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McPherson College's Environmental Impact on Water Use, Energy Use, and Waste Generation/Disposal

Adelina Cripe

ABSTRACT

The increasing population has had a negative impact on water use, energy use, and waste generation/disposal at global and national levels. Therefore, conservation plans have been created and implemented to address these impacts. For my senior project I investigated the ways in which McPherson College has a negative impact on the environment and suggested a conservation plan that will reduce the effects it has on the environment. Through my research I have analyzed the consequences of the college's actions by collecting data and observing the campus's behavior. My results proved my hypothesis correct, showing that the college has had a relatively negative impact on the environment. The data I collected focused on utility bills, waste audits, and showerhead testing. Electric, water, and waste disposal usage and cost were the greatest during the summer months and natural gas usage and cost were the highest during the winter and fall. The entire campus population contributed to the high cost and usage per capita for electric, water, and waste. The annual electric and waste disposal costs increased in the last five years (1998-2002). The water and natural gas costs decreased, so therefore the over all utility cost decreased. These results suggest that through utility trends, low population, and increasing annual electric and waste disposal costs, McPherson College has had a negative impact on the environment. As a result of testing the showerhead flow rates in each dorm, I have concluded that Dotzour showerheads wasted more water than those in Bittinger and Morrison. Through the waste audits I conducted, I found that the college generated a large amount of non-recyclable waste and disposed food that could be composted and paper that could be recycled. These results are interesting due to the fact that the college has paper-recycling stations available, thus showing that the current recycling program is ineffective. Based on my observations of the college's actions and management polices, I have seen that institutional practices pertaining to water and energy use were wasteful. During the waste audits I observed that the college generated a large amount of waste that could be recycled and disposed of articles that be reused. Through the data I collected and the behaviors I observed I have created a conservation plan for McPherson College that addresses the institution's energy use, water use, and waste generation/disposal.

Keywords: *water, energy, natural gas, waste disposal, waste generation, environmental impact, conservation plan*

INTRODUCTION

The human population has increased dramatically over a relatively short period of time. Approximately 200,000 years ago a few thousand individuals inhabited the earth. In the 1800's the population surpassed 1 billion and in 1999 it reached 6 billion people (Harrison and Pearce, 2000). The projected population for 2025 is 8.5 billion people (Hjorth, 2000).

Although the specific numerical data was unavailable for global water use and waste disposal/generation per capita, the impact that an increasing population has had on the environment can be seen through the global per capita use of energy. In 2001 the global per capita rate for electricity was 65.7 million BTU per year (Energy Information Administration).

At the national level, water use, energy use, and waste disposal impacts can be seen on the environment. The average water consumption per person is 374 gallons per day (U.S Census Bureau, 2001). It is also estimated that the annual average energy consumption per person in 2001 was 342 million BTU per year (Energy Information Administration). In 1999 each person generated 229.2 lbs of trash per year and 131.9 lbs of trash per year was deposited in landfills (U.S. Census Bureau, 2001).

Due to the environmental impacts of water use, energy use, and waste generation/disposal, a need for conservation is present. The growing demands on the environment have created an urgent demand to link research with improved environmental management (Jackson, 2001). One commonly practiced method that includes research, analysis, and management is a conservation plan. Conservation plans have been implemented in cities, offices, and schools. Austin, Texas, for example, implemented a conservation plan to reduce its extensive water use (Greeg and McReynolds, 1995). As part of the Kitsap Peninsula Vocational Skills Center's conservation plan, triple glazed skylights were installed to reduce its energy use (Donald, 1997). Eastern Illinois University has created a waste disposal conservation plan and implemented a recycling program on campus. In 2001, the campus recycled 56% of its total waste (EPA Waste Wise). Through conservation plans that targeted water use, energy use, and waste generation/disposal, these organizations improved their environmental impact.

For my Senior Project, I investigated McPherson College's water use, energy use, and waste generation/disposal trends and analyzed their environmental impact. To address these issues I have

created a conservation plan.

When I approached this study I expected to find that the institution's actions reflect a negative impact. While conducting my research I addressed the following questions: (1) What are the trends in water use, energy use, and waste generation for the past five years at McPherson College? and (2) What can be done to lessen this environmental impact?

