Chapter 6

Environmental Land Use and the Ecological Footprint of Higher Learning

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Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/48191

1. Introduction

The lifestyles of individuals, groups, or nations can be measured by utilizing an accounting tool known as ecological footprint. Ecological footprint refers to the productive land needed to support a given population. As discussed by Wackernagel and Rees (1996), "The ecological footprint concept is simple, yet potentially comprehensive: it accounts for the flows of energy and matter to and from any defined economy and converts these into the corresponding land/water are required from nature to support these flows" (p. 3). A concept known as "overshoot" occurs if demands by humans exceed the supply of a given biologically productive area (Turner et al., 2006). Thus, a larger ecological footprint indicates a less sustainable society.

Research on ecological footprint literature links together the concepts of footprint size and economic development. In other words, footprints represent population size and consumption levels (Wackernagel & Rees, 1996). Furthermore, more-developed countries contain market economies that consume greater levels of natural resources, and environmental degradation is largely driven by the growth and intensification of market economies (Jorgenson, as cited in Jorgenson & Burns, 2006). For example, Americans when compared to the rest of the world exhibit a large ecological footprint due to an intensely consumption-oriented lifestyle. The average ecological footprint for an American is 23.68 acres as compared to the world's average of 5.53 acres (Global Footprint Network, 2003). Further research suggests an economical discrepancy between those who possess large ecological footprints and those who possess small ecological footprints. Wackernagel et al. (2003) found that those contributing most to climate change through their energy intensive lifestyles will most likely be less affected by, and better shielded from, the outfalls of climate change than poor people living on marginal land or in underserved urban conditions.

Though ecological footprint can be used as a useful tool to help measure sustainability, some scientists have criticized ecological footprint calculations for oversimplifying ecosystem processes to numerical values. Assumptions may not be valid as the ecological footprint arbitrarily assumes both zero greenhouse gas emissions, which may not be optimal, and national boundaries, which makes extrapolating from the average ecological footprint problematic (Fiala, 2008). Despite these criticisms, the ecological footprint calculation can serve as a heuristic tool for designing and implementing plans for today as well as for tomorrow. Moreover, plans that take environmental calculations into consideration will have a far greater potential of keeping the Earth as a stakeholder in the planning process than those plans without such calculations.

Colleges and Universities across the world serve as incubators for tomorrow's leaders. In essence, they leave an educational imprint on individuals in an effort to educate and facilitate the development of tomorrow's leaders. These institutions serve as the setting where ideas can take form and this is where ideas can be implemented in a semi contained setting as part of the larger community. Though it is well established that educational institutions leave their imprints on innovative minds, this chapter introduces the idea that institutions of higher learning also leave ecological footprints on the landscape. Universities provide support to environmental issues through policies, programs, and research. The idea of greening campuses has become so popular that the Princeton Review has posted a Green Rating Honor Roll to document the top schools that provide a healthy and sustainable quality of life for the students, environmentally-minded and educational preparations for the future workforce, and environmentally responsible school policies for all to follow (Princeton Review, 2008).

Thinking green has been a hot topic among US Colleges in recent years. To think green is to incorporate environmental impacts into decision-making activities that affect daily lifestyles. The impact that a society imposes on the environment holds importance, as it is a key issue of sustainability. Sustainability refers to the dilemma of how to "meet the needs of the present without compromising the ability of future generations to meet their own needs" (Wackernagel & Rees, 1996, p. 33). Fortunately, one place where sustainable initiatives have spread is on campuses throughout America. Universities have provided support to environmental issues through policies, programs, and research.

The Princeton Review has posted a Green Rating Honor Roll to document the top schools that provide a healthy and sustainable quality of life for the students, environmentally-minded and educational preparations for the future workforce, and environmentally responsible school policies for all to follow (Princeton Review, 2008). The Princeton Review ranked the following eleven colleges throughout the United States as receiving a green rating of ninety-nine points.

- Arizona State University, Tempe
- Bates College
- College of the Atlantic
- Emory University

- Georgia Institute of Technology
- Harvard University
- State University of New York at Binghamton
- University of New Hampshire
- University of Oregon
- University of Washington
- Yale University

Although all the above-listed universities have displayed an extraordinary commitment to green initiatives, Harvard University located in Cambridge, MA; Emory University located near Atlanta, GA; and Bates College in Lewiston, ME, were chosen for closer examination in part due to the accessibility of online information concerning green programs as well as in respect to their diverse financial strategies for integrating sustainable principles. An inventory was performed encompassing a list of similarities and differences concerning green initiatives and strategies. Moreover, this inventory can serve as a framework for other colleges to follow in the future. It is in this context that we discuss the current consumption and environmental awareness levels associated with the use of water and energy resources for dormitory students on The University of Alabama's campus.

