Mount Allison University Environmental Audit 2002:

Completed by Sustainability Solutions Group

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Preface

Six years have passed since Mount Allison University first began the environmental auditing process. Over this time, a number of significant changes have occurred, both in the state of the world environment and at our university. The world's resources continue to be degraded at an exhausting pace. Environmental issues are one of the most pressing concerns in the world today. From global climate change to deforestation, polluted waters to urban smog, human actions threaten to radically alter the world's capacity to sustain life. In response to this planetary emergency, the university has made adjustments to its own operations. Progress has been made in the areas of transportation, paper consumption, as well as water and energy use. Unfortunately, the majority of practices have not been altered as significantly as is warranted by the current rate of environmental degradation on a global scale. In the areas of solid waste, hazardous materials, and finance, the university's practices remain largely unchanged since the time of the last audit. What will it take to truly minimize the university's impact on the environment?

During our research this summer, we noted two general obstacles to achieving the considerable improvements in university operations that are required to make Mount Allison a leader in environmental performance. First, was a distinct sense that the university was isolated from its natural surroundings in the Tantramar region. This is a problem common to many endeavours that work on a local level. Without being able to show directly the damage caused on the immediate environment, the impact of an activity can seem separate and disconnected from the activity itself. Unfortunately, local resources, such as the Canadian Wildlife Service and the Biology department on campus, reported that little research has been done on the local and impact of human activity in our region in recent times. Studies of this nature would make the information contained in a report like this one more than a hypothetical assessment of the university's true impact on its physical environs.

The second obstacle we noted was the integration of environmental concerns into the philosophy and decision-making process at Mount Allison. The university has made strides toward considering the environmental impact of its decisions. The Environmental Policy passed in 1999 and the completion of three biannual audit reports has helped greatly to engaging the university community on this matter. However, we lack long-term direction. The policy is guided by vague end-goals like "minimization" and "where required" that reflect the need for a stronger definition of how the university perceives its role in addressing what many have argued is now a global environmental emergency. We need to determine where these concerns fit into the university's philosophy. Further, we need to reassess what an acceptable pace for "minimization" might be, and what we decide what "where required" means. The university has the skeleton of an Environmental Management System (EMS) with a policy and auditing schedule. More effort needs to be focused on ensuring that a long-term strategy is in place for taking action based on the results of audits, and revising the policy so that it is both ambitious and specific enough to effect meaningful change. By creating a long-term management plan that is integrated with, and not parallel to, the established decision-making processes of our university, Mount Allison will be better poised to make headway in becoming environmentally and economically sustainable.

Students, faculty, staff, and administration at Mount Allison have put considerable effort into incorporating their concern for the environment into specific areas of the university's operations. This year's report attempts to capture the state of our resource use and output, as well as the degree to which the campus community acknowledges an awareness of environmental issues. We cannot stress enough the importance of using the specifics of this report to guide effective action in the future.

-August 29, 2002
Geoff Law, Mount Allison University
Kate Kennedy, Sustainability Solutions Group

Executive Summary

Since environmental auditing and the environmental policy were initiated, there has been a growing recognition on campus of the need for the University to operate in an environmentally friendly manner. There is still much work to be done before environmental concerns become ingrained in the operations of the University. A letter grade has been assigned to each chapter according to the progress and overall environmental performance in that area. The grades respect the environmental policy performance indicators, but take into account areas of concern not covered by these indicators. The grades, on a scale from A to F, reflect the effort towards, and the performance in, reducing the environmental impact of each area examined. The following legend defines the standards upon which each grades are assigned. Please note that an additional grade "Pass" has been added and that the standard for D has been adjusted so that the scale reflects those efforts that have continued, but not supplemented, since the time of the last audit.

Grade	Standard
A	All aspects of the environmental policy are adhered to and exceeded; Substantial effort is made to improve environmental practice and to incorporate environmental concerns into decision making
B	Significant effort has been made both to improve environmental practice and to incorporate environmental concerns into decision making.
C	Steps have been taken to improve environmental practice and consideration is given to environmental concerns in decision making.
D	Continuation of efforts begun prior to 2000. No new initiatives have been added.
Pass	Practice has not changed since the Environmental Policy was passed.
Fail	Practice has worsened

The grade for each chapter appears in both the executive summaries and at the end of each chapter in the report.

Buildings

There are currently 47 buildings that comprise the university campus. A small number of changes have occurred since the last audit. During this time one building, Hillcrest house, was demolished, while one building, the Coastal-Wetlands Center was built. Significant renovations have taken place in a number of buildings, including Bennett building, Avard-Dixon, Barclay, Bennett House, Edwards, University Center and Hunton House. Where ever possible the university attempts to take full advantage of environmentally-friendly technology. The university continues to use tripled layered insulation, Wattstopper technology in bathrooms, low flow faucets, and low flow-high pressure toilets. It is recommended that prior to the construction or major renovation of any building on campus, the University undertake an environmental impact analysis, which is presented to Senior Administration and the Director of Facilities Management before construction, as per the policy. An analysis of this fashion should consider the impact of the type and efficiency of materials used, damage to local flora and fauna, the energy efficiency of the design, and ability to accommodate technology which reduces environmental impact.

Grade Assigned: **C**

Energy

There has been a steady increase in electricity consumption at Mount Allison. From June 1, 2001 to May 31, 2002, our total consumption measured 11,420,093 kilowatt hours, an increase of 410,609 kilowatt hours over the previous year. Oil consumption fluctuates from year to year as a result of winter weather conditions. Efforts have been made to make the steam lines leak-free, and to install more efficient fixtures whenever renovations are done. In two years, when natural gas is expected to become available in Sackville, the university will be prepared to switch the main boiler, as well as a number of off-campus buildings over to this cleaner-burning fuel. In addition, Facilities Management has been investigating the possibility of installing a wind turbine on university property, for the purpose of meeting the campus energy demand more sustainably. In the last two years, steam and electricity meters have been installed and connected to a computer program that allows us to monitor our consumption constantly. It is recommended that the university use the data gathered from the meters to set a baseline and create a comprehensive plan to reduce consumption. The university should also continue to seriously examine the possibility of introducing renewable energy technologies on campus.

Grade Assigned: **C**

Transportation

In the past two years since the last audit in 2000, the university fleet has increased by one vehicle. The use of these vehicles has not changed dramatically since the last audit, however Facilities Management has recently purchased a bicycle for its staff to use on campus. This will reduce the amount of driving done on campus by this department. Two bike racks have been installed since the last audit, both located at the Dunn building. At the time of this audit, a number of bike racks to serve residential and academic buildings throughout campus were being installed. It is recommended that the University investigate and make funds available for the purchasing of a zero emissions vehicle. The University should foster and improve the use of car-pooling and ride sharing programs, and promote travelling in the most sustainable manner possible.

Grade Assigned: **B**

Air Quality

From May 2000 to April 2002 1 006 528.35 kg of green house gases were emitted by Mount Allison University. A comparison with the previous audit on the amount of greenhouse gases produced is difficult, because a different method for calculating the amount of gas produced was used to calculate this years total. The 2000 audit reported that 5 654 472.9 kg of green house gas was emitted by the University in the two year auditing time frame. The significant decrease can be attributed to the exclusion of embodied energy in this audit (it can only be calculated once). The University's Environmental Policy currently does not have a section dealing with air quality. It is recommended that the University create a section in the policy, complete with performance indicators, specifically focused on issues of air quality. It is also recommended that the University make a commitment to reduce emissions to meet or exceed Canada's Kyoto Protocol commitment of 6% below 1990 levels.

Grade Assigned: **D**

Hazardous Materials

The sources and volumes of hazardous materials being used in an intricate system such as Mount Allison University are often hard to track, which makes the measuring of the impact of hazardous chemicals disposed of by the University largely unknown and difficult to estimate. From May 2000 to April 2002 Mount Allison University disposed of approximately 25 251.42 litres and 14 379.2 kg of hazardous waste. In comparison with the 2000 audit, there was a 2511 liter increase in the amount of liquid hazardous waste being disposed of, and a 13 277.9 kg increase in the amount of solid hazardous wastes disposed of. This extreme increase is due to the inclusion of solid cleaners used in food services in this years audit. Hazardous wastes

on campus are not disposed of on a regular basis, but are disposed of only when there is sufficient quantity to warrant disposal. It is recommended that the University create a campus wide database dealing with hazardous wastes on campus, providing information on the purchasing, storage, and disposal of wastes. A system of this nature would allow the tracking of wastes from cradle to grave, and eliminate the purchasing of chemicals which might already be in excess in on campus. It is further recommended that all members of the University community strive to ensure that all hazardous wastes are kept, labeled, used and disposed of in the proper fashion.

Grade Assigned: **C**

Solid Waste

An accurate measurement of the amount of solid waste produced by the university is impossible to obtain, as the amount of waste produced is not weighed. Thus a comparison on the amount of waste produced between this audit and the previous audit is not possible. It is important that if the university wishes to accurately gauge its impact upon the environment that it begin to measure the amount of waste produced. The University is currently billed for 224 tonnes per year, 23 tonnes per month from September to April, and 10 tonnes per month from May to August. The cost of disposal varies depending on what materials the University is disposing of. The University has made some progress in the area of solid waste. A number of new recycling containers were installed in the fall of 2000, and in the spring of 2002, yard waste started being composted on site, to eventually be reused as fertilizer on campus grounds. It is recommended that the University begin to weigh the amount of solid waste and recycling which it produces. Without accurate numbers on the amount of waste produced, gauging the environmental impact, and making reductions, is difficult.

Grade Assigned: **D**

Paper

The 1998 audit reported that 4 498 218 sheets of paper were consumed between 1997 and 1998. In 2000, the audit reported that 6 450 000 sheets of paper had been consumed from May 1998 to April 2000. From May 2000 to April 2002 Mount Allison University consumed 8 275 681 sheets of paper. This marks a 1 825 681 increase in the amount of paper consumed at the University. This increase is partly due to greater consumption, and partly due to more accurate accounting of paper used on campus. It is recommended that the University create a specific section of the environmental policy dealing specifically with paper use on campus. All members of the University community are encouraged to adopt paper saving methods, such as printing double-sided, using both sides of the paper before recycling it, and only printing necessary documents.

Grade Assigned: **C**

Food

Sodexho continues to be the primary food provider on campus. Approximately $42,000 are spent each week of the school year on food served at Jennings and the Golden A Café. A small portion of this is supplied by local sources and some adjustments are made to the menu according to the season. Unfortunately, organic food is not yet served by Sodexho. It is recommended that the Director of Food Services continue to investigate the possibility of purchasing organic foods, and that meals be planned using more locally available ingredients.

Grade Assigned: **D**

Water

In 2001, Mount Allison's water consumption increased by 3,147,000 litres over the previous year to a total of 174,386,000 litres. Retrofits, a decrease in activity in some labs, and the combination of the two meal halls, has reduced consumption in some of the larger buildings, however the overall trend has been an increase. The university continues to install more efficient fixtures whenever renovations are done, and is open to testing water saving

technologies. The quality of incoming water from the Town meets health regulations, however the university remains somewhat vague on the impact of its activities on waste water. It is recommended that the university make it a priority to retrofit particularly inefficient fixtures on campus, and that a baseline for total water consumption is set and comprehensive plan for reduction made from that baseline.

Grade Assigned: **C**

Finance

This year, Mount Allison will have a total of $44,349,377 with which to operate the university. The source and spending of these dollars stretch the university's environmental impact far beyond the bounds of the campus. There is room to minimize this impact in the areas of income, purchasing, and investments. Though the larger majority of the university's income is in the form of government grants and student fees (85.5%), our operations are also dependent on endowments and donations. Currently, the External Relations department does not screen donors on the basis of ethics or environmental practice. Though an environmental purchasing policy is not yet in place, some effort is made in the purchasing department to address the environmental impact of the university's expenditures. A number of materials are purchased in bulk, and the Purchasing Manager encourages departments to order more environmentally friendly or efficient items when they are available. Two years ago, it was proposed that the Board of Regents consider switching some of the university's investments to an ethical portfolio, however, the university continues to invest in unscreened funds. It is recommended that the university develop an environmental purchasing policy, and that it seriously reconsider the feasibility of screening both donors and its investments.

Grade Assigned: **Pass**

Education

At Mount Allison University, a number of programs exist, both academic and extracurricular in nature, which seek to educate the university community about environmental issues. The university continues to offer Environmental Science and Environmental studies programs, which integrate environment-related courses from a variety of departments. However, a number of faculty have expressed concern over the lack of resources devoted to the Environmental Science program. In addition to academic programs, a number of extracurricular environmental initiatives have been undertake in the attempt to raise environmental awareness. These initiatives, in large part, have been undertaken by the Blue Green Society and Green Ambassadors, both of whom have sought to increase environmental awareness within the university community through a number of educational campaigns. Unfortunately, many members of the university community remain unaware of the university's environmental impact on the local and global environment. It is recommended that faculty continue working to incorporate local and global environmental issues into their classes, and that the university appoint an Environmental Literacy task-force to address the ever-growing need for environmental education at Mount Allison.

Grade Assigned: **C**

Acknowledgments

Mount Allison University's Third Environmental Audit was made possible through the help and advice of numerous people:

The Environmental Issues Committee for overseeing the continuation of the auditing process over the past six years. Sustainability Solutions Group for providing its services in environmental auditing. Jeff Lamb for his advice and good judgement. Perry Eldridge for having to answer oh, so many questions about the technical backbone of the university.

We thank the following people for their help with all the details contained in the report: Audrey Kenny, Deanne Ward, Pamela Lusas, Andrea Ward, Michelle Strain, Mark Payne, Wendell Richards, Mark Henchy, Janet Robinson, Rosemary Polegato, Brad Walters, Paul Bogaard, Margaret Beaton, Jean-Guy Godin, Robert Ireland, John Read, Roger Smith, Canadian Wildlife Services, Colin MacKinnon, Christa Methot, Stephen Duffy, Richard Lautenschlager, Dan Steeves, Dave Stewart, Peter Ennals, Dale Creelman, George Woodburn, Jeff Ollerhead, Ralf Bruning, Cindy Allan, Mike Boudreau, Bea Walker, Joanne Peters, Helmut Becker, Yonatan Strauch, Yuill Herbert, and everyone who took the time to complete the Environmental Audit Survey.

Purpose of the Audit

This report is the third biannual environmental audit of Mount Allison University. The first audit was conducted in the summer of 1998 by two students, Hillary Lindsay, and Sarah O'keefe. The second audit was conducted in the summer of 2000, by three students, Anna Kirkpatrick, Kate Kennedy, and Jacques Breau. The purpose of the environmental audit is fourfold:

1) To account for the resources which flow through Mount Allison University

2) To compile comprehensive environmental data from the various sectors of the University community.

3) To educate the administration, students, staff, faculty and community.

4) To initiate changes leading to a more environmentally sustainable campus.

Under the direction of the Environmental Issues Committee, two students, Kate Kennedy and Geoff Law, were hired to conduct the third audit during the summer of 2002. The third report is intended to act as a comprehensive update of Mount Allison's environmental accountability since the 1998 and 2000 reports, but also as an assessment of the performance indicators in each section in the University's Environmental Policy. The policy was created as a means of ensuring that the various members of the University community continue to work towards making Mount Allison a leader in environmental performance. In this report, the auditors decided to continue on with the examination of current performance indicators in the Environmental Policy, and whether or not they are being met. In a number of cases, the performance indicators were, found to be by the auditors, ineffective measures of environmental impact or progress. In these cases, changes have been suggested. Supplementary to this report, the auditors have included a report examining the performance indicators within the Environmental policy, determining whether or not the current performance indicators are accurate measurements of the University's full environmental impact, and what changes can be made so that the full environmental impact of the University can be accounted for in the performance indicators. Wherever possible, this year's auditors have attempted to expand the scope of research conducted in each chapter, in the hope of providing the most comprehensive account of the University's environmental impact.

Environmental Action on Campus

The following is a brief history of environmental action undertaken by the University. A full account of student environmental action on campus can be viewed in the education chapter. It should be noted that a large portion of environmental action at Mount Allison has been the result of grassroots and individual initiatives. Though a large portion of the push for stronger environmental accountability at the University is driven by these student groups, environmental concerns are slowly becoming more and more apart of the daily operations of this institution. Environmental action taken by the University has increased dramatically since the environmental auditing and policy were enacted. In the summer of 1998 two students were hired to carry out an extensive environmental audit of Mount Allison University. From the recommendations made in this report, the Environmental Issues committee developed an Environmental Policy for the University. The policy was passed by the Board of Regents in May 1999, officially becoming a University document. It contains a general policy and a set of performance indicators in each of the following nine areas: Curriculum, Energy, Hazardous Materials, Transportation, Water Consumption, Solid Waste, Food, Purchasing and Buildings. The policy does not contain time frames or regulatory mechanisms, but instead focuses on achievable goals that can be used as a measure of progress in each area. It states that these goals are to be fulfilled "on an ongoing basis as resources become available and technology improves." The Environmental Policy has not been altered since its adoption as a official University document, although it is meant to be revised periodically. In the spring of 2000 three students were hired as 'Green Ambassadors.' Their job was to raise the profile of the profile of the policy amongst staff and students through formal and informal

presentations around campus, and to gain a general impression of how the policy has been received by members of the University community. In the summer of 2000 the second environmental audit of Mount Allison University was conducted. Green Ambassadors were again hired for both the 2000-2001 and 2001-2002 academic year, once again working to raise the profile of the policy and the audit, and helping various members of the University community to reduce their environmental impact. In summer of 2001 a student was hired to create a funding document for the sustainable residence initiative, looking for various sources of funding for a project of this nature. It was also in this year that the University adopted the Sustainable Residence Initiative as an official University project. And, in the summer of 2002 two students were hired to conduct the third environmental audit of the University.

Organization of the Audit Chapters

The organization of this report is essentially identical to that of the 2000 audit in terms of the division of chapters and the subsections contained within, with a few exceptions. The presentation of information in each **Audit** subsection has been adapted from the last report, and altered only where new information has been added, or if greater clarity could be given.

The **Introduction** gives a brief synopsis of the major improvements (or lack thereof) since the 1998 and 2000 reports, including the total use or disposal of particular materials as a means of gauging the basic impact of the university in each area of resource flow.

Environmental Significance provides information on the current supply or scarcity of a resource, and the impact of human use of this resource on the local and global environment. Although many of these subsections have changed little since the last report, significant changes to policy or breakthroughs in human understanding of the various issues since 2000 have been included. For the 2002 audit, the auditors attempted to better show the links between these areas of environmental concern and human health concerns.

Current Environmental Policy quotes the section of the Environmental Policy that pertains to that chapter.

Responsible Parties identifies the organization and personnel responsible for the management of a particular resource on the Mount Allison campus. In a few cases, these parties are explained more fully in this report.

The **Audit** subsection comprises the bulk of each chapter and addresses the current state of the environmental resource and its use at Mount Allison. In a few chapters, this subsection has been significantly altered from the last report in terms of the type or extent of data collected. This is indicated at the beginning of this subsection within each chapter.

Case Studies provide examples of environmentally responsible actions taken by other universities or institutions to manage a particular resource. Wherever possible regional or Canadian examples were selected.

Recommendations outline the concrete actions that can be taken by various members of the university community. Many recommendations have been taken from the last report simply because no action was taken by the respective parties. Recommendations that, upon further research, proved ineffective, have been amended or omitted. In addition, a number of new recommendations were made based on the current management of each resource. In each chapter, recommendations are made for:

Senior Administration
Staff
Faculty
Students

Review of Current Environmental Policy is presented as a chart in each chapter. It is designed to provide a quick synopsis of the performance indicators that accompany each section of the current Environmental Policy, the progress made in each of these areas, and changes that might make these indicators more accurate measures of progress. In many cases the auditors found the performance indicators themselves to be satisfactory

and no change is proposed.

Letter Grades are explained in the Executive Summary of the report. They are designed to give the briefest possible synopsis of the university's performance in each of the areas studied by the auditors. They appear at the end of each chapter.

N.B. All direct references made in the text are footnoted and a complete bibliography of sources used for the report can be found on page As much as possible, data collected for the audit was integrated into the text of the report. In instances where extensive data was collected, a note of it is made in the text with directions to an appendix. All appendices are located at the end of the report.

Buildings

Introduction

There are currently 47 buildings that comprise the University campus. A small number of changes have occurred since the last audit. In the past two years, one building, Hillcrest house, was demolished, while one building, the Coastal-Wetlands Center was built. Significant renovations have taken place in a number of buildings, including Bennett building, Avard-Dixon, Barclay, Bennett House, Edwards, University center and Hunton house. Where ever possible the university attempts to take full advantage of environmentally-friendly technology, including tripled layered insulation, Wattstopper technology in bathrooms, low flow faucets, and low flow-high pressure toilets.

Environmental Significance

"We think that education occurs mostly in buildings, yet apparently we believe that the design and operation of those same buildings have nothing to do with education."[1]

-David Orr

The way in which we choose to design and construct our buildings impacts on the environment in a number of ways. The materials we choose to build with can exact a heavy toll upon the environment, in both the production and use of a particular product. The way in which we choose to construct our buildings also has a continuous impact upon the environment. If a building is built poorly, it will only persist to be a drain on valuable resources. In order to lessen the environmental impact, it is essential that all buildings are constructed in a sound manner, taking advantage of new technologies that greatly reduce the environmental impact of our buildings (in both construction and use).

The resources used in the construction of buildings can have detrimental effects upon both the environment and human health. While the use of some resources, such as tropical wood, contributes to the depletion of fragile ecosystems, others, such as asbestos, can cause adverse health effects. The following is a list of some common materials used in construction, and their impact upon us and the environment.

- PolyChlorinated Biphenyls (PCBs) are found in numerous building products, including flourescent lights, and have been found to cause some forms of cancer
- Asbestos, formerly used as a flame retardant, known to cause cancer when inhaled
- Lead based paints, cause brain and nervous system damage
- Mold, found in moist areas, holds the potential to cause severe allergic reactions
- Chlorofluorocarbon (CFCs), found in air conditioners, refrigeration units,
- Mercury, found in HVAC controls, is a neuro-toxin

It is important that when the university constructs a new building, that it take advantage of recycled materials, passive solar lighting and heating, proper insulation, and technology which lightens the buildings impact upon the environment. If our buildings are constructed in the proper manner, utilizing the proper technologies, they can conserve water, energy, improve air quality, and even increase productivity.

We are often largely unconscious of the effect that our built environment

[1] Hannum, Hildegarde ed. People, Land and Community. New Haven: Yale University Press, 1997 pg 248

has on the way in which we think and act. We have the power to change our built environment, but simultaneously, our built environment has the power to effect our thoughts and habits. In Greening the College Curriculum, David Orr writes that, "buildings have their own hidden curriculum that teaches as effectively as any course taught in them."[2] It is important that, if Mount Allison is going to be an environmental leader, that its built environment reflects this.

Current Environmental Policy

"The University will endeavour, under the supervision of Facilities Management, to minimize the ecological impact of the construction, maintenance and operation of the buildings on campus."

There are three performance indicators in the buildings subsection of the University's environmental policy.

- "Response time for building maintenance and repairs is monitored and minimized. Neglected maintenance tasks generally increase energy use and potential harm to the environment
- Prior to new building projects, an environmental impact analysis is completed and such impact is minimized through appropriate selection of materials or design elements.
- Building construction or renovation makes use of environmentally friendly materials and disposal procedures." (Section 2.9, Mount Allison University Environmental Policy, www.mta.ca/environment/)

Responsible Parties

The maintenance and repair of campus buildings is the responsibility of the Facilities Management department. The need for repairs, renovations, or construction of new buildings is reported to the director of Facilities Management. When there are sufficient funds available, the director requests design proposals from architects. The contract is then awarded to the lowest bidder.

Audit

The construction of new facilities on campus provides the university with the opportunity to make a clear statement about their concern for environmental and operation cost savings. While the university has made some changes to its building practices to incorporate environmental concerns, there is still much more the university can do to lessen the environmental impact of its buildings. As the university will soon be entering into a phase of large growth, it is important that the university attempts to design these buildings in the most environmentally friendly manner as possible. With this future expansion in mind, it is important that the university develop a environmental construction policy (taking into account both use and design). The implementation of such a policy will allow the university to operate more efficiently (decreasing costs), promote environmental sustainability, and become an environmental leader.

Currently, the procedure for maintaining buildings at Mount Allison, beyond day to day maintenance work, is as follows: when it is recognized that a building is in need of repairs a project file is started and the appropriate member of the Facilities Management team is designated to oversee the job. The extent of a repair or renovation is assessed, along with an estimate of the cost. The project is then included in the master list of projects to be considered in a given year. If ample funding can be allocated, a job contract is drawn up and bid on by interested companies. It is at this stage that environmental concerns can be addressed and potentially included in the stipulations for winning a bid. Details such as the type and components of materials used, recycling of waste generated in the project, and installation of energy efficient technology can be tailored to minimize the environmental impact of a project. If a project cannot be granted the necessary funding to be completed, it is deferred until a later date, with the urgency determining the level of priority granted. Economic factors play an

[2] Greening the College Curriculum, David Orr pg 16

important role in determining priority; Facilities Management aims to address problems before they become more expensive to repair. While this method of prioritizing is often consistent with addressing environmental concerns, it is essential that environmental urgency not be a secondary consideration. For example, upgrading the university's heating system is currently a priority as heat loss results in a direct financial loss. Installation of solar panels, on the other hand might be deferred simply because it demands a start-up cost much higher than that demanded by hooking a building into the NB Power grid. Although the installation of solar panels for the University Centre was put off due to financial costs, the university continues to keep environmental issues in mind when building or renovating.

When deciding upon a contractor, the university does not yet adhere to a policy of hiring on the basis of environmental practices. However, advances have been made on the part of Facilities Management to ensure that environmental considerations are stipulated in contracts before they are tendered. Efforts are made to recycle as much of the waste materials from the project as possible. For the renovations on the Dunn building in the summer of 2000, a special contract was granted for a company to remove and recycle waste from the old building. While contracts continue to be awarded more for economic measures than environmental concerns, the university continues to consider different environmental projects. For instance solar panels were considered for both the new Dunn building as well as the University Centre. Unfortunately the University was not able to secure sufficient funds to see the project through to completion. Environmental impact assessment are not yet standard procedure when constructing new buildings or major renovations. The completion of an environmental impact analysis should be adopted as standard procedure by the University.

In the two years since the last audit, there has been one building built, one torn down, and a number of extensive renovations on a number of buildings (full list of all renovation work can be found in Appendix A). In the summer of 2001 the Coastal-Wetlands research centre was constructed. It is a state-of-the-art facility which takes advantage of the latest in technology. As it's intended use is as an experimental greenhouse, it is equipped with sensitive computer controls which regulate the temperature and amount of light within. Major renovations took place in a number of both academic and residential buildings. In the summer of 2001 renovations took place in the third floor of the Avard-Dixon building, creating more office space. Two washrooms were also installed during the renovations. As well in the summer of 2001, extensive renovations took place in the Bennett building, which included the installation of an elevator, and the creation of more office space. In September of 2000, there were extensive renovations to the dons apartment in Bennett house. Masonry repairs were carried out on Edwards house, Flemington, Chapel, and the University Centre. Extensive roofing jobs were carried out on Convocation hall, University Centre, Edwards House, and Cuthbertson house. In the spring of 2001 the university upgraded the fume hood ventilation system in the Barclay building. These are some of the major building and renovation jobs carried out in the past two years, and is not meant to be an exhaustive list of all repair work done on the university campus. While a detailed list of all the materials used in building and renovation projects in the past two years would help in show the true environmental impact of each building, the collection of that data was determined to be out of the scope of this audit. The collection of materials used data would aid in the full assessment of the environmental impact of the university.

In July 2000, an extensive facilities use survey was carried out by the A.J. Diamond Company. Their report identified both program space deficiencies and building condition deficiencies. From this survey, they developed two future development options for the University. The University recently adopted option one of this master plan. This plan is an extensive, long-term plan for campus development, which attempts to organize the campus according to its various operations, with residences located on the north end of campus near the meal hall, academic buildings focused around the quad, and student services located at the southern end of campus. It should be noted that the A.J. Diamond plan is only a provisional guide, providing suggestions as to how the University should develop, but is not a definitive plan for campus growth. Some of the general suggestions made by the A.J. Diamond corporation, not specific to either plan, include:

- The removal of the Fine Arts studios from both Hart Hall and Gairdner buildings. Hart Hall will be renovated to create more class room and office space.

- The Library space will be reorganized so as to make more study and book space. The archives will be relocated to either the Gairdner building or to a Library extension.

- Renovation and updating of laboratory space in the Barclay building, which will increase the overall amount of space dedicated to research.

- Renovation or Replacement of Trueman and Palmer

- Accessibility renovations, in Avard-Dixon, Flemington, Crabtree, and Centennial Hall.

- Renovation of Athletic centre.

The special features of option one are as follows:

- Trueman is replaced by a new residence located at the north end of campus

- Trueman/McConnell is renovated to house all current occupiers of the University Center (SAC, Student services, CHMA, Argosy, Allisonian, Pub, Golden A, Mail room, Mail boxes), except Windsor theatre. It is planned for this facility to also house the book store, and repro graphics.

- Renovations to the University Centre so that it could house the entire Fine Arts department, and Windsor theater.