MATERIALS AND METHODS

An assessment of the impact the college has had during the past five years was needed to create an accurate conservation plan. My assessment was divided into two different categories - data collection and observation. My data sources varied from utility bills to waste audits. I utilized my observations as a student and resident of McPherson College to assess the college's environmental impact. When I combined both numerical and anecdotal data, I was able to understand the college's environmental impact more broadly and accurately.

Data Collection

Population

I went to the campus registrar's office to collect campus population statistics for the last five years. The population included students, faculty, and staff.

Water

To quantify the impact that the college has had on water use I used two methods and several materials. The first method was to collect water bills from the Facilities Management Office. To acquire accurate data, I collected photostatic copies of water bills from the past five years (1998-2002). They purge their files every five years, therefore, limiting my research.

The second method I used to analyze water use at the college was to measure the flow rate of the water produced by showerheads in each dorm. I went to every shower in all four dorms (Dotzour, Metzler, Bittinger, and Morrison), and ran the water for five seconds into a graduated plastic bag. These two methods gave me a way to analyze the current impact that the college had on the environment and a direction to improve the impact.

Energy

I divided the energy bills into two types – electric and natural gas. I collected photostatic copies of bills for electric use from the City of McPherson's Board of Public Utilities and for natural gas use from Oneok Energy Marketing and Kansas Gas Service.

Waste Generation/Disposal

The waste data was divided into two categories: generation (the quantity of trash created) and disposal (where the trash is taken). To measure the waste generated at McPherson College I conducted four waste audits by going through the four dumpsters on campus.

I analyzed the disposal trends of the college by collecting photostatic copies of bills from McPherson Area Solid Waste Utility and weighed the amount of paper the college recycles on a weekly basis.

Observation

I used my personal observation of the college's actions and behaviors to gather an understanding of its environmental impact.

RESULTS

Data Gathered

Population

The campus population fluctuated in conjunction with the annual school cycle as evident in Figure 1. The college population was higher in the fall semester and decreased in the spring. Students did not live on campus during the summer months until the summer of 2002. However, this did not cause any drastic change in the population, only gradual decreases among the student population were seen.

Water

Figure 1 also shows the monthly increase in water usage and cost in the fall months over the last five years. The box plots show that in March, July, and September there was a wider range of usage, yet the cost fluctuation was not visible until October and November. The water usage and costs per capita were the largest in the summer months while the fall and spring months remained constant.

The annual water cost decreased every year in a linear fashion with the exception of 2000 (Fig. 2). The annual water cost in 2002 was almost half that of 1998.

The average flow rate for each residence hall can be seen in Figure 3. The standard deviation shows that the showerheads in Dotzour and Metzler varied more than the showerheads in Morrison and especially Bittinger.

Electrical

An increase in electric usage during the fall months is apparent in Figure 1. The range in electrical usage varied from month to month in 1998-2002. While the range remained constant, the electrical usage fluctuated in the months of August and September.

Similar to water usage and costs per capita, the summer months were incredibly high and the spring and fall months were constant. I also found it interesting that the electric costs per capita increased every year since 1998.

The annual electric cost grew in a linear manner over the past five years. Figure 2 explains how this steady increase of cost doubled over time.