The University of Alabama is in the preliminary stages of moving toward a more sustainable campus. Currently, it is difficult to track environmentally friendly progress on campus, as no study has been previously performed to establish where The University of Alabama is concerning environmental initiatives. Thus, if a snapshot of the University were established to include both consumption and environmental awareness levels, then those findings would serve as a benchmark from which the implementation of green strategies may be evaluated in terms of effectiveness. Accordingly, this research documented the environmental awareness and consumption levels of dormitory students concerning energy and water resources on The University of Alabama's campus. Moreover, findings were gathered from the dormitories Ridgecrest East and Lakeside East. The goal was to measure the current ecological footprint of dormitory students on The University of Alabama campus. Specific research objectives were to (a) determine the current state of students' environmental awareness, and (b) determine the current consumption levels in terms of electricity and water usage for specific dormitories on campus.

2. Research methods

A case study approach was utilized during this research. According to Theodorson and Theodorson (as cited in Punch, 1998) a case study is defined as "a method of studying social phenomena through the thorough analysis of an individual case. Described simply, a case study provides a snapshot of particular social phenomena (Hakim, 1987, p. 61). Thus, the case study approach allows for in-depth research on specific populations, such as the dormitory students that will serve as the focus for this research. This approach also permits the researcher to evaluate subjects in a naturalistic setting as well as conduct research from a wide array of methods such as interviews, observations, numerical data, and questionnaires

(Punch, 1998, p. 153). Suitably, interviews, observations, surveys, and data analysis are the primary methods utilized in this research. Even as the case study approach proves to be a viable research tool, a limitation is the inability of the researcher to derive generalizations from specific instances (Punch, 1998, p. 155). In light of this accusation, it is of importance to note that the case study approach warrants merit as this research requires an in-depth inquiry into a particular situation that has yet to be documented.

As mentioned previously, the focus of this research is centered around dormitory students residing on The University of Alabama campus located in Tuscaloosa, Alabama. In the fall of 2008, The University of Alabama reached a record enrollment of 27,052 students (Andreen, 2008). Of the 27,052 students approximately 7,000 students are housed on campus (E. Russell, e-mail, February 24, 2009).[1] Therefore, on-campus residency accounts for approximately 26% of the student population as illustrated by Figure 1.

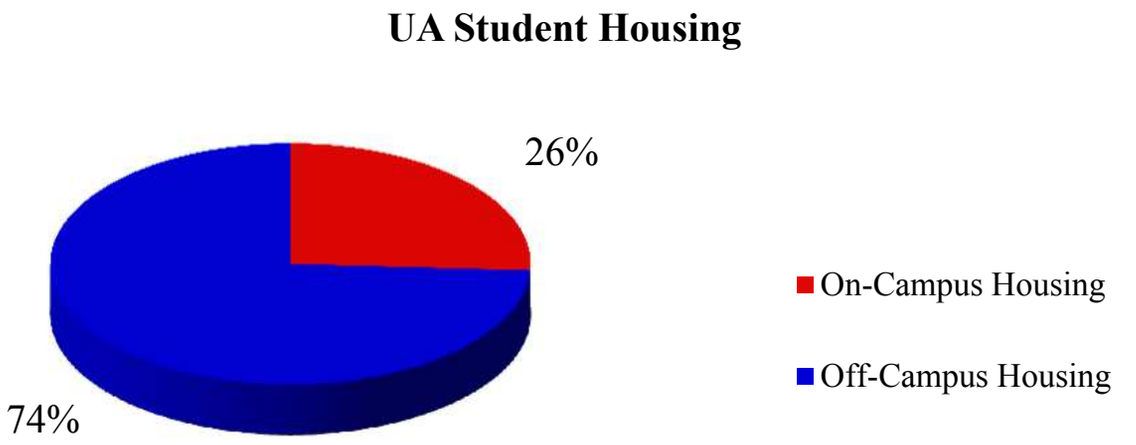


Figure 1. UA student housing.

For this study two dormitories were chosen for sampling. The selection was done by methods of random sampling. Random sampling allowed every dormitory to have an equal opportunity of being selected. The process entailed writing down the names of all the possible dormitories on campus on individual slips of paper. The dormitory names were mixed up and then drawn out of a hat. The dormitories Lakeside East and Ridgecrest East were selected for an analysis of energy and water usage records. The coed student populations housed within Lakeside East and Ridgecrest East are 238 and 316 students, respectively.

3. Survey and data analysis

The University of Alabama's Department of Energy Management aided in providing energy and water consumption records concerning the Ridgecrest East and Lakeside East dormitories. A content analysis of the records was performed to determine applicable

[1] An e-mail was received from Russell, E. on February 24, 2009. This e-mail is not traceable by the reader and is therefore not found in the references per APA style.