There were a number factors contributing to the decision to pursue option one of the proposed plans. One of these factors was adherence to the university's environmental policy. While option one would see the creation of approximately 6000 sq ft more unsubstantiated space than option two, option one focuses on the renovation of existing buildings rather than the creation of new facilities. This will allow the university to reuse existing building space and materials, cutting down on the need for new materials. While option one maybe be acting against the environmental policy, in terms of creating more unsubstantiated space, it may, in the long run, reduce the schools environmental footprint by reusing existing structures rather than creating new ones. The true test of adherence, and commitment to the environmental policy will be shown in the way in which these facilities are renovated or built. The building plan presents a tremendous opportunity for the university to demonstrate its commitment to reducing its environmental impact. New buildings present to university with the opportunity to use the latest in technology, reducing energy, water and heat consumption, through proper insulation, solar panels, and low flow water fixtures, and alternative building techniques, taking advantage of passive solar heating and wind generated power. Renovations, as well present the university the opportunity to invest in technology which will both reduce the amount of money spent on each building (energy, heat, water) but will also act to reduce the environmental impact of that building. For example, both Trueman House and Palmer House are slated for extensive renovations. Both buildings have extensive southern exposure, which would make them suitable for the use of passive solar heating, and/or the use of solar panels.

In the 1999/2000 academic year, the sustainable residence initiative was begun. This student initiative sought the construction of a multipurpose environmentally friendly facility which would serve as a residence, meeting center, classroom, and demonstration center for sustainable living. Currently the university has adopted the Sustainable Residence Initiative as an official university project, and is currently raising funds so that a architect and engineer can be hired to design building plans. A building of this nature would help the university reduce the environmental impact, and provide a model from which future building can be based upon.

Case Study

In 1996, McGill University carried out an extensive renovation of one of their residences on campus. The residence which was built in the late 1960's was in a state of disarray, and required immediate attention. The structure of the building itself was still functional, so the decision was made to renovate the building, incorporating a number of environmentally friendly technologies. The University strived to recycle as many products as possible from the old residence, incorporating them in various fashions in the new residence. The facility was constructed in a fashion that allowed the university to add on additional, environmentally friendly technology once it became financially possible to obtain and implement. The building currently features, and can house a number of interesting technologies including:

- A greenhouse for each housing unit, designed to capture and store solar heat, which is then used to heat the building (passive solar heating)
- Water heated through the use of solar energy (active solar heating)
- Rainwater collection system, to be used in gardening and laundry facilities
- Avoidance of PVC-based products
- Ecological waste water treatment facility (Living machine)

The residence is being built as a multi-purpose facility, as it will be used as a resource and demonstration center, and is integrated into a number of classes taught at the university.

Recommendations

For Senior Administration

1. Establish a set of standards to direct the energy use, water consumption, quality and design of future building projects on campus with the purpose of minimizing the environmental impact of the university's buildings. Specifics might include those listed in Recommendation 5 for staff.

2. Prior to approval of significant renovations or construction on any existing or future structures on campus require that an environmental impact analysis be presented. This analysis would consider the type and efficiency of materials used, the damage to local flora and fauna, the energy efficiency of the design and its ability to maximize renewable environmental resources.

3. Encourage the reduction of toxic building materials by providing funds for the purchase of non-toxic alternatives.

4. Make a commitment to eliminate purchases of all old growth wood products.

5. Continue to support and provide funding for the design and building of the Sustainable Residence.

For Staff

5. Make a commitment to favour structural designs which have a smaller environmental impact. Favoured designs would include:
   a) Plans sized for optimal use of building materials
   b) Space for recycling containers
   c) Recycled products (eg: carpet, tile, furniture)
   d) Low toxicity floor and wall coverings
   e) Efficient energy and light fixtures
   f) Optimal use of passive energy from shade and sun using windows
   g) Insulation which significantly exceeds existing

building codes

h) High quality ventilation system
i) All contract agreements include a clause outlining the treatment of solid waste by the contracted company. This agreement would demand that a concerted effort be made by the company to:
j) maximize the efficiency of all materials used
k) use recycled and environmentally friendly materials whenever they are less than 5% more expensive than the non-recycled alternatives.
l) sort and recycle all recyclable solid waste.

1. Demand full corporate disclosure of all products and procedures used by companies entering or under contract with the university. The disclosed material and processing information should then be made available to all concerned individuals.

2. Establish a data base to record and address maintenance issues as quickly as possible. This should be accessible to all staff, students and faculty for input. A well maintained building is generally less harmful to the environment, and observations made in existing buildings can help in designing better buildings in the future. Continue to keep accurate and accessible records of building maintenance done.

3. Encourage the reduction of waste in the trades shop by providing funds for the removal of recyclable waste (wood, metal) to recycling centres.

For Administration, Faculty, Staff, and Students:

4. Take the initiative to kindly report any facility defects you find to Facilities Management by e-mailing fixit@mta.ca

Figure 1.1 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Response time for building maintenance and repairs is monitored and minimized. Neglected maintenance tasks generally increase energy use and potential harm to the environment.	This policy is adhered to for most repairs. Some repairs assume priority over others, bumping more unimportant repairs down the priority list.	No change proposed.
Prior to new building projects, an environmental impact analysis is completed and such impact is minimized through appropriate selection of materials or design elements.	Environmental impact analysis is not carried out in all cases.	Require that an environmental impact analysis be conducted prior to all new construction and major renovations.
Building construction or renovation makes use of environmentally friendly materials and disposal procedures.	While not all materials are environmentally friendly, there has been some headway made in this area.	Define what environmentally friendly materials and disposal procedures are.

Letter Grade: C

Energy

Introduction

There has been a steady increase in electricity consumption at Mount Allison. From June 1, 2001 to May 31, 2002, our total consumption measured 11,420,093 kilowatt hours, an increase of 410,609 kilowatt hours over the previous year. Oil consumption fluctuates from year to year as a result of winter weather conditions. Efforts have been made to make the steam lines leak-free, and to install more efficient fixtures whenever renovations are done. In two years, when natural gas is expected to become available in Sackville, the university will be prepared to switch the main boiler, as well as a number of off-campus buildings over to this cleaner-burning fuel. In addition, Facilities Management has been investigating the possibility of installing a wind turbine on university property, for the purpose of meeting the campus energy demand more sustainably. In the last two years, steam and electricity meters have been installed and connected to a computer program that allows us to monitor our consumption constantly. This will make it easier to target inefficiencies, and enable us to set a baseline from which to set goals for reducing our energy demand.

Environmental Significance

The production of energy raises a number of environmental concerns. In Canada, on a per capita basis, we consume more energy than any other nation in the world.[1] Our exorbitant demand for energy has caused a number of environmental problems, which threaten to effect us and the environment in both the short and long term. As a typical developed nation, we have the tendency to view energy as a limitless resource with little impact, this is however not true, as current methods for generating energy are simply not sustainable. The David Suzuki foundation claims that in Canada, "energy consumption grew about 13 per cent between 1990 and 1998, while emissions rose at a rate of 1.5 per cent annually, 17 per cent since 1990. Rising emissions trigger more rapid climate change and worsen air pollution - with serious health consequences."[2]

The majority of energy in Canada is produced from either large scale hydro-electric dams, the burning of fossil fuels, or nuclear power. In the process of burning coal, natural gas, or oil for energy generation a number of poisonous gasses are released into the atmosphere. These gases pose a great threat to both human health and environmental integrity. In Canada, the energy industry is the single largest contributor of carbon dioxide emissions, which is believed to be the main green house gas contributing to global warming.[3] Once hailed as the safe alternative to the burning of fossil fuels, nuclear power has revealed the potential it has to be devastating to both human health and the health of the environment. The Chernobyl disaster of 1986 is all too much the perfect example of the potential danger inherent in nuclear technology. While small scale hydro-electric dams can

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[1] David Suzuki Foundation, 'Huge Energy Appetite,' http://www.davidsuzuki.org/Climate_Change/Politics/Huge_Energy_Appetite.asp

[2] David Suzuki Foundation, 'Huge Energy Appetite,' http://www.davidsuzuki.org/Climate_Change/Politics/Huge_Energy_Appetite.asp

[3] David Suzuki Foundation, 'Huge Energy Appetite,' http://www.davidsuzuki.org/Climate_Change/Politics/Huge_Energy_Appetite.asp

be environmental friendly and sustainable, we have the tendency in Canada to build massive dam projects, such as phase one of the James Bay project, which flooded an area of 15873 square km.[4] Large hydro-electric dams of this nature cause the release of large quantities of methane, a greenhouse gas, from decomposing vegetation. The flooding also causes the release of mercury from vegetation, which eventually bio-accumulates in the food stream, effecting the health of humans, Beluga whales and seals.[5]

We must strive to reduce the amount of energy that we consume, while at the same time invest energy and resources into the development of renewable energy technologies, such as wind, solar, and geo-thermal. Not only are our current methods of energy production environmentally devastating, but they are primarily based upon non-renewable resources. If we wish to ensure the environmental health of the planet, while at the same time ensuring that we will have the capacity to meet future energy demands, it is essential that we develop sustainable, renewable forms of energy production today.

Audit

At Mount Allison University, energy is supplied from three primary sources: electricity, Light Oil, and Bunker A Oil. The systems and billing for these sources have not changed since the time of the last audit. For a number of years, Facilities Management has looked forward to the installation of metering technology that would allow us to monitor the amount of steam and electricity being consumed by individual buildings on campus. In the past, we have only known how much steam flow is leaving the main boiler at the Heating Plant. Now, with over a year's worth of data on monthly consumption and constant measure of the steam flow and wattage going into each building, it is possible to make more accurate assessments of the university's energy consumption. A sample of the electricity demand and steam flow to metered buildings is contained in Appendix B. The technology is still being fine tuned, but the charts contained in this chapter give a fairly accurate picture of the breakdown of total heat and electricity consumption on our campus as shown by the meter data.

Electricity: Between June 1st 2000 and Mary 31st 2001, the university consumed 11,009,484 kilowatt hours of electricity, and between June 1st 2001 and May 31st 2002, this totaled 11,420,093 kilowatt hours. Figure 2.1 charts the increase in total electricity consumption since 1998 and a breakdown of monthly consumption in each building is contained in Appendix C.

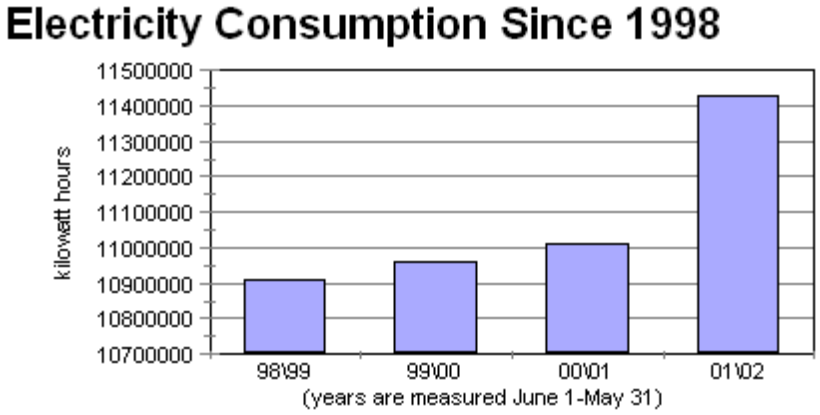


Figure 2.1: (The graph below does not begin at zero. The increase from 2000/2001 to 2001/2002 is a 9% increase in consumption)

The university's electricity consumption has been on a steady increase for a number of years. This is thought to be the result of larger numbers of

[4] 'Comparative Study of Hydroelectric Projects in Canada and India,' http://www.expert-eyes.org/report.html

[5] 'James Bay Project: Electricity and Impact,' http://www.american.edu/TED/JAMES.HTM

students, as well as the continued increase in the number of electric equipment. Electricity powers most equipment on campus, as well as heating Sprague House, Central Stores, Bermuda House, Carriage House, Cuthbertson House, and Facilities Management.

For the past several years, lighting on campus has been undergoing retrofitting to improve energy efficiency. Building renovations always include switching from T-12 fluorescent bulbs to T8 models, which use 12 watts less energy. At this time, Facilities Management does not keep track of retrofits done on an individual basis, though the department is beginning to create a database that will keep record of the specifics on each building and chart changes as they are made.

Ventilation systems on campus are a growing energy draw. A number of buildings have undergone upgrades in circulation and cooling to improve indoor air quality. The complete renovations of the PEG (now the Dunn building) and Jennings meal hall included the installation of more energy intensive ventilation systems. In April, 2001 the final phase of upgrading the fume hoods and ventilation in the Barclay building was completed. In 2001, the top floor of the Bennett Building (previously called the CLT) was completed as office space, including a new air handling system. Similarly, the third floor of Avard Dixon was finished and now houses the Geography department. The interior work done on this floor included the addition of an air conditioning system, office equipment, and lighting. Finally, the interior renovation on classroom 101 in Hart Hall featured a new air exchanger.

As it is the sole provider of energy in New Brunswick, the university continues to receive its energy from the New Brunswick Power Commission. NB Power has a net generating capacity of 3140 megawatts.[6] There was a substantial decrease in the generating capacity over the past two years, which is a direct result of the almost complete shut down of the Point Lepreau nuclear generating station for assessment and repairs. In 1995, the Point Lepreau generating facility had over 1 300 000 kilograms of nuclear fuel waste in storage on site. It is estimated that this nuclear waste has a half life of over 15 million years.[7] There are a number of different energy production methods employed by NB power, including hydro-electric, nuclear, coal, oil and natural gas combustion. Currently, there is one nuclear power station, six hydro-electric generating stations, five thermal generating stations, and three combustion turbines.[8] NB power currently is running two experimental wind energy stations in Knowlesville and Lameque, but has yet to make a substantial investment in this, or any form of renewable energy technology.

Oil: Mount Allison uses both light oil and Bunker A oil to heat buildings and hot water on campus. Baxter House, Black House, the Canadian Studies/Anchorage building, Colville House, Cranewood, McGregor House, and the Pavillion Bousquet (formerly called the Monastery) are heated using light oil. Between May 1, 2000 and April 30, 2001 the university consumed 89,182 litres of light oil. This decreased to 72,498 litres in 2001-2002. A breakdown of this total by month can be found in Appendix D. Fluctuation in light oil consumption can largely be attributed to varying winter temperatures from year to year.

Bunker A oil is used to heat most of the buildings on campus. The oil is burned in a central boiler located in the Heating Plant and creates steam which circulates through steam lines to the individual buildings[9]. Between May 1, 2000 and April 30, 2001 the university used 2,351,282 litres of Bunker A oil. In 2001-2002 consumption totaled 2,210,050. Monthly consumption totals can be found in Appendix E. Though the Technical Services Manager on campus has been working for the last several years to make the steam lines more efficient, he attributes changes in Bunker A oil

[6] NB Power, 'Corporate Review,' http://www.nbpower.com/en/about/corpinfo/review.pdf

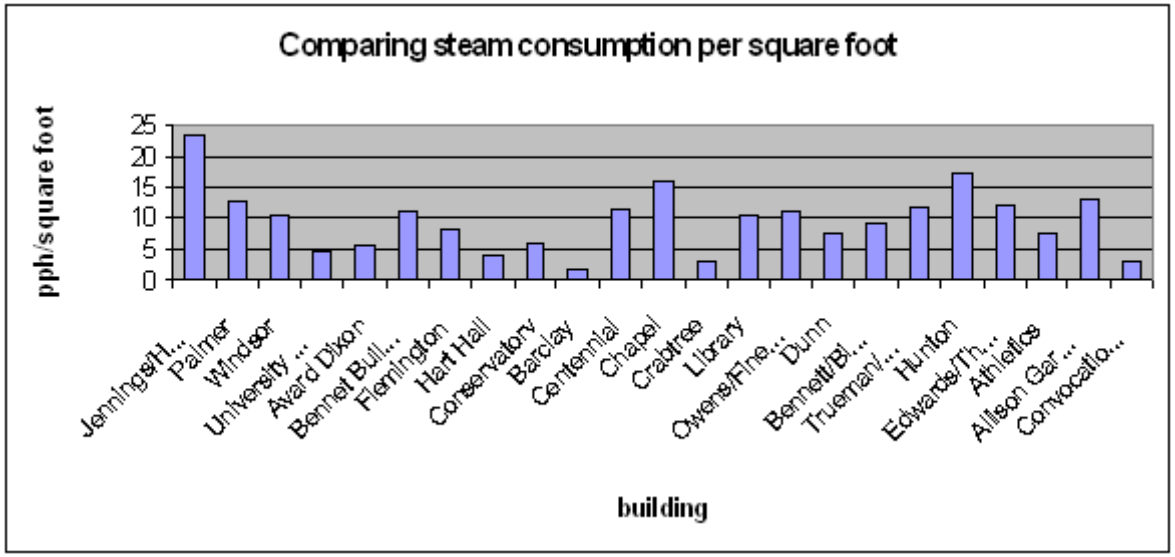
[7] Iodine 129 has a half-life of 15.8 million years. Taken from "Top 10 myths of the nuclear industry" Action Group on Nuclear Issues, Sussex NB, 1997.

[8] NB Power, 'Power Generation,' http://www.nbpower.com/en/about/generation/system_map.html

[9] Specifics on the main heating system can be found in both the 1998 and 2000 audit reports.

use to a warmer winter. The steam produced by burning Bunker A oil is measured in pounds per hour and is metered as it flows into individual buildings. The university now has over one year's worth of data collected from these meters that can be used to establish a baseline from which to make reductions. This data is contained in Appendix F. Figure 2.2 compares, per square foot of total floor area, the heat consumption in each of the buildings heated by steam.

Figure 2.2:



Jennings/Harper has by far the greatest consumption, in part due to the high ceilings in Jennings which mean a smaller total floor area. This may also be the reason for a high unit consumption in the Chapel. Centennial Hall, and Bennett Building are typically kept very warm in the winter months. Allison Gardens also has a high ceiling, as well as housing the ice arena, which accounts for greater heat consumption in other parts of the building to overcome the cooling of the rink itself. A list of the exact figures represented by this graph is located in Appendix G.

Natural Gas: The university has, for the last number of years, been preparing for the availability of natural gas in Sackville. Currently, this is scheduled for 2004, by which point the Technical Services Manager hopes to have the main boiler outfitted to burn both Bunker A oil and natural gas, as well as those off-campus buildings currently heated with electricity, and the kitchen in Jennings. The gas will be supplied by Enbridge Gas New Brunswick.

Renewable Energy: Since the time of the last audit, some progress has been made toward integrating renewable sources into the university's energy supply. New Brunswick Power has become increasingly more receptive to the contribution of wind energy from privately owned turbines. Currently, a joint project between the Village of Dorchester, The University of New Brunswick, and NB Power is underway to locate wind turbines in the area. The Mount Allison farm has been identified as a potential site for a turbine. At the time of this report, the Technical Services Manager is facilitating the placement of an anamometer (device that measures wind regimes) onto the radio tower at the farm property. Two years ago, the university investigated the possibility of replacing the south roof of the University Centre building with solar shingles. Unfortunately, funding was not secured for this project, nor have there been plans made to implement solar energy elsewhere on campus. In response to the Environmental Audit Survey, 93 percent of students and 100 percent of faculty and staff supported the introduction of alternative energy sources as a means of supplementing the current sources used on campus.

Case Study

In June 2000, the University of Vermont installed a 9 by 58 foot array of solar panels, capable of generating 5 kilowatts of energy. The panels are part of a multi-media educational display on photovoltaics that includes a website displaying in real time, the electricity generated by the panels. "This project shows the casual passerby and the serious student of renewable technology the potential of solar voltaics to generate renewable energy in Vermont."[10]

Recommendations

For Senior Administration

1. Continue working with NB Power toward installing a wind turbine on university property for the purpose of meeting a portion of the campus energy demand with wind power.

2. Create a policy that limits what students can bring into their dorms, eg all mini fridges must meet *Energuide* guidelines, only one fridge per room, etc.

3. Secure funds to hire a student to seriously research the possibilities of alternative energy use on campus, perhaps in the form of a feasibility study.

For Faculty

1. If applicable to your class, assign projects that would consider the feasibility of using alternative forms of energy on campus.

2. On sunny days consider if it is necessary to have lights on. If you teach in a classroom with more than one light switch use as few of the overheads as possible (without compromising the students' eyes)

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http://www.nwf.org/campusecology/pdfs/uvm_solar.pdf

3. Report overheating, over lighting, etc. to Facilities Management.

For Staff

4. Test out the effectiveness of a solar hot water heater by installing one in one of the satellite houses (ie: Cuthbertson). If successful, future installations should be considered.

5. Records of retrofits should be kept as a means of monitoring the results of energy and water conservation efforts. This would enable the university to better understand fluctuations in energy and water consumption.

6. Equip more rooms with *Wattstopper* technology.

7. Post signs or small stickers beside light switches in academic buildings and residences (including bathrooms) requesting people to turn lights off when leaving the room.

8. Post signs in the computer labs reminding students that if they are working past lock up time to turn off the computers when they leave.

For Students

9. When not using your personal computer for a half hour or more, turn it off. Turn off the monitor whenever it is not in use. This saves energy and is better for the computer.

10. When working in the computer lab during low traffic periods, take the initiative to turn some unused computers off; new arrivals can easily turn them on again.

For Senior Administration, Faculty, Staff and Students

11. If you have heating controls in your room, use them responsibly. Consider putting on a sweater rather than turning up the heat.

12. Always remember to turn lights off whenever leaving the room. It is a myth that turning lights on and off uses more energy than leaving them on.

13. When working at your desk, use the desk lamp rather than lighting up the entire room.

14. If you see any heating or electrical problems, let Facilities Management know through fixit@mta.ca so that the problem can be fixed.

15. If you notice a classroom or office not being used with the lights on, turn them off.

Figure 2.3 Review of Environmental Policy:

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
A baseline has been established as a standard against which improvement in energy consumption can be measured.	The university now has one year's worth of data from the meters installed on individual buildings. This should be used to set a baseline as soon as possible.	No change proposed.
Projects to increase energy efficiency or decrease pollution have been undertaken wherever there were an acceptable payback period of the costs required to undertake the project.	A number of steps have been taken to improve energy efficiency including retrofitting of fixtures, energy saving features on computers and lights, and fixing leaks in the steam lines.	No change proposed.
A holistic approach to utilities management is used. A holistic approach implies that energy costs should be analysed by taking into account all energy types rather than examining individual systems or energy types in isolation	The university has begun investigating alternative energy sources including solar shingles, and a wind turbine, despite the cost difference. More research needs to be done on the feasibility of using renewable energy sources on this campus.	The wording of this indicator could be improved to make it's meaning clearer.
Buildings not in used during the summer are closed.	Most buildings are used during the summer. Residence buildings are frequently used for conferences and other buildings often undergo repairs or renovation and would be in need of the utilities. However, those not used are closed.	This indicator would be clearer if it specified what closing a building involved in terms of energy consumption.
Government initiatives are monitored to ensure participation in relevant programs in the areas of pollution reduction and energy efficiency.	Government initiatives are monitored by the staff in the Facilities Management department.	No change proposed.
Buildings are constructed incorporating energy efficiency and renewable energy technologies.	Newly constructed buildings on campus integrate more energy efficient technologies. Renewable energy technologies have not yet been incorporated into buildings on campus.	No change proposed.

Grade Assigned: C

Transportation

Introduction

In the past two years since the last audit in 2000, the university fleet has increased by one vehicle. The use of these vehicles has not changed dramatically since the last audit. Two bike racks have been installed since the last audit, both located at the Dunn building. While this audit was being written, a number of bike racks were being installed to service both residential and academic buildings throughout campus. When asked what method they employ to travel to the University, 8% of students, 46% of faculty, and 60% of staff use their car. Of these people driving to the University, only 8% of faculty, and 13% of staff car-pool.

Environmental Significance

Our dependancy on transportation reliant upon fossil fuels has a profound effect upon both the environment and the way in which we function within that environment. From infrastructure, to sound, waste, and air pollution, to decreased physical activity, fossil fuel dependent methods of transportation have a heavy impact upon the health of the environment and us. We must ensure that we are at all times aware of our transportation options, and conscious of the impact that those choices have upon the environment.

In our society the most prevalent fossil fuel-based system of transportation is the automobile. From the extraction of raw materials, transportation of those materials, production (which is an energy intensive process), driving, and disposal, automobiles exact a heavy toll on the environment. It is estimated that in driving alone the average automobile will produce 3 to 4 times its own weight in carbon dioxide emissions per year (along with a number of other harmful gasses).[1] World wide, it is estimated that automobiles alone are responsible for producing about 25 percent of the world's carbon dioxide emissions.[2] In Canada, the David Suzuki foundation estimates that on average just under half of the green house gasses emitted per individual per year is a direct result of automobile use.[3] Besides producing carbon dioxide, the burning of gasoline and diesel emit a deadly concoction of toxins, including nitrogen oxides, carbon monoxide, a number of volatile organic compounds, small particulate matter, and sulphur dioxide. All of these chemicals in combination, beyond the natural coping capacities of the earth, have caused a number of human health issues, including cancer, premature death, increased cases of asthma and other respiratory illnesses.[4] This pollution is also exacting ever increasing tolls upon the integrity of the environment, as it is responsible for creating acid rain and global warming.

Over the past decade, the fastest growing area of transportation has been aeroplane travel. Aeroplanes are known to have one of the most inefficient

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[1] Climate Change Solutions, 'Transportation,' http://www.climatechangesolutions.com/english/individuals/opportunities/transport

[2] Climate Change Solutions, 'Transportation,' http://www.climatechangesolutions.com/english/individuals/opportunities/transport/chart1.htm

[3] David Suzuki Foundation, 'Huge Energy Appetite,' http://www.davidsuzuki.org/Climate_Change/Politics/Huge_Energy_Appetite.asp

[4] Climate Change Solutions, 'Transportation,' http://www.climatechangesolutions.com/english/individuals/opportunities/transport/chart1.htm

passenger to emissions ratio of all available transportation options. As the World Watch Institute notes, "the environmental toll of air travel is increasingly coming under scrutiny as well. Airplanes can be especially fuel-inefficient over short distances. They are the primary source of heat-trapping greenhouse gas emissions from humans that are deposited directly in the upper atmosphere, and scientists have noted that these emissions have a greater warming effect than they would have if they were released at the surface."[5]

As fossil fuels become increasingly scarce, we must strive to develop environmentally friendly and sustainable methods of transportation. By reducing our dependance on fossil fuels for transportation purposes, especially for distances that can be easily walked or bicycled, we will be able to slow the accumulation of these deadly pollutants and reduce their impact upon both the health of the environment and ourselves.

Current Environmental Policy

"Under this policy, the university will endeavour, through the supervision of Facilities Management, to minimise energy consumption and to reduce emissions and the consumption of fossil fuels.

The performance indicators for this section are as follows:

1. Bike racks available at academic and residence buildings

2. Emission levels are taken into consideration in the purchase of vehicles" (Section 2.4, Mount Allison University Environmental Policy, www.mta.ca/environment)

Responsible Parties

The maintenance of the university fleet vehicles is the responsibility of each individual department, while that installation of new bicycle racks, and repair of grounds damaged by traffic is the responsibility of the Grounds Supervisor in the Facilities Management department.

Audit

The Mount Allison campus is specifically designated pedestrian area, with vehicular access granted to university vehicles only. Often non-university vehicles drive and park on the university campus (In some cases for medical reasons). In the two years since the last audit, the university purchased two vehicles, a diesel powered 4x4 pick-up truck, to be used for snow plowing, and a truck for the Coastal-Wetlands centre. The old 4x4 which the University was using was sold after the purchase of the new vehicle. The university investigated the possibility of using bio-diesel to fuel the truck, but was decided against it as there is no ready supply of bio-diesel available in Sackville. The vehicles operated by the University are as follows:

- One Garbage/Moving truck
- One 4x4 trucks used for snow plowing and miscellaneous tasks in the summer
- Three pick-up trucks to transport plumbing, carpentry and custodial tools and supplies
- One truck used by the Biology department
- One truck used by the Coastal Wetlands Institute
- Two vans to transport electrical and carpentry tools and supplies
- One van for the heating and Ventilation crew
- One van for Support Services for delivering mail
- One van for Sodex'ho Alliance for delivering food
- Two sit down lawn mowers
- Three Tractors

All vehicles are powered by gasoline, except for the garbage truck, one 4x4 truck, and all tractors and mowers, which are powered by diesel, except one

[5] World Watch Institute, State of The World 2001, New York: W.W. Norton & Company, 2001 pg 111

sit down mower which is gas powered. Since the last audit the use of these vehicles has not decreased a significant amount. To decrease the amount of subsidized driving taken by Supervising members of Facilities Management, a bicycle has been purchased which can be used by supervisors to travel to and from work sights on campus. The use of this bicycle will help offset the use of vehicles on campus to travel very short distances. Despite the small size of Sackville and the close proximity of the university to residential and commercial centres, many people still insist on driving their automobile to work. For many people who live close to the University, walking or bicycling are viable transportation options.

In the attempt to move away from our dependancy upon fossil fuels, many companies are researching alternative technologies, including electric-gas hybrids, fuel-cell technology, fully electric vehicles, and clean burning fuels. All of the major automobile manufacturers are pursuing this technology, and releasing a variety of hybrid (gas-electric) vehicles. The majority of these alternative, environmentally friendly vehicles are compact cars. As the university's fleet is composed of mainly trucks and vans, necessitated because of the heavy loads they are required to carry, a compact car of this nature may not be a practical choice for the University. However, the Ford motor company recently began leasing an electric pick-up truck. The electric Ford Ranger has zero emissions, battery life of approximately six hours, and a 650 lbs payload.[6] As university vehicles are not often required to travel long distances, and often idle for long periods of time, a vehicle of this nature would be able to adequately replace existing pick-up trucks. It is important that the University continue to research the possibility of using alternative fuel technologies such as clean-burning fuel technologies, or bio-diesel fuel on campus.

We are lucky in Sackville, because of its small size we are able to bicycle of walk to many destinations in the town. The University is less than a five minute walk to downtown. Despite the towns small size and the University's close proximity to residential area's, many members of the university community insist on driving to work. The university currently has eight bike racks on campus, located at the library, Crabtree, Music Conservatory, two at the Athletic Centre, University Centre, and two at the Dunn building (which have been added since the last audit). The bike rack at the Avard-Dixon building had to be removed this winter to allow for work to be done on a broken water pipe. The university is currently planning on installing a number of new bicycle racks on campus. Bicycle racks will be installed (and re-installed) at Avard-Dixon, Jennings, Trueman, Bennet/Bigelow, Flemington, Barclay/Hart Hall, and the Facilities Management building.

