 140-acre suburban campus. Its structures include 62 buildings, 12 of which are dormitories in which the students are housed and three dining halls and two cafés; the total built square footage is 1.4 million (with another 400,000 coming online in summer 2011). When the independent study of the campus waste stream emanating from these facilities was conducted in the Spring 2010 semester, all who enrolled were Environmental Analysis (EA) majors. At that time, the interdisciplinary EA program had 2.25 full-time equivalent faculty and 90 declared majors. The Sustainability Integration Office was created in 2009 and its work is conducted in close coordination with PACS; since 2008, it has helped approximately 50 students to serve as Sustainability Assistants or Sustainability Action Fellows whose research and data analysis has been central to the college’s evolving sustainability plans and management. Its first director also co-taught the independent study herewith described.

1. Course goals and objectives

This experimental class had a series of interrelated goals and objectives. By developing a methodology to analyze what went into the college’s trash cans, recycling bins, compost collectors, and dumpsters and from what sectors of the campus these materials originated, it produced the first sustained assessment of the particulars of the campus waste stream (Donovan, et al., 2010). It did so without the expenses usually associated with hiring outside consultants and contractors, yet provided data collection as rigorous as those professionals might have produced.
IV. Course Structure

The class grew out of a conversation between the authors in the fall 2009 about how to seed the college's curriculum with courses on sustainability, a central goal of the ACUPCC commitment text: "Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society." (ACUPCC: http://www.presidentsclimatecommitment.org/about/commitment). Although it was by then too late to create a university-approved class for the following semester, Pomona College offers faculty and students the option of setting up independent studies that do not require as much lead time to develop. Through the Environmental Analysis program's listserv and informal faculty and student networking, we issued an invitation for a limited number of students to enroll in EA 199: Greening the Waste Stream; we also submitted a rationale to the college registrar that read in part:

"Gross" trash, liquid waste, electronic waste, hazardous waste, compostable material, non-compostable material, CRV plastic, non-CRV plastic, CRV glass, non-CRV glass, food wastes (theoretically compostable), food wastes (currently compostable), liner, plastic film, metal, paper cups, paper, cardboard, misc. paper, general paper, and Misc. paper. This segment of the class concluded with two projects: students prepared and presented visual depictions of the Pomona waste stream, and then they would employ, established a ratio for the number of bags, and types of material ("trash" and "recycling") that would be selected from five sectors of the campus–administrative; residential; academic (science; and non-science; and the campus center (student union). After determining the nomenclature they would ask Housekeeping to employ when it tagged the bags, and denoting the kind of waste collected and from which sector, they also expanded the range of categories into which to place the sorted items (Table 2). Finally, with help from the SIO, they assembled the necessary protective gear, scales, and other material to facilitate their analyses. The results (Table 3) confirmed that a large portion of Pomona College's trash actually was recyclable; changing that ratio would save the college money and divert material away from Los Angeles County landfills that are reaching capacity (NBCLA: http://www.nbclax.com/news/local-beat/LA-to-Generate-More-Trash-Than-It-Can-Handle-97528034.html).