Figure 2. Lakeside East Residential Hall.

Figure 3. Ridgecrest East Residential Hall.

themes and patterns. Additionally, the records assisted with the calculation of the ecological footprint analysis of energy and water usage in dormitories on campus. The energy records acquired reported monthly electrical and natural gas usage figures for the two dormitories from 2007 and 2008. Due to some technical problems with the water meters, only the last five months of 2008 were available for analysis. However, water usage assumptions were derived for the entire year of 2008. Ecological footprint calculations were projected from estimates of the average water usage in 2008 and from the actual natural gas and electricity usage figures from 2007 and 2008. Even from water approximations, the derived ecological footprint has the ability to serve as a benchmark that can be utilized in future research. During the analysis of water and energy records, the data concerning the population rates for Ridgecrest East and Lakeside East during 2007 were unfortunately unattainable; consequently, the 2008 population numbers were substituted. In addition to the analysis of energy records, an interview with the Director of Energy Management was conducted in an effort to get a proper vision of the campus in terms of resource management.

4. Calculating the ecological footprint

Data from the Department of Energy Management were utilized in the ecological footprint calculation. The following identifies the process for calculating ecological footprints:

1. Estimate the average population size.
2. Estimate the average annual consumption for a particular item.
3. Estimate the land area appropriated per capita for the production of items consumed.
4. Estimate the ecological footprint of the average person for all items consumed.
5. Multiply the population by the per capita footprint.

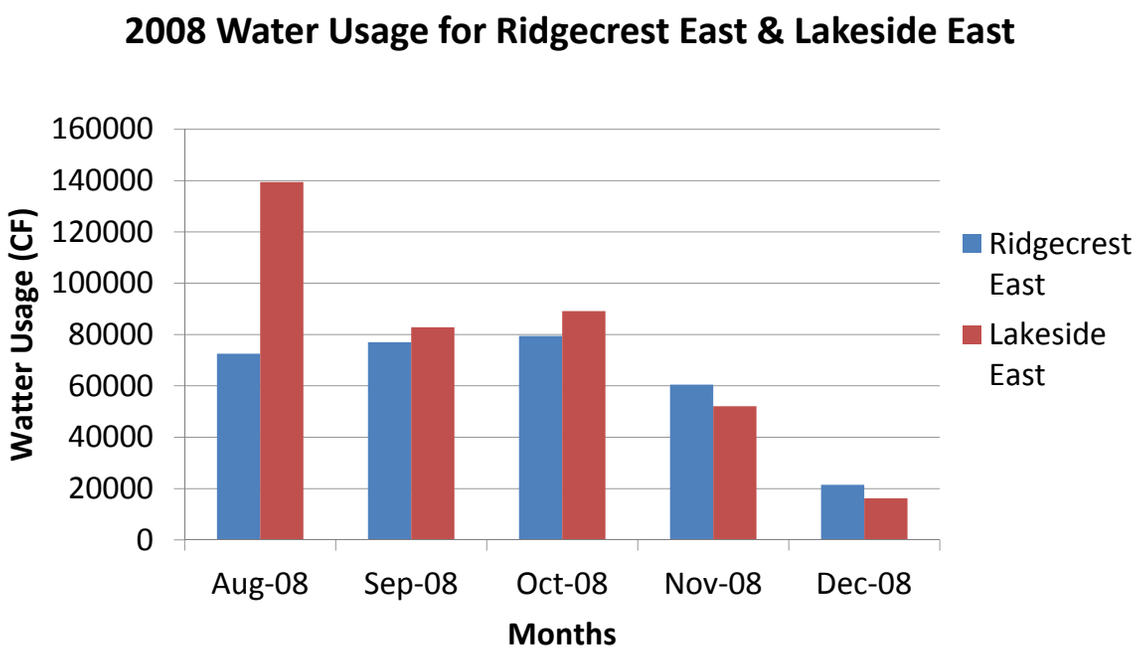
The ecological footprint calculation was utilized to determine land use requirements associated with the consumption of resources. The calculation was performed utilizing water, electric, and natural gas records. All the records used in this study were obtained from the Department of Energy Management.

Water

Water usage records were acquired pertaining to Ridgecrest East and Lakeside East Residential Halls from August to December 2008. Due to some technical problems with the water meters, accurate water usage readings prior to August 2008 were unattainable. The trend for water usage at Ridgecrest East showed little variation during the months of August, September, and October as consumption ranged from approximately 72,000 to 80,000 cubic feet or approximately 538,000 gallons to 599,000 gallons. Usage dropped slightly during November followed by a dramatic decrease in December. Lakeside East Residential Hall demonstrated more drastic trends than Ridgecrest East as usage in August peaked at nearly 140,000 cubic feet followed by a marked decline in September as Lakeside levels dropped around 40%. A slight increase occurred during the month of October. In November and December consumption decreased drastically as water usage dipped below Ridgecrest levels.