Case Studies

Biodiesel

"Biodiesel is a replacement fuel for diesel; it requires no engine modification and does not affect engine performance. It is made from 100 percent virgin vegetable oil or recycled restaurant grease, and can be mixed in any proportion with fossil fuel diesel. . . it is usually mixed at a proportion of 20 percent vegetable oil and 80 percent diesel, known as B20. Using this mix lowers emissions and particulate matter pollution by about 20 percent. . . In warm weather, 100 percent biodiesel can be used."[7] The use of biodiesel fuel is a practical alternative for the university. It requires little in the way of infrastructure change, and can be used in vehicles without modification. Biodiesel fuel can be purchased in bulk from a number of sources and stored and mixed on site.

Wright State University in Dayton Ohio recently replaced two of its maintenance vehicles with Electric, zero emission trucks leased from Ford. The vehicles mainly stay on the campus grounds and are recharged during the night time. It is estimated that the university will save upwards of 4000

[6] Think Technologies, 'Electric Vehicles,' http://www.thinkmobility.com/tech_gallery.asp?PRODCODE=RANGER

[7] National Wildlife Federation, 'Bio-diesel use on campus at the University of Vermont,' http://www.nwf.org/campusecology/pdfs/uvm_bus.pdf

dollars a year from decreased fuel, oil, and maintenance costs.[8]

Recommendations

For Senior Administration

1. Support, through allocation of funds, the purchasing of lower or zero emission vehicles.

For Staff

2. When possible, arrange to use one vehicle for multiple tasks (eg custodial deliveries combined with carpentry deliveries).

3. Plant hedges in areas where people cut corners to prevent the problem of pedestrian damage to the turf and tree roots.

4. Explore alternatives to current use of university vehicles:
   • make small deliveries on foot/bicycle
   • consider the possibility of using cleaner burning fuels (eg biodiesel, propane)
   • consider purchasing lower or zero emission vehicles

9. When on University business, travel more sustainably by taking a train or bus instead of flying or driving alone.

10. Create a ride-sharing page on the Mount Allison website, where rides can be posted and car-pools organized.

[8] Wright State University, 'Costs Saving From Electric Vehicles,' http://www.wright.edu/cgibin/news_item.cgi?43

For Administration, Staff, Faculty, and Students:

5. Unless absolutely necessary, all members of the university community should avoid driving their vehicles onto the campus.

6. The university community should be encouraged to car pool, and to use the drive board in the University Centre.

7. For those staff, faculty and students who live 5 km or less from the university campus, cycling or walking to work or class is a realistic alternative.

8. Because neither the grass nor the root structures of the trees on campus are strong enough to support regular pedestrian traffic, all members of the university community should try to keep to the walkways in order to preserve this vegetation.

Figure 3.1 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Bike racks are available at academic and residence buildings	Bike racks are being constructed throughout the University campus this summer.	No change proposed.
Emission levels are taken into consideration in the purchase of vehicles	The University waited to purchase a new vehicle so that a more fuel efficient model could be purchased.	Establish what impact emission levels have on the decision of what vehicle is chosen.

Grade Assigned: B

Air

Introduction

From May 2000 to April 2002 1 006 528.35 kg of green house gases were emitted by Mount Allison University. A comparison with the previous audit on the amount of greenhouse gases produced is difficult, because a different method for calculating the amount of gas produced was used to calculate this years total. The 2000 audit reported that 5 654 472.9 kg of green house gas were emitted by the University in the two year auditing time frame.

Environmental Significance

Global climate change, caused by excessive amounts of greenhouse gas, threatens to have a devastating impact upon the environment. Although we may produce relatively small amounts of greenhouse gas here in Sackville when compared to other places, because of its trans-boundary nature, global climate change will impact the entire planet. Green houses gases produced here in Sackville will impact upon peoples and environments throughout the world. As example, It has been shown that the majority of smog in the Southern Atlantic Region originates in the Eastern United States and Southern Ontario.[1] From extreme weather patterns, to rising sea levels, global climate change could have a grave impact, not only throughout the world, but also specifically here in Sackville.

Air quality is progressively becoming an issue of greater concern, as science continues to unveil the impacts poor air quality can have on both environmental and human health. We can examine the quality, of the air which surrounds us immediately, in terms of what chemicals and particulate matter is in the air we breath, and what negative effects it has upon the environment and our health. Air quality of this nature is often referred to as ground level ozone, and has received quite a bit of attention from health and environment officials, because direct links can be established between this ground ozone and environmental and human health degradation. Ground level ozone has been linked to causing a number of cardio-respiratory complications, damage to vegetation, and damage to other synthetic and natural materials.[2] Air quality can also be dealt with on the amount of greenhouse gases which the university emits, contributing to global climate change. Climate change threatens to change the way in which the world functions, which will inevitably result in the devastating impacts upon the integrity of the environment and our livelihood within that environment. While separated for the purposes of description, these two aspects of air quality are very much interconnected. It is often the same chemicals that cause ground level ozone which are also responsible for causing global warming.

The majority of activities carried out by the University have an impact upon air quality. From transportation, to building construction and design, the processing of products, to the use of fertilizers and pesticides, to the consumption of energy, to the production of waste, the University has a large impact upon the quality of air, which must be recognized and accounted for in the calculation of the University's impact upon the environment.

[1] Environment Canada, 'Air Pollution Facts,' http://www.ec.gc.ca/envpriorities/cleanair_e.htm

[2] Health Canada, 'Environmental Determinants on Human Health,' http://www.hc-sc.gc.ca/ehp/ehd/catalogue/bch_pubs/98ehd211/chapter7.pdf

Current Environmental Policy

The University currently does not have a policy concerning air quality

Responsible Parties

Air quality is effected in a number of ways by the Mount Allison community. From the consumption of fossil fuels for heating, electricity, and transportation, to wastes sent to the landfill, to the use of fertilizers on campus lawns, almost all activities under taken at Mount Allison have a direct impact upon air quality.

Audit

Green House Gas Emissions

Energy and Heating

Electricity and heating are the two greatest sources of green house gas emissions at the University. The following is the amount of CO_2 emissions solely from heating and electricity at the University.

- Jan-Dec 1999 - 17 451 tonnes
- Jan-Dec 2000 - 18 608 tonnes
- Jan-Dec 2001 - 18 541 tonnes
- Jan-Apr 2002 - 8 771 tonnes

In total, 63 371 tonnes of CO_2 has been emitted from heating and electrical consumption alone since January 1999. These measures include the conversion of other green house gases (such as methane) converted into CO_2 equivalents. As a different method for calculating the amount of CO_2 is being used for this audit, which makes comparison with the amount of greenhouse gas produced from 1998 to 2000 difficult. The following chart is a break down of the amount of various gases produced by electricity and oil consumption at the University since 1999.

Figure 4.1

Emissions (in Tonnes)	Jan-Dec 1999	Jan-Dec 2000	Jan-Dec 2001	Jan-Apr 2002
Electricity				
CO_2	5308.7	5635.9	5565.8	2472.2
N_2O	5502.15	5841.23	5768.56	2562.25
CH_4	7.19	7.64	7.54	3.35
CO_2 emission equivalent	10818.1	11484.7	11341.9	5037.8
Light Oil				
CO_2	241.56	261.81	225.41	116.04
N_2O	0.34	0.37	0.32	0.17
CH_4	0.05	0.05	0.04	0.02
CO_2 emission equivalent	241.9	262.2	225.8	116.2
Heavy Oil (Bunker A)				
CO_2	6379.68	6848.92	6961.63	3610
N_2O	8.32	8.93	9.08	4.71
CH_4	2.60	2.79	2.84	1.47
CO_2 emission equivalent	6390.6	6860.6	6973.6	3616.6

Transportation

The University currently operates thirteen vehicles, and three tractors in their vehicular fleet. Unfortunately, the auditors were unable to get information on either the number of kilometers driven or the amount of gas consumed in the past two years. It is recommended that the University begin to record this information, so that environmental impact can be accurately measured.

The University currently uses a two sit down mowers, a number of push mowers, and 'weed-whackers.' All of these tools consume gas and emit green house gases at varying levels, depending upon fuel efficiency and use.

Personal transportation, under taken for University related activity's, such as attending various conferences, or meetings, produces large amounts of greenhouse gas. The University currently does not record the number of kilometers traveled or gas consumed when subsidizing travel. Travel expenses are not separated into different categories, they are currently recorded all as a single cost. Gas, cost of airplane ticket, lodging, and food is all recorded as one cost. It is recommended that the University begin to keep separate records on the amount of kilometers traveled, gas consumed, and distance of airplane travel, so that the University will be able to more accurately measure their impact upon the environment.

Although undertaken as an individual choice, the method of transportation that one chooses to travel to and from the University has a great impact on the environment. Although it is not directly related to the environmental impact of the University, as it is not the jurisdiction of the University to control how members of the University community travel to work. Indirectly, the University can have a large impact on aiding members of the University community reduce their dependence on their automobile. By organizing car-pools, making the campus bike and walking friendly, the University can act to reduce the environmental impact of its staff.

Solid Waste

As waste generated by the University decomposes it produces methane gas. The exact amount of gas cannot be determined exactly, as neither the exact amount of waste produced by the University is not measured, and the decomposable content in solid waste varies. For the purpose of the calculation, we used the amount of waste that the University is billed for by Tantramar Sanitation Service (224 tonnes per year). For decomposable content, the Environmental Protection Agency suggests an average of 19% decomposable content for garbage in North America. The amount of methane gas produced in one year by solid waste from Mount Allison University is 1569.6 kg (3139.2 kg for the past two years, as both the amount of solid waste and disposable content remained constant). Greenhouse gases were also produced in the transportation, sorting, and disposal of the waste, but are difficult to measure and account for in this calculation, as the specific data need to make this calculation could not be determined.

Fertilizer

The use of synthetic fertilizer has been shown to release amounts of nitrous oxide through the microbial processes of nitrification and dentrification. The following calculation of the amount of nitrous oxide released from fertilizer spread on campus is an average (it is impossible to know exactly how much nitrogen gets converted to nitrous oxide). The equation accounts for loss due to run-off, and nitrogen that is not converted (or volatized). In the past two years, there has been 16.65 kg of nitrous oxide released from fertilizer use on campus.

Food

The production of food has become a very energy intensive process. Large quantities of energy are required to run farm equipment, manufacture various chemical fertilizers and herbicides/pesticides, processing, transportation, and packaging. Eating food from animal sources requires the input of more energy than a vegetarian diet. Consuming local and

organic foods also decreases the amount of energy consumed in the production process. There is approximately 1100 on the meal plan at Mount Allison University, which results in the release of approximately 946000 kg of greenhouse gas.

Embodied Energy

Embodied Energy is the energy that was used in the creation of various products. Embodied energy was calculated, and included in the emissions total in the 2000 audit. When calculating emissions, embodied energy should only be included once. It is included in this audit (although not in the calculation of total emissions) because it is important to realize exactly how much energy goes into the production of the products we use.

The production and construction stages of producing a building emit large amounts of green house gases. The way in which a building is built largely effects the amount of energy it will consume, and consequently the amount of green house gases emitted. The embodied energy of a building is the energy required for the production, transportation, and construction of the building. This number at best is going to be a estimation, as the specific emissions behind the production of each product, the distance each product has been transported, or the exact amount of energy consumed in the building process is not known. This calculation grants us a glimpse at the average amount of energy consumed in the building process. The embodied energy on campus is calculated using the total square footage of all university buildings. The total emissions from embodied energy on campus was calculated to be roughly 563 556.72 kg, which marks a 2753.1 kg increase in embodied energy because of the construction of Wet-land facility.

The production of automobiles includes a large amount of embodied energy, in the production and transportation stages. The embodied energy of a vehicle corresponds directly to the size of the vehicle, the bigger it is, the more energy is required to produce it. All spare parts and replacement parts are another source of embodied energy, and are not considered in this calculation. The total embodied energy in the University fleet is 4350 kg, which marks a 750 kg increase, as the University purchased one new full-sized pick-up truck during the last two years.

Carbon Sinks

An exact count of the number of trees on campus was not available. It would be safe to estimate that there is well over a thousand trees on campus. This includes wooded areas behind Harper, by Normandy field and the Quarry. There is also a large number of shrubs and perennials on campus. Since the last audit, Facilities Management planted 99 trees and 328 shrubs. It is difficult to measure exactly how much carbon dioxide these trees absorb, but they do offset the University's total emissions to a certain degree. The University, in conjunction with the blue/green society are currently working on a plan to see native tree species grown on the University farm. These trees would eventually replace trees on campus that are dying or diseased, and will serve to further offset the amount of greenhouse gas produced by the University.

Currently air generated from the burning of oil, in the creation of heat, is filtered through the smoke stack and released into the atmosphere.

The ventilation systems for the science, and fine arts department (Hart Hall and Gairdner building) release all air collected in the ventilation systems into the outside air without any sort of filtration, despite the fact that it potentially contains hazardous chemicals. Both the Gairdner and Hart Hall ventilation systems release the fumes from the ventilation system at the ground level, close to high traffic areas on campus. The ventilation systems in the science buildings release fumes on the roof. A number of responses to the Environmental Survey identified the ventilation of air from the Gairdner building, directly onto a main walkway, as a great health concern on campus.

The results from the Environmental survey on the quality of indoor air were decided to be too subjective to include as material in the audit. What can be said though, is that the large majority of the members of the University are concerned with the quality of indoor air at the University. Many of the

older buildings on campus were identified as having very poor air quality. It is important that the University carry out a annual tests on indoor air quality, to ensure that members of the University community are not being exposed to harmful air.

Case Study

The students at Lewis and Clark University recently (Feb 27, 2002) voted to allocated $17 000 dollars of student fees to bring the University into compliance with the Kyoto Protocol, bringing its greenhouse gas emissions 7 percent below 1990 levels. 83% of voting students supported the small increase in fees in order to meet the Kyoto goal. This money was directed towards various projects, including energy reduction retrofits and tree planting.

Recommendations

For Senior Administration

1. Endorse an emissions reduction target for Mount Allison that meets or surpasses Canada's Kyoto Protocol commitment of 6% below 1990 levels.

2. Create a section on air quality in the Environmental Policy, complete with performance indicators.

3. Commit funds to implementing energy sources which do not create air pollution (e.g wind and solar energy) where economically feasible

1. Make funds available for the purchase of zero emission vehicles.

For Staff

2. Establish an emissions reduction target that meets or surpasses Canada's Kyoto Protocol commitment of 6% below 1990 levels.

3. Measure the composition and quantity of the smoke emitted from the boiler smokestack and use this data to establish a baseline from which to make improvements.

4. Investigate filtration mechanisms for the air being emitted from buildings in which hazardous materials are used, particularly Barclay, and Fine Arts.

5. Continue to restrict the use of automobiles on campus.

6. Implement systems to reduce greenhouse gas emissions as recommended in other chapters of this report.

7. Continue to test indoor air quality in response to concern from building managers and occupants.

8. Work toward achieving air quality in all campus buildings that exceeds government health standards.

For Administration, Faculty, Staff and Students

9. Report poor indoor air quality to Facilities Management, or email fixit@mta.ca.

10. Bike or walk whenever possible.

11. Consider car pooling whenever driving is necessary. Car pooling in pairs travelling 14 km per day reduces emissions by 50% and eliminates 34kilograms of hydrocarbons, 13.6 kilograms of nitrous oxides, 249.5 kilograms of carbon monoxide and 4490.5 kilograms of carbon dioxide every two weeks.

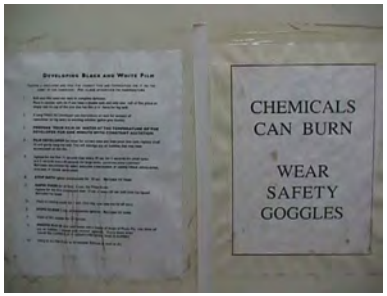
12. Support the implementation of alternative energy forms which do not pollute the atmosphere.

13. Reduce energy and heat consumption whenever possible. (See

chapter on Energy)

14. Request that Sodexho purchase more food from local sources. This will reduce emissions resulting from transportation.

Letter Grade: D



Hazardous Materials

Introduction

From May 2000 to April 2002 Mount Allison University disposed of approximately 25 251.42 litres and 14 379.2 kg of hazardous waste. For this calculation, 'disposed of' includes all hazardous wastes going through the Science Stores facility for special disposal, and hazardous waste disposed of through the regular waste stream. In comparison with the 2000 audit, there was a 2511 litre increase in the amount of liquid hazardous waste being disposed of, and a 13 277.9 kg increase in the amount of solid hazardous wastes disposed of. This extreme increase is due to the inclusion of solid cleaners used in food services in this years audit. Exact comparisons with the previous audit in hazardous wastes is difficult, as wastes are not disposed of on a regular basis, but are rather disposed of when there is sufficient quantity to warrant disposal. As a result disposal occurs on a irregular schedule.

The sources and volumes of hazardous materials being used in an intricate system such as Mount Allison University are often hard to track, which makes the measuring of the impact of hazardous chemicals disposed of by the University largely unknown and difficult to estimate. Although Mount Allison does not currently have a unified campus wide database, to record the purchasing, storage, and disposal of hazardous materials on campus, there are a number of smaller systems regulating their use on campus, such as the Science Stores facility.

Environmental Significance

It is a difficult task to describe hazardous wastes in their most general sense. A vast array of chemicals exist which are considered hazardous, with new ones being discovered every day. Each of these chemicals is a distinct compound, with its own characteristics on how it will react within different environments. It is important to recognize the dependence we have on these chemicals in our modern age, and how we have come to blindly accept all new chemicals as positive steps forward, never stopping to consider the potential long term health and environmental effects inherent within them. DDT is the perfect example of our blind acceptance of chemicals. Once hailed as the greatest chemical invented, is now one of the Twentieth Century's most notorious chemicals. We are only beginning to realize the effect that hazardous wastes are having upon the environment and human health. We are as well only now coming to realize how persistent and pervasive chemicals can be in the environment, effecting environments and people great distances from their site origin. This is not to say that we must eliminate all chemicals, but we must err on the side of caution, examining the potential impact they will have upon environmental health.

The link between hazardous materials, and human and environmental disasters is one that is made all to often. In terms of human health concerns, hazardous materials have, in severe cases, been linked to causing cancer, and detrimental damage to nervous, respiratory, and circulation systems.[1] Environmentally, hazardous wastes pose a great threat to environmental integrity. Hazardous wastes, when in sufficient quantities, have been proven to kill off all life within a certain ecosystem.[2] An event of this nature occurred in Prince Edward Island in the summer of 2001, when large rains washed pesticides off potato fields into the local water

[1] World Watch Institute, State of The World 2001, New York: W.W. Norton & Company, 2001 pg 27

[2] World Watch Institute, State of The World 2001, New York: W.W. Norton & Company, 2001 pg 27

systems, where they proceeded to destroy all aquatic life within the river system.[3]

Current Environmental Policy

"Under this policy, the university will endeavour, through the Fine Arts and Safety Committee, to limit the use of Hazardous Materials as follows:

- Pesticides are used on campus only when required
- Micro-scale laboratories are used
- Effective, environmentally friendly cleaning supplies are used
- The transportation of all hazardous materials is monitored." (Section 2.3, Mount Allison University Environmental Policy, www.mta.ca/environment)

Audit

The generation and use of hazardous waste is concentrated in five major areas on campus: scientific research, fine arts, cleaning materials, facilities management trades shops, pesticides/herbicides use, and other sources. As per the previous two audits, these five sections will be audited separately, with a number of recommendations for each specific chapter.

Scientific Research

Responsible Parties

Chemicals used in the university labs are ordered by professors on an individual basis, however, the chemistry department is generally considered central in possession of chemicals as it houses the Science Stores facility, which is directed by Roger Smith. The Science Stores facility is responsible for the storage and disposal of hazardous wastes on campus.

Audit

As mentioned in the previous two audits, in all possible situations, lab experiments are done using micro scale chemistry. The use of as little chemistry as possible has been implemented in as many classes and research laboratories as possible. Micro scale work reduces cost and toxic waste by using chemicals in as minute quantities as possible.

The Science Stores facility is a centralized service that provides chemicals and coordinates the disposal of hazardous wastes on campus. The facility is located on the ground floor of the Barclay building. Since the last audit in 2000, there have been no major changes to the functioning of the Science Stores facility. Science Stores continues to make use of a database into which all departmental and research purchase orders are compiled and processed. A number of departments acquire their chemicals through Science stores, including all science departments, and the fine arts department. There are a large quantity of chemicals stored at the Science store facility, and effort is made to reuse the chemicals on hand before purchases of new chemicals are made. Purchases tend to be made only in the quantity required to carry out a certain experiment.

The disposal of hazardous wastes on campus is carried out through the Science Stores facility. Each year Science Stores sends out a memorandum to all departments on campus informing them on what information is required for hazardous wastes to be properly disposed of on campus. When chemicals are returned to the facility, they are separated according to content under the Lab Pack categories and stored in large containers on site in the Barclay Building. When sufficient waste has accumulated, Laidlaw Environmental Services Ltd, is contracted to remove the waste. Laidlaw transports the waste to their holding station in Debert, Nova Scotia. From there the waste is shipped for disposal at a number of facilities throughout

[3] Global Media, 'Prince Edward Island Fish Kills,' http://www.canada.com/search/site/story.asp?id=F6681196-5FC2-474C-A1AC-EF510FD15097

Canada. In the past two years, Science Stores disposed of 2350.63 kilograms of solid hazardous wastes and 1305 litres of liquid hazardous wastes. A full break down the wastes disposed of can be seen in Appendix I. An exact comparison with the 2000 audit is not possible, because in the 2000 audit all chemicals were measured in litres, while for this audit, measurements were compiled in both kilogram and litre measurements. It is, as well, difficult to do comparisons from year to year on the disposal of hazardous wastes because lab packs are disposed of only as they reach full capacity. Which means that there is little continuity in the amount or type of chemicals disposed of from year to year. It is hoped that through proper education and awareness, students and staff will choose to dispose of their chemicals in the proper fashion. But it is difficult to ensure that all hazardous wastes are disposed of in the proper manner.

Science Stores and Laidlaw Environmental Services Ltd, are licensed by their respective provincial governments, to both produce and dispose of hazardous wastes, and is audited by the government for compliance with environmental regulations.

For the past two years, radioactive materials on campus have been regulated by Dr. Ralf Bruening of the Physics department. The university is licensed to handle certain radioactive materials through the Atomic Energy Control Board.[4] The use of radioactive materials is designated for use in the Dunn, Flemington, Barclay, and Huntsman marine science centre in St. Andrews New Brunswick. It was noted in the 2000 audit, that the use of radioactive materials on campus has been steadily decreasing. This trend has continued, as radioactive materials have only been used once on campus in the past two years. Because they are quite expensive, many departments have successfully found alternatives to using radioactive materials in teaching and research. As a result, the use of radioactive materials has almost been eliminated on campus. It was however pointed out that Dr. David Fleming, a bio-physicist, who is the recent recipient of a Federal research chair, will most likely require the use of radioactive materials in his research. It is believed that the university will be required to apply for a new license to accommodate the materials that Dr. Fleming will require to carry out his research.

The storage and disposal of radioactive material is all done according to the regulations set out by the Atomic Energy Control Board. Storage occurs in one of two ways, sealed and unsealed, and both are kept in labeled refrigerators. In January of 2001, there was an inspection carried out by the Canadian Nuclear Safety Commission. They found a number of minor infractions on campus, mostly pertaining to improper labeling and lack of contact numbers, all of which have been subsequently rectified. In the past two years the university disposed of a large portion of the radioactive waste stored on campus. The waste was disposed of according to AECB regulations. A large portion was removed by the inspecting officer, while other material were neutralized and disposed of through the regular waste stream. The University is required, and does keep extensive records of purchase, storage, use and disposal of radioactive materials on campus.

Science Research Recommendations

For Faculty

1. Consult Science Stores before purchasing hazardous materials to avoid overlap.

2. Ensure proper labelling of all hazardous chemicals in labs so as to avoid unknowns in the disposal procedure.

3. Continue to meet regulations for purchasing, using, disposing of hazardous materials. Consider exceeding regulations for the sake of environmental safety beyond human health.

4. Educate students on the effects of toxic laboratory chemicals on wildlife and their larger environmental impacts when they are poured down the drain, both in teaching and through signs posted

[4] Mount Allison's license is set to expire on January 31 2003. The auditors were told that under the new license the Atomic Energy Control Board would increase the monitoring of nuclear materials.

in the labs.

5. Take all first year students on a tour of the chemical disposal site and identify procedures at Mount Allison, to increase awareness of responsible disposal methods and hazards.

6. Continue to prepare laboratory assignments in groups of two or more, when feasible, to reduce chemical wastage.

7. When feasible utilize micro-scale lab techniques in the laboratory portion of classes.

For Students

8. Use proper disposal methods when dealing with any chemical waste.

9. For senior research students, consult Science Stores when ordering chemicals to avoid overlap.

Fine Arts

Responsible Parties

Thaddeus Holownia, head of the Fine Arts Department and director of the photography program, is responsible for the purchasing of chemicals for the photography lab. The photo technician, is then responsible for the mixing and storing of all photo chemicals. Dan Steeves is responsible for the ordering, storage and disposal of the chemicals used in the printmaking facilities.

Audit

Photography

Unfortunately, the Fine Arts department was unable to provide the auditors with information on the amount of chemicals used in the photography department during the past two years. We were informed by the head of the department that the amount of chemicals used does not differ greatly from year to year. As a result, we will include the report from the previous audit on the amount of chemicals used in the photography department, to give an indication of how much hazardous waste is being produced there.

The disposal of all chemical wastes generated by the photography department, except the selenium toner, is done by flushing the waste chemicals into the sewage system, without treatment. The selenium toner is collected throughout the year and disposed of through the Science Stores facility.

Although fixer has notable silver content it continues to be flushed down the drain with the other chemicals. The town of Sackville does not have a by-law specific to silver, although it does have a by-law concerning the disposal of contaminants which states: "no person shall discharge water or wastes containing cyanides, chromium, cadmium, copper, or sulfides; or containing a toxic or poisonous substance in sufficient quantity to infure or interfere with any sewage treatment or constitute a hazard to humans or animals." Silver is not considered a toxic or poisonous substance in this by-law. The Head of Fine Arts is currently looking into initiating a silver recovery program for the photography department.

Figure 5.1 Quantities of Chemicals used in Photo lab (May 1998 to May 2000)

Product	Quantity
TMax RS developer	304 litres
Dektol Developer	1140 litres
Hypoclearing Agent	76 litres
Rapid Selenium Toner	19 litres
Flexicolor Developing Kit	19 litres kit

Rapid Fix	**1710 litres**
E-6 Developing Kit	**30.4 litres**

Printmaking and Lithography

The auditors requested, but did not receive an inventory of the quantity of chemicals used in printmaking and lithography since 2000. They were informed that use of chemicals has not changed significantly in the past two years.

The printmaking studio currently uses a variety of chemicals, most of which are hazardous. Varsol continues to be the main cleaning agent used in the printmaking studio. The Varsol is recycled as much as possible, and is only discarded of when it is no longer useful for cleaning. When a sufficient quantity of Varsol has accumulated it is disposed of through the Science Stores facility. The auditors were informed that within the Varsol cleaning system, approximately 10 liters of Varsol is lost every month due to evaporation, which must be replaced. The printmaking facility continues to consume, on average, two 45 gallon drums of Varsol each year.

Various types and concentrations of acids are used in the printmaking and lithography process. When ready to be disposed of, all acids are neutralized using sodium bicarbonate. The mixture is then poured into a marble vat where it is further neutralized before being disposed of into the sewage system. When handled by the staff, all acids go through this procedure, but it is difficult to ensure that all students are complying with this procedure for disposal.

The rag service for the Printmaking and Lithography studios is still provided by the Canadian Linen Company. The service picks up dirty rags in exchange for clean rags. The dirty rags are then taken back to the company's facilities where they are washed and made available for future use.

The staff involved in the printmaking and lithography studios educate each student about the proper handling, use and disposal of hazardous waste. They have considered switching to methods of printmaking which do not require as much hazardous chemicals, but are reluctant to switch, as they believe that these systems have not proven themselves as effective as traditional methods.

Fine Arts Recommendations

For Senior Administration

10. Make funds available for a silver recovery program in the photography lab.

For Faculty

11. Develop a proposal for the administration outlining what would be required to establish a silver recovery program on campus.

12. Conduct workshops for staff, students and faculty teaching them methods for establishing an environmentally sensitive studio.

13. Reuse, recycle and share chemicals whenever possible.

14. Continue to seek out less hazardous alternatives to chemicals used in Fine Arts.

For Students

15. Learn and follow proper disposal methods of chemicals.

16. Encourage safe disposal of chemicals amongst fellow students.

Cleaning Materials

Responsible Parties

Cleaning materials at the University are purchased and used by two departments, Facilities Management and Sodexho Alliance. In Facilities Management purchasing is the responsibility of the custodial supervisor. At Sodexho Alliance, the purchasing of cleaning supplies in the responsibility of the director of Sodexho on the Mount Allison campus.