A final goal and objective concerned those very same commitments: as Pomona College and other ACUPCC signatories have come to appreciate, the more detailed information they gather about the extent of their resource use and carbon footprint, the more they realize how complex their responses must be to reduce the flows of energy or waste (Pomona College, 2010; Wells, et al. 2009). This reality only added to our students' motivations, for they realized that by collecting accurate information on the campus's waste stream they would have a direct impact on policymaking. Moreover, because their research would be folded into the college's annual gathering of sustainability-related data, they also understood their work could have broader implications: just as the research they conducted benefited from earlier analyses at other U. S. colleges and universities so their findings could bolster initiatives on additional campuses. The opportunity to compare and contrast across campuses and regions, which is built into ACUPCC's principles, adds a competitive and incentive-based drive, as in this instance, to narrow waste streams (ACUPCC: http://www.presidentsclimatecommitment.org/about/commitment).
To build off their hands-on research, the students completed two additional assignments. They first drafted a report of their findings (Donovan, et al., 2010), which was folded into the SIO’s annual Sustainability Report (Pomona College Sustainability Annual Report, 2010). They also developed a PowerPoint presentation of their results that they presented in separate sessions to the class teachers, Parke and the Housekeeping staff. In each setting, their findings were assessed and debated, and important questions were raised about the local and larger implications of their research. These questions were then combined with the students’ insights into the potential of their findings, shaped the class as individual projects that would help green the campus waste stream. Students were required to write a project proposal that identified the problem they hoped to resolve and discuss its purpose, practical, and value; determine the precise steps that the SIO could take to resolve this concern; establish a working budget needed to fund the project; and then present the findings of their proposals to the class. The array and soundness of their proposals to the class were impressive, and within months the SIO had begun to implement several of them—for instance, a detailed study of the presence and location of recycling bins on campus went to the Housekeeping supervisor for use in purchasing new bins; a proposal to expand recycling in one of the campus eateries is currently being transformed into a proposal to go to the committee that oversees campus dining. Further analyses of the college’s landfill data in subsequent years will suggest the impact of these and other policy initiatives.

1. Pedagogical Challenges and Learning Outcomes

Because of the experimental nature of the class—the teachers nor the students had participated in such a course before—all its participants were flying blind in some respects. Had the course been focused on carbon audits, energy independence, or reductions in greenhouse gas emissions there would have been a plethora of studies on which to draw (Button, 2009; Eagan et al., 2008; Helferty et al., 2009; Rappaport and Creighton, 2007; Wells, et al., 2009). But establishing this class’ reading list proved somewhat more complicated by the relatively obscurity of the topic of greening the waste stream. Although it was not difficult to locate readings on the history of waste management in the United States, the text the teachers thought crucial to set the broader context, it was not immediately obvious how to locate case studies of waste-stream analyses at other colleges and universities. This imbalance was overcome by a simple exercise: instructor contacted peers across the country to find out what reports their campuses had generated; these became essential building blocks for the class syllabus.

The various assignments—presentations; the final report; and individual projects—made sense given what we hoped students would be able to generate in terms of data and relevant insights about its import. That said, the success of any particular assignment depends on its relationship to course objectives, and outcomes, as well as on student abilities. Given that this was an untested class, and that it drew in students of different interests and skills, it was not obvious that the course requirements would fully capture or adequately reflect student achievement.

Another challenge was course-specific: the SIO already had collected landfill data for some of the preceding yeart at the waste stream, but no one had analyzed the materials of the waste stream; that is, waste had been divided into categories such hazardous, electronic, compost, recyclable and trash yet there had been no effort to refine these categories, identify their components, or determine if they were accurate reflections of the waste stream (Table 1). This being a U. S. college campus, we could guess that a good portion of the weekly trash consisted of glass bottles of one size or another, but was that truly during the week? And regarding film, how much of that material was being recycled? It is also important to hypothesized about what they might find in the waste stream, and then designed a model of analysis around their hypothesis, they recognized that they would have to adapt to whatever material they fished out of the garbage bags. This recognition gave them an appreciation for the on-the-ground difficulties associated with real-world data collection and policy analysis.

To assess these presumed outcomes that derived from anecdotal evidence the co-teachers had gained during the semester through conversations and email communications with individual students, they used SurveyMonkey to create an online survey of learning outcomes (Wells, 2009). It asked students about course goals, structure, and pedagogy; the extent of their learning about waste streams; whether knowledge of this “real-world” issue increased motivation; and the usefulness of course requirements and their “applied” nature.

Posted in July, 2010, SurveyMonkey was sent out with an email message inviting students to respond within two weeks. Within the stated timeframe, four of the five students completed the survey, a completion rate of 80%. Its results confirmed our hypotheses about what the students learned in and gained from this class analyzing the campus waste stream.