Figure 11 details water usage in cubic feet consumed. Figure 12 depicts the steps we were utilized to calculate the ecological footprint of water resources consumed in the dormitories Lakeside East and Ridgecrest East. First, the populations of Lakeside East and Ridgecrest East were established. As mentioned previously, 238 students reside within Lakeside East, whereas 316 students live in Ridgecrest East. A full twelve months of records were unavailable, so estimations were used to approximate the yearly water consumption levels within the dormitories. The 2008 yearly estimations for each building were derived from taking the average amount of water used during the five months and then multiplying that average by twelve months. For Ridgecrest East the figure 746,616 cubic feet was used as the 2008 water usage estimate, while the figure 911,496 cubic feet was used for Lakeside East.

Thus, an ecological footprint calculation concerning water resources can be derived by utilizing the water consumption estimates for the two residential halls as indicated above. Initially, the amount of water consumed in cubic feet per dormitory student must be established. The number was calculated by dividing the total water estimates for each



Source: University of Alabama Department of Energy Management

Figure 4. 2008 Water Usage for Ridgecrest East and Lakeside East.

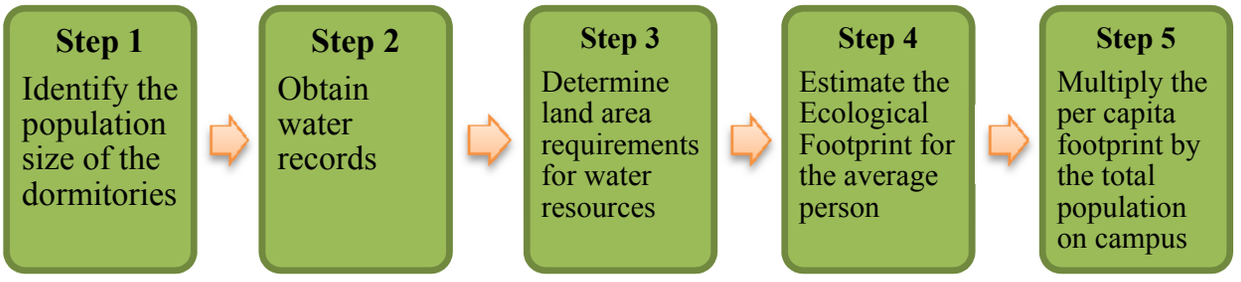


Figure 5. Ecological footprint procedure for water.

dormitory by the subsequent student populations residing in each residential hall. Consequently, the average amount of water consumed per student for Lakeside East was 3,830 cubic feet (28,649 gallons) and 2,363 cubic feet (17,674 gallons) for Ridgecrest East.

To obtain a real-world comparison, consumption figures of the individual dormitory student are listed in gallons as well as cubic feet. The individual usage levels can further be broken down into daily usage figures by dividing by 365 to represent the approximate number of days in a year. As a result the daily consumption level for an individual residing in Lakeside East was 10.49 cubic feet or 78.49 gallons and 6.47 cubic feet or 48.42 gallons for those in Ridgecrest East. Daily usage figures are useful as they can be easily compared to the national average of the average American. According to the Environmental Protection Agency (2003), the average American consumes 90 gallons of water daily in the home, as

compared to the average European consuming 53 gallons daily, and the typical Sub-Saharan African citizen consuming only 3-5 gallons per day.

After establishing the consumption levels for water resources, it was necessary to determine the amount of land required for the utilization of water resources. Thus, water resources were converted to cubic meters by multiplying by 0.0283 and then divided by 1,500 m^3/ha/yr to accommodate the amount of forested land needed to accommodate the water consumed (Anundson et al., 2001, p. 26). The result was equivalent to

0.0723 hectares (0.1785 acres) per dormitory student in Lakeside East and 0.0446 hectares (0.1101 acres) per dormitory student in Ridgecrest East.