Audit

In the past two years, Facilities Management used 14032.7 litres of cleaning materials. A full break down of the quantity of each products used is located in Appendix J. It is important to note that not all of the cleaning materials used are considered hazardous materials. For those cleaners which contain ingredients hazardous to human health, which require specific handling and disposal procedures, Materials Safety Data Sheets (MSDS) are required. MSDS sheets for specific cleaners contain information on the supplying company, product, use, and toxicology data (effects upon human health). The MSDS information for all products purchased by the department is kept in a binder at the MSDS centre in the Facilities Management building. The binder in continually updated by the Senior Supervisor of Custodial Services. In the past two years, Facilities Management used 10802.9 liters of cleaner considered hazardous enough to require MSDS (approximately 77% of all cleaners used). A comparison with the 2000 audit is difficult, as cleaning products were measured in both litres and kilograms, while all cleaning materials used by Facilities Management currently come in liquid form. In the 2000 audit, 6081.45 litres of cleaning materials were used, which when compared to this years audit, marks a 4 721.45 liter increase. This increase is partly due to the conversion of 1 100.8 kg of cleaning materials in the 2000 audit into litre measurements for this years audit. Custodial services is open to trying new, more environmentally friendly products. In the past two years two environmentally friendly cleaners have been introduced, one being an all purpose general cleaner, while the other is a disinfectant. The use of these products by the custodial staff is optional. It has been found that they are generally not as effective cleaners as their chemical counterparts, and have as a result, are not used frequently. There is currently no specific procedure for disposal of cleaning materials, all chemicals are simply dumped down the drain.

In the past two years, Sodexho Alliance used 6622.552 kg of solid cleaning products, and 3299.02 litres of liquid cleaning products. Average amounts of the amount of cleaners used in a year were given, and then expanded to fit the two year auditing time frame. Cleaning supplies for food services here on campus is ordered centrally through the Sodexho Alliance Company. All cleaning materials are disposed of by washing them down the drain. It should be noted that the cleaning supply totals were not included in the 2000 audit, and are responsible for the substantial increase in the kilogram amount of hazardous waste produced. A complete list of these cleaners is contained in Appendix K.

Recommendations

For Senior Administration

For Staff

17. Request full disclosure for all products and procedures from contracted cleaning supply companies, and companies contracted to do cleaning work on campus.

18. Purchase cleaning materials based on environmental indicators beyond human health.

19. Investigate more environmentally sound disposal methods for the more hazardous cleaning products used on campus.

For Sodexho

20. Continue to keep an accurate inventory of the volumes of cleaning products used in food services.

Pesticides

Responsible Parties

The maintenance of Mount Allison grounds is the responsibility of the Grounds Superintendent who is assisted by approximately 11 full time grounds staff. Outdoor pesticide application is carried out by the University. Indoor pest control is the responsibility of the Custodial Supervisor and the custodial staff. Its application is the responsibility of a company contracted by the university.

Audit

Pesticide use on campus has fluctuated greatly in the past. From 1994 to 1997 the university undertook a comprehensive spraying program each year, which consisted of two applications of a fertilizer, a pesticide, and a insecticide. From 1997 to 2000 the university used one spraying to apply three different herbicides to the entire campus grounds. Since 2000, the university has not carried out a campus wide herbicide, insecticide, or pesticide spraying. Although no campus wide spraying has occurred in the past two years, it does not mean that the university has phased out the use of pesticides completely. The university is willing to use pesticides in specific situations where an infestation threatens to destroy sections of the university's lawn. Effort is made to avoid spraying, but if deemed necessary, it will be conducted. The University employs a integrated pest management system (IPM) to care for University grounds. In this system, if a pest/disease is located, mechanical methods are first used to try to physically remove the problem. If such methods fail, organic pesticides are used. Only after organic pesticides fail to control the problem are chemical pesticides considered. When deemed necessary, the University will only spray pesticides on the infested area. Areas of the campus which are not effected are not sprayed. Spot spraying greatly reduces the amount of pesticides applied. Since the last audit, the university sprayed two ounces of Round-Up on stone beds (area directly below benches) and flower beds on campus to limit weed growth. The University also conducted a full spraying of the main football field, and spot treated the lower field. In total, for both fields, 2.7 grams of pesticide was sprayed. The grounds supervisor informed the auditors, that the University continues to look into the use of alternative pesticides, but have not been fully implemented as of yet because they are much more expensive then their traditional chemical counterparts. The auditors were informed that many alternative pesticides have not been approved for use, which necessarily limits the University ability to use them.

Facilities Management continues to explore the use of alternative ground covers on campus. The hope is that by planting of alternative ground cover (grasses and plants), which are native species, they will not require pesticide or fertilizer application. Although this is the hope, Facilities Management has found that some alternative ground covers required the same amount of fertilization as normal grass. The University should continue to investigate the use of native species for ground cover, as they may prove more resistant to pests, and reduce or eliminate the need for pesticide application.

Apart from the use of pesticides, the University sprays its lawns with a number of fertilizers each year. In 2001 the university used 1450 kg of fertilizer upon the university grounds. Although the University has done little fertilizing this year, Facilities Management is hoping to secure funds to carry out an extensive fertilization of the University campus this year. The projected amount of fertilizer which would be used in the coming year is approximately 3110 kg. The exact amount of fertilizer used will be dependent on the amount of money that Facilities Management is able to secure for the project. The breakdown of projected fertilizer use is contained in Appendix L. The main and lower sports fields continue to be on a separate fertilizing schedule, which can be viewed in Appendix M. It

is projected that the university will spread 16.33 kg of fertilizer on the fields this year. No numbers were given to the auditors as to the amounts of fertilizers used in previous years. In the past year, the University began composting yard wastes. This material is composted and utilized as fertilizer. Compost material has so far only been used on flower beds, but the Grounds Supervisor hopes that soon, through the use of a screening process, the compost material will be made suitable for use as a lawn fertilizer, which will serve to reduce the University's dependence upon chemical fertilizers. The auditors were informed that fertilization does not occur on the grounds surrounding the Swan Pond, as they do not want the fertilizers leaching into and contaminating the Swan Pond water.

Since May 2000 the University has use 500 ml and 90 grams of indoor pesticide to kill of various insects. A complete break down of indoor pesticides used is available in Appendix N

When asked whether or not they support the spraying of the campus with herbicides in order to maintain a weed free campus, 70% of students, 86% of faculty, and 66% of staff claim that they do not support spraying.

Recommendations

For Senior Administration:

21. Make funds available for increased upkeep of grounds to reduce the need for chemical pesticides, herbicides, and fertilizers.

22. Make funds available for the purchase of more environmentally friendly pesticides, herbicides, and fertilizers.

23. Lift any pressure on the grounds maintenance staff to keep the campus completely weed free.

24. Ban pesticide and herbicide use everywhere on university grounds excluding the main athletic fields.

25. Continue to notify university and local community as to spraying schedule at least one week in advance.

For Staff:

26. Experiment by setting aside a patch of lawn to keep pesticide/herbicide free. Use this to measure the potential result of a ban.

27. Continue to actively investigate environmentally friendly alternatives for lawn care

28. Continue to incorporate alternative ground covers on campus, wherever it can reduce the amount of chemical spraying.

29. If Mount Allison does make the switch to pesticide- free grounds, make sure that people know about it through articles in The Tribune, Times and Transcript, The Argosy, and through signs that read "This lawn is pesticide and herbicide free".

For Administration, Staff, Faculty, and Students:

30. Educate yourself on the issues surrounding pesticide/herbicide spraying, considering what defines a healthy lawn or healthy campus.

31. Avoid using hazardous chemicals on your own lawns and educate those around you who do.

Shop Chemicals

Responsible Parties

Wendell Richards, the trades supervisor at the university's Carpentry shop is responsible for the purchasing, storage, and disposal of all hazardous materials used by shop staff. Perry Eldridge is responsible for the Plumbing shop and the hazardous chemicals in this work.

Audit

The auditors were informed this year that little change has occurred in the carpentry shop over the past two years. As reported in the previous audit, there is currently no inventory in place to keep track of the products used in the carpentry department. Supplies are purchased when the need arises. All members of the Carpentry department make use of the same materials, avoiding unnecessary overlap. The main sources of hazardous materials in the shop are paints, varnish, solvents, batteries, and various adhesives. Of all the paints and stains purchased, approximately 75 percent of paint is water based, while 50 percent of all stains are water based. Water based paints are chosen due to financial reasons as they are less expensive than oil based paint. The shop has investigated the use of water based alternatives to traditional adhesives, but found that these products much more expensive and not quite as effective. With the exception of batteries used for drills, batteries used by the shop are not rechargeable. Batteries and flourescent lights (containing acid) are clearly labeled and disposed of in the regular garbage waste stream. Other hazardous materials, including varsol, varnish, adhesives, and contact cement are collected, and disposed of at the end of the fiscal year through the Westmorland-Albert solid waste corporation.

The plumbing shop currently makes use of one chemical. In the past two years the University plumbers used 192 litres of Scram sewer pipe cleaner. Scram is a fairly toxic chemical, and is only used when no other option is available. The auditors were informed that in the coming year, the plumbing department plans on switching to a more environmentally friendly sewer pipe cleaner.

Shop Chemical Recommendations

For Staff:

32. Wherever possible, minimize the use of hazardous materials in carpentry and plumbing work.

33. Ensure that the disposal of hazardous materials used in carpentry and plumbing work meets or exceeds government regulations.

34. Establish and maintain a complete inventory of all items purchased and stored in the shop (to allow for the measuring of the amount of each chemical used).

35. Request full disclosure of procedures from all companies supplying toxic substances to the Mount Allison community. Divest from those companies with violations of environmental regulations.

Other Sources of Hazardous Waste

Photocopiers on campus use toner cartridges and fuser lubricant that contain hazardous materials. The fuser lubricant used by the machines consists of Polydimethylsiloxane. The toner cartridges contain Styrene/butadiene copolymer, steel powder, iron oxide and carbon. While these substances are classified as hazardous according to the Material Safety Data Sheets, none of them are particularly dangerous; the most serious threat posed by these materials is minor respiratory irritation. All of these chemicals are consumed during the photocopying process. Empty

cartridges are collected and sent to a recycling company where they are either re-filled or disposed of.

Old computers, which are still functional, are collected and delivered to various school and social groups throughout the region. This program avoids the disposal of functional computers, and ensures that they are used until no longer functional. The disposal of computer parts in the regular waste stream has become a great concern lately, as there are a number of heavy metals and toxic chemicals contained within computer components. Once in the regular waste stream, these parts break down, eventually releasing these chemicals into the environment. Methods to dispose of electronic waste in the most environmentally friendly manner should be investigated by the University.

When disposed of through the regular waste stream, batteries often release large amounts of mercury into the local environment, which has the potential to bio-accumulate and effect the health of plants and animals, including humans. There is currently no system in place to collect and recycle batteries on campus. Various departments recycle the batteries they use, but there is no campus wide system for collecting and recycling batteries. Batteries can be recycled in Sackville by Wheatons recycling facility, and rechargeable batteries can be purchased at various retailers in Sackville.

The University continues to pay 50 dollars for the reclamation of refrigerant (CFCs) from all refrigerators being disposed of. A large number of the refrigerators disposed of each year are left behind by students in the various residences. This process diverts large amounts of hazardous waste from the normal waste stream and allows the chemical to be disposed of in the proper fashion.

From May 2000 to February 2002, 6044.3 litres and 846 kilograms of chemicals were used in the University pool. For a complete breakdown of the amount of each individual chemical refer to Appendix O. In comparison with the 2000 audit, there was a substantial increase of almost 1700 more litres of chemical used in the pool. There was however, a decrease in the amount of solid chemicals used. In comparison with the 2000 audit, there was 55 fewer kilograms used. There are a number of non-chemical alternatives that the University could employ in the pool, such as ozone, ionizers and magnets to ensure the cleanliness of the pool without the application of large amounts of chemicals. All chemicals are flushed into the sewage system when the pool is drained.

Hazardous materials are occasionally brought in by contractors and used for various maintenance work around campus. The University does not currently track the use of these chemicals or their respective disposal procedures.

Recommendations

For Senior Administration

36. Request a $50 deposit for any mini fridges that are brought onto campus to ensure their removal.

37. Establish regulations limiting the quantity and type of products with hazardous materials that residents are permitted to bring onto campus.

38. Continue to recycle Freon from all fridges on campus.

For Staff

39. Ensure that all waste from electronic equipment, including computers, is disposed of in the most environmentally friendly manner.

40. Request information from companies regarding the type and

amount of hazardous material in products supplied and potentially disposed of.

41. Request full disclosure on hazardous materials used by companies contracted to do work on the campus. Consider including a request for less hazardous alternatives to these materials in work contracts.

42. Establish and maintain a battery recycling program on campus.

Case Study

The University of Washington is one of the most progressive schools in dealing with and minimizing the impact of hazardous wastes on their campus. The school has created a campus wide data-base containing chemical inventories, which has allowed for the creation of "comprehensive and systematic programs for the sharing of surplus chemicals and the recycling and substitution of hazardous materials campus-wide."[5] This program reduced the amount of chemicals disposed of by the University, and also acted to reduce costs, as fewer chemicals required purchasing. The database contains an 'excess chemical' page on which professors can indicate what excess chemicals they posses. Other professors search this page before purchasing new chemicals. Often the excess chemicals were offered for free or reduced price, which makes greater incentive for reuse. The University of Washington also hired a specific staff member to "minimize hazardous waste by helping lab and physical plant staff identify safer substitutes for commonly used chemicals."[6] These two activities in conjunction with one another has served to greatly reduce the environmental impact of hazardous waste at the University of Washington.

General Recommendations

For Senior Administration:

43. Ensure that a consolidated system of monitoring the purchase, use, storage, and disposal of *all* hazardous materials at Mount Allison University is established.

44. Request full disclosure of procedures from all companies supplying toxic substances to the Mount Allison community. Divest from those companies with violations of environmental regulations.

For Staff:

45. Ensure that M.S.D.S. centers are kept up to date, including information on all hazardous products in use on campus.

46. Ensure proper labeling of all hazardous materials stored on campus. It is much more difficult to safely dispose of unidentified materials.

[5] Keniry, Julian. Ecodemia: Campus Environmental Stewardship at the Turn of the 21st Century.
Washington: National Wildlife Federation, 1995 pg 166

[6] Keniry, Julian. Ecodemia: Campus Environmental Stewardship at the Turn of the 21st Century.
Washington: National Wildlife Federation, 1995 pg 159

Figure 5.2 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Pesticides are used on campus only when required	Pesticides are currently used only when pests are sited on campus. Spraying is limited to the problem area. The football fields continue to be sprayed with pesticides each year.	Further define the term required, detailing what problem and to what degree of damage. Define what types of pesticides will be used on campus.
Micro-Scale laboratories are used	The micro-scale method is implemented in the majority of chemistry classes at Mount Allison.	No change proposed.
Effective, environmentally friendly cleaning supplies are used	A few Environmentally friendly cleaning supplies are being purchased, but the use of these products is optional. Most products are still purchased with price foremost in mind.	Define where these environmentally friendly cleaning products are to be used. Establish exactly how many environmentally friendly products are to be offered.
The transportation of all hazardous materials is monitored	Hazardous Materials are monitored in a series of smaller database systems. A University-wide monitoring database has not yet been created.	A University-wide monitoring system to track the transportation, storage, and disposal of hazardous materials should be created.

Grade Assigned: C

Solid Waste

Introduction

An accurate measurement of the amount of solid waste produced by the university is not possible to obtain, as the amount of waste produced by the University is not weighed. Thus a comparison on the amount of waste produced between this audit and the previous audit is impossible. It is important that if the university wishes to accurately gauge its impact upon the environment that it begin to measure the amount of waste produced. Recycling procedures are largely similar to those two years ago, there has been an observed increase in the amount of waste being recycled at the university, but is hard to quantify in specific numbers, as the amount of recycling is, as well, not measured.

Environmental Significance

The accumulation of solid waste is increasingly becoming recognized as a problem that is not best solved by simply finding more places to hide it. We are discovering the alarming effects of landfills on water, soil, and air quality, not only in their immediate surroundings, but globally. The ability of contaminants to move through, and damage, ecosystems is shocking. For example, as of last year, 1/4 of the landfills in the state of Maine were discovered to have contributed to ground water contamination[1]. Methane from the decay of organic material in landfills is currently the 5th largest source of greenhouse gas emissions in Canada, and "roughly equal to the greenhouse gas emissions from 5 million automobiles"[2].

Some solid waste sites, including the Westmorland-Albert Solid Waste Corporation (WASWC), are taking advantage of opportunities to divert as much waste as possible from landfill, reaping the economic benefits of selling various materials to be recycled. WASWC serves the residential sectors of Westmorland, Albert, Kings and Kent counties, including the town of Sackville, in total servicing approximately 120,000 households. This past year, the site received 142, 994 metric tonnes of solid waste, approximately 45 percent of which was diverted from landfill and recycled.

But at the same time as recycling technology advances, the number of disposable items on the market is also on the rise. Reusable, washable, refillable goods are being abandoned for disposable products that proclaim to make for a simpler, more hygienic lifestyle. Yet the polluted air and a shortage of clean drinking water resulting from our abundance of waste has so far proven to be neither simple nor hygienic. To address the solid waste issue, be it on campus or on a larger scale, must involve reducing and reusing as much as recycling.

Responsible Parties

The custodial and grounds staff and their respective supervisors, working within the operations of Facilities Management, are responsible for the collection and disposal of solid waste at Mount Allison.

Current Environmental Policy

"The University will endeavour, under the supervision of the Department of Facilities Management, to minimize solid waste production."

The performance indicators for this section are as follows:

[1] World Watch Institute, State of The World 2001, New York: W.W. Norton & Company, 2001 p. 34

[2] Alain David, Environment Canada engineer, www.davidsuzuki.org/Climate_Change/Solutions/Landfills.asp

- "Solid waste generated by the university is limited.
- There is an effective paper waste reduction program.
- An effective recycling program is maintained across campus.
- Yard waste is used as mulch on campus grounds
- Furniture is offered for sale or donation prior to disposal." (Section 2.6, Mount Allison University Environmental Policy, www.mta/ca/environment)

Audit

Material Sent to Landfill

A precise measurement of the amount of solid waste produced by the university is impossible to derive, as neither the university, nor the Tantramar Sanitation facility weighs the amount of waste generated. Currently, Tantramar Sanitation charges the university dumping fees based on what type of waste is being disposed of. Tantramar Sanitation service charges the university a flat tonnage rate of 23 tonnes per month from September to April, and 10 tonnes per month from May to August (the University is in full knowledge of this arrangement). The actual amount of waste disposed of naturally fluctuates above and below the amounts agreed upon. If the university wishes to decrease the amount of waste it produces, it is important that they first know exactly how much waste they are producing. By weighing the amount of solid waste produced, the University could potentially save money, as decreases in the amount of waste disposed of would lower dumping fees. If the University is able to determine the amount of waste produced, a base line for solid waste production should be produced.

Solid waste generated on the Mount Allison campus is first collected in individual garbage cans in buildings and on the grounds, where it is collected and transferred to central locations by the custodial and grounds staff. Following this, it is collected from these sites and transported to the Tantramar Sanitation facility by university vehicles. Tantramar Sanitation then transports the waste to the Westmorland-Albert solid waste facility, located outside of Moncton.

Until recently, the grounds crew at Mount Allison sent yard wastes, including grass clippings, leaves, and branches, to the landfill. During the fall of 2000 grounds crew began composting this yard waste, in the hope to be able to reuse it as a fertilizer on campus grounds. Wood waste generated on campus (fallen branches, trees being removed) are composted if chipped. If the wood is not chipped, it is given to Bermuda House to be used as fire wood or to the Fine Arts department for use in various art projects. The creation of this composting system represents a significant step in reducing the amount of waste generated by the university.

University furniture is replaced when worn out or deemed unsuitable for use. Decisions on what pieces need to be replaced are made by the Facilities Requirements Manager. Old furniture is first made available at the annual university sale, which occurs a number of times throughout the summer months. What does not sell is stored for re-sale the following year. Furniture goes to landfill when it is considered unrepairable.

Food Services

The consolidation of the two meal halls into the renovated Jennings facility in the spring of 2000, has led to a significant reduction in waste output in food services. The director of food services informed the auditors that the amount of food waste has been reduced in the past two years, but the exact amount of waste produced by food services is not measured. Up until January of 2002 food waste from the meal hall was being transported to a local pig farm, to be used as pig feed. In January 2002, the Federal government passed legislation that banned the use of food waste as animal feed. As a result, food wastes from the meal hall were then shipped to the Dorchester penitentiary for composting. For the coming year, food wastes will be sent to the Westmorland-Albert solid waste site for composting. Although composting food wastes is a valuable step, efforts must be made

to limit the amount of food waste generated. To help decrease the amount of food waste produced, food services have introduced a number of 'on-site' (on-demand) cooking, which eliminates the creation of excess amounts of food. The amount of food waste generated can still be further reduced if students were to take only as much food as they need.

A large portion of dry waste at both the Jennings meal hall and Golden A café is generated from food packaging. The director informed the auditors that whenever possible, products are purchased in bulk. While this is primarily a financial consideration, it does help reduce the amount of packaging per volume of food. In addition, many products that were once packaged in boxes are now packaged in bags, which in turn has decreased the amount of waste produced. All cardboard boxes received by the meal hall are now broken down and recycled, while at the time of the last audit, they were simply thrown out. Unfortunately, due to persistent theft problems, the director of food services has decided to switch from reusable salt and pepper shakers to plastic disposable shakers. Currently, food services uses disposables in the Golden A Café, for catering conferences, at outdoor events, in emergencies, and for sick trays and bag lunches. Accurate records of the number of disposable items used at the meal hall or the Golden A café are not kept. To give an estimation of the number used, last year the meal hall used disposable cutlery for four days, over seven meals, the amount of disposable items used would be approximately 7500 of each plates, cups, and cutlery.[3] This is in no way meant to be an accurate measurement of the use of disposable items on campus, as the actual number is much higher than this. Disposable cutlery is used further, in the Golden A, for sick trays, conferences, and outdoor events. This calculation is merely being used to demonstrate the excessive amount of waste generated by the use of disposable items in food services. No progress has been made to further implement the use of reusable cutlery in the Golden A. A number of years ago Sodexho attempted to implement reusable cutlery in the Golden A, but stopped because of persistent theft, and inadequate dishwashing facilities on site. In order to reduce the amount of disposable items used, the director of food services informed us that he is currently investigating the possibility of having each residence purchase a set of reusable plates and cutlery which would be used for students who require sick trays. These reusable trays must be supplied by the students, Sodexho is hesitant to purchase these items due to logistical concerns and the threat of theft.

Since the last audit, Sodexho has switched from using 'White Swan' napkins from Scott, which were made with 100% virgin fibre, to using napkins made from recycled content. The switch to recycled napkins was made a year and a half ago. Overall, the number of napkins used in the meal hall is currently under one case per day (one case contains 9000 napkins. But it should be noted that the new napkins are four times smaller than previous napkins). This reduction is in large part due to the use of individual napkin baskets placed on each table in the meal hall, rather than having a single central dispenser. This basket system allows students to take and use napkins as they are needed, avoiding unnecessary consumption of napkins. The switch to recycled napkins has been generally well received by both students and meal hall staff.

Recycling

The recycling program remains virtually unchanged in the last two years, with paper products and beverage containers (glass and plastic) being recycled by the university. Currently, paper is sent to the Dorchester Penitentiary where it is shredded and reused as animal bedding. This began in September 1998, prior to which time paper was picked up and recycled by Ergon. The exact amount of paper recycled by the university is not recorded. The Director of Custodial Services informed the auditors that there has been an increase in the amount of paper recycled on campus. For the past four years, beverage containers have been recycled through Wheatons all-in-one recycling facility. The Wheatons depot located at the Industrial Park in Sackville accepts both glass and plastic containers. The collection of paper is similar to the collection of waste destined for landfill. Individuals deposit recyclable paper into the appropriate bin on their floor

[3] There were seven meals served in this four day period. Assuming that there are approximately 500 students served at breakfast, and 1000 students served at lunch and dinner, this would result in the use of at least 7500 disposable items (plates, cups, cutlery).

or building, after which custodial and/or grounds staff transfer the material to a central location (McConnell Hall). Glass bottles are collected and recycled, by individuals, on a building by building basis.

In the fall of 2000, following recommendations made in the 2000 audit, the university purchased a number of containers designated specifically for can and paper recycling. These containers were placed in all academic, administrative and residential buildings on campus. Educational campaigns were carried out by both the Blue-Green society and Green Ambassadors, informing the university community about how to recycle on campus. There are still however, a number of questions as to exactly which items can and cannot be recycled. It may prove to be worth while for the university to send out a mass e-mail, and post on the Mount Allison web page, exactly which items can and cannot be recycled. Most of the confusion centred around exactly which paper products can be recycled.

When asked whether or not they felt they had an adequate understanding of how to recycle on campus, 71% of students, 66% of faculty, and 66% of staff claimed that they have an adequate understanding. A number of concerns were raised with the auditors, that the recycling program on campus is not clear enough.

In 1999 the town of Sackville switched to the Wet-Dry system introduced by the Westmorland-Albert Solid Waste Corporation. Some confusion associated with the recycling program on campus may have to do with the implementation of a system that is incongruent with the University's. Investigations and experiments are currently taking place to assess the possibility of implementing the Wet-Dry program here on campus. The facilities management department have successfully implemented the Wet-Dry program within their building. It is planned that in the fall of 2002 two buildings, one academic and one residential, will serves as test cases, to assess the viability of implementing the Wet-Dry program on campus. It is currently unknown how much the Wet-Dry program will cost the University.

The amount of solid waste that the university sends to the landfill can be greatly reduced if the University is able to successfully implement the Wet-Dry system on campus. There are however, other methods which the university could undertake to reduce the amount of material sent to the landfill. These measures include, on-site composting, and the further recycling of various materials on campus.

It is important to note, that the University provides waste disposal for companies doing contract work. So the waste generated by renovations, or other projects contracted out, will be included in the amount of waste disposed of by the University.

Sodexho

Paper products continue to be recycled at Sodexho whenever possible. Cardboard boxes are broken down and recycled. A number of other waste products produced by the meal hall are reused by other members of the university. For instance bread bags are reused by the athletic department, and the fine arts department collects a variety of waste products (generally buckets and canisters) from the meal hall.

Case Study

At Johnson State College in Vermont, students worked to integrate composting efforts with food waste resulting from the meal hall, in a project to reclaim the campus farm, and initiate a community garden. Staff in the meal hall separate compostable pre-consumer food scraps out and the compost created is used in the garden on the farm property. Students conduct composting demonstrations for the community and the garden has been managed by a variety of local groups and the produce donated to a food bank and sold locally.[4] This initiative is an excellent model for a holistic approach to learning and practising sustainable solid waste management, organic growing, and community-university partnerships. Here at Mount Allison, this example could be used to further the steps taken toward meeting the Environmental Policy performance indicators in a

[4]Keniry, Julian. Ecodemia: Campus Environmental Stewardship at the Turn of the 21st Century. Washington, DC: National Wildlife Federation, 1995. p.149

number of areas, including Solid Waste, Food, and Education.

Recommendations

For Senior Administration:

1. Ensure that the university's solid waste is being weighed accurately, either on site or at Tantramar Sanitation Service.

2. Make funds available for implementing the Wet-Dry program on campus.

For Sodexho:

3. Pursue the possibility of recycling more of the solid waste generated in food services. These materials could either be picked up or be transported to the Westmorland-Albert Solid Waste Corporation. These materials include plastic, cardboard and aluminum/tin cans.

4. Research the possibility of composting food waste on site.

5. Switch to reusable cutlery and dishes in the Golden A Cafe.

For Faculty and Staff:

5. Ask suppliers of products to minimize packaging and inquire as to whether they`ll pick up and reuse bubble paper, Styrofoam packing pieces, etc.

For Staff:

5. In addition to regular garbage cans outside add a bin for recycling drink containers next to all outside garbage cans.

6. Label all garbage cans and recycling bins on campus with signs clearly stating what can be disposed of in each container.

7. Periodically remind the university community of the recycling program on campus via the Argosy, CHMA radio, and communication with residence staff.

8. On the Environment page of the Mount Allison website, post a comprehensive description of the university's recycling program (listing what can and cannot be recycled on campus).

9. Consider coordinating a year-end collection of furniture, electronics, kitchenware, and other household items being discarded by leaving students. These things can be sorted and resold to incoming and returning students in September.

For Students:

8. The recycling representative in each residence should have a much larger role than making sure all bottles are ready for pick up. Duties could include:
   - Posting signs over bins instructing what can and can`t be recycled and ensuring that they are followed.
   - Setting up containers for reusables like yogurt containers and plastic bags and taking them to preschools, the Salvation Army,etc .
   - Putting out a box in September and April to collect discarded clothes and other items, when students are packing or unpacking, to take to the Salvation Army.

For Administration, Faculty, Staff, and Students:

8. Make an effort to ensure that everything that can be reused or recycled is not thrown out.

9. If living off campus Wheatons (536-0351) will pick up recyclables and also give information about what can and can`t be recycled.

10. Canvas bags and backpacks can be used instead of plastic bags. If you do have plastic bags, the Salvation Army will accept them and reuse them.

11. Daycares, kindergarten class rooms etc. will often gladly take old

yogurt containers, etc. for arts and crafts.

12. Bring unwanted clothing, books, furniture, etc. to the Salvation Army.

13. Educate those around you if you notice them throwing out something which could be recycled or reused.

14. Before making any purchase, business related or personal, consider the following questions before making a decision:
- Do I really need this product ?
- Can I buy it used ?
- Could I repair or refurbish the old item instead ?
- Can I loan or lease it from someone else ?
- Does it contain recycled/recovered materials ?
- Will this product reduce waste in my office ?
- Is it made from non toxic materials ?
- What kind of packaging is used ?
- Is it reusable or recyclable ?