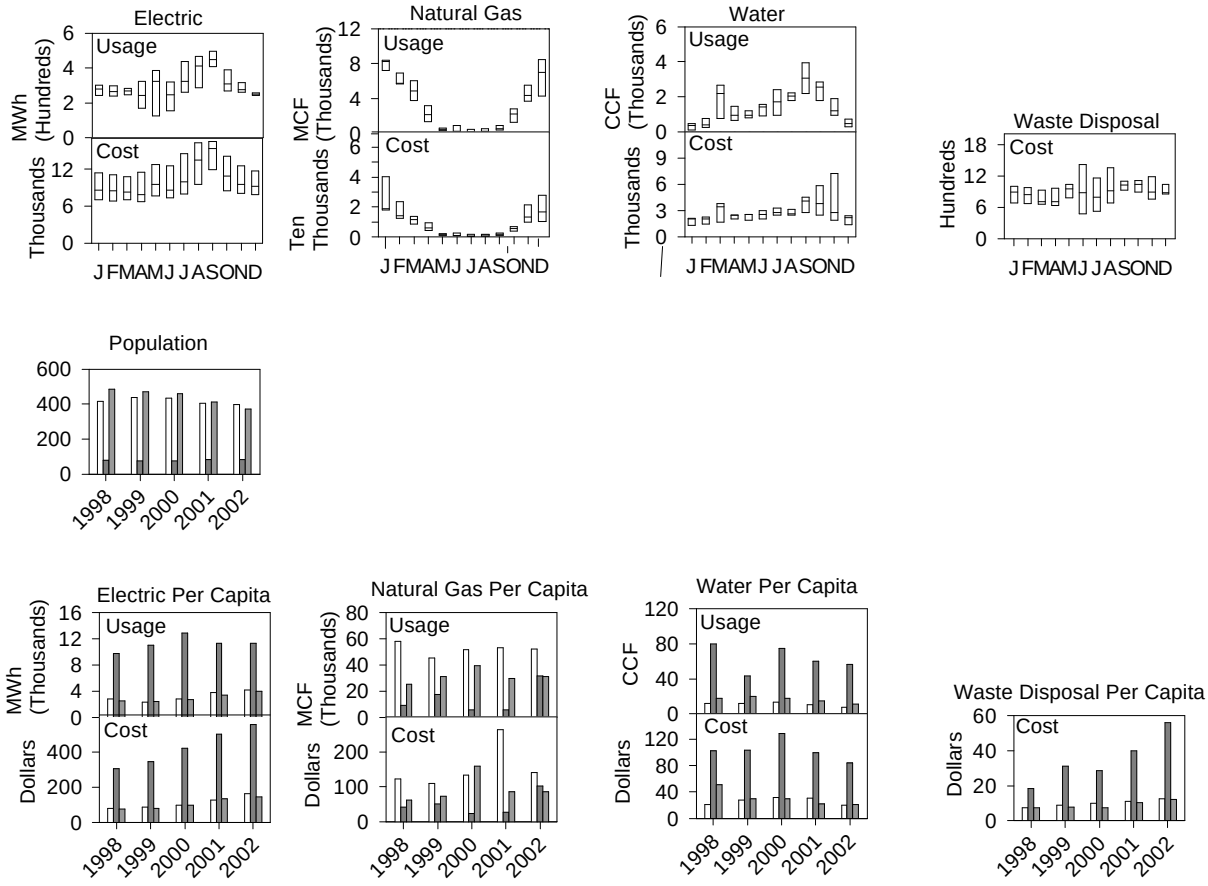

Figure 1. In the first two rows, cost and usage for each utility is depicted in box plot graphs showing the minimum, maximum, and median. In the last two rows, usage and costs per capita are depicted through bar graphs (Fall, Summer, Spring respectively). The population graph was used to calculate the per capita numbers. The unit for cost is dollars and the units for usage are MWh (mega watt hours) for electric, MCF (million cubic feet) for natural gas, and CCF (hundred cubic feet) for water.

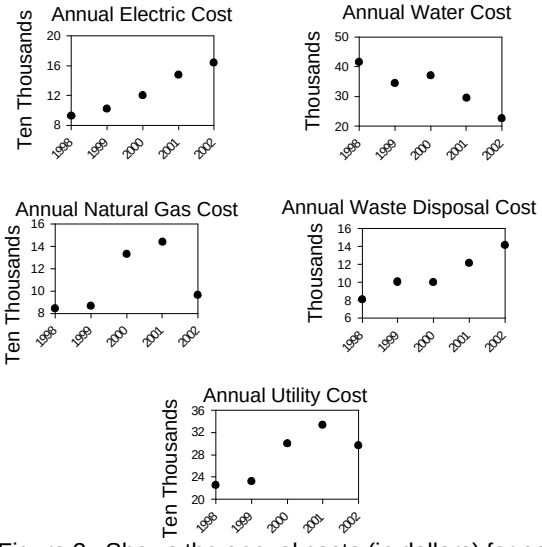

Figure 2. Shows the annual costs (in dollars) for each utility as well as a combined annual utility cost.