All four respondents agreed that the class goals had been made clear; that its content and structure made sense given the stated goals; and that the presentation of its subject matter, in and out, had facilitated their learning. They were unanimous, in their concurrence that the class greatly increased their knowledge of waste-stream dynamics in general and Pomona College’s in specific. All four affirmed that this knowledge heightened their understanding of the links between their individual levels of consumption and waste-creation and the larger society’s. As one student observed: “I am amazed at how much awareness of my own consumption practices increased as a result of this class. It made me aware of the fact that everything we throw away ends up in a landfill and/or the ocean eventually.” In their responses to a question asking whether the class increased their “real-world” skills, three of four concurred: “The skills built designing, performing, and presenting on the waste audit could be applied to ‘real-world’ projects,” said one; another asserted that he/she “learned how to write an appropriate assessment of research I had done as well as look at data with a more critical eye.” Finally, all four respondents indicated that the class’ activities (presentations, tour of the e-waste recycling facility, et al.) had deepened their knowledge of the complex issues involved in waste management and motivated them in their research. One student put it this way: “I learned to fund the project; and then present the findings of my proposals to the class.”

1. Course Ramifications

Without claiming too much for this single independent study on greening the waste stream, it nonetheless fulfilled some of these wider ambitions. It provided students with an opportunity to test theoretical knowledge, offered them a chance to analyze information that could have a clear benefit for their campus community (and beyond), benefit that was captured in the final team report and in their final individual projects; and it enabled them to work together as a team to resolve any difficulties, foreseen and unforeseen, that might arise over the course of the semester.

To the students about course goals, structure, and pedagogy; the extent of their learning about waste streams; whether knowledge of this “real-world” issue increased motivation; and the usefulness of course requirements and their “applied” nature.

Table 3. Results of waste audit – materials designated for landfill, by weight

<table>
<thead>
<tr>
<th>Category</th>
<th>Total weight</th>
<th>% of weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recyclable</td>
<td>135.2</td>
<td>41.8%</td>
</tr>
<tr>
<td>Compostable</td>
<td>128.5</td>
<td>39.7%</td>
</tr>
<tr>
<td>Trash</td>
<td>58.4</td>
<td>18.0%</td>
</tr>
<tr>
<td>Haz/eWaste</td>
<td>1.6</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

Another challenge was course-specific: the SIO already had collected landfill data for some of the preceding yeart at the waste stream, but no one had analyzed the materials of the waste stream; that is, waste had been divided into categories such hazardous, electronic, compost, recyclable and trash yet there had been no effort to refine these categories, identify their components, or determine if they were accurate reflections of the waste stream (Table 1). This being a U. S. college campus, we could guess that a good portion of the weekly trash consisted of glass bottles of one size or another, but was that truly during the week? And regarding film, how much of that material was being recycled? It is also important to hypothesized about what they might find in the waste stream, and then designed a model of analysis around their hypothesis, they recognized that they would have to adapt to whatever material they fished out of the garbage bags. This recognition gave them an appreciation for the on-the-ground difficulties associated with real-world data collection and policy analysis.

To assess these presumed outcomes that derived from anecdotal evidence the co-teachers had gained during the semester through conversations and email communications with individual students, they used SurveyMonkey to create an online survey of learning outcomes (Wells, 2009). It asked students about course goals, structure, and pedagogy; the extent of their learning about waste streams; whether knowledge of this “real-world” issue increased motivation; and the usefulness of course requirements and their “applied” nature.

Posted in July, 2010, SurveyMonkey was sent out with an email message inviting students to respond within two weeks. Within the stated timeframe, four of the five students completed the survey, a completion rate of 80%. Its results confirmed our hypotheses about what the students learned in and gained from this class analyzing the campus waste stream.

All four respondents agreed that the class goals had been made clear; that its content and structure made sense given the stated goals; and that the presentation of its subject matter, in and out, had facilitated their learning. They were unanimous, in their concurrence that the class greatly increased their knowledge of waste-stream dynamics in general and Pomona College’s in specific. All four affirmed that this knowledge heightened their understanding of the links between their individual levels of consumption and waste-creation and the larger society’s. As one student observed: “I am amazed at how much awareness of my own consumption practices increased as a result of this class. It made me aware of the fact that everything we throw away ends up in a landfill and/or the ocean eventually.” In their responses to a question asking whether the class increased their “real-world” skills, three of four concurred: “The skills built designing, performing, and presenting on the waste audit could be applied to ‘real-world’ projects,” said one; another asserted that he/she “learned how to write an appropriate assessment of research I had done as well as look at data with a more critical eye.” Finally, all four respondents indicated that the class’ activities (presentations, tour of the e-waste recycling facility, et al.) had deepened their knowledge of the complex issues involved in waste management and motivated them in their research. One student put it this way: “I learned to fund the project; and then present the findings of my proposals to the class.”