Figure 6.1 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
There is an effective paper waste reduction program	Paper waste continues to be a major issue at Mount Allison, paper consumption has steadily risen over the past six years.	Establish a specific section of the Environmental Policy dealing with paper consumption on campus. Create effective polices to reduce paper consumption and set target dates for implementation
An effective recycling program is maintained across campus	In order to increase participation, participants require more information, and increased number of bins.	Define what participation levels, and quantity of products recycled, renders a system effective.
Furniture is offered for sale or donation to disposal	Effort is made to make furniture available for sale or donation	No change proposed
Yard Waste is used as mulch on campus grounds	Yard waste is composted and re-used as fertilizer	No change proposed

Letter Grade: C

Paper

Introduction

The 1998 audit reported that 4 498 218 sheets of paper were consumed between 1997 and 1998. The 2000 audit reported that 6 450 000 sheets of paper had been consumed from May 1998 to April 2000. From May 2000 to April 2002 Mount Allison University consumed 8 275 681 sheets of paper. This marks a 1 825 681 increase in the amount of paper consumed at the University. This increase is partly due to greater consumption, and partly due to more accurate accounting of paper used on campus.

Environmental Significance

Global paper consumption continues to increase at an unrelenting pace. In their report, *The State of the World 2000*, the World Watch Institute claims that "by 2010, global demand for paper is expected to rise by nearly 31 percent."[1] At this rate of consumption, the U.N. Food and Agriculture Organization (FAO) predicts that by 2010 the amount of paper consumed globally will reach 391 million tons.[2] Pulp and paper industries throughout the world consume large quantities of energy, and have, per product of output, one of the highest pollution emission level of any industry.[3] The paper production process effects all dimensions of our environment, "from soil erosion and species loss when forests are harvested in British Columbia or Chile, to air pollution from pulp mills and waste incinerators in Japan, to the deadly dioxins released by mills along lakes in North America and Russia, to life-less rivers in China and India. Paper's impacts spread far and wide, and can persist for decades to centuries."[4]

The situation in Canada is no different, current trends, in both the production and consumption of paper, continue to create a number of environmental problems. Within Canada, "over 45% of. . .surface area is covered by forest," which represents "approximately 10% of the worldwide vegetation cover."[5] Canada currently "ranks number one in the world for newsprint production and export, number one for exports of softwood lumber and wood pulp and ranks number two for production of softwood lumber"[6] Despite these seemingly impressive statistics, most of Canada's forests are harvested in a very unsustainable manner. It is estimated that approximately 90% of all forests in Canada are harvested by clear cutting, causing severe ecological damage, including soil erosion, the loss of carbon sinks, and the loss of bio-diversity through species habitat depletion.[7] De-forestation is coupled with the release of numerous, hazardous chemicals during the paper production process, including, carbon dioxide (a greenhouse gas), chlorine and chlorine dioxide, chloroform (known carcinogen), and Phenols (which impair human immune and nervous

[1] World Watch Institute, State of the World 2000, Chapter 6, New York: W.W. Norton & Company 2000 pg 102

[2] World Watch Institute, State of the World 2000, Chapter 6, New York: W.W. Norton & Company 2000 pg 117-118

[3] World Watch Institute, State of the World 2000, Chapter 6, New York: W.W. Norton & Company 2000 pg 107-108

[4] World Watch Institute, State of the World 2000, Chapter 6, New York: W.W. Norton & Company 2000 pg 104

[5] Stats Canada, "Loggin Industry in Canada," http://www.statcan.ca/english/research/25F0002MIE/25F0002MIE2000001.htm

[6] Natural Resources Canada, "Canadian Forestry Facts," http://www.pfc.cfs.nrcan.gc.ca/monitoring/inventory/facts/facts_e.html

[7] Global Forest Watch, "Canada Overview," http://www.globalforestwatch.org/english/canada/index.htm

systems).[8] Specifically in New Brunswick, forests currently occupy approximately 85 percent of the land,[9] with over 70 percent of wood harvested using clear cutting methods.[10] New Brunswick alone currently has 10 paper mills in operation.[11] As current practices in the consumption and production of paper bring high environmental costs, we must seek to reduce unnecessary paper use, reuse whenever possible, and when no longer useful, recycle.

Current Environmental Policy

There is currently no policy regarding paper, except for four performance indicators contained within other sections. Within the Solid Waste section, the performance indicator states:

-"There is an effective paper waste reduction program."

In the Purchasing section, there are three performance indicators specifically regarding paper, they state:

-"Photocopiers and printers minimize the required use of paper;"

-"Recycled and post-consumer paper is purchased;"

-"Unbleached recycled paper is available in the Bookstore."

Responsible Parties

Michelle Strain, Manager of Support Services at Mount Allison, co-ordinates the ordering of paper for photocopy machines and printers in all campus departments. Support Services also oversees the activities of Repro graphics.

Audit

This summer Michelle Strain conducted an extensive campus wide audit of paper use. It is from this paper audit that the majority of the information in this chapter comes from. From May 2000 until April 2002, the University community consumed 8 275 681 sheets of paper. The 2000 audit reported that paper use, from 1998 to 2000, was 6 450 000 sheets. This marks a 1 825 681 increase the amount of paper consumed at the University. This substantial increase can be attributed partly to an increase in paper use, and partly to the inclusion of paper use which may have been missed in the previous audits. The purchasing of paper is done by individual departments through their budget. A pie chart depicting the percentage of total paper consumed by department is available in Appendix ? and ?.

Of total paper consumption on campus, the majority can be attributed to the Bookstore (12.94% and 16.38%), the library photocopiers (12.25% and 9.75%), Student Administrative Services (7.18% and 7.34%), and Financial Services (5.48% and 4.16%), and the President's Office (3.29% and 4.51%). The increase in the amount of paper consumed by the Bookstore is a direct result of more classes using course and lab packs (which are printed by the Bookstore). Although there was a substantial decrease in the amount of paper consumed at the photocopiers in the Library, they still represent a large section of the paper consumption on campus. This decrease is due in part to the increased use of course packs, which has served to decrease the amount of photocopying undertaken by students. High paper consumption in Student Administrative Services, Financial Services, and the President's Office is due to the large number of communications undertaken by these departments. The high numbers for Social Sciences is due to the fact that paper consumption is tallied for the entire Faculty, and not individual

[8] 'Reach For Unbleached,' Health Effects of Pulp Mill Pollutants, http://www.rfu.org/Health.htm

[9] Information Canada, 'New Brunswick," http://www.infocan.gc.ca/facts/newbrunswick_e.html

[10] New Brunswick Forestry Association, 'New Brunswick Forestry Statistics," http://www.nbforestry.com/e/dyk/index.htm

[11] New Brunswick Forestry Association, 'New Brunswick Forestry Statistics," http://www.nbforestry.com/e/dyk/index.htm

departments. The faculty of Social Science is composed of five different departments, which gives each department an average paper use of 1.48% from May 2000 to April 2001, and 1.32% from May 2001 to April 2002. Appendix ?, represents the changes in consumption over the past two years, illustrating an increase or decrease in the amount of paper consumed by the various departments on campus.

The largest increases, over the two year period, in the amount of paper consumed occurred in the following departments; Bookstore(206568 sheet increase), The President's Office (67589 sheet increase), SAC-CHMA-Pub-Sodexho (62313 sheet increase), SAS (incl Massie) (38806 sheet increase), Psychology (31063 sheet increase), Computing Services (25458 sheet increase), Math/Computer Science (24268 sheet increase), and Chemistry (23064 sheet increase). The largest decreases in the amount of paper consumed over the past two years occurred in the following areas; Library photocopiers (55000 sheet decrease), Financial Services (33524 sheet decrease), Printing Labs (30000 sheet decrease), Library Administration (20572 sheet decrease), and History (17333 sheet decrease). A full break down of the total amount of paper consumed can be viewed in appendix (***insert appendix number here***).

In 2000, Mount Allison purchased all of its paper from Xerox. As noted in the previous audit, Xerox has a policy to only purchase paper from companies that "are committed to sound environmental practice and sustainable forestry management...(these) companies must be in full compliance with environmental regulatory requirements in the countries where they operate." The auditors were unable to find out exactly from who Xerox purchases its paper, and the old growth content of its paper. In 2001, Mount Allison switched contracts for paper supply to Econosource. Paper from Econosource has no recycled content, and is made entirely from virgin fiber. However, coloured paper from Econosource contains 30% post-consumer content, while card stock contains 50% post-consumer content. The auditors were unable to determine where exactly econosource paper comes from, and whether or not they have an environmental policy to which they abide.

The two largest sources of paper consumption on campus are photocopying and printing. Mount Allison, along with all other Maritime Universities, is a part of a collective bargaining group which forms collective contracts for photocopy suppliers. In August 2000, Mount Allison entered into a new contract with Canon.[12] The University currently employs 6 public copiers and 27 departmental copies. All of the new machines from Canon are consolidated digital photocopiers and printers. The consolidation of the two greatly reduces the amount of tonner consumed. The Canon copiers also allow for easier double-siding of documents, which, if used, can drastically reduce the amount of paper consumed. In the coming academic year (2002-2003) all Canon copiers on campus will have their default setting placed on double sided printing. A number of departments on campus still have single function printers. Although these single function printers are not being removed, the trend is towards using the Canon copiers as much as possible, as they decrease both the amount of tonner and paper (through easier double siding printing) consumed.

During the past academic year, a new printing program was begun, which has dramatically reduce the amount of paper consumed by student printing. The new system sends print jobs to a central computer which is linked directly to the printer. After sending a print job to this central computer, the user must click on their work and enter their password in order for it to print. This process eliminates the printing of unwanted copies, ensuring that only the documents that are wished to be printed are. Although there maybe other factors contributing to the decrease in the amount of printing taking place at University Print labs, there was a substantial decrease of 30 000 sheets in the past year, which can partly be attributed to the implementation of this new printing system.

The "Record", is Mount Allison's alumni magazine, which is published by the external relations office. Approximately 15000 copies of each issue are printed and distributed to alumni. The Record is published three times during the year, with two issues being approximately 40 pages, and the other being approximately 56 pages. As was noted in the previous audit, the Record continues to be printed on recycled paper.

[12] Canon's environmental policy can be found on the companies web site: http://www.canon.com/environment/a-01.html

The paper towel used by the University is 100% recycled with 80% post consumer content. The paper towel at the University is supplied by Unisource. Toilet paper is purchased from G.H. Wood and is also 100% recycled.

Letterhead on campus has for many years been printed on 50% pre-consumer recycled content, 20% post-consumer recycled content, with the remaining 30% composed of virgin fiber. As noted, the amount of letter head used by the University is included in the total amount of paper used by the University.

At Mount Allison, a paper recycling program has been in place since 1989. Currently, most kinds of paper can be recycled, including newsprint, foolscap, white and coloured paper, and cardboard (except corrugated). Paper in recycling bins continue to be shredded and sent to the Dorchester Penitentiary, where it is used as animal bedding. In the fall of 2000, a number of new paper and can/bottle recycling bins were placed throughout the University campus. In the past, Facilities Management has investigated the feasibility of placing individual recycling bins in each office and residence room to encourage recycling. This project has been sidelined by investigations into the possibility of implementing the wet-dry system on campus (see solid waste chapter).

The University continues to increase the use of its web site for communication and teaching needs. A number of faculty have taken to placing teaching materials, course outlines, handouts, supplementary material, on the web site, eliminating the need to print out hard copies for each student. The University is encouraging staff and faculty to purchase a version of Adobe Acrobat Reader, which allows for faculty and staff to create secure documents which they can then post on the Web CT program (for teaching and communication purposes). The secure nature of Adobe eliminates the fear of alteration of electronic material. So far, only 65 members of the University community have purchased this program. If implemented on a campus wide basis, it could serve to greatly reduce paper consumption. A number of departments already make use of the web site for various communications, for instance, Financial Services, in the coming year, are going to be placing Student financial accounts on the web SIS program. Currently they send out three financial statement per year to all students. They hope to reduce this to one statement per year (for tax and legal purposes), while the other two statements will be posted on web SIS.

In April 2000, the Library switched its overdue notification system, from computer printouts, to an e-mail based system. It was noted in the last audit that between May 1999 and April 2000, the library sent out 14 000 notices, each on a large sheet of paper. This switch to electronic notification system has resulted in a significant decrease in the amount of paper consumed by the Library. Student Administrative Services continues to employ the use of an on-line application system on the University's website. A large number of students have taken advantage of this on-line service each year. Although S.A.S. is required to print out these applications for processing, a significant amount of paper is saved in a reduction of the amount of applications mailed to students. This year S.A.S., in compliance with the environmental policy, reduced the number of academic calendars it printed. All new students were given calendars, while returning students were asked to rely upon web based versions (the academic calendar is available in both html and adobe format on the University's website).

The Department of Support Services (D.S.S.) continues a number of paper recycling initiatives. D.S.S. continues to collect all one sided scrap paper, which is cut and glued together into scratch pads. A number of departments make use of this program, to the extent where many have eliminated the purchasing of these products from outside sources. D.S.S is also running a joint program with various departmental secretaries to recycle unused pages in old exam booklets.

The University's bulk email policy has not been amended since the last audit. Certain departments are given permission to send out one mass email per week. Beyond this, permission is required on a per-email basis from one of the Vice Presidents. It is feared that without this policy, the amount of mass emails would become burdensome, resulting in important messages not being read. There are still a variety of intra-University mailings that use a large amount of paper, often unnecessarily (most often these are advertisements for various products or events). In addition, many people still insist on printing out hard copies of all e-mails, which can be a source of great paper waste.

The calculation of a paper-to-tree ratio is highly variable, as the exact ratio depends on a number of variables, such as the pulping process, and size of the tree. Using the variables given by the University of British Columbia, the consumption of 8 275 681 sheets of paper at Mount Allison resulted in the following:

- 702 trees cut down

- 62 895.2 litres of oil burned
- 1556 kg of air pollution released
- 3 211 179.2 litres of water consumed
- 262 371.3 kWh of energy consumed
- 4122.6 kg/yr of CO2 filtering capacity lost[13]

The results from the environmental survey indicate the both faculty and students are more than willing to undertake a number of paper saving measures. 100% of Faculty respondents to the environmental survey indicated that they would be willing to use unbleached and/or recycled paper if it were available. 33% of faculty support an increase of 10% in spending to purchase environmentally friendly products, while 44% support an increase in 5%. 72% of faculty would accept assignments via email. 94% would accept assignments printed on both sides of the page, while 91% would accept assignments printed on one-sided paper (paper on which one side has already been used). 94% of students responded that they would use unbleached and/or recycled paper if it were available. 25% of students indicated that they would support a 10% increase in cost to support environmentally friendly products, while 33% indicated that they would support an increase of 5%. 89% indicated that they would hand in assignments via email. 81% would print assignments on both sides of the page, while only 63% said that they would hand in assignments printed on one-sided paper. 100% of staff respondents indicated that they would use unbleached and/or recycled paper if it were offered. The high results from faculty and students indicates a willingness on both sides to conserve the amount of paper being consumed.

Case Study

In 1998, the University of British Columbia committed itself to reducing its paper consumption by 20% by 2004. The University is taking a pro-active paper reduction program, singling out the largest paper users on campus and working within the department to decrease the amount of paper they consume. In conjunction with this reduction campaign, the University is encouraging individual departments to purchase 30% post-consumer recycled paper, which has been successfully implemented in a number of departments with only minor increase in costs.[14]

Recommendations

For Senior Administration:

1. Create a section on paper consumption for the Environmental Policy, complete with performance indicators.
2. Make a policy of eliminating purchases of all paper products containing old growth wood fibre.
3. Continue to make post-consumer paper available at the bookstore for departments and individuals to purchase.
4. Encourage prospective students to use the Mount Allison website for information and applying instead of hard copies received in the mail.
5. Encourage other universities under the inter-university tender to switch to recycled paper.
6. Make it university policy that all internal communication be done on E-mail to save paper.
7. Inform all contracted companies of the university's concern about paper wastage, and ask that all communication and information from them be printed double-sided.
8. Request that Econosource disclose the forest management practices of the timber companies that supply its pulp.

For Faculty:

9. Discuss with your department the possibility of order less paper each year and using the savings toward the purchase of recycled content paper.
10. Suggest a departmental policy that all copying be done on both sides of the paper
11. Encourage students to submit assignments printed on both sides of the paper, either by printing double-sided or by printing on paper

[13] Clark, Amelia, and Joshua Campbell. "An Environmental Review of Fine Paper Use at Dalhousie University." http://www.sierrayouthcoalition.org/en_CA/SusCamp/resources/FINEPAPE.PDF

[14] UBC Campus Sustainability Office: "Paper Reduction Program." http://www.sustain.ubc.ca/2ourinitiatives/paper_reduction.html#1

already used on one side.

12. Encourage students to submit shorter assignments via E-mail and allow students to use this method when submitting longer essays as well.
13. Reduce your own paper consumption by using E-mail as much as possible and not printing anything you don't have to.
14. When possible, use overheads instead of handouts.
15. Reuse all paper that has only been used on one side. One-sided paper can also be made into scratch pads free of charge at Central Stores. (One-sided paper should not be recycled since half of it is still useful.)
16. Recycle paper once it has been used on both sides.
17. Consider using part of the department's budget for a paper shredder so that confidential documents can be recycled.

For Staff:

18. Discuss with your department the possibility of order less paper each year and using the savings toward the purchase of recycled content paper.
19. Suggest a departmental policy that all copying be done on both sides of the paper
20. Reuse all paper that has only been used on one side. One sided paper can also be made into scratch pads free of charge at Central Stores. One sided paper should not be recycled, half of it is still perfectly good.
21. Consider using part of the department's budget on a paper shredder so confidential documents can be recycled.
22. Reduce your own paper consumption by using E-mail and not printing anything that you don't have to.
23. Print all exams and exam booklets on both sides of the paper.
24. Recycle paper once it has been used on both sides.

For Students:

25. Ask your professor if you can hand in assignments single spaced, double sided, or via E-mail. If told that you can't, ask why not.
26. Encourage the SAC office to purchase recycled paper products.
27. Read books on course reserve in the library rather than photocopying them.
28. Photocopy double-sided or onto paper that has already been used on one side.
29. Use posters minimally, and if you do make them, use paper that has already been used on one side.
30. Reuse all one sided paper (to print assignments on the other side, for signs, for rough work, for class notes, etc.)
31. If you live in residence, keep a box in your room to be emptied periodically into the main paper recycling bin. If you live off campus, keep paper products and all other recyclables separate (including cardboard) and ask Wheatons to come and pick them up. Call 536-0351.
32. When buying new paper, buy unbleached and with the greatest post-consumer available. If the store does not carry recycled paper, request it.

Letter Grade:

Food

Introduction

Sodexho continues to be the primary food provider on campus. Approximately $42,000 are spent each week of the school year on food served at Jennings and the Golden A Café. A small portion of this is supplied by local sources and some adjustments are made to the menu according to the season. Unfortunately, organic food is not yet served by Sodexho.

Environmental Significance

The interrelationship between the food we produce and the health of the environment is one that is often over looked. Not only how we choose to produce our food, but what we choose to consume, has a profound effect upon the health of our environment. It is a delicate balance, as the foods we choose to produce and consume has a direct impact upon the environment, while environmental conditions largely dictate what foods we are able to produce. Agriculture world wide is in a state of disarray environmentally, from the use and run-off of pesticides, to increased rates of soil erosion, to bacterial contamination, the 'factory' farm constitutes a great threat to the integrity of the environment.

The use of pesticides is one of the greatest environmental concerns today. A wide variety of pesticides in use today are known to cause cancer and birth defects, while others can act as hormone mimickers causing adverse health effects. Health Canada estimates that "food generally accounts for about 80 to 95 percent of our daily intake of most persistent toxic contaminants."[1] The result being, that a large portion of the pesticides sprayed upon our food is absorbed into our bodies. Pesticides as well, besides being disastrous to human health, are devastating to health of the environment. The accumulation of pesticides in an ecosystem have been known to cause, the re-gendering of amphibians, the build up of bacterial matter, and if in high enough concentrated, the destruction of entire ecosystems.

On average, the typical North American diet derives 25% of its calories from animal products. Besides generally being a fattier diet, the grain used to produce one pound of hamburger, through animal feed, could other wise be used to produce 8 loaves of bread or 24 plates of spaghetti. The amount of water used to produce that same amount of hamburger (2,500 gallons) could be used to grow more than 50 pounds of fruits and vegetables. It is estimated that cattle consume 70 percent of all grain in the United States, and that half of all water consumed in the United States is used to grow feed and provide drinking water for cattle and other livestock.[2] In a world of over six billion people, with what little resources we have, the typical North American diet is simply no longer sustainable. By eating lower on the food chain more often, we are able to lessen our impact upon the environment.

Often the transportation involved in shipping the foods we consume is over looked in its impact upon the environment. The purchasing of tropical foods, or foods grown great distances from where they are consumed

[1] Health Canada. "The Health and Environment Handbook for Health Professionals" http://www.hc-sc.gc.ca/ehp/ehd/catalogue/bch_pubs/98ehd211/chapter8.pdf

[2] Earthsave Canada www.earthsave.bc.ca

require large quantities of fossil fuels to be burned in the transportation process, contributing to urban smog problems and climate change. A focus on purchasing local foods when ever possible can greatly decrease the amount of fossil fuels burned in the transportation process.

Mount Allison university, as a representative of a large population, holds a significant amount of purchasing power. The decisions the university makes on what it chooses to consume effects not only the health of the environment, but the health of all members of the university community. The choice to purchase local-organic food, not only promotes sustainable agriculture and environmentally friendly practices, but improves the health of university personal, and spurs development in the regional economy. David Orr writes, "agriculture (not argibusiness) would be given a large economic boost if a number of these institutions purchased locally grown food from farms operated sustainably. In return they would raise the quality of the food they serve, thereby improving the health of their students, lowering expenditures by reducing the costs of transporting food long distances, strengthening the local economy, and improving their ethical posture by reducing their complicity in a food system that is neither just nor sustainable."[3]

Current Environmental Policy

"The University will endeavour, through the Department of Administrative Services, to minimize the ecological impact of food consumption on campus."

The performance indicators for this section are as follows:

- " Packaging and waste are minimized.
- Organic(pesticide/herbicide free) and seasonal options(food that does not have to be preserved) are used.
- Food is procured from local sources
- Information regarding ingredients and processing practices are made available to students
- Products which meet or exceed the standards outlined by the National Ecology labelling system are purchased.
- Environmentally friendly cleaning supplies are being used
- China or reusable plastics are used
- Food and cardboard recycling programs are used" (Section 2.7, Mount Allison University Environmental Policy, www.mta.ca/environment/)

Responsible Parties

All food on campus, with the exception of that served by the President's Cottage and Cranewood, is supplied by Sodexho. Under the direction of Mark Henchey, Sodexho is responsible for the operation of the Golden A Café and the Jennings meal hall. Changes to food service are made through a suggestions board and through residence representatives.

Audit

"Sodexho believes that we have a special responsibility to protect our environment for future generations. This responsibility has grown from our unique relationship with millions of consumers throughout North America, whose quality of life tomorrow will be affected by our stewardship of the environment today. We share their belief that the right to clean air, clean earth, and clean water is fundamental and unwavering. Sensitivity to environmental issues is an integral part of Sodexho's way of doing business. Vendors must demonstrate that their production process is as

[3] David Orr, Rooted in the Land: Essays on Community and Place eds. William Vitek and Wes Jackson. New Haven and London: Yale University Press, 1996 pg 232

environmentally friendly as possible."[4]

With the exception of the food served at the President's Cottage and at Cranewood, all food on campus is prepared by Sodexho. This food is served at the Golden A Café and at the Jennings meal hall. Food at the café is sold on an item by item basis. All students living in residence, with the exception of those in the Pavilion Bousquet, are required to purchase a meal plan which entitles them to 14 or 19 all-you-can-eat meals per week. Those not on the meal plan can purchase meals individually. Approximately 1150 members of the university community are on the full meal plan. This shows no marked change since the last environmental audit. Because the director does not keep records of the amount of food purchased, it is difficult to make any comparison with the activities in previous years. In particular, it makes gauging the environmental impact of food consumption on campus largely inaccurate.

The meal hall and the café offer only limited quantities of locally grown food. Neither the meal hall nor the café offers organic options. According to the Director, these items are too expensive and not available in large enough quantities for Sodexho. Because the company operates under national contracts for larger quantities in order to receive a better unit price it is not possible for them to buy from small organic growers. Though such companies might indeed be able to supply the needs of Mount Allison's food services, Sodexho signs contracts to supply for all of its Canadian locations.

Much of the food served by Sodexho is distributed by Sysco (formerly Serca) operating under a national contract. Sysco supplies food services at Mount Allison with baked goods, non-perishable food, and cleaning products and delivers once weekly.

The university receives some of its food supply from Maritime sources, including Baxter milk products, Sterling apples, Hub Meat Packers of Moncton, and potatoes from Nova Scotia.

On its website, Sodexho Canada advertizes the availability of fair trade coffee at its locations. Currently the coffee served at Mount Allison is purchased from Nabob and Nestle, though the director has said he will look into the possibility of purchasing fair trade coffee if Sodexho does in fact have a contract with a fair trade coffee supplier.

As planned at the time of the 2000 environmental audit, information on the ingredients of the dishes served at Jennings is now contained in a binder in the meal hall. The preservatives, additives, and processing practices of ingredients are not listed in this binder. Students with allergies or specific dietary needs must communicate these to the director so that alternatives can be provided.

The consolidated Jennings meal hall has now been open for two full academic years. The director has noted increased efficiency in the various materials used in food services, including food itself. In addition to consolidation, a number of the meals served at Jennings are now cooked on demand, for example stir-fry and omelettes. This means that prepared food is not wasted. (For specifics on the amount of waste resulting from food services on campus, please refer to the Solid Waste chapter of this report)

Case Study

Bates Dining at Bates University in Lewiston, ME

"A member of the Maine Organic Farmers and Growers Association (MOFGA), Bates Dining has established connections to buy organic produce from local farmers. Bates College began to buy locally in 1996. Through the efforts of our purchasing manager, we became affiliated with MOFGA. We currently buy turkeys, potatoes and tomatoes from the association. Another great aspect of our purchasing program is smart purchasing. We always buy products from companies which try to minimize waste. We also purchase our coffees from Equal Exchange, a

[4] Sodexho, 'Environmental Policy,' http://www.sodexhousa.com/corp_environ.html

distributor of organic coffees."[5] Bates College has a population of approximately 1650 students.

Recommendations

For the Director of Food Services:

1. Begin offering an organic option in the Golden A and meal hall by providing one meal with organic ingredients every week. With sufficient student demand, increase the amount of organic options available.

2. Purchase produce from local growers whenever possible.

3. Request product information regarding ingredients, processing methods and suppliers for all food items supplied by Sodexho and make it available to students.

4. Consider donating extra food to a charitable cause, such as a soup kitchen or a Meals-on-Wheels program.

For Students:

5. Request product information from Sodexho regarding ingredients, processing methods and suppliers for all food items.

6. Avoid eating those foods which do not meet environmental and socially acceptable standards.

7. Reduce food waste, only put on your plate what you can eat.

8. Limit the meat content in your diet. Eating lower on the food chain requires the input of less energy and fewer resources.

[5] Bates College, 'Environment Initiatives,' http://www.bates.edu/dining-environment.xml

Figure 8.1 Review of Environmental Policy:

Current Performance Indicator	Current State of Affairs	Proposed Changes to Performance Indicator
Packaging and waste are minimized.	Some packaging is avoided by purchasing in bulk. Wastes are not measured.	Separate the components of this indicator to address packaging, dry waste, and food waste specifically.
Organic (pesticide/herbicide free) and seasonal options(food that does not have to be preserved) are used.	No organic options are currently available; some changes in foods offered depending on the season.	No change proposed.
Food is procured from local sources	A small portion of food is procured from local sources.	No change proposed.
Information regarding ingredients and processing practices are made available to students	A binder is available that lists the ingredients of all dishes served in the meal hall. It does not include information on processing.	No change proposed.
Products which meet or exceed the standards outlined by the National Ecology labelling system are purchased.	The National Ecology labelling system does not contain many food products in its listings.	Research a labelling system specific to the food industry and revise this performance indicator accordingly.
Environmentally friendly cleaning supplies are being used	The products used are biodegradable.	No change proposed.
China or reusable plastics are used	China is used in the meal hall. Food at the Golden A Café is served on Styrofoam and picnics/outdoor functions also use Styrofoam.	Indicate where and in what circumstances that china or reusable plastics should be used.
Food and cardboard recycling programs are used.	Food will be sent to Westmorland-Albert beginning in September, 2002. Cardboard continues to be recycled.	No change proposed.

Grade Assigned: D

Water

Introduction

In 2001, Mount Allison's water consumption increased by 3,147,000 litres over the previous year to a total of 174,386,000 litres. Retrofits, a decrease in activity in some labs, and the combination of the two meal halls, has reduced consumption in some of the larger buildings, however the overall trend has been an increase. The university continues to install more efficient fixtures whenever renovations are done, and is open to testing water saving technologies. The quality of incoming water from the Town meets health regulations, however the university remains somewhat vague on the impact of its activities on waste water.

Environmental Significance

In Sackville the water supply comes from Tantramar River watershed, a ground source. 91% of the population in the Atlantic region[1], and approximately a third of the world's population[2] rely entirely on groundwater supply. It has long been thought that groundwater was safe from contamination, but in May 2000, the catastrophe in Walkerton, Ontario challenged that notion. The death of 7 people as a result of an E. Coli outbreak caused by leaching of manure from a nearby farm into the groundwater supply of this small town, was a wake up call in Canada. All over the world, fresh water supply is being depleted as a result of overuse and contamination. We are only now discovering contamination caused by chemicals phased out decades ago. At the same time, with water consumption increasing at twice the rate of population growth, the demand for water is predicted to increase to 56 percent more than is currently available[3]. Clearly then, contamination of and dependence on water cannot continue indefinitely. Here at Mount Allison, this relationship is largely hidden in the plumbing. Clean water comes out of the tap, and potential contaminants vanish down the drain or are shipped away for disposal in landfill. It is essential that in managing water as a finite resource, we do our part to conserve water *and* avoid spoiling water both for those supplied by the local watershed and beyond.