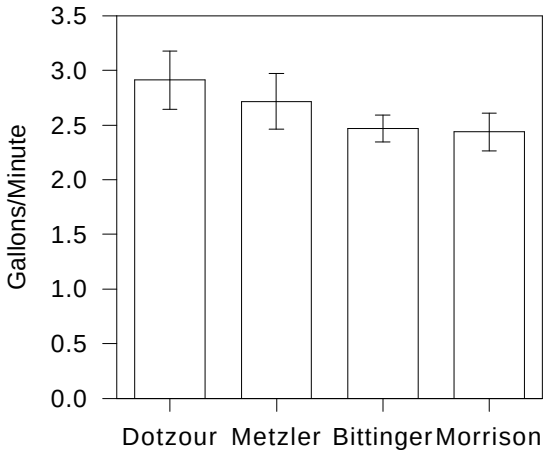

Figure 3. The average flow rate is depicted in this graph for each residence hall in gallons/minute.

Natural Gas

The natural gas cost and usage differed from water and

electric. It was higher in the winter and fall months and lower in the summer months (Fig. 1). The range of natural gas cost and usage decreased in the summer months and varied more during the winter and fall. Unlike electric and water, natural gas cost and use per capita did not peak until fall.

In Figure 2 the annual natural gas costs are depicted. In 1998, 1999, and 2002 the cost were lower than in 2000 and 2001.

Waste Generation/Disposal

Waste disposal cost and costs per capita graphs are shown in Figure 1. Even though the range varied throughout the year, there was little variation in the fall, summer, spring, and winter months. The costs per capita increased during the summer months and were higher at this time. The cost per person was the highest in 2002. The fall and spring months were constant.

Figure 2 shows how the annual waste disposal cost fluctuated over time. In 1998 and 1999 waste disposal costs were relatively constant. In 2000 and 2001 the cost almost doubled before dropping drastically in 2002.

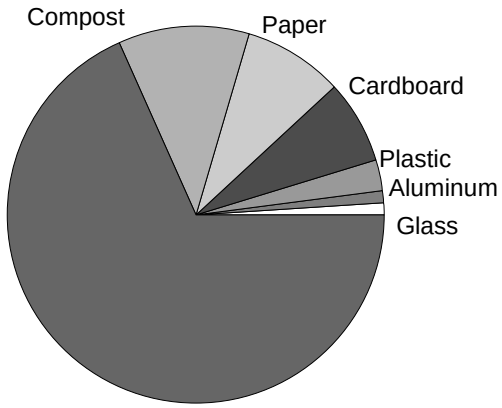

Figure 4. This pie chart breaks down the seven different items found in the dumpster over 2002. These numbers are percentages and were found by weighing each category and dividing by the total weight of the trash.

Waste generation trends can be seen in Figure 4. The waste audit proved that the majority of garbage generated was non-recyclable. Of the recyclable items, similar amounts of compost, paper, and cardboard were found.

Observations

Water

Through my observations, I saw that the college wasted the most water in residence halls and for irrigation purposes. Students turned on the showers and left them running for a certain time period in order to heat the water. Other wasteful behaviors could be seen when students took multiple showers and/or baths a day.

The fescue grass on campus requires a large amount of water. I observed that the college had a tendency to over water the grass as well as run the sprinklers during rain and/or high wind.

Energy

In the residence halls, appliances like televisions and lights were left on in the lobbies, kitchens, and dorm rooms when not in use. The lights in the bathrooms and hallway were left on 24 hours a day.

Natural Gas

I have seen that natural gas was wasted during the wintertime when students ran the heater when not in the room. Other students had windows open when running the heater.

Waste Generation/Disposal

The campus generated the majority of its non-recyclable waste at the cafeteria by using styrofoam products and unnecessary wrapping. By disposing of carpets, lamps, clothes, and other reusable items the college was contributing to the overuse of landfills. The current recycling program is ineffective due to lack of implementation.

DISCUSSION

The above results indicate the impact that the college has had on energy, water, and waste generation/disposal. From these results I have assessed the environmental impact that the college had. The first part of the discussion will analyze the data and explain its significance. The attached conservation plan (Appendix A) proposes possible solutions to the college's behavior.

Population

Population played a major role in the college's environmental impact. Even though the population decreased, usage and costs per capita increased. In this situation, addressing the college's management policies is the only solution.

Water

The college practiced water conservation by decreasing its annual water cost. It installed water saving showerheads in the new residence dorms and plans similar replacements during renovations in the summer of 2003.

Although McPherson College already addressed the

over usage and waste of water, there is still room for improvement. Through my data I found that water rates decreased in the winter while the grass was dormant and peaked in the fall during the prime-planting season. This, combined with my observations, shows that conservation techniques are needed.