Ecological Footprint for Water 2008	Lakeside East	Ridgecrest East
Total Water Usage 2008 (cubic ft)	911,496	746,616
Water Usage per Month (cubic ft)	75,958	62,218
Water per Student in 2008 (cubic ft)	3,830	2,363
Total Land Area in Hectares per Dormitory Student	0.0723	0.0446
Total Land Area in Acres per Dormitory Student	0.1785	0.1101

Table 1. Ecological Footprint for Water 2008

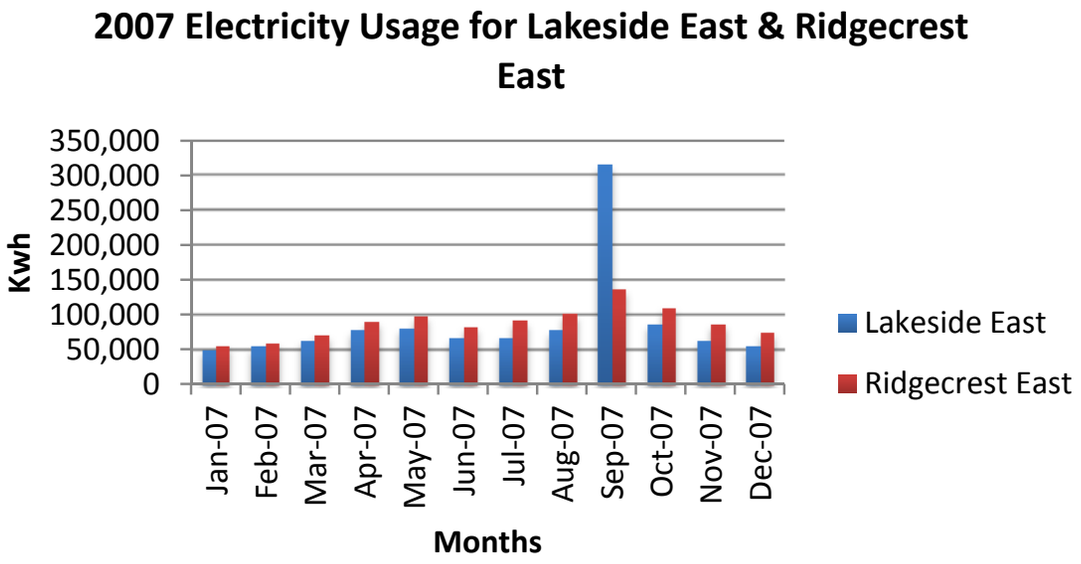
It is germane to keep in mind that all of these figures, concerning hectares/acreage required, only apply to the land required concerning water resources utilized during the consumption of housing. Accordingly, "the ecological footprint concept is based on the idea that for every item of material or energy consumption, a certain amount of land in one or more ecosystem categories is required to provide the consumption-related resource flows and waste sinks" (Wackernagel & Rees, 1996, p. 63). Thus, a complete ecological footprint calculation encompasses many different goods and services as this study looks specifically at water and energy resources associated with housing needs of dormitory students on The University of Alabama's campus.

a. Electricity

In addition to supplying the water records, as indicated in the findings in the previous section, the Department of Energy Management also provided electric and natural gas records for use in this research. To assist with the analysis of Lakeside East and Ridgecrest East Residential Communities, complete electrical and natural gas records were gathered from January 2007 to December 2008. Energy consumptions records from both 2007 and 2008 show a general trend of Lakeside East utilizing slightly less electricity per month with the exception of a peak on September 2007. During September 2007, Lakeside East Residential Hall experienced a spike in usage as

315,007 kilowatt hours (kWh) were consumed. This consumption stands-out on the electrical records as neither Lakeside East nor Ridgecrest East demonstrated another usage level over 140,000 kilowatt hours during the two-year span.

Despite the September peak for Lakeside East, electricity usage throughout the 2007 year remained somewhat consistent as January through March accounted for a range of approximately 50,000 to 65,000 kWh. April to May experienced a slight increase with consumption hovering near 80,000 kWh. June to July numbers were barely below 70,000 kWh, while August numbers increased back up to nearly 80,000 kWh. October boasted the second highest usage for 2007 at 87,151 kWh. Finally, during the months of November and December consumption ranged from 65,000 to 55,000 kWh. Interestingly, even as Lakeside East consistently consumed less power per month during 2007 with the exception of the September spike, the total 2007 energy consumption figures for Lakeside East (1,067,609 kWh) were slightly higher than Ridgecrest East (1,066,400 kWh).