Responsible Parties

The Technical Service Manager at Facilities Management is responsible for monitoring water consumption on campus as well as the upkeep and replacement of fixtures, piping, and equipment.

Current Environmental Policy

"Under this policy, the university will endeavour, through the supervision of Facilities Management, to minimise water consumption.

The performances indicators for the following section are as follows:

- Water efficient models are installed when replacing any water fixtures on campus.

[1] Environment Canada's State of the Environment Report: www.ec.gc.ca/soer-ree/English

[2] World Watch Institute, State of The World 2001, New York: W.W. Norton & Company, 2001

[3] Council of Canadians : www.canadians.org

- Projects are undertaken to decrease water usage.

- Longevity and water efficiency are primary considerations when purchasing water fixtures." (Section 2.5, Mount Allison University Environmental Policy, www.mta.ca/environment)

Audit

Mount Allison's water supply comes from the Tantramar River watershed, a groundwater source that is piped and treated by the Town of Sackville, for a charge of $0.80 per 1000 litres. The piping and treatment of water and sewage remains unchanged since the time of the last audit. According to the Public Works and Water Department, our watershed appears to be safe from contamination and depletion. 11 locations are monitored every two weeks and show that New Brunswick regulations for quality are consistently being met. In addition, the town's committee on water and sewer is spearheading research to quantify more accurately the amount of water in the ground source. It is hoped that this will provide the basis from which to improve local watershed management.[4]

Mount Allison's total water consumption in 2001 was 174,386,000 litres of water, showing an increase of 3,147,000 litres compared with total consumption for 2000. This translates into approximately 780,000 litres per student last year, or 215 litres daily per student. The quantity of water consumed by each of the buildings on campus in the last two years is contained in Appendix Q, with an analysis of those numbers in the paragraphs below.

Water is used at Mount Allison primarily in bathrooms, in science and photography labs, for food preparation, for outdoor watering, for air conditioners in select buildings, and for the fountain in the Swan Pond. The sites of major water consumption on campus have not changed a great deal in the last two years. The top water consumers last year in descending order were Harper/Jennings, Trueman/McConnell, Barclay, Windsor, Athletic Centre, Crabtree, Bennett/Bigelow, Edwards/Thornton, Palmer, Allison Gardens, University Centre, Flemington, Heating Plant, and Hart Hall. The total consumption in each of these buildings has fluctuated somewhat over the last three years. There has been a marked improvement in the water consumption for these top buildings, with a decrease of 13,630m^3 since 1999, though the campus wide trend has been an increase. Figure 9.1 charts the last three years of water use in the buildings with the highest consumption on campus and notes the percentage these buildings contributed to the total consumption on campus most recently. In 2001, these fifteen buildings comprised 71 percent of the total consumption, with the remaining 24 buildings totalling 29 percent.

Figure 9.1:

Building:	1999	2000	2001	% of total in 2001
Trueman/McConnell	40,363m^3	20,143	20,564	11.79
Barclay	16,328	20,443	19,334	11.09
Harper/Jennings	15,336	24,051	21,984	12.6
Crabtree	12,993	10,022	10,625	6.09
Windsor	12,879	12,438	12,733	7.3
Athletic Centre	10,384	14,425	12,192	6.99
Edwards/Thornton	9,229	9,228	8,478	4.86
Bennett/Bigelow	8,468	8,205	9,330	5.35
Flemington	6,374	5,248	5,134	2.94
Hart Hall	5,105	4,670	3,455	1.98

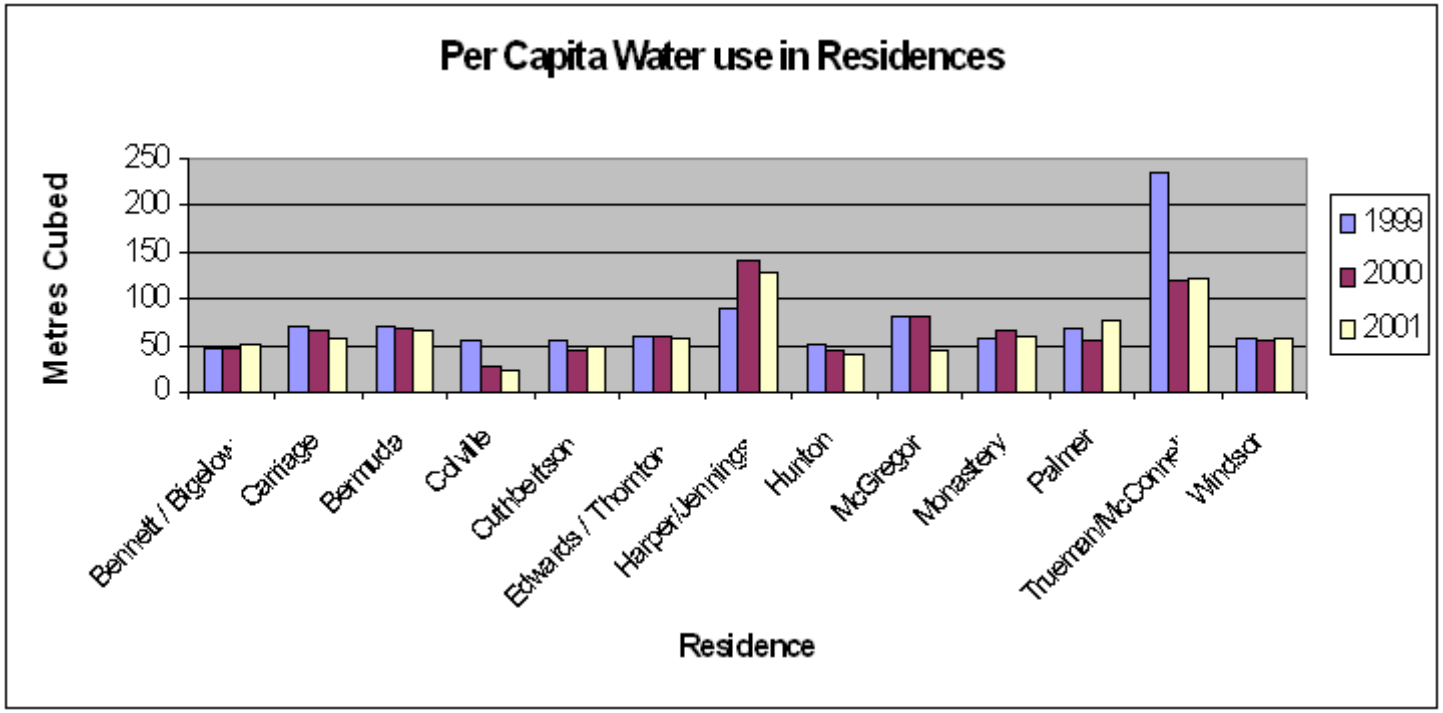
[4] Information on the Town's water management obtained from a phone interview with Town of Sackville Engineer, George Woodburn, June 2002.

The combination of two meal hall facilities into one, beginning in March 2000, resulted in an overall decrease in water used for food services, though the meter readings for Harper/Jennings and Trueman/McConnell are among the highest because they are two of the largest residences on campus, each housing approximately 170 students. Barclay and Flemington both operate a number of laboratories that make use of water both for cleaning equipment, and for water aspirators. Although the Coastal Wetlands Institute has been added to the water meter at Flemington (as of 2000), it is not yet fully operational and has thus not had any notable impact on the total consumption. The overall drop in consumption at Flemington, as well as the increase in Barclay can be attributed to the level and type of research being done in those buildings. The steady decline in consumption at Hart Hall is the result of reduced activity in the photo labs located there. Figure 9.2 graphs the consumption in these buildings in 2001 for comparison.

Buildings on campus vary somewhat in terms of the style and efficiency of bathroom fixtures-showers, faucets, toilets, and urinals. Showers range from 42 to 3 litres per minute, sinks from 31 to 4.68 litres per minute, toilets from 22.5 to 1.6 litres per flush, and urinals from 5 to 2.8 litres per minute, depending on the model. Currently, when buildings are renovated the fixtures are replaced with a more efficient model. Washroom retrofits since the 1998 survey include the Dunn Building, the CLT, one washroom in Bigelow House. Those since the 2000 audit, include the completion of the third floor of Avard Dixon, and a shower repair in Bennett House. Hunton House is currently undergoing a complete renovation of the interior, which will include retrofits of all water fixtures.

Figure 9.2 compares the water consumption in each residence building per capita, showing results for 2000 and 2001 (measured from January-December of each year).

Figure 9.2:


Per Capita Water use in Residences
Metres Cubed
250
200
150
100
50
0
1999
2000
2001
Bennett / Bigelow
Carriage
Bermuda
Colville
Cuthbertson
Edwards / Thornton
Harper/Jennings
Hunton
McGregor
Monastery
Palmer
Trueman/McConnell
Windsor
Residence

The water use per capita last year in descending order was as follows: Harper, Trueman, Palmer, Bermuda, Monastery(Pavilion Bousquet), Carriage, Windsor, Edwards/Thornton, Bennett/Bigelow, Cuthbertson, McGregor, Hunton, Colville. Both Trueman and Harper share water meters with McConnell and Jennings meal halls, respectively. From September 1999 to February 2000, McConnell was the only meal hall open and since March 2000, Jennings has become the sole meal hall, serving nearly all students living in residence. This can be seen in the fluctuations in water consumption for these two buildings. It was noted in the 1998 audit that Trueman housed the most inefficient water fixtures compared to the other residences. The sprinklers used to water the football field is measured in the Trueman/McConnell metre. It is also worth pointing out that in 2001, when McConnell was no longer used and Jennings served double the population, Trueman's per capita water consumption was only 8 cubic metres lower than Harper's. Water use has steadily decreased in a number of residences, including Carriage, Bermuda, Colville, Hunton, McGregor, and Edwards/Thornton. A complete listing of the total and per capita water consumption in residences can be found in Appendix R.

Outdoor water use at Mount Allison grew substantially in the past two years. The majority of the water used in outdoor sprinklers is measured in the metre of the building from which the water is drawn. Only the football fields, places where sod has been replaced, flower beds, and trees are habitually watered. In 2001, 4963m^3 of water were used on the football fields. In the first half of 2002 this has totalled 1489m^3 with an additional charge of $1333.37 for un-metered sprinklers and hydrants on campus.

Future projects to reduce Mount Allison's water consumption include a pilot test of a waterless urinal in Facilities Management, ongoing work at making the waterlines leak-free, and continued retrofitting of fixtures with increasingly efficient models.

Case Study

In 1993, the University of British Columbia constructed the C.K. Choi building. Among other ecological design features, the building uses excellent water saving techniques and equipment. "Composting toilets installed in this project do not require water for flushing. City water is generally only required for low flow lavatory faucets (spring loaded to further reduce waste) and kitchen sinks. Irrigation of site planting material is provided solely from collected rain water (stored in an 8000 gallon subsurface cistern) and recycled grey water from the building. Projected water usage is approximately 300 gallons per day."[5]

Recommendations

For Senior Administration

1. Make funds available for immediate retrofitting of particularly inefficient water fixtures.

For Staff

2. Declare a baseline for water consumption based on the water invoices from 2001 and set targets for reduction from the baseline.

3. Continue to replace inefficient water fixtures with more efficient models.

4. Accurate records of water saving measures should be compiled and unified by Facilities Management. These records should include all low-flow toilets, showers, and faucets installed on campus, as well as a current list of all water saving features included in new and renovated buildings.

5. Look into alternatives to water consuming appliances such as composting toilets.

6. Follow through with the testing of a waterless urinal at Facilities Management.

7. Investigate the possibility of collecting and using rainwater on campus.

[5] www.iar.ubc.ca/choibuilding/matsuzaki.html

8. Wash vehicles only when necessary.

9. Conserve water on a individual basis.

For Faculty

1. In labs, encourage students to conserve water whenever possible (ie washing test tubes all at once rather than individually).

2. Conserve water on a individual basis.

3. Report any leaks immediately to Facilities Management (fixit@mta.ca)

For Students

4. Limit shower length to about 8 minutes.

5. Turn off water taps when brushing your teeth.

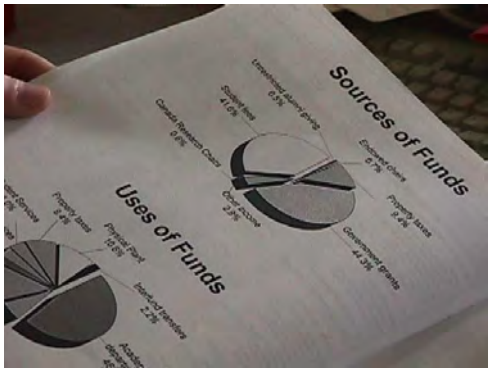
6. Report any leaks or dripping faucets immediately to Facilities Management (fixit@mta.ca)

7. Post a sign in your residence bathroom asking people to help conserve water by following the above recommendations for students.

Figure 9.3 Review of Current Environmental Policy:

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Water efficient models are installed when replacing any water fixtures on campus.	Water fixtures are being replaced by more efficient models when the fixture needs replacing or when a building is renovated.	No change proposed.
Projects are undertaken to decrease water usage.	Projects are undertaken to reduce leaks.	No change proposed.
Longevity and water efficiency are primary considerations when purchasing water fixtures.	These two factors are considered when purchasing water fixtures.	No change proposed.

Grade Assigned: C



Finance

Introduction

This year, Mount Allison will have a total of $44,349,377 with which to operate the university. The source and spending of these dollars stretch the university's environmental impact far beyond the bounds of the campus. There is room to minimize this impact in the areas of income, purchasing, and investments. Though the larger majority of the university's income is in the form of government grants and student fees (85.5%), our operations are also dependent on endowments and donations. Currently, the External Relations department does not screen donors on the basis of ethics or environmental practice. Though an environmental purchasing policy is not yet in place, some effort is made in the purchasing department to address the environmental impact of the university's expenditures. A number of materials are purchased in bulk, and the Purchasing Manager encourages departments to order more environmentally friendly or efficient items when they are available. Two years ago, it was proposed that the Board of Regents consider switching some of the university's investments to an ethical portfolio, however, the university continues to invest in unscreened funds.

Environmental Significance

Without a comprehensive understanding of the practices Mount Allison is condoning though the money it takes from donors and invests through purchasing and holdings, it is difficult to assess the full reach of the university's environmental impact. Supporting companies with environmentally destructive practices has a negative impact on many levels. It provides companies with an incentive to operate irresponsibly, slows the development of more environmentally friendly goods and services, and depletes resources necessary for the mere continuation of industry and university alike.

Current Environmental Policy

"The University will endeavour, under the supervision of the Controller to minimize the ecological impact of the products and services purchased in support of campus operations. By choosing to take responsibility for the whereabouts of our finances, we can come to better understand the university's environmental impact and ultimately reduce it.

The performance indicators for this section are as follows:

1. Photocopiers and printers minimize the required use of paper.

2. Recycled and post-consumer paper is purchased.

3. Unbleached recycled paper is available in the Bookstore.

4. In the purchase of products, the following factors are taken into consideration:
   a) reduced packaging;
   b) environmental performance(i.e. energy saving),
   c) reduced consumption;
   d) construction (i.e. recycled materials rather than tropical hardwoods, PVC); and longetivity.

5. Information is provided to departments comparing the environmental performance of different products. I.e. Fax machines that can use recycled paper, etc." (Section 2.8, Mount Allison University Environmental Policy, www.mta.ca/environment)

Responsible Parties

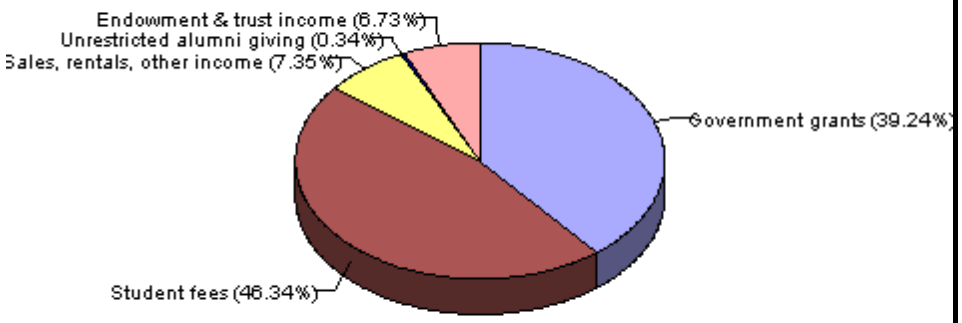
The Purchasing Manager in the Financial Services department is responsible for all purchase orders from the university, the External Relations office is responsible for all incoming funds to be used for the university's operations, and the Board of Regents University Investment Committee is responsible for the university's investment portfolios.

Audit

University Funding

Mount Allison receives funding for its operations from government grants, student fees, alumni giving, endowed chairs, Canada Research Chairs, as well as about 3.3% from various other sources. Figure 10.1 shows the breakdown of funding sources:

Figure 10.1



Government grants make up a larger portion of total incoming funds this year, whereas student fees, despite increase, contribute a slightly smaller portion. Likewise, alumni giving will contribute 0.1% more to the budget than last year, while endowment income will contribute 0.6% less.

The External Relations department at Mount Allison is responsible for soliciting alumni, foundations, and corporations for donations to the university. At this point, donors are not screened based on their environmental practices or ethics. The auditors requested, but did not receive a list of the major donations received in the last two years.

Figure 10.2 shows the consolidated budgets for the past two years, and the projections for the upcoming 2002-2003 academic year. It should be noted that the dollars shown for 2000-2001 and 2001-2002 are taken from the

adjusted and not the original budgets, so as to accurately reflect actual funds spent in those years. This information is as reported in the university budgets produced by the budget officer and review committee, available at Financial Services.

Figure 10.2:

Department	Amount in 2000-2001	%	Amount in 2001-2002	%	Amount in 2002-2003	%
Faculty of Arts	5,429,333	14.1	5,545,693	13.8	5,791,683	13.1
Faculty of Social Science	2,777,561	7.2	2,904,605	7.2	3,176,836	7.2
Faculty of Science	4,394,126	11.4	4,548,651	11.3	4,931,509	11.1
Academic Affairs and Con't Ed	2,324,006	6.0	2,447,710	6.1	2,846,853	5.6
Library	1,990,697	5.2	2,019,158	5.0	2,108,614	4.8
Computing Services	1,247,775	3.2	1,345,535	3.4	1,454,781	3.3
Admin. and General Services	4,770,581	12.4	4,527,264	11.3	4,750,670	10.7
Physical Plant	6,806,111	17.7	8,088,220	20.1	10,396,190	23.4
Student Services	2,596,007	6.8	2,704,365	6.7	2,769,542	6.2
Direct ancillary expenditures	4,763,607	12.4	4,536,512	11.3	4,794,700	10.8
Other budgets	501,523	1.3	389,640	1.0	763,000	1.7
Interfund transfers	870,575	2.3	1,105,147	2.8	925,000	2.1
Total net expenditures:	38,417,902	100.1	40,162,500	100.0	44,349,377	100.0

The university's total consolidated budget has increased by approximately 13% since 2000-2001. Although actual funding for each department is budgeted to increase, the portion of the total devoted to each area has changed somewhat, with a larger portion going to the Physical Plant and to Other Budgets in the coming year than has in the past. Each department receives funding for salaries and benefits, employment related expenses, and supplies. The allocation of funds to each of these areas varies greatly between departments. High priority items identified by the budget committee for this year are library acquisitions, alterations and renovations, and scholarships.

In addition to funds from the university budget, academic departments also receive grants for research projects, equipment and student hirings. The Natural Science and Engineering Research Council of Canada (NSERC), Social Science and Humanities Research Council of Canada (SSHRC), as well as a number of other Federal and Provincial foundations accept research proposals in a wide variety of disciplines. Figure 10.3 lists the amount of funding received by Mount Allison in the past two school years:

Figure 10.3:

Foundation	Amount Received in 2000-01	Amount Received in 2001-02
NSERC	$620,814	$626,506
SSHRC	$128,140	$151,509
other federal funds	$342,450	$1,683,319
provincial funds	$148,828	$100,580

University Procurement

The purchasing process at Mount Allison has not changed significantly in the past two years. There have been amendments to the purchasing policy, however these have been clarifications and not additions. The policy to date does not contain any reference to the university environmental policy, nor does it make any stipulations on the environmental impact of purchases, or bans on particularly harmful or products or endangered species. The full policy can be found at www.mta.ca/administration/financial/policpurch.htm.

Though environmental considerations have not been made official in the purchasing department, some efforts are being made to address the issues outlined in the Purchasing section of the environmental policy. Since 1999, the Purchasing Manager has included a request for information on environmental practices in each of the bids that are done by public tender. As of yet, the information obtained from this request has not been a deciding factor in any of the deals closed. In the fall of 2001 the department put purchase requisition forms on the Financial Services website as part of an attempt to make internal communications more time and resource efficient. Though forms must be submitted to the purchasing department in hard copy, it has meant an overall reduction in paper wastage. Currently, Purchasing is working to connect their system to the Facilities Management online work order system, in part to reduce written communications between the two departments. Externally, a number of companies with whom the university does business have switched to electronic ordering. Although this minimizes paper needed at the ordering stage, we still require paper invoicing for the purpose of financial audits. A more significant reduction in paper consumption in university procurement would be possible through an electronic data storage system.

Mount Allison continues to do some of its larger purchases through Interuniversity Services Inc.(ISI), a purchasing cooperative that includes 17 maritime universities and colleges. The purchasing departments of these schools meet twice a year to review their contracts. Products and services

for which the cooperative has agreements include benefit plans, courier, moving, paper, light bulbs, fuel oil, garbage bags, and linen. Last year, Mount Allison spent $1.15 million through these agreements. ISI has adopted an environmental policy entitled “Environmentally Aware Procurement” which includes a policy statement, guiding principles, and supplier requirements. This policy is accessible to the Purchasing Manager on the ISI website.

Figure 10.4 lists the university’s top 15 suppliers and their environmental policies and accountability. It is important to note that the existence of a policy does not necessarily or accurately reflect corporate efforts to reduce environmental impact. Wherever possible, a company should be researched on the impact of its product and/or operations on humans and the environment both locally and globally. The university can send a strong message by choosing to do business with companies that practice a concern for these issues.

Figure 10.4:

Company	Product/Service	Environmental Policy
Arthur Arseneau Architects	construction	No response.
Avondale Construction	construction	No response.
Blackwell North America	publishers, library services	No information available.
Blue Cross	insurance	No information available.
BSM Services		No information available.
CIBC Mellon	financial services	No information available.
Dell	computers	Dell's environmental policy can be found at www.dell.com/us/en/gen/corporate/vision_003_environ.htm
Faxon Canada	library services	No information available.
Imperial Oil	oil	The environmental policy for Imperial Oil (owned by Esso) can be found at: http://www.imperialoil.ca/thisis/she/index_she.html
Jones Masonry	stone work	No response.
NB Power	electricity	http://www.nbpower.com/en/enviro/index.html
Prentice Hall Canada	books	No information available.
Sodexho	food services	Sodexho does not have an official environmental policy, though it does post statements on its website (http://www.sodexhousa.com/corp_responsibility.html) regarding corporate responsibility for people and the ecosystem.
Sunlife Canada	life insurance	No information available.
Town of Sackville	water	The Town does not have an environmental policy, but does have a number of committees working on local environmental issues.

University Investments

The structure, allocation, and management of the university's investments remain virtually unchanged since the last audit. Investments are organized and managed as follows: Long term financial investments are in the General Endowment Fund, which contains approximately $55 million, the Bell Fund, which has increased in the past two years to from $15 to $25 million, and a defined benefit pension plan fund of $11 million. Both endowment funds provide scholarships and money to the university's operating budget. The pension plan provides pensions for university staff (with the exception of faculty).

The Investment Committee of the Board of Regents oversees the General Endowment Fund and the pension funds, while the Bell Endowment Fund Committee oversees the Bell Endowment Fund. The funds are subsequently managed by Common Fund, Barclay's Global Investors, and Jarislowski Fraser. The assets of these funds are held by CIBC Mellon and Royal Trust banks.

The university's investments are in pooled funds and indexes not subject to screening. The possibility of moving a portion of the university's investments into ethical portfolios was brought forth by former Mount Allison student and Student Administrative Council VP Finance, Ted Rutland. In October 2000, he gave presentation of his report entitled "Aligning Investment with Mission: The Case for Missions-Based Investing at Mount Allison" to the university Board of Regents. Representing the board, Vice President Administration, David Stewart informed the auditors that at this time the university cannot consider screening investments or switching to screened portfolios simply because the Board of Regents has a fiduciary responsibility to invest money in a manner that will provide the highest return. Unfortunately, this means that Mount Allison continues to invest in an index of stocks that includes companies known to have contributed disproportionately to environmental degradation and injustice to people in other parts of the world.

Case Study

When it first opened in the 1970s, Hampshire College in Amherst Massachusetts developed a socially responsible investment policy to favour investment in companies that demonstrated responsibility for the environment as well as for providing a healthy workplace.

Recommendations

For Senior Administration

1. Establish an Environment Purchasing policy demanding the following:
   - recycled, non toxic and renewable product alternatives be favoured by the purchasing department whenever the product is less than 5% more expensive than its conventional alternative.
   - full disclosure of environmental practices and policies be provided by companies under contract.
   - university investments be restricted to investment funds with commitments to pursue environmental responsibility.
   - funding provided by environmentally responsible sources be favoured by the university.
   - all funding sources provide full disclosure of any environmental policies and declare any conflicts of interest between the environment and funding sources.

2. Buy only those products which meet or exceed the standards outlined by the National Ecologo labelling system.. Products certified by the Ecologo system "are proven to have less of an impact on the environment because of how they are manufactured, consumed or disposed of. Certification of products and services is based on compliance with stringent environmental criteria that are established in consultation with industry, environmental groups, and independent experts."

3. Sign the Valdez Principles and abide by them in all business

transactions (see Appendix U for the Valdez Principles

4. Conduct a comprehensive environmental and social audit of all university investments and provide a unified investment portfolio for the public.

5. Conduct a comprehensive audit of all donor corporations and foundations from whom the university accepts financial support and make this information available to the public.

6. Establish a unified list of all the companies with whom the university has contract agreements and make this information available to the public.

For Staff

7. Ask suppliers of products to minimize packaging and inquire as to whether they`ll pick up and reuse bubble paper, Styrofoam packing pieces, etc.

Figure 10.5 Environmental Policy Review:

Current Performance Indicators	Current State of Affairs	Proposed Changes to Performance Indicators
Photocopiers and printers minimize the required use of paper.	The Canon printer units will be set to print double-sided as the default option at the beginning of this school year.	No change proposed.
Recycled and post-consumer paper is purchased.	Number 5 paper contains 30% post-consumer and 20% pre-consumer content. Coloured papers contain 30% post-consumer content.	No change proposed.
Unbleached recycled paper is available in the Bookstore.	100% post-consumer paper is available at the Bookstore.	No change proposed.
In the purchase of products, the following factors are taken into consideration: a) reduced packaging; b) environmental performance (i.e. energy saving), c) reduced consumption; d) construction (i.e. recycled materials rather than tropical hardwoods, PVC); and longevity.	Energy efficiency, and longevity are taken into account in the purchase of products for financial reasons. Recycled building materials are used if stipulated in the contract. Reduced packaging is not currently a priority in purchasing decisions.	No change proposed.
Information is provided to departments comparing the environmental performance of different products. I.e. Fax machines that can use recycled paper, etc.	This information is provided only when the purchasing manager is aware of alternatives.	No change proposed.

Grade Assigned: Pass

Education

Introduction

At Mount Allison University, a number of programs exist, both academic and extracurricular in nature, which seek to educate the university community about environmental issues. The university continues to offer Environmental Science and Environmental studies programs, which integrate environment-related courses from a variety of departments. A number of faculty have expressed concern over the lack of resources devoted to the Environmental Science program, however. In addition to academic programs, a number of extracurricular environmental initiatives have been undertake in the attempt to raise environmental awareness. These initiatives, in large part, have been undertaken by the Blue Green Society and Green Ambassadors, both of whom have sought to increase environmental awareness within the university community through a number of educational campaigns. Unfortunately, many members of the university community remain unaware of the university's impact on the local and global environment.

Environmental Significance

The world is currently faced with a significant number of environmental problems. If positive environmental change is to be realized, we, as human beings and citizens, must become more informed of the exact nature of these environmental crises. From global climate change, to deforestation, to the pollution of local water systems, we must learn and become aware of the role we play in both creating and solving these environmental problems. As institutions of higher education, universities are granted the unique opportunity to assume a lead role in educating students about environmental sustainability. Our educational institutions hold the responsibility of training students to become well informed and socially conscious decision making citizens. David Orr writes in *People, Land, and Community*, that "the ecological emergency is about the failure to comprehend our citizenship in the biotic community," which can only be resolved, "if enough people come to hold a bigger idea of what it means to be a citizen, and this knowledge will have to be taught carefully at all levels of education."[1] Although an environmental education must account for, and encompass, the global significance of environmental issues, it must simultaneously strive to be rooted within the local environs. This "will require a curriculum shaped in part by the particularities of location, bioregion, and culture."[2]It is through an understanding of our local environment that we are able to understand the ways in which ecosystems function, and the impact we have upon them. Kirkpatrick Sale writes, our crucial task as human beings is to come "to understand the place, the immediate, specific place, where we live."[3] Only through an understanding of place are we able to take global environmental issues, which seem so large and distant from ourselves, and place them within our immediate local environment to see their effects and possible solutions. Given the pervasive nature of environmental problems, a basic understanding of environmental issues will allow students to be capable of lessening their impact upon the

[1]Hannum, Hildegrade ed. People, Land, and Community. New Haven: Yale University Press, 1997 pg 243

[2]"Re-ruralizing Education" by David Orr.Rooted in the Land: Essays on Community and Place eds. William Vitek and Wes Jackson. New Haven and London: Yale University Press, 1996 p.231

[3]Hannum, Hildegrade ed. People, Land, and Community. New Haven: Yale University Press, 1997 p. 220

environment. It is only through education, learning about the causes, consequences, and possible solutions to environmental issues, that we will be capable of bringing about positive change.