Electrical
Through my research and observations I concluded that the college's excessive wastefulness of energy needs the most improvement. The high annual cost can be attributed to the overuse and waste of electricity by students, faculty, and staff.

Natural Gas
Even though the college decreased its annual natural gas usage, my results and observation show that there is room for improvement. Through leaving windows and doors open and by over heating rooms during the cooler months, natural gas was wasted. These practices can be addressed by simple individual choices.

Waste Generation/Disposal
In order to address the wasteful practices of generation and disposal at McPherson College, the college must begin to reduce, recycle, and reuse. Once these practices are implemented not only will the annual cost decrease, but also McPherson College will have a lesser impact on the environment as a whole.

Conclusion
Through my observations and research I have concluded that McPherson College has already begun to implement water and natural gas conservation plans. Improvements, however, can still be made in these two areas. There is a great demand that the college implement more aggressive electric and waste generation/disposal conservation techniques. Only through addressing these critical issues as suggested in my conservation plan can McPherson College lessen its environmental impact.

ACKNOWLEDGEMENTS

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Bills
I would like to thank Facilities Management and the business office for providing the appropriate bills for me to photocopy and analyze. I would especially like to thank Phil Hudson, Connie Stucky, and Lisa Easter.

Shower
I would like to thank the Arizona Department of Water Resources for providing me with the bag to use to measure the flow rate in each of the showers in each of the four residence halls. I would also like to thank Tony Segovia for helping me in Metzler.

Waste
I would like to thank Wes Hoffert, Santiago Canez, Adeline Cripe, Lorna Baird, and Gad Jacobs for assisting me while I dug through the four dumpsters on campus.

Overall Help and Guidance
I would like to thank the Science faculty for their guidance and support. I would especially like to thank Dr. Jonathan Frye who helped me with every step of my project and answered all my questions. I would also like to thank Kelli Johnson and Ginger Baum for their encouragement.

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Appendix A:
A Conservation Plan for McPherson College

Adelina Cripe

INTRODUCTION

Educational institutions can teach many lessons inside and outside the classroom. The means by which most educational institutions are managed and kept provide an environmental paradigm of waste and natural domination to its students. This paradigm becomes a lifelong lesson that most people follow. Consequently, it is this way of life, which leads to a negative impact on the environment as well as environmental problems (eg: excessive energy use, water use, and waste disposal/generation.)

McPherson College is no exception to this trend. This paradigm of waste and natural domination can be seen in the decisions and actions of students, faculty, and staff. Because this attitude dictates people's actions towards God's creation, a church related college should encourage environmentally "friendly" actions. In Genesis Chapter 2 vs. 15 God asked his people to be stewards of the land, by protecting it and using it wisely (Holy Bible, 1995). Currently, however, it can be seen that McPherson College's actions do not coincide with this request and therefore the college is having a negative impact on the environment as well as teaching the college community life lessons that worsen this impact.

In order to adjust the impact that the college has on the environment as well as install an environmentally aware paradigm in the college community, certain policies have to be adopted and practiced. For my senior project, therefore, I have analyzed McPherson College's impact on the environment and have created an institutional conservation plan.

Goal

To ameliorate the current McPherson College environmental impact by implementing cost effective policies.

Problem Statement: Energy

Energy has become one of the most basic of human needs in the technological era. It is not just an end in itself but it is a means to obtain many ends. Energy is needed to heat and air-condition buildings, to heat water, to power engines, and to generate electricity for everyday uses. According to Harrison and Pearce, global consumption of commercial energy has risen more than fourfold over the past 50 years (2000a). There was once concern that energy sources from fossil fuels would run out. This fear, however, has been replaced by the concern that the continuing demand for energy will cause the global climate to change. Carbon-containing fuels emit carbon dioxide, and carbon dioxide is considered a greenhouse gas, which is contributing to Global Warming (Harrison and Pearce, 2000a).

McPherson College's actions have attributed to the environmental problems concerning energy use. The institution has a tendency to leave the lights on in dorm rooms, lobbies, kitchens, bathrooms, classrooms and offices when not being utilized (Cripe, 2003). Transporting food to the college and the amount of driving conducted by the college has environmental consequences. According to the Office of Brethren Witness pamphlet, Save the Earth, every mile someone does not drive keeps a pound of carbon dioxide out of the atmosphere (2003).