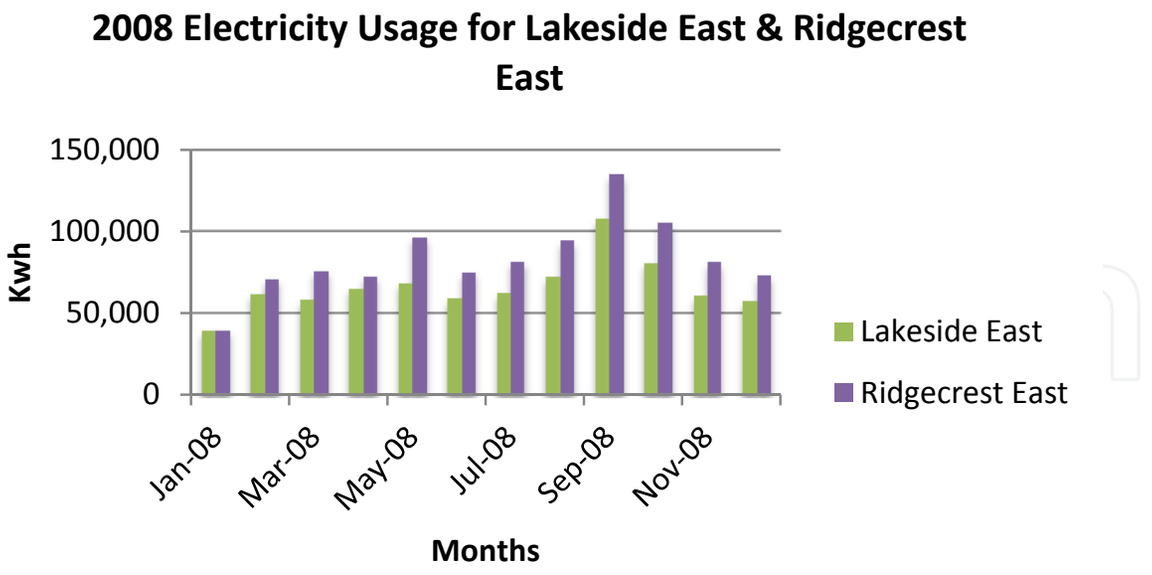


Source: University of Alabama Department of Energy Management

Figure 6. 2007 Electricity Usage for Lakeside East and Ridgecrest East.

As mentioned previously, Ridgecrest East has in general consumed a higher amount of electricity in terms of kilowatt hours per month during 2007 when compared to Lakeside East. Those higher consumption rates for Ridgecrest East are indicated as the following approximated percentages above Lakeside East's usage levels: January was 11% higher, February displayed an 8% increase, March had an 11% increase, April saw a 16% increase, May's increase jumped up 22%, June displayed a 24% increase, July had a 35% increase, October displayed a 27% rise, November increased to 35%, and finally December had a 36% increase over Lakeside East's consumption levels. Electricity consumption for Ridgecrest East during September 2007 was only about 44% of what Lakeside East consumed.

During 2008, Lakeside East consumed less total electricity each month than Ridgecrest East. Moreover, when the total consumption figures of 2008 for both dormitories are compared to the 2007 fiscal year, together the buildings show an overall decrease in electrical usage. Lakeside East displayed the following monthly consumption during 2008 recorded in



Source: University of Alabama Department of Energy Management

Figure 7. 2008 Electricity Usage for Lakeside East and Ridgecrest East.

kilowatt hours: January was 39,628 kWh; followed by February with 62,320 kWh; March consumed 58,206 kWh; April used 65,469 kWh; May was 68,613 kWh; June was recorded at 59,222 kWh; July had 62,597 kWh; August consumed 72,264 kWh; September was recorded at 108,040 kWh; October used 81,022 kWh; November had 60,623 kWh of usage; and finally during December 57,632 kWh were utilized. Similar to the methodology utilized to calculate the ecological footprint concerning water resources, Figure 15 depicts the ecological footprint procedure from which the electrical impact of students was derived.

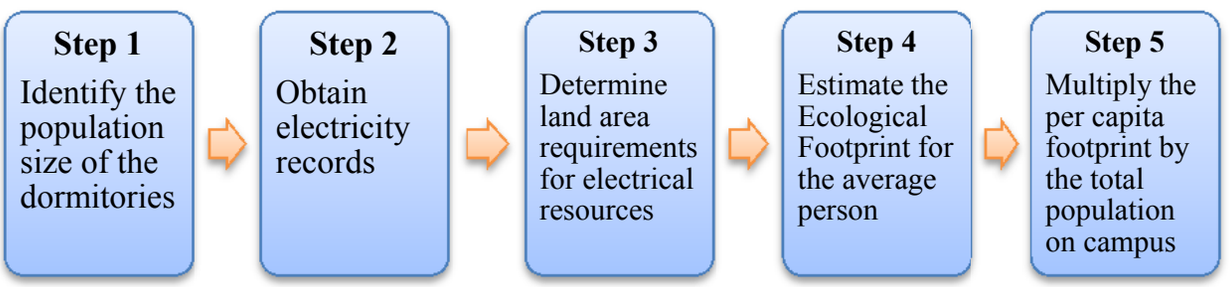


Figure 8. Ecological footprint procedure for electricity

For a more in-depth analysis of electrical usage for the two dormitories, the amount of energy utilized by each dormitory student for the year was calculated as the total electricity consumption numbers were divided by the amount of students residing within each dormitory. This accounted for the amount of electricity utilized per student to be 4,486 kWh at Lakeside East and 3,375 kWh at Ridgecrest East. It is important to note that even though the energy consumption numbers showed little variation during the 2007 fiscal year, the higher population numbers within Ridgecrest East resulted in energy usage per student that

was considerably less than those found at Lakeside East. Just as the 2007 electricity records were broken down for analysis, the 2008 electricity records were evaluated for individual usage levels.