Current Environmental Policy

"The University encourages faculty and senate to consider, where appropriate, taking steps to incorporate environmental content throughout existing curriculum, increasing environment related course offerings and programs seeking more resources to dedicate to environmental research."

The performance indicators for this section are as follows:

> -"Cases and examples derived from the audit or other on campus environmental work are incorporated into course-work.
>
> -Local-community resources such as Canadian Wildlife Services are utilized, and local regional issues are integrated into course work.
>
> -An environmental certificate acknowledging that a student is graduating with an understanding of environmental issues, resulting from taking a certain number of related courses, is awarded upon graduation.
>
> -Speakers, presentations, debates and other such methods are utilized to educate students on environmental topics." (Section 2.1 Mount Allison University Environmental Policy, www.mta.ca/environment)

Responsible Parties

The University Senate is responsible for making decisions regarding academic affairs.

Audit

There have not been any additions to environmental course offerings since the 2000-2001 calendar was printed, however there are a handful of courses with environmental content that were not listed in the 2000 Environmental Audit that are starred in the chart above. It should be noted that a number of the courses listed in the academic calendar have not been offered in recent years, including Biology 1211, Sociology 3611 and Chemistry 3011. Economics 3821 Natural Resource Economics, Anthropology 4521, and Anthropology 2501 will not be offered in the coming school year 2002-2003. Figure 11.1 lists the environmental courses and course with environmental content listed in the university calendar.

Figure 11.1:

Environment Courses	Course with Environmental Content
Anthropology 2501"Environment and Society” Anthropology 4521"Ecological Anthropology” Anthropology 4531* “Cultural Ecology” Chemistry 3011 “Environmental Chemistry” Environmental Science 4901 “Environmental Issues” Environmental Studies 4000 “Issues in Environmental Studies” Environmental Studies 4951 “Special Topics in Environmental Studies” Geography 2101 “Natural Resources Management” Geography 3101 “Environment and Development” Geography 3201 “Geography and Public Policy” Geography 4101"Seminar in Environmental Issues” Geoscience 2031 “Global Environmental Change” Philosophy 1651 “The Changing Image of Nature” Philosophy 3721 “Environmental Ethics” Sociology 3611 “Environmental Controversies”	Biology 1211, 2101, 3011, 3501, 3551, 3911* Canadian Studies 3400 Chemistry 1501 Commerce 3371 Economics 3551, 3801, 3821 Geography 1201, 2221, 2311 Geoscience 1001, 2101 History 3360 Math 1131* Philosophy 3511 Religious Studies 1651, 3911, 3921

The auditors and faculty from the Environmental Science and Studies programs identified a number of courses and charted their registration levels in the last five school years as a means of determining student interest in environmental topics. The results of this study were not conclusive. Registration levels fluctuated for most courses, some of which have not been offered every year. The totals are listed in Appendix S.

There have not been any developments to the Environmental Studies department since the requirements listed in the 2000-2001 academic calendar. The number of students pursuing declared environmental studies majors in the 2000-2001 academic year was 7, and the number pursuing declared environmental studies minors was 13. In the 2001-2002 year, these numbers increased to 13 and 14, respectively. The number of students who graduated with a major in environmental studies in 2001 was 0. This increased to 5 in 2002.

The Environmental Science program, though it continues to be offered as an interdisciplinary science major, lacks the necessary leadership to develop as a particular field of study. Presently, the requirements make it a fairly rigorous general science degree. The current director of the program is optimistic that the return of a separate capstone course on environmental issues, Environmental Science 4901, which this past year (2001-2002) was shared with the Environmental Studies department, will help to fine tune the major. This coming year (2002-2003), the capstone will be taught by Dr. Duffy of the Chemistry department. It will centre on a major theme that will integrate science-based project work with an issue that is subject to environmental policy and debate. In addition, the course will include material on a range of environmental issues and presentations from experts in these fields.

The faculty interviewed regarding the Environmental Science program shared the opinion that the leadership necessary to shape the program would best come from the creation of a part-time or full-time faculty position that would have as its job description the development of Environmental Science and teaching the capstone course. It was also suggested that at least one other Environmental Science course be added to the elective options for the major, a course that would integrate the sciences as opposed to one taught within any of the four science departments.

The number of students pursuing declared Environmental Science majors in the 2000-2001 academic year was 9. In the 2001-2002 year, the total of declared majors increased to a total of 11 students. The number of students who graduated with a major in Environmental Science in 2001 was 1. This increased to 12 in 2002, demonstrating a clear interest in this program on the part of students. It will be pertinent after the 2002-2003 academic year to evaluate the program, including a survey of students who have completed the program and the professors who have taught courses that contribute to the requirements.

In response to the establishment of the Environmental Studies and Science programs, the library has created a $10,000 account for books, films and other resources on environmental topics to be purchased in the 2002-2003 school year. This account is funded by the Student Donation Fund for library acquisitions. At the time of this report, $7000 worth of materials are already on order.[4]

In December 2000, the university approved the Institutional Strategic Research Plan to direct the allocation of Canada Research Chairs (CRC)[5]. The university senate opted to expand the number of chair positions by splitting the single Tier 1 position (senior researcher) into two Tier 2 (junior researcher) positions, giving the university funding for a total of six Tier 2 positions to be allocated over five years beginning in 2000. Each chair position is funded for five years by the CRC and can be renewed after that time. The plan's success will be measured on the basis of (among others)increased numbers of students engaged in research, increased levels

[4] Information obtained from an email to faculty from Brian McNally, Systems Library, Ralph Pickard Bell Library, Mount Allison University.

[5] The Canada Research Chairs were referred to as Millenium Chairs in the 2000 Environmental Audit.

of multi-disciplinary research being conducted, and increased numbers of visiting researchers to the university for collaborative projects in the major research themes identified. The chairs have been and will be selected on the basis of four major research themes: Coastal Wetland Environmental Sciences, Health-Related Research, Canadian Studies, and Critical Cultural Theory. Of these the first is has a predominantly environmental focus. It was intended to provide a common research focus for ten faculty in the Biology and Geography departments and opportunities for collaboration with related agencies and other universities.

The Coastal Wetlands Institute facility was completed in 2000. The building houses the Chignecto Herbarium, sedimentology lab, GIS mapping facility, molecular biology lab, and controlled-environment facilities including the greenhouse visible from the centre of campus. The institute was created with funding from the Canadian Foundation for Innovation, private donation, and maintenance and in-kind support from the university itself. It was designed to draw together researchers from multiple departments on campus, as well as provide an important and long-needed connection between the university, government researchers (Canadian Wildlife Service, Ministry of Environment, Department of Fisheries), and community members. To date, it has engaged researchers with the Atlantic Canada Conservation Data Centre of the New Brunswick Government, the Canadian Wildlife Service, and a number of researchers from abroad. It specializes in the study of coastal wetlands as fragile ecosystems threatened by numerous human impacts, including climate change, air pollution, water contamination, agriculture, and development. As such it has the potential to be a critical source of new information on the local significance of environmental problems currently being experienced all over the world. At this point, the greenhouse portion of the facility is not yet achieving the conditions it was designed to match. It will require more precise temperature and humidity controls, in order to be useful for research and teaching. Because of this, a number of the faculty who had planned to gear their research toward the coastal wetlands have in the meantime focussed on other areas of interest. It is hoped that with more funding and attention to the equipment and hiring necessary to operate the facility to the capacity first proposed, Mount Allison will ultimately house a key resource for learning more about the local ecosystem.

Atlantic Canada Conservation Data Centre (ACCDC) of the New Brunswick government is currently housed in the President's Cottage on the Mount Allison Campus. Though there has been some communication between the data centre and the science departments, there is much more room for collaboration between the two. Together with the CWS, this centre provides access to local resources and data that can be made an integral part of course material. There are currently a number of courses, mostly in the Geography and Environmental Studies programs, which do utilize community organizations. Involvement of community organizations is usually up to the discretion of the individual professor. Although there is still room for further utilization of community resources, the use of community resources has grown in the past two years.

In response to the Environmental Audit Survey, 66% of faculty answered yes when asked whether they felt they were adequately educated on environmental issues. When asked if they felt their knowledge of environmental issues was such that it could be incorporated into their teaching material, 69% answered yes. When asked if they did in fact incorporate environmental issues into their teaching, 72% answered yes. While these are encouraging results, it should be noted that the number of total responses represented approximately a quarter of the faculty teaching at Mount Allison.

Another recent development in environmental education at Mount Allison is the proposed introduction of a sustainable residence. In the winter prior to the last audit, Blue Green Society first began what is now known as the Mount Allison Sustainable Residence Initiative or MAUSRI. That spring a presentation was made to the administration to have the initiative taken up by the university officially. The project has had an exciting development in the last two years including an ecological design seminar in February 2001, fundraising efforts for a conceptual design contract, the official endorsement of the project by the university administration, and a number of special topics research projects conducted in the Winter 2002 semester devoted to exploring the scope for community involvement in the

residence.

In the past two years, the Blue Green Society has undertaken a number of initiatives designed to increase environmental awareness on campus. In 2000-2001, these initiatives focussed around campus greening and recycling, MAUSRI, the Free Trade Area of the Americas summit, a double-sided photocopying campaign (carried out in conjunction with Michelle Strain), and an educational campaign for the international Buy Nothing Day in November. As well, during that year, a number of students planned and organized the Climate Change Caravan, a cross country bicycle trip which sought to educate Canadians on the issues surrounding climate change. In the 2001-2002 academic year, environmental initiatives focussed on the sustainable residence initiative, the school group, which conducted environmental education in local schools, and the forestry group, which completed the initial steps to begin a native tree nursery on the university farm. The Blue Green Society was also involved in the initial stages of a project seeking to developing wind turbines in the Tantramar area.(Please consult the Energy chapter of this report for further details on this endeavour).

There have also been a number of environmental initiatives undertaken by groups, which, although not technically affiliated with the university, include many members from the university and Tantramar community, and are a valuable educational resource. The two main local organizations are the Tantramar Environmental Alliance (TEA) and the Council of Canadians. Some of the campaigns carried out include awareness on water supply, food safety, and pesticide use.

In the past two years, there have been a number of speakers brought to the university to speak on environmental issues. During the 2000-2001 events included presentations by David Suzuki and Lloyd Augustine, and a weekend workshop on the sustainable residence initiative which featured experts in the field of ecological design, including Robert Peña, Kevin Jeffrey, Robert Eaton, and Martin Liefhebber. Events in the 2001-2002 academic year included: the Coming Together Conference on Maritime globalization issues, a work shop presentation on straw bale construction, and some progress on the potential for generating wind power on campus. Environmental speakers continues to represent a significant portion of the Environmental Studies program budget.

Leadership Mount Allison has been a source of funding for guest speakers to the university in what is known as the Leadership Series, and in recent years for student curricular and co-curricular initiatives. In the past two year, a number of environmental projects have been granted Leadership Mount Allison funding. Since the first call for proposals went out in September 2000, 4 of 32 curricular projects, and 7 of 62 co-curricular projects have had an environmental focus. Curricular projects have included the Environs journal for student environmental writing, and a weekend workshop of professors and students working on developing special topics projects around the future sustainable residence. Co-curricular projects funded included the Climate Change Caravan, MAUSRI, a World University Service of Canada seminar on Human Rights and the Environment, and a seminar on human rights abuses in the oil industry.

Awareness about the university's efforts to reduce its environmental impact vary between faculty, staff and students. In response to the Environmental Audit Survey this year, 42 percent of faculty, 67 percent of staff, and 22 percent of students were aware of the previous environmental audits having been conducted. 42 percent of faculty, 68 percent of staff, and 16 percent of students were aware of the university's environmental policy. Although these numbers are lower than they were two years ago, the response to the survey increased fourfold since it was done two years ago and may be more representative of the entire campus community.

Case Study

Bowdoin College in Brunswick, Maine offers a course in its Environmental Studies program called *Campus: Architecture, Landscape, Planning in the Groves of Academe* which"(e)xamines a range of different American campuses as a mirror in miniature of changing urban planning, architecture, and landscape practices beyond the walls of academe. Moreover, the American campus's built environment expresses changes in attitudes toward

higher education and the collegiate experience over time...Bowdoin's built environment is the seminar's most valuable resource."[6] This seminar could be used as a model for a future course at Mount Allison integrating the sustainable residence.

Recommendations

For Senior Administration

1. Appoint an environmental literacy task force to work towards the implementation of the following recommendations:

2. Include the statement "all students, upon graduating, will possess the knowledge, skills, and values to work towards an environmentally sustainable future" (Blueprint for a Green Campus) as part of the university's mission statement.

3. Consider hiring an environmental science professor specifically to coordinate the Environmental Science program.

4. Make funds available for the creation of more Environmental Studies and Environmental Science courses.

5. Develop a mandatory first year course, which would focus on the problem of environmental degradation and, more importantly, the possible solutions. This course would focus on students' individual responsibility for the environment and provide them with the tools needed to be environmentally responsible citizens. The course could also include a section on the environmental impacts of campus life and methods to reduce that impact.

6. Sign and abide by the Talloires Declaration (see Appendix T).

7. Encourage faculty to incorporate and highlight environmental content in their courses.

8. Organize workshops for faculty in all relevant disciplines to teach professors how to add environmental content to their courses. This could be done with the help of an organization such as Second Nature, which provides training to faculty so that students will be environmentally literate when they graduate.

9. Make funds available for supervisors and management staff to learn more about minimizing the university's environmental impact in their area of responsibility. This might include workshops, conferences, and reading material.

10. Co-ordinate the selection of environmental representatives from each department (both academic and non-academic) on campus. These representatives would be responsible for implementing the environmental policy in their departments. They could hold a training session on environmentally friendly practices in the office and classroom, including how to copy on paper that has already been used on one side, how to copy on both sides, what can be recycled, as well as how to save energy and water in the workplace.

For Faculty

11. Research environmental issues applicable to your field with the purpose of including these in your course material.

11. When discussing an environmental issue in class be sure to carry through on the subject by informing students of the university's environmental impact, as well as actions they can take to reduce it. For example: while discussing global warming in geo-science

[6] Bowdoin College, 'Campus: Architecture, Planning, and Landscape in the Groves of Academe,' http://academic.bowdoin.edu/courses/f01/es011/

class, be sure to mention that turning off lights and computers when not in use and walking or cycling rather than driving can help to reduce the greenhouse effect.

12. Wherever possible, make use of community resources such as the Canadian Wildlife Service and the Tantramar Environmental Alliance to incorporate local environmental issues into your teaching.

For Students

13. Take the initiative to educate yourself on environmental issues through books, newspapers, television etc.

14. Encourage faculty to include environmental issues in their courses through questions and comments in class.

15. Invite guest speakers to your society meetings to discuss relevant environmental issues. For example, the commerce society could have someone speak about environmental cost analysis.

16. Help organize and advertise an event such as a Mount A Earth Day to educate fellow students on environmental issues.

17. Teach by example, bring a reusable cup when you get coffee, turn the lights out when you leave your room, use a canvas bag when you buy groceries, et cetera.

Figure 11.2 Review of Environmental Policy:

Performance Indicator	Progress	Proposed change to performance indicator
Local-community resources such as Canadian Wildlife Services are utilized, and local regional issues are integrated into course work.	This has not been formalized. Some independent study projects are done with the CWS. Local and regional issues are integrated depending on the professor's interest.	Because use of local resources and teaching of local issues are different components, this indicator should be separated into two.
Cases and examples derived from the audit or other on-campus environmental work are incorporated into course-work.	These examples are dependent on a professors knowledge of these issues.	No change proposed.
An environmental certificate acknowledging that a student is graduating with an understanding of environmental issues, resulting from taking a certain number of related courses, is awarded upon graduation.	This certificate has not yet been developed and has been challenged by Senior Administration as giving priority to one special interest group over another.	This indicator should be reconsidered and perhaps replaced with one that better measures the education offered, as opposed to a reward system for this education.
Speakers, presentations, debates and other such methods are utilized to educate students on environmental topics.	The university continues to bring environmental speakers onto campus and host conferences and meetings on environmental issues, however the number of environmental speakers has declined since the last audit.	No change proposed.

Grade Assigned: C

Environmental Audit Survey 2002: Student Results

1. If acceptable would you hand in assignments via e-mail ?

[ ] Yes [ ] No

406 respondents
yes: 361
no: 45

2. If acceptable would you hand in assignments printed double sided ?

[ ] Yes [ ] No

412 respondents
yes: 335
no: 77

3. If acceptable would you print assignments on one-sided paper (paper which has already been used on one side) ?

[ ] Yes [ ] No

412 respondents
yes: 260
no: 152

4. Are you familiar with the university's Environmental Policy, which was approved in May, 1999 ?

[ ] Yes [ ] No

405 respondents
yes: 58
no: 347

5. Are you familiar with the university's Environmental Audits, conducted in 1998 and 2000 ?

[ ] Yes [ ] No

411 respondents
yes: 74
no: 337

6. What method of transportation do you most commonly use to commute to work/class every day ?

[ ] Car [ ] Bicycle [ ] Foot

419 respondents
car: 32
bicycle: 22
foot: 365

7. How far do you live from campus ? (Km)

395 respondents
0-5km: 376
6-15km: 0
16-30km: 5
31-45km: 7
46km+: 7

8. Would you use unbleached and/or recycled paper if it was offered ?

[ ] Yes [ ] No

403 respondents
yes: 380
no: 23

9. Would you support a university purchasing policy which favoured environmentally friendly products, equal in quality to the unfriendly alternative, at a cost;

[ ] 10% more expensive [ ] 5% more expensive (as per the current policy) [ ] Equal in price [ ] Other

409 respondents
10%: 105
5%: 138
equal: 157
other: 9

10. Would you prefer the university invest in "Ethical Investment" funds over standard investment funds ? Please comment.

[ ] Yes [ ] No [ ] don't know

404 respondents

yes: 134
no: 33
don't know: 237

11. Do you support the spraying of the campus with herbicides in order to maintain a weed free campus ?

[ ] Yes [ ] No

383 respondents
yes: 112
no: 271

12. Do you feel you are adequately educated on environmental issues ?

[ ] Yes [ ] No [ ] N/A

393 respondents
yes: 120
no: 230
N/A: 43

13. Do you feel that there is an adequate number of courses offered that focus specifically on environmental issues ? If no, in which area would you like to see more focus on environmental issues (ie biology, political science)

[ ] Yes [ ] No [ ] N/A

399 respondents
yes: 85
no: 140
N/A: 174

Suggestions for departments where students would like to see more environmental course offerings varied greatly and included almost every discipline. Political Science, Philosophy, Commerce, Biology, Biochemistry, Economics, and Geography. There were also a number of respondents who suggested that all departments needed more environmental content.

14. Would you consider the ventilation, heating and cooling in the building you live/most often work in on campus to be:

[ ] Very poor [ ] Poor [ ] Fair [ ] Good [ ] Excellent Name of Building:

387 respondents
Very poor: 44
Poor: 116
Fair: 127
Good: 88
Excellent: 12

Student opinion on air quality varied greatly even within the buildings noted. It was difficult to trace any trends.

15.Do you support the introduction of alternative energy sources (wind turbines, solar panels, et cetera) as a means of supplementing the current energy sources used on campus ? Why or why not.

[ ] Yes [ ] No

394 respondents
yes: 368
no: 26

Reasons for supporting alternative energy sources included environmental impact, and demonstrating leadership as an institution. Reasons against included concern for cost, and inefficiency.

16. What areas of wastage do you see in your department and around campus ?

Some of the common areas listed were paper, water, energy, food in the mealhall, and mass mailings.

17. Do you feel you have an adequate understanding of how to recycle on this campus ? Please comment.

[ ] Yes [ ] No

396 respondents
yes: 283
no: 113

18. How would you rate the disposal methods for hazardous wastes on

this campus ? Please comment further if there are hazardous wastes specific to your area of study.

[ ] Very poor [ ] Poor [ ] Fair [ ] Good [ ] Excellent [ ] N/A

353 respondents
very poor: 11
poor: 6
fair: 39
good: 65
excellent: 15
N/A: 217
The responses for this question varied widely within the areas of study listed.

Food Services (applicable only to those who use the meal hall or the Golden A Café)

19. Would you eat organic food were it offered ?

[ ] Yes [ ] No

348 respondents
yes: 297
no: 51

20. Are you vegetarian ?

[ ] Yes [ ] No

367 respondents
yes: 68
no: 299

21. If so, do you feel there are adequate vegetarian options available ?

[ ] Yes [ ] No

66 respondents
yes: 20
no: 46

22. Do you support the use of reusable containers, and/or reduced packaging overall in food services on this campus?

[ ] Yes [ ] No

364 respondents
yes: 344
no: 20

23. What ideas do you have to improve the environmental practices of this university ?

Suggestions included more education campaigns, improved recycling system, reducing food waste in the meal hall, and composting in the meal hall and residences.

24. Do you have any suggestions for this year's auditors, beyond the questions asked in this survey ?

Very few people responded to this question.

Environmental Audit Survey 2002: Faculty Results

1. Are you familiar with the university's Environmental Policy, approved in May, 1999 ?

[ ] Yes [ ] No

36 Respondents
Yes: 15
No: 21

2. Are you familiar with the university's Environmental Audits, conducted in 1998 and 2000 ?

[ ] Yes [ ] No

36 Respondents
Yes: 15
No: 21

3. What method of transportation do you most commonly use to commute to work/class every day ?

[ ] Car [ ] Bicycle [ ] Foot

39 Respondents
Car: 18
Bicycle: 2
Foot: 19

4. Do you car-pool regularly ?

[ ] Yes [ ] No [ ] N/A

36 Respondents
Yes: 3
No: 19
N/A: 14

5.Would you be interested in car-pooling ?

[ ] Yes [ ] No [ ] N/A

34 Respondents
Yes: 6
No: 14
N/A: 14

7. How far do you live from campus ? (Km)

16 Respondents
5km or less: 9
6km to 15km: 0
16km to 30km: 3
Over 30 km: 4

8. Would you use unbleached and/or recycled paper if it was offered ?

[ ] Yes [ ] No

34 Respondents
Yes: 34
No: 0

9. Would you support a university (and departmental) purchasing policy which favoured environmentally friendly products, equal in quality to the unfriendly alternative, at a cost;

[ ] 10% more expensive [ ] 5% more expensive (as per the current policy) [ ] Equal in price [ ] Other

36 Respondents
10%: 12
5%: 16
Equal: 8
Other: 0

10. Would you prefer the university invest in "Ethical Investment" funds over standard investment funds ? Please comment.

[ ] Yes [ ] No [ ] don't know

35 Respondents
Yes: 21
No: 5
Don't Know: 9

11. Do you support the spraying of the campus with herbicides in order to maintain a weed free campus ?

[ ] Yes [ ] No

36 Respondents
Yes: 5
No: 31

12. Do you feel you are adequately educated on environmental issues ?

[ ] Yes [ ] No

36 Respondents

Yes: 24
No: 12

13. Do you feel your knowledge of environmental issues is adequate to incorporate environmental concepts into your daily teaching ?

[ ] Yes [ ] No

36 Respondents
Yes: 25
No: 11

14. Do you incorporate environmental content into any of your teaching material ?

[ ] Yes [ ] No

32 Respondents
Yes: 23
No: 9

15. Would you accept assignments via E-mail from students ?

[ ] Yes [ ] No [ ] N/A

33 Respondents
Yes: 24
No: 8
N/A: 1

16. Would you accept assignments double sided from students ?

[ ] Yes [ ] No [ ] N/A

34 Respondents
Yes: 32
No: 1
N/A: 1

17. Would you accept assignments on one-sided paper (paper which has been used on one side) from students?

[ ] Yes [ ] No [ ] N/A

34 Respondents
Yes: 31
No: 2
N/A: 1

18. Would you consider the ventilation, heating and cooling in the building you work/live in on campus to be:

[ ] Very poor [ ] Poor [ ] Fair [ ] Good [ ] Excellent Name of Building:

36 Respondents
Very Poor: 6
Poor: 12
Fair: 15
Good: 3
Buildings identified as Very Poor: Crabtree, Flemington, Barclay, Harthall, Avard-Dixon, Sprague House

19.Do you support the introduction of alternative energy sources (wind turbines, solar panels, et cetera) as a means of supplementing the current energy sources used on campus ? Why or why not.

[ ] Yes [ ] No

34 Respondents
Yes: 34
No: 0

20. What areas of wastage do you see in your department and around campus ?

21. Do you feel you have an adequate understanding of how to recycle on this campus ? Please comment.

[ ] Yes [ ] No

36 Respondents
Yes: 24
No: 12

22. How would you rate the disposal methods for hazardous wastes on this campus ? Please comment further if there are hazardous wastes that are specific to your department.

[ ] Very poor [ ] Poor [ ] Fair [ ] Good [ ] Excellent

7 Respondents
Very Poor: 1
Poor: 0
Fair: 1
Good: 3
Excellent: 2

Environmental Audit Survey 2002: Staff Results

1. Are you familiar with the university's Environmental Policy, which was approved in May, 1999 ?

[ ] Yes [ ] No

51 Respondents
Yes: 35
No:16

2. Are you familiar with the university's Environmental Audits, conducted in 1998 and 2000 ?

[ ] Yes [ ] No

51 Respondents
Yes: 34
No: 17

3. What method of transportation do you most commonly use to commute to work/class every day ?

[ ] Car [ ] Bicycle [ ] Foot

56 Respondents
Car: 34
Bicycle: 4
Foot: 18

4. Do you car-pool regularly ?

[ ] Yes [ ] No [ ] N/A

53 Respondents
Yes: 7
No: 28
N/A: 18

5.Would you be interested in car-pooling ?

[ ] Yes [ ] No [ ] N/A

51 Respondents
Yes: 5
No: 24
N/A: 22

7. How far do you live from campus ? (Km)

24 Respondents
5km or less: 16
6km to 15km: 3
16km to 30km: 1
Over 30 km: **4**

8. Would you use unbleached and/or recycled paper if it was offered ?

[ ] Yes [ ] No

50 Respondents
Yes: 50
No: 0

9. Would you support a university purchasing policy which favoured environmentally friendly products, equal in quality to the unfriendly alternative, at a cost;

[ ] 10% more expensive [ ] 5% more expensive (as per the current policy) [ ] Equal in price [ ] Other

50 Respondents
10%: 11
5%: 25
Equal: 14
Other: 0

10. Would you prefer the university invest in "Ethical Investment" funds over standard investment funds ? Please comment.

[ ] Yes [ ] No [ ] don't know

49 Respondents
Yes: 16
No: 9
Don't Know: 24

11. Do you support the spraying of the campus with herbicides in order to maintain a weed free campus ?

[ ] Yes [ ] No

47 Respondents
Yes: 16
No: 31

12. Do you feel you are adequately educated on environmental issues in your work at Mount Allison?

[ ] Yes [ ] No

49 Respondents
Yes: 20
No: 29

13. Would you consider the ventilation, heating and cooling in the building you work/live in on campus to be:

[ ] Very poor [ ] Poor [ ] Fair [ ] Good [ ] Excellent Name of Building(s):

51 Respondents
Very Poor: 12
Poor: 19
Fair: 9
Good: 9
Excellent: 2

14.Do you support the introduction of alternative energy sources (wind turbines, solar panels, et cetera) as a means of supplementing the current energy sources used on campus ? Why or why not.

[ ] Yes [ ] No

52 Respondents
Yes: 52
No: 0

15. What areas of wastage do you see in your department and around campus?

16. Please identify any ways you know of to reduce water wastage on campus.

17. Do you feel you have an adequate understanding of how to recycle on this campus ? Please comment.

[ ] Yes [ ] No

48 Respondents
Yes: 32
No: 16

18. How would you rate the disposal methods for hazardous wastes on this campus ? Please comment further if there are hazardous wastes that are specific to your department.