In order to address the college's wasteful energy use, I propose the following:

Short-term

1. **Resident Assistants will turn off unused lights and televisions.**
   I propose that when Resident Assistants make hourly rounds, they turn off lights and televisions in lobbies.
   Cost Benefit Analysis
   The college will save energy and money on electricity at no additional cost.

2. **Switch to compact fluorescent/low wattage light bulbs.**
   I propose that the college replace all incandescent light bulbs with compact fluorescent/low wattage light bulbs. This switch should occur in the light fixtures in dorm rooms, bathrooms, hallways, kitchens, and lobbies. The same would occur in the classrooms, offices, hallways, and bathrooms in other buildings including the necessary lighting for the cafeteria. The fixtures outside used for security purposes would also be replaced with fluorescent/low wattage light bulbs.
   Cost Benefit Analysis
   It will take the college an initial investment of approximately $4.00 a light bulb. The college, however, will save $67 on energy costs per light bulb over its lifetime (Earth Day Network, 2001).

3. **Provide a weekly shuttle to Wal-Mart and Dillons, as well as to Wichita and Kansas City Airports during holiday travel.**

I propose that Facilities Management organize this shuttle service. It will be available free for students for weekly trips to Dillons and Wal-Mart, with additional locations and trips if there is a demand. Several shuttles will take students to Wichita and Kansas City Airports during holiday travel.
Cost Benefit Analysis
Benefits for providing this shuttle include: building a community through carpooling and reducing the demand for a vehicle. This policy asks the college to cover the cost of a driver, van, maintenance, and gas.

4. **Place energy saving stickers on light switches.**
I propose that the graphic design program design brightly colored, attention-grabbing stickers that will be printed in-house. The stickers will be placed in bathrooms, classrooms, offices, kitchens, and in every dorm room in the appropriate buildings.
Cost Benefit Analysis
Paper and ink will be the only cost incurred. The benefit will be a decrease in the McPherson College energy bill.

5. **Use natural lighting in the cafeteria for breakfast and lunch.**
I propose that the lights in the cafeteria be turned off for breakfast and lunch. The large windows in the cafeteria provide a sufficient amount of natural daylight.
Cost Benefit Analysis
The cafeteria has large windows allowing the use of natural lighting, reducing the institution's energy bill. Since the lights can by turned off manually at the generator by a cafeteria worker, there are no additional costs for the college to adopt this policy. Additional savings will be seen in the life of the existing light bulbs and other equipment.

6. Promote that the college negotiates locally grown produce and other food items in its contract with Sedexho Marriott.
I propose that the college negotiate with Sedexho Marriott (food services) to buy local produce and other food items that are either grown and/or produced in McPherson, McPherson County, and the State of Kansas.
Cost Benefit Analysis
The college will save money on transportation costs, and local markets will benefit.

7. **Promote energy saving ideas to students, faculty, and staff through educational programs.**
I propose that the college adopt the promotion of energy saving ideas to students, faculty, and staff. This will be conducted through dorm meetings, Freshman Seminar, educational programs, convocation presentations, and campus wide emails.
Cost Benefit Analysis
It will cost nothing to implement these educational programs; yet will save money wasted on electrical purposes.

Long-term

1. Work with an environmental consulting firm to plan and implement an energy and money saving system.
I propose that college hire an environmental consulting firm to plan and implement an energy saving system that will include motion sensors and solar power panels. Because this will entail changing electrical wiring this policy is considered a long-term goal.
Cost Benefit Analysis
The college will protect the environment while at the same time save money in the long term.

2. Adopt an energy eco-efficient building and renovation policy.
I propose that the college adopt an energy eco-efficient building and renovation policy. William McDonough and Partners will be contacted to create and apply energy saving plans for any new building or renovation (McDonough and Braungart, 2002).
Cost Benefit Analysis
Since altering the heating and cooling system in already existing dorms is not efficient, when new buildings are constructed or renovated the new systems will be installed and implemented. Although the initial outlay may be higher, the savings in energy and water costs will be seen over time.

Problem Statement: Water
Water is the most important finite resource because humans cannot survive without it. Less than 1% of freshwater is available for human use even though 71% of the earth's surface is covered by water. Water is unequally distributed throughout theWorld; consequently, water can be very difficult to acquire for some people. Water tables are falling on every continent and withdrawals from rivers and underground reserves have grown by 2.5-3%

annually. The situation is predicted to become grimmer as the quality of water decreases due to contamination (Harrison and Pearce, 2000b).