1. Course Ramifications

Without claiming too much for this single independent study on greening the waste stream, it nonetheless fulfilled some of these wider ambitions. It provided students with an opportunity to test theoretical knowledge, offered them a chance to analyze information that could have a clear benefit for their campus community (and beyond), benefit that was captured in the final team report and in their final individual projects; and it enabled them to work together as a team to resolve any difficulties, foreseen and unforeseen, that might arise over the course of the semester.
There have been several immediate and practical consequences of EA 199: Greening the Waste Stream. The SIO adopted a number of the recommendations emanating from the individual student projects. It integrated the findings of the students' final report on campus waste into Pomona's 2009-10 Sustainability Annual Report (Pomona College, 2010), which has been submitted to the President and the Board of Trustees, with the opportunity to shape the college's environmental practices and policies. There will be a curricular impact, too: using EA 199 as a model, the teachers approached the EA Program about the possibility of revamping the required spring-semester seminar around a series of campus-based sustainability issues. The faculty agreed, and the authors began developing a series of topics that would utilize ten teams of four students each to address such issues as how to manage the campus' hazardous waste stream, generate new emergency-power systems, reduce dining-services waste, establish a campus bicycle plan, extend composting services into the dormitories and offices, assess the sustainability efforts of a five-star luxury hotel, evaluate the EA curriculum itself, and develop a local water-reclamation project.

1. Conclusions

In 2006, when President Oxtoby challenged the incoming class at Pomona to engage directly on questions of campus sustainability, he could not have known how fully they would respond (Oxtoby, 2010). Over the last three years, for instance, upwards of 50 students have worked for the SIO launching a series of research projects that transformed the way the college collected resource data, enabling it to more sustainably manage its resources and save money in the process. The EA Program benefited as well from the rapidly growing interest in sustainability studies: in 2008 it graduated 13 majors; in 2010 it graduated 26; 42 are expected to graduate in 2011. One member of the class of 2010 proved a key figure in EA 199, a reflection of the campus-wide engagement with pressing environmental issues.

EA 199: Greening the Waste Stream, in short, rode a wave of student interest, allowing its participants to focus their academic skills on a critical and understudied problem. They learned first hand how essential good data and good data-crunching is to the development of effective problem solving. This hard-won information and enhanced analytical skills were also essential to the creation of new policies that would allow the college to reduce its waste stream, a boon to the campus and community. In so doing, the class strengthened the college’s ACUPPC commitment to building sustainability into the academic and campus-wide engagement with pressing environmental issues.

2. References


Miller, C., 2010, Email communication to M. Adorno, Registrar, Pomona College, January 12.


1. [14] Not including construction/demolition waste or the diversion that results from formal donation/reuse programs.
2. [15] Recycling, composting, and green waste numbers are estimated based on average pick-up frequency and estimation of average volume.
3. [16] Green waste numbers for 2006-07 and 2007-08 are unknown; the volume for 2008-09 is used as a place holder for these years.
5. [18] “Currently compostable” refers to food wastes that can be handled under the campus’ current composting system, which cannot take wastes with dairy or meat ingredients.
6. [19] “Gross” refers to items such as hair, dust, etc. that did not fit into other categories and that was unpleasant to handle.
7. [20] share: Bookmark on Delicious
8. [21] Diq this
9. [22] Recommend on Facebook
10. [23] Tip on Hivyes
11. [24] Mix it up!
12. [25] Share via MySpace
13. [26] Share on Orkut
14. [27] Share on Reddit
15. [28] Share with Stumblers
16. [29] Tweet this
17. [30] Follow this posts comments

Article printed from Journal of Sustainability Education: http://www.jsedimensions.org/wordpress