To acquire the electricity consumed per dormitory student during 2008, the electrical totals were divided by the amount of the respective residential populations. Thus, the average student consumed 3,343 kWh within Lakeside East and 3,177 kWh for Ridgecrest East. To relate student electricity consumption rates to a real-world example the 2007 and 2008 figures were broken into monthly averages. The 2007 monthly rates per dormitory student were calculated to be approximately 374 kWh for Lakeside East and approximately 281 kWh for Ridgecrest East. For 2008 the monthly averages were approximately 279 kWh for Lakeside East and approximately 265 kWh for Ridgecrest East. According to the Energy Information Administration (2007), the average Alabama household consumes 1,305 kWh per month.

After the consumption levels were successfully calculated for electrical resources, the amount of land could be determined for the usage of electrical resources. To accommodate the carbon emissions from the utilization of electricity the rate of 169 m^2 of forest for every 100 kWh of electricity was used for the following ecological footprint calculations (Anundson et al., 2001, p.11). Thus, the individual amount of electricity per dormitory student was first divided by 100 kWh and then multiplied by 169 m^2. Accordingly during 2007 for Lakeside East, the amount of land needed per dormitory student was 7,581 m^2 (0.758 hectares or 1.873 acres) and for Ridgecrest East 5,703 m^2 (0.570 hectares or 1.409 acres). During 2008, the amount of forested land area necessary per student amounted to 5,650 m2 (0.565 hectares or 1.396 acres) for Lakeside East and 5,369 m^2 (0.537 or 1.327 acres) for Ridgecrest East. In Table 7, meters squared were converted to hectares by dividing by 10,000. Additionally, hectares were converted by multiplying by 2.471.

Ecological Footprint for Electricity 2007	**Lakeside East**	**Ridgecrest East**
Total Electricity 2007 (kWh)	1,067,609	1,066,400
Electricity per Student in 2007 (kWh)	4,486	3,375
2007 Total Land $(m)^2$ per dormitory student	7,581	5,703
2007 Total Land in Hectares per dormitory student	0.758	0.570
2007 Total Land in Acres per dormitory student	1.873	1.409
Ecological Footprint for Electricity 2008	**Lakeside East**	**Ridgecrest East**
Total Electricity 2008 (kWh)	795,636	1,004,000
Electricity per Student in 2008 (kWh)	3,343	3,177
2008 Total Land $(m)^2$ per dormitory student	5,650	5,369
2008 Total Land in Hectares per dormitory student	0.565	0.537
2008 Total Land in Acres per dormitory student	1.396	1.327

Table 2. Ecological Footprint for Electricity 2007 and 2008

As a reminder, it is important to note that all the ecological footprint analysis that has been mentioned in this section pertains only to the electrical energy consumption as related to housing concerns. In reality electricity consumed for housing is only one area of a person's life where electricity is utilized. Therefore, the electrical usage and subsequent land area may in fact be larger than the estimates listed above. In general, ecological footprint calculations encompass a variety of goods and services associated with a person's lifestyle. This research looked specifically at water and energy usage of the footprint equation as related to housing needs.

In addition, each student's consumption of natural gas was calculated in the same way. Thereafter, each students total land area requirement at Lakeside East was calculated as follows: 0.179 acres for water resources in 2008, 1.873 acres for electricity in 2007, 1.396 acres for electricity in 2008, 0.170 acres for natural gas in 2007, and 0.177 acres for natural gas in 2008. Furthermore, Ridgecrest East's numbers were 0.110 acres for water in 2008, 1.409 acres for electricity in 2007, 1.327 acres for electricity in 2008, 0.142 acres for natural gas in 2007, and 0.140 acres for natural gas in 2008. Thus, if the entire student population that resides on-campus of approximately 7,000 individuals adopted the consumption habits of either Lakesides East or Ridgecrest East residents, then the land acreage as illustrated in Table 7 would have been needed.

When evaluating these figures it is important to understand that Lakeside East and Ridgecrest East are both relatively new buildings found on The University of Alabama's campus. As this study represents a sample of consumption levels taken from the new and therefore more efficiently constructed dormitories, the land requirement estimations for the students living on-campus are likely to be a best-case scenario. Overall, from the ecological footprint calculations utilized, Ridgecrest East displayed a lower environmental impact or land requirement than Lakeside East for water, electricity, and natural gas.