It costs McPherson College an average of $33,019.54 a year for current water practices (Cripe, 2003). The majority of this water is used for irrigation purposes on campus. Fescue grass requires a large amount of water and maintenance. In addition, the college has had a tendency to waste water by over watering, water when raining, or windy. Water is also demanded for shower use. In general, students take multiple showers a day for an extended amount of time. The college wastes water by not fixing leaking faucets and showerheads immediately after they break. Faucets and showerheads leak for months before they are fixed (Cripe, 2003).

In order to address the college's wasteful water use, I propose the following:

Short-term

1. **Promote water saving tips and ideas to students, faculty, and staff through educational programs.**
   See Energy/Short-term/7 for proposal and cost benefit analysis.

2. **Manually turn on irrigation system when needed and turn off when raining and/or windy.**
   I propose that the campus switch to a manual irrigation system. The ground maintenance crew can turn the sprinklers on and off when needed, controlling how much and when water is used for landscape purposes.
   Cost Benefit Analysis
   The college will decrease water usage during non-needed times, therefore, reducing the cost of the college's water use. With little effort and cost, the college will save money and water.

3. **Fix leaks in showerheads and faucets after they begin leaking or break.**
   I propose that the college's Facility Management staff fix leaky showerheads and faucets in the bathroom promptly after they are reported. Cleaning staff will be responsible for reporting leaks promptly.
   Cost Benefit Analysis
   The college will save money, yet the cost will be minimal to Facilities Management.

Long-term

1. **Switch to natural landscaping by using natural vegetation.**
   I propose that the college adopt a plan to switch to natural vegetation landscaping. This will include removing fescue grass and replacing it with natural prairie short grasses.
   Cost Benefit Analysis
   Prairie short grasses will reduce the amount of time spent by Facilities Management to cut and manicure the lawn. Consequently, water and energy costs will decrease.

2. **Purchase new water-saving washing machines.**
   I propose that when new washing machines are needed, the college will purchase new water-saving washing machines.
   Cost Benefit Analysis
   Currently it may be too expensive to switch all the washing machines to water-saving washing machines but the change can occur gradually when old ones need replacing. By switching gradually the benefit of water-saving washing machines will be greater than the added cost. The college will save money and water.

3. **Adopt a water eco-efficient building and renovation policy.**
   See Energy/Long-term/2 for proposal and cost benefit analysis

Problem Statement: Waste

Waste is an inevitable by-product of most human activities. As the global population has grown, the amount of waste generated has increased. According to The Recyclers Handbook, the average American throws away 3.5 pounds of trash a day (1990). Currently there are four options for trash disposal: (1) Landfills- 80% of all trash, (2) Incinerators- 10% of municipal refuse is burned, (3) Transfer Stations- where trash is held before put in landfills, and (4) Processing Plants- recycling (The Recycler's Handbook, 1990). Recycling has become a technological fix in order to deal with the waste disposal issue. Even though it is helping, recycling is not the answer. The answer lies within the amount of waste generated.

McPherson College pays an average of $10,864.92 a year for waste disposal. The college community throws away clothes, food, paper, and other items that could be recycled, reused, and/or composted. Therefore, the institution contributes to landfill problems. The campus does not buy recycled office paper or use paper products. Polystyrene (styrofoam) products are used in the cafeteria and Dog House. Polystyrene is made up of material that does not decompose.

In order to address the college's wasteful generation and disposal trends, I propose the following:

Short-term

1. **Adopt a recycling program on campus.**
   I propose that every building have a separate receptacle for five recyclable items (paper, aluminum, glass, newspaper, and plastic bottles) and that they be placed in a convenient location. The college will contact John Hawk at McPherson Area Solid Waste Utility in order to rent a trailer with places to dispose of the five recyclable articles. This trailer will be placed by the cardboard receptacle besides Facilities Management and the recycling goods will be placed in them. The trailer will be delivered to the recycling center when full. A committee of students, faculty, and staff will work together to organize and run the recycling program. This committee will also promote the recycling center by advertising it throughout campus.
   Cost Benefit Analysis
   McPherson College pays an average of $10,864.92 for trash pickup/disposal a year. Implementing a recycling program will easily cut this amount in half; therefore, this will save money.

2. **Sponsor a bi-annual college and community yard sale.**
   I propose that the college host a yard sale in May and September to reuse items that are no longer wanted. It will include both the college and town communities.
   Cost Benefit Analysis
   The cost is nothing to implement, and the current disposal fee will decrease.

3. **Sponsor a McPherson College Swap.**
   I propose that a McPherson College Swap be held year round. Students will swap clothes with each other in the dorm lobbies or in an unused dorm room.
   Cost Benefit Analysis
   Having the McPherson College Swap will reduce the amount of clothes that are thrown away, thus saving landfill space. McPherson College's disposal fee will decrease while students are taught to reuse by lessening the amount of trash thrown away.

4. **Promote recycling and consumption reduction to students, faculty, and staff through educational programs.**
   See Energy/Short-term/7 for proposal and cost benefit analysis.

5. **Purchase recycled office paper.**
   I propose that the college buy recycled office paper. The college will contact an environmentally conscious organization (e.g.: Pennsylvania Resources Council) for a complete list of brand name recycled products.
   Cost Benefit Analysis
   The price of recycled paper may vary from virgin paper depending on the type of paper demanded. The college, therefore, needs to compare prices among competitors and find the company that is the least expensive.

6. **Sell recycled notebooks in bookstore.**
   I propose that before all paper is sent to a recycling center, some will be collected to make recycled notebooks. The clean side of the paper can be collated into a notebook and sold in the bookstore. Once the notebook has been completely used, they can be taken apart and put in the paper receptacles.
   Cost Benefit Analysis
   A club, committee, and/or SGA will use this project as a fundraiser and will cost the college nothing.

7. **Compost food and yard waste.**
   I propose that the college initiate an on-campus composting program with the help of the McPherson Area Solid Waste Utility. Unused food from the cafeteria will be collected in a composting pile. After decomposing, this waste will be applied as fertilizer. A pile for yard waste will also be started. This waste will be taken to the McPherson Area Solid Waste Utility to be chipped and shredded. The college will go and collect the necessary amount of needed mulch for fertilizer.
   Cost Benefit Analysis
   The college will save money on disposal fees and fertilizer costs. The only cost incurred will be transportation.

8. **Purchase paper products for the cafeteria and Dog House.**
   I propose that the college switch to paper products for carryout purposes.
   Cost Benefit Analysis
   The benefits in this policy center around the environmental ones since the price of paper products vary.

Summary

For each proposal above, I have given the basic cost benefit analysis as it pertains to time and money. In fact, 20 of the 23 proposals actually save McPherson College money. However, the main focus of my research and proposal continues to be the

stewardship of our resources. To understand more fully the implications of the proposed changes on our environment, consider the following: Replacing one incandescent light bulb with an energy saving compact fluorescent bulb means that 1,000 pounds less carbon dioxide will be emitted into the atmosphere (Earth Day Network, 2001). Every mile someone does not drive keeps one pound of carbon dioxide out of the atmosphere (The Brethren Witness Office, 2003). Instilling environmental ethics on over 350 students places the practices of McPherson College out into the world. Repairing a single dripping faucet can save hundreds and into the thousands of gallons per year (The ABC'S of Water Conservation, 1999). Water saving washing machines saves 20 gallons of water per load as well as energy costs of heating extra water (Arizona Department of Water Resources, 2002). At McPherson College alone, it is estimated that 64,000 gallons of water can be saved per month! Switching from polystyrene products to paper products for food service decreases the amount of non-biodegradable material in landfills. Making the proposed changes saves McPherson College money, instills a policy of stewardship in its students and, most importantly, protects our environment and resources.

Conclusion

McPherson College has an obligation to lessen its impact on the environment because it is an educational institution and is affiliated with the Church of the Brethren. Educational institutions teach students what actions are acceptable by the way the institution is managed. By providing a recycling center on campus, for example, students will learn the importance of recycling. These lessons will impact students' actions towards the environment for the rest of their lives. As McPherson College is affiliated with the Church of the Brethren it has an obligation to care for God's creation. The land can still be used but the college must not have a negative impact on it. Change is a very disturbing process that can be very intimidating. At times it requires time and money. It may seem easier to just continue life as normal, but in the case of McPherson College's environmental impact, the time has come to accept the challenge of implementing change.

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