Additionally, land requirements decreased for electricity needs for both dormitories from 2007 to 2008. On the other hand, during the two year-span the land requirements for natural gas showed only a slight decrease for Ridgecrest East while Lakeside East showed an increase in demand. Acreage for water resources were not compared from 2007 to 2008 as the required data were unattainable.

Ecological Footprint: Land Requirements in Acres for the Dormitory Student Population	**Lakeside East**	**Ridgecrest East**
From 2008 Water Consumed	1,253	770
From 2007 Electricity Consumed	13,111	9,863
From 2008 Electricity Consumed	9,772	9,289
From 2007 Natural Gas Consumed	1,190	994
From 2008 Natural Gas Consumed	1,239	980

Table 3. Ecological Footprint for the On-Campus Population

5. Conclusion and policy implications

Although much progress has been made in recent years there is more that The University of Alabama can do in support of sustainable practices, as exemplified by green universities across the country. The first step toward becoming a green campus merely entails setting the goal of wanting to be more sustainable. The President of University of Alabama's message to the student body during fall of 2008 was the initial step required to set the tone for the campus. Now that a goal has been set, a subsequent plan will need to be developed. Objectives will need to be established in order to facilitate progress toward the end goal.

Before any other steps of the plan can be formulated lest carried out, it is essential to stop and take an inventory. The inventory determines where the campus is now so that progress may be more accurately measured. Thus, this research has served as a snapshot of where the campus currently is, during the academic semesters of fall of 2008 to early spring of 2009 in terms of sustainability. The snapshot is a useful tool as it was used to compare The University of Alabama to the top green schools. These prestigious universities were utilized in this analysis to serve as the pinnacle of where The University of Alabama may strive to be concerning environmental initiatives.

Taking the other schools analyzed in this research into consideration, our first recommendation is to formulate an official environmental plan that involves a variety of stakeholders in the planning process. This initiative needs the involvement of students, faculty, staff, alumni, investors, and the community as a whole. During the planning process, objectives must be set that are measurable as well as quantifiable to the overall goal of the plan. If these objectives are to serve as serve as milestones towards the goal of sustainability. Ecological footprint calculations as used in this study will be beneficial for monitoring progress towards this goal.

Our second recommendation is to strive to establish a recognizable environmental office on campus supported by a full-time staff. This ensures availability of knowledgeable staff to assist with inquiries from environmentally-aware students and community members as well as to address sustainability issues in accordance with the campus's environmental plan. According to data gathered on sustainable universities by the Sustainable Endowments Institute (2009), a considerable number of schools have recognized the need for full-time campus sustainability administrators. Currently, 56 percent report having dedicated sustainability staff.

We also recommend the incorporation of green building elements within residential student housing just. Generally speaking, universities are long-term owners of institutions. Hence, looking at the cost of operation over the period of a product's life cycle will help them accept some of the additional costs associated with green building methods. According to Moskow (2008), "Sustainable developments are more cost-effective in the long term and, therefore,

ultimately, more valuable" (p.xv). This is especially true as the price of resources such as electricity and natural gas continue to rise. Additionally, green buildings have been noted to promote a healthy, productive work environment that would benefit the welfare and academic status of The University of Alabama.

Fortunately, The University of Alabama has already begun incorporating some green features in buildings such as low flow toilets, low flow faucets, low flow showerheads as well as plans for lighting controls and high efficiency hoods for new projects. Though those efforts are commendable, our recommendation is to use Bates College as an example to strive toward concerning green buildings. Due to cost restrictions, Bates College has not filed for the proper LEED certification for their structures. Despite not having filed, Bates College has used the LEED criteria as a standard in which to construct LEED equivalent buildings. Furthermore, green is marketable and green building designs are a good way to promote The University of Alabama's image.

Our final recommendation is education. Additional educational opportunities may in fact reduce the environmental impact of the University. Due to the fact that the role of academic institutions is to educate and facilitate in the development of tomorrow's leaders, this is a prime environment within which to integrate green technologies. Leaders that are unable to recognize the mismanagement of resources will be incapable of solving environmental problems. If environmentally friendly strategies are to be incorporated into future policies, then exposure to sustainable education is essential.

An expansion of research concerning ecological footprint analysis would be beneficial in an effort to determine the environmental impact of the campus. Though food and recycling strategies were only briefly discussed in this study, a more in-depth analysis may be needed to evaluate whether or not the University should try to promote locally or organically supplied food in the cafeterias and whether or not to participate in the *RecycleMania* competition. Additionally as only dormitory students were analyzed in this study, more sample groups could be evaluated and include both on-campus and off-campus students. Studies on climate change, transportation issues, student led initiatives, and a plethora of other opportunities exist for exploration.

In conclusion, we wish to emphasize that if places of higher learning are able to lessen their ecological footprints, they would ultimately have a greater positive impact on humanity and the dwindling resources of the World.

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