[ ] Very poor [ ] Poor [ ] Fair [ ] Good [ ] Excellent

17 Respondents
Very Poor: 0
Poor: 3
Fair: 6
Good: 7
Excellent: 1

19. What ideas do you have to improve the environmental practices of this university ?

20. Do you have any suggestions for this year's auditors, beyond the questions asked in this survey ?

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Appendix A - Major Repairs and Renovations

Building	Use	Date Built	Floor Area	Basement Floor Area	Date	Job	Date	Job	Date	Job	Date	Job
Flemington	Labs/Class	1933	32010	3261	*September 2000*	*waterproofing foundation*						
CLT	Office/Class	1958	10246	2895								
Con Hall	Auditorium	1966	48565	9711	*?*	*roof replacement*						
Crabtree	Offices/Classes	1979	43505	10876								
Fawcett	Support Services/B	1960	7950	7950								
Gairdner Fine Arts	Studios	1965	14593	4892	*October 2000*	*gutter/eavestrough repairs*						
Harper	Residence	1964	44000	11000	*April 2001*	*roof repair*						
Hunton House	Residence	1958	20500	5130								
Jennings	Dining Hall	1965	16685	16685								
MacGregor	Residence	1920	3100	900								
Monastery	Residence	1920	9200	3100	*November 2000*	*microbial remediation*						
Owens Art Gallery	Gallery	1900	22546	8245								
Palmer	Residence	1934	24343	6319								
President's Cottage	Offices/Dining	1910	6468	1325								
Allison Gardens	Arena	1946	25000	3200								
Sprague House	Offices	1900	3200	900								
Thornton	Residence	1968	24800	6200								
University Centre	Offices	1928	36446	10716	*September 2000*	*sloped roof replacement*	*October 2000*	*masonry repairs*				
Windsor Hall	Residence	1962	59650	12050								
Library	Library	1970	76245	34320								
PEG	Offices/Labs	1957	34220	9859								
Trueman/Tweedie/McConn	Residence/Dining H	1946	76000	37000	*January 2001*	*replace condensate pump and steam trap*	*March 2001*	*repair steam piping in tunnels*				
Athletic Center	Athletics	1968	53169	5302								
Avard Dixon	Offices/Classes	1958	36073	9641	*summer 2001*	*3rd floor reno*						
Barclay	Offices/Labs	1968	57856	15710	*August 2000*	*reno chem labs into biochem, removal of radioactive material*	*April 2001*	*final upgrade of fume hood vent. systems*				
Baxter House	Offices	1900	3566	925								
Cranewood	Private Home	1836	7000	1500								
Bennett House	Residence	1958	20100	5025	*September 2000*	*addition of student room*	*?*	*reno of Don's apt.*	*August 2001*	*repair showers, cleaning exhaust and antimicrobial treatment in 7 bathrooms*	*May 2001*	*Wattstoppers installed in all hallways*
Bermuda House	Residence	1920	10140	2220								
Bigelow House	Residence	1958	20100	5025								
Black House	Offices	1920	10025	2965								
Carriage	Residence	1920	3303	1128								
Anchorage	Offices	1920	5435	1358.75								
Centennial Hall	Offices	1883	17442	4791								
Chapel	Religious Ceremoni	1965	10428	4258	*October 2000*	*masonry repairs*						
Colville House	Residence	1920	3500	1500								
Conservatory	Offices/Conservato	1966	31166	12140	*September 2001*	*replace front doors*						
Cuthbertson	Residence	1920	5200	500								
Edwards	Residence	1968	24800	6200	September 2000	*stone repair*	*October 2000*	*(link) roof replacement*				
Facilities Management	Physical Plant/Offic	?	11481	8697								
Hart Hall	Offices/Classes	1920	7750	1550								
Rectory Lane House	Studios	1940	3000	1000								
Hillcrest	offices	1880	3060									

Appendix B - Sample of electricity demand and steam flow from meter readings

Electricity Demand at 10:12am on June 26, 2002

Building	kW
Centennial Hall	18.25
Chapel	5015
Crabtree	60.44
Library	222.1
Owens	63.53
Dunn	25
Bennett Building	0
Trueman/McConnell	104
Hunton	1.45
Edwards/Thornton	16.01
Athletic Centre	0
Allison Gardens	1.95
Convocation Hall	37.16
Fine Arts	19.2
Jennings/Harper	90.09
Palmer	2.48
Windsor	16.98
Facilities Management	106.4
Avard Dixon	24
University Centre	54.55
Flemington	56.03
Presidents Cottage	4.45
Conservatory	33.4
Barclay	194.7
Bennett/Bigelow	19.21
Hart Hall	16.41
Campus	**1225.04**

Steam Flow at 10:39 am on June 26, 2002

Building	pounds per hour
Harper/Jennings	87.18
Palmer	0
Windsor	172.1
University Centre	0
Avard Dixon	93
Conservatory	0
Bennett/CLT	50.83
Hart Hall	18.78
Centennial Hall	0
Flemington	1043
Barclay	48.37
Crabtree	88.84
Chapel	26.91
Dunn	0
Owens/Fine Arts	174.4
Library	861.7
Convocation Hall	0
Bennett/Bigelow	0
Trueman/McConnell	0
Athletic Centre	0
Hunton	0
Allison Gardens	150.4
Edwards/Thornton	401.4
Total campus:	**3471.83**

(Includes all 23 buildings fed by the main boiler at Physical Plant)

Appendix C - Power Consumption: June 1, 2000-May 31, 200

Building	KwH	2000								2001														2002				
	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May
Allison Gardens	0	6480	4560	4080	53280	64800	75120	32880	53520	51120	7680	4320	1451	3120	3600	3600	56880	75840	65040	59280	61680	64320	11520	4320
Baxter House	1225	1247	1308	1428	2126	2108	1845	1941	1777	1706	1994	1725	50797	1847	1805	1628	2212	2544	2941	2040	1986	2106	2216	1567
Black House	2058	1964	1923	2228	2618	3421	4007	4193	4346	3349	3010	2397	5669	1766	1755	1557	2724	4010	3729	3824	3869	3345	3748	3308
Burmuda House	0	11120	3760	7680	14560	17760	20560	28640	27920	20800	17440	9280	2957	5600	4400	7440	11440	17120	18960	24000	24400	20640	15760	9520
Canadian Studies	1003	945	1017	1194	1650	1771	2074	1135	1566	1502	1374	1582	3565	1242	1243	1205	1192	798	716	721	865	791	774	730
Carriage House	1863	2449	1587	3070	4906	6622	8576	11544	11162	1116	5459	3529	9887	3327	1888	2935	5478	7366	8012	9351	10630	9095	7428	4553
Central Stores	0	8800	4160	5440	6720	14720	16960	30080	27040	21120	18560	12480	2092	3520	4160	4640	7200	16160	18880	24480	24960	21920	16640	12480
Children's Centre	1200	920	800	880	2160	3360	5440	5880	5760	4320	3480	2120	2762	1080	960	1240	1640	3440	4440	5400	5800	4600	3280	2480
Colville House	908	1196	947	765	733	716	611	562	508	503	477	584	1733	1153	1169	1628	2094	2021	1458	1731	1902	1709	1736	1474
Cranewood	2064	1437	1293	2302	2879	3429	3553	3437	3215	2763	2665	2271	53958	1278	1792	1199	1490	1710	1837	1626	1484	1283	1526	1426
Cuthbertson House	3088	2584	1718	3436	6897	10625	13761	17845	15971	12663	10061	7677	16802	2731	1844	2588	5402	9111	11310	13139	14384	12166	9713	8109
Hillcrest House	2699	1616	1297	2086	4343	2258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
McGregor House	2117	2051	2015	1744	2561	2926	3789	2391	3386	2869	2656	1456	3762	1095	1079	1762	2280	2473	2179	2296	2547	2510	2352	1579
Monastery	5680	4960	4720	5920	8320	7520	6960	7600	7520	7440	8000	4960	5520	5760	4960	4800	6960	6400	5200	5360	6480	6400	6640	4320
Physical Plant	632800	651600	674800	816200	965200	896400	1028000	705200	1001800	880000	862200	695600	653200	722600	771600	791000	1024200	950000	854200	891600	936600	896000	869200	753400
Sprague House	0	1880	600	1280	3120	5080	8560	9600	8960	6960	5560	3680	3936	880	840	1320	2760	5520	6560	7040	7160	5600	4600	3920
Total:	656705	701249	706505	859733	1082073	1043516	1199816	862928	1174451	1018231	950616	753661	818091	756999	803095	828542	1133952	1104513	1005462	1051888	1104747	1052485	957133	813186

June 1'00-Mary 31'01: 11009484

June 1'01-May 31'02: 11430093

420609

Year	KwH
98\99	10909197
99\00	10962308
00\01	11009484
01\02	11430093

Appendix D - Light Oil Consumption May 1, 2000-April 30, 2002

	2000								2001												2002			
Building	**May**	**June**	**July**	**August**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**August**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**
Cranewood	985	1499	305	632	186	1478	2048	2633	4458	3240	2586	3467	1152	565	0	0	0	390	1403	1947	2221	2449	1770	1583
Baxter House	0	167	0	86	0	613	752	1122	634	1067	1422	686	358	515	0	0	12	187	821	1139	1089	1081	841	583
Black House	1426	0	531	0	0	581	1552	1554	2620	1797	1157	1218	467	769	0	0	0	997	1048	1448	1643	1854	1451	1071
Canadian Studies	1402	523	406	0	379	638	1793	2434	3308	1860	2237	1658	380	1241	0	0	0	1451	1894	2442	2263	2500	2165	1722
McGregor House	0	0	268	0	0	174	1043	369	960	794	703	0	0	261	0	0	0	81	338	561	444	728	388	288
Monastery	2082	1349	558	28	28	727	2691	2785	2151	2441	2068	1826	1288	495	694	0	435	337	2061	2057	2080	2255	2361	2265
Colville	315	315	180	185	185	175	622	1223	1544	567	990	696	0	321	0	0	0	159	707	1074	1146	1143	954	665
Total:	6210	3853	2248	931	778	4386	10501	12120	15675	11766	11163	9551	3645	4167	694	0	447	3602	8272	10668	10886	12010	9930	8177

May1'00-April 31'01: 89182

May 1'01-April 31'02: 72498

98\99 151481
99\00 84220
00\01 89182
01\02 72498

Appendix E - Bunker A Oil Consumption

	Month	Litres	Dollars (before tax)
2000	May	127684	29504.79
	June	83459	19478.76
	July	42230	10997.53
	August	41960	10309.57
	Sept	85703	34872.68
	Oct	170778	44009.49
	Nov	256332	69898.57
	Dec	331807	81361.99
2001	Jan	341160	79431.85
	Feb	339412	76299.11
	March	297959	66398.16
	April	232798	53867.23
Total 00/01:		**2351282**	**576429.73**
	May	166193	36317.26
	June	41056	9348.45
	July	40982	9102.1
	August	42107	8636.15
	Sept	39081	9031.62
	Oct	168263	40653.95
	Nov	252297	56998.64
	Dec	291648	60279.78
2002	Jan	327806	65931.43
	Feb	302733	61017.05
	March	310645	62062.73
	April	227239	53602.71
Total 01/02:		**2210050**	**472981.87**

Year	**Total Litres**
98\99	2131155
99\00	2022800
00\01	2351282
01\02	2210050

Appendix F - Steam Consumption

Building	Flow	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Jennings/Harper	87.18	1321933	1190666	1422841	769253.1	383233	39373.02	45359	23484.2	195801	489598.2	0	1041527
Palmer	0	338368.7	316192	309381.5	235344	168085.8	9223.24	39000.2	28395.9	44692.3	141824.7	700749	365219
Windsor	172.1	742634	693144	628313	447499	222769	234044	175310	172097	205351	296212	475047	572610
University Centre	0	235293	213028.4	173934.8	119836.1	53423.32	2115.89	0	0	0	40696.29	133523	208509.9
Avard Dixon	93	488206.7	29249.33	200140.3	243585	178744.3	112661.5	121330.4	119278	147342	181437	226128	411606
Bennet Building	50.83	115642.2	110932.3	113253.4	103368.1	50533.02	93.96	0	0	486.68	8080.44	75670.4	108574.8
Flemington	1043	334038	314184	306478	236888	0	37673.2	34209.3	32093.83	29246.27	119847.2	217332	268957
Hart Hall	18.78	257807	0	161981	145002	86334.31	81749.9	10762.93	1552.24	4627.51	77960.58	158561	197165
Conservatory	0	77142	231108.9	187550	154144.8	869.67	0	931.21	0	0	0	10478.1	221686.6
Barclay	48.37	132114	1153533	112781	930510	651244	54699.5	123833.9	116938	118826	488151	867711	1223960
Centennial	0	209699	212169.1	198291	158808	73364	37469.3	18381.13	10975.5	992.19	100291	173065	206808
Chapel	26.91	173397	151592.3	163837	119382	82268	23758.2	18036.2	18972.1	17558.95	68082.9	115125	154991
Crabtree	0	217503	0	137361	130167	41785	107467	96430	84198	73840	106212	133039	179832
Library	861.7	276964	769217	801589	688301	775478	0	0	0	0	0	0	116174
Owens/Fine Arts	174.4	481746	431402	410851	306381	216568	167562	93676	71088	90421	176276	300763	373257
Dunn	0	301978	270784	254960	237164	124189	0	25477.8	60299.52	60478.61	161635	232551.3	280043
Bennett/Bigelow	0	371913	363337	373816	269942	125807	307536	39115	41261	88597	192198	279580	299133
Trueman/McConnell	0	917202	910364	895067	742234	601633	65263	114861	95754	147527	29311	717937	942572
Hunton	0	347456	326071	347724	316581	145323	281118	251532	240948	244296	272088	288063	314182
Edwards/Thornton	401.4	681533	603926	598560	473551	346780	267985	303111	291746	293828	416788	593346	571530
Athletics	0	363184	353077	401824	293147	159373	23191	32826	58742	26919	124895	352349	306478
Allison Gardens	150.4	287210	291335	324042	180728	173397	30598	59809	58742	64323	160178	359361	282997
Convocation Hall	0	211651	194344	160093	210616	177872	1173569	0	951388	270033	131935	179665	223838

Appendix G - Comparing energy use in campus buildings per square foot of floor area

Electricity

Building	March, 2002	Floor Area	Building	kwh per squ. foot
Centennial Hall	11933.95	17442	Centennial Hall	0.684
Chapel	4515.47	10428	Chapel	0.433
Crabtree	26664.61	43505	Crabtree	0.613
Library	105571.8	76245	Library	1.385
Owens	18974.04	22546	Owens	0.842
Dunn	30573	34220	Dunn	0.893
Bennett Building	0	10246	Bennett Building	NA
Trueman/McConnell	144306	76000	Trueman/McConnell	1.899
Hunton	7651	20500	Hunton	0.373
Edwards/Thornton	25156	49600	Edwards/Thornton	0.507
Athletic Centre	0	53169	Athletic Centre	NA
Allison Gardens	64320	25000	Allison Gardens	2.573
Convocation Hall	10977.5	48565	Convocation Hall	0.226
Fine Arts	14106.2	14593	Fine Arts	0.967
Jennings/Harper	75784.96	60685	Jennings/Harper	1.249
Palmer	12018	24343	Palmer	0.494
Windsor	26844.44	59650	Windsor	0.450
Facilities Management	117903	11481	Facilities Manageme	10.269
Avard Dixon	13255	36073	Avard Dixon	0.367
University Centre	67743.55	36446	University Centre	1.859
Flemington*	31088	36840	Flemington*	0.844
Presidents Cottage	2794.69	6468	Presidents Cottage	0.432
Conservatory	20865	31166	Conservatory	0.669
Barclay	144859.3	57856	Barclay	2.504
Bennett/Bigelow	11170.6	40200	Bennett/Bigelow	0.278
Hart Hall	16635.86	38000	Hart Hall	0.438
Baxter House	2106	3566	Baxter House	0.591
Black House	3345	10025	Black House	0.334
Bermuda House	20640	10140	Bermuda House	2.036
Canadian Studies	791	5435	Canadian Studies	0.146
Carriage House	9095	3303	Carriage House	2.754
Central Stores	21920	7950	Central Stores	2.757
Children's Centre	4600	?	Children's Centre	NA
Colville House	1709	3500	Colville House	0.488
Cranewood	1283	7000	Cranewood	0.183
Cuthbertson House	12166	5200	Cuthbertson House	2.340
Hillcrest House	0	3060	Hillcrest House	NA
McGregor House	2510	3100	McGregor House	0.810
Monastery	6400	9200	Monastery	0.696
Sprague House	5600	3200	Sprague House	1.750

Steam

Building	March, 2002	Floor Area	Building	kwh per squ. foot
Jennings/Harper	1422841	60685	Jennings/Harper	23.44633765
Palmer	309381.5	24343	Palmer	12.70925934
Windsor	628313	59650	Windsor	10.53332775
University Centre	173934.8	36446	University Centre	4.77239752
Avard Dixon	200140.3	36073	Avard Dixon	5.548202257
Bennett Building	113253.4	10246	Bennet Building	11.05342573
Flemington*	306478	36840	Flemington	8.319163952
Hart Hall	161981	38000	Hart Hall	4.262657895
Conservatory	187550	31166	Conservatory	6.017775781
Barclay	112781	57856	Barclay	1.94933974
Centennial	198291	17442	Centennial	11.36859305
Chapel	163837	10428	Chapel	15.71125815
Crabtree	137361	43505	Crabtree	3.157361223
Library	801589	76245	Library	10.51333202
Owens/Fine Arts	410851	37139	Owens/Fine Arts	11.06252188
Dunn	254960	34220	Dunn	7.450613676
Bennett/Bigelow	373816	40200	Bennett/Bigelow	9.298905473
Trueman/McConnell	895067	76000	Trueman/McConnell	11.77719737
Hunton	347724	20500	Hunton	16.96214634
Edwards/Thornton	598560	49600	Edwards/Thornton	12.06774194
Athletics	401824	53169	Athletics	7.557486505
Allison Gardens	324042	25000	Allison Gardens	12.96168
Convocation Hall	160093	48565	Convocation Hall	3.29646865

*The floor area for Flemington includes the addition of the Coastal Wetlands Facility built in 2000, which totals 4830 square feet.

Appendix H-Emissions Questionnaire
(created by the Canadian Mortgage and Housing Corporation and was published in the Calgary Herald Saturday, May 20, 2000**)**

"Greenhouse Gas Emission Questionnaire"

Too many people think there is little they can do to help reduce greenhouse gas emissions. In fact, the car you drive and the way you operate your household are major emitters. When combined with the emissions incurred in manufacturing the various products you buy-especially the "embodied energy" in houses and cars-your personal choices account for about one-third of the total greenhouse gases produced in Canada each year.

How does your household fare in terms of its greenhouse gas emissions? To help you answer that question, take this questionnaire to help you get a rough estimate of your household emissions. All you'll need is a calculator, and some basic information about your energy use, food habits and waste generation. When you are finished, you can check your household's emissions (expressed here in terms of kilograms of emissions) against those of a typical Canadian household.

HOME

Operating Energy

There are two ways to calculate greenhouse gases emitted from your dwelling due to energy consumption. Those who have access to their utility bills should use method #1. Those without access to utility bills should use method #2.

Method #1

What is your average monthly electrical consumption?

(KWh/month) x 6 = kg/yr. _____

What is your average monthly natural gas consumption?

(cubic metres/month) x 23 = kg/yr. _____

What is your average monthly oil consumption?

(litres/month) x 38 = kg/yr. _____

If the cost of heating your dwelling is not included in the above bills (eg. If your landlord pays for your heat), you need to add emissions from this source. The amount will depend on the square footage of your dwelling (including basement if you have one) and the type of fuel used. Choose the right fuel type factor from these values-oil:3.4, electric:4.2, gas:2.0

(Sq ft) x)fuel type factor) = kg/yr. _____

Method #2

If you do not pay utility bills or you do not have access to them, you can estimate your emissions by knowing the size of your home and the type of energy used to heat it. For the size of your dwelling, enter the area (in square feet). If you live in an apartment, include only the area of your unit. If you live in a house, include the basement. For the fuel type, enter the following factor-oil: 6.0, electric: 6.5, gas: 4.0.

Your emissions will also depend on whether you (or your landlord) have taken special steps to improve the energy efficiency of your dwelling (eg. caulking, high efficiency lighting, electronic thermostats, etc.). If you have, enter 0.85 for the efficiency factor below. If not, enter 1.

(sq ft) x (fuel type factor) x (efficiency factor) = kg/yr. _____

Embodied Energy

Energy was used to create the materials that went into constructing your dwelling. The larger your dwelling, the greater the emissions involved. Enter the square footage of your dwelling in the formula below. If you live in an apartment, include only the area of your unit. If you live in a house, include the basement.

Homeowners: The construction of a newly-built home triggers greenhouse gas emissions. If you have kept the same home or bought only older homes for at least 10 years, discount your emissions by entering 0.75 in the equation. Otherwise enter a 1.

(sq ft) x (discount factor) x (o.57 = kg/yr. _____

Second Home

If you own or rent a second home or cottage, go through the above calculations (for both operating and embodied energy) for that home and enter the amounts here:

(operating energy) + (embodied energy) = kg/yr. _____

YOUR TOTAL HOME-RELATED EMISSIONS= KG/YR _____

PERSONAL TRANSPORTATION

Does anyone in your household use a vehicle? If no, enter 0 at the end of this section and go to the next section on Mass Transportation.

Operating Energy

If someone in your household does use a vehicle, you can estimate the yearly operating emissions if you know the fuel efficiency of the vehicle and the approximate distance drive per year. In the equation below, fuel efficiency is expressed in terms of the number of litres your vehicle uses for each 100 km travelling (eg. if it is 10 litres per 100 km, enter 10).

The kilometres driven should be the aggregate for everyone in your household.

If you don't know the exact fuel efficiency of the vehicle, you can estimate it by choosing the most appropriate factor from this list:

- full-size pick-up,. Full-size SUV: 18
- full-sized car, mini-pick-up, small SUV, or minivan: 16
- mid-sized car: 11
- small car: 9

(Fuel efficiency) x (km/yr) x .025 = kg/yr. _____

Embodied Energy

Larger vehicles consume more energy during their manufacture and therefore have higher emissions from embodied energy. To calculate the embodied energy of the vehicle you use, choose the appropriate factor from the following list of vehicle types and enter it in the equation below.

- full-size pick-up, full-size SUV: 725
- full-sized car, mini-pick-up, small SUV or mini-van: 678
- mid-sized car: 608
- small car: 524

Vehicle Owners

Buying a newly-built vehicle triggers more manufacturing and more emissions. If you have kept the same car or bought only used cars for at least five years, discount your energy by entering 0.75 in the equation. Otherwise enter a 1.

_____ (vehicle type factor) x _____ (discount factor) = _____kg/yr.

Second Vehicle

If your household uses more than one vehicle, go through the above calculations (for both operating and embodied energy) for each extra vehicle and enter the amounts:

(operating energy) = (embodied energy) = kg/yr. _____

YOUR HOUSEHOLD'S PERSONAL TRANSPORT EMISSIONS = KG/YR. _____

MASS TRANSPORTATION

In an average week, how far do people in your household travel on local transit?

(km/wk.) x 2.3 = kg/yr _____

In an average week, how far do people in your household travel on the inter-city train or bus?

(km/wk) x 0.15 = kg/yr. _____

In an average year, how far do people in your household travel by plane (including business travel)?

(km/yr) x 0.25 = kg/yr. _____

YOUR HOUSEHOLD'S MASS TRANSPORTATION EMISSIONS = KG/YR. _____

WASTE

The garbage you put out contains embodied energy and will take energy to transport and dispose of. On average, how many green garbage bags or garbage cans does your household put out per week?

(bags or cans/wk) x 300 = kg/yr. _____

YOUR HOUSEHOLD'S WASTE-RELATED EMISSIONS = KG/YR. _____

FOOD

The amount of emissions related to your household food consumption will depend on your eating habits. Eating vegetables, fruits, and grains causes lower emissions than getting the same amount of food energy from meat. Organic food avoids energy-intesive chemical fertilizers and pesticides. Buying food grown in your region involves less transportation energy than food from abroad. So if members of your household make an effort to eat a non-meat diet and buy organic or locally-produced food, enter a discount factor of 0.5 below. If not, enter 1.

(# people) x 860 x (discount factor) = kg/yr. _____

YOUR HOUSEHOLD'S FOOD-RELATED EMISSIONS = KG/YR. ___

TOTAL EMISSIONS

Each household has its own emissions "profile" depending on personal choices and circumstances. For instance, your household may have heavy emissions in personal transport if you drive a lot, or in mass transport if you fly frequently. In order to see your household's profile and total emissions bring forward the sums you arrived at in the questionnaire to fill out the following table. Add them up to get your household's grand total.

Home	_____ kg/yr.
Personal Transportation	_____ kg/yr.
Mass Transportation	_____ kg/yr.
Waste	_____kg/yr.
Food	_____kg/yr.

GRAND TOTAL = KG/YR. _____

A typical Canadian household of two adults and two children in a 2500 sq. ft. house with one car would score about 27, 650 kg/yr on this questionnaire. This should give you some idea as to whether your household's emissions are high or low compared to the average.
This is a working version of the questionnaire. If you have any comments or suggestions, please email Ray Tomalty at corps@web.net. A final version of this questionnaire will be available in the fall of 2000 from CMHC's Canadian Housing Information Centre. Call (613) 748-2367.

Appendix I - Hazardous Waste Disposal 2000-2002

Hazardous Chemical	Number of Units Disposed Of	Quantity
Waste Oxidizing Substances Solid	1	80kg
Waste Solid Containing Flamable Liquids	4	400kg
Waste Corrosive LIquids	2	240kg
Waste Flamable Liquids	6	550kg
Waste Phosphrous, amorphus red	1	15kg
Waste Poisonous/Flamable Liquids	2	160kg
Waste Corrosive Liquids	4	245kg
Waste Contaminated Glass	1	100kg
Waste Cynaide	1	6.83kg
Waste Poisonous Solids	7	466kg
Waste Water Reactive Liquid	1	17.8kg
Waste Poisonous Liquids	5	285L
Waste Flamable Liquids	5	840L
Waste Oil	8	160L
Waste Verciculite/Oil	3	40kg
Waste Fermaldehyde	1	20L
Waste Solids Containing Corrosive Liquids	1	30kg
	Total Amounts	2350.63kg
		1305L

Appendix J - Cleaning Product Usage May 1, 2000 - April 30, 2002

Product	Use	May 1, 2000 - Apr 30, 2001	May 1, 2001 - Apr 30, 2002	units each	MSDS	Total Amount 2000-2001	Total Amount 2001-2002	Total
Gum Remover	remove gum from carpet	35	62	spray can	no			
Sealer	floors	21	32	18.9 liters	yes	396.9	604.8	1001.7
Finish	floors	51	86	18.9 liters	yes	963.9	1625.4	2589.3
Stripper	wax removal	12	6	18.9 liters	yes	226.8	113.4	340.2
Buffing Solution	floors	34	32	3.8 liters	yes	129.2	121.6	250.8
Carpet Cleaner	carpets	23	10	18.9 liters	yes	434.7	189	623.7
Dispenser hand soap		473	333	1 liter	no	473	333	806
Bar soap (guest)		2	4	2 ounces	no	0	0	
Laundry soap		24	36	18.9 liters	yes	453.6	680.4	1134
Klinger (toilet bowl cleaner)	toilet bowl cleaner	541	564	1 liter	yes	541	564	1105
Vinegar	glass, floors	67	49	3.8 liters	no	254.6	186.2	440.8
Easy off	oven cleaner	11	15	1 liter	no	11	15	26
dustbane	sweeping compound	5	1	box??	no			
defoamer	floor machines	2	7	3.8 liters	no	7.6	26.6	34.2
Neutrac auto	salt remover (floors)	83	44	3.8 liters	yes	315.4	167.2	482.6
Servopro	degreaser	28	38	3.8 liters	yes	106.4	144.4	250.8
Servosept	disinfectant	296	248	3.8 liters	yes	1124.8	942.4	2067.2
Scrub eze	shower cleaner	121	131	3.8 liters	yes	459.8	497.8	957.6
Javex	mops, rags	153	206	3.8 liters	no	581.4	782.8	1364.2
Enviro All purpose	all purpose cleaner	75	47	3.8 liters	no	285	178.6	463.6
Enviro disinfectant	disinfectant		46	3.8 liters	no	0	46	46
Hygenic	disinfectant		26	3.8 liters	no	0	26	26
Tylex	mildew remover		23	1 liter	no	0	23	23
						6765.1	7267.6	14032.7

Appendix K - Cleaning Materials From Food Services	Quantities Used	Amount per Unit	Total
Solid Fun Cleaner	35capsuels	8 lbs	280 lbs
Stainless Power Cleaner	35capsuels	8 lbs	280 lbs
Metal Pro Dishwasher Plus	800capsuels	8lbs	6400 lbs
SterBac Sanitizer	18	4 L	72 L
RinseDry	64	2.27 L	145.28 L
Lime Away	36	1 Gallon	36 Gallons
Grease Cutter	150	1 Gallon	150 Gallons
SS Cleaner	16	?	
Simplex Toilet Cleaner	35	32oz	1120 oz
Digiclean Handsoap	65	750ml	48.75 L
Window Cleaner	35	32 oz	1120 oz
Floor Cleaner	45	4 Gallons	180 Gallons
DiningHall Dynamix	100	32 oz	3200 oz

Appendix L - Fertilizer Use 2001 and Projected use 2002

	2001		
Fertilizer	Number Used	Amount	Total Amount Used
12\24\24	10 Bags	25 kg	250 kg
16\30\6	5 Bags	25 kg	125 kg
10\6\4	5 Bags	25 kg	125 kg
12\3\10	30 Bags	25 kg	750 kg
Bonemeal	10 Bags	20 kg	200 kg
		Total Amount	1450 kg

Projected Use 2002			
Solucal S	27 Bags	20 kg	540 kg
20\5\20	61 Bags	25 kg	1525 kg
15\3\12	17 Bags	25 kg	425 kg
Bonemeal	15 Bags	20 kg	300 kg
10\8\20	13 Bags		
10\6\4	3 Bags		

Appendix M - Main and Lower Field Fertilization Program: 2002

Date	Fertilizer	Amount
Late May	15\30\12	5 pds
3rd week June	20\5\20	4 pds
2nd week July	20\5\20	4 pds
1st week August	20\5\20	4 pds
4th week August	Solucal	7 pds
1st week September	20\5\20	4 pds
4th week September	20\5\20	4 pds
Late November	10\8\20	4 pds
		36 pds

Appendix N - Indoor Pesticide Use On Campus May 2000 to April 2002

Chemical	Amount
Dursban 2e	500ml
Ficam W	90 grams

Appendix O - Pool Chemical Use: May 2000 to February 2002

May 2000
40 (20litres) of Atlantic 12
06 (25Kgs) of Sodium Bicarbonate
6 (20 Kgs) of Calcium Chloride
03 (8 Kgs) of Super Sequa Solution
4 (25 Kgs) of Soda Ash

July 2000
1 (8Kg) of GLB Oxbybrite
2 (4 litre) of TLC

Sept 2000
40 (20 litres) of Atlantic 12
4 (x 4 litres) of Muriatic Acid

Nov 2000
40 (20 Litre) of Atlantic 12

Feb 01
40 (20 Litre) of Atlantic 12

May 01
48 (20 Litre) of Atlantic 12

June 01
6 25 kgs of Sodium Carbonate
6 20 Kgs Calcium Chloride
3 8 Kgs of Super Sequa Solution
4 25 kgs of Soda Ash

July 01
1 R0007 22 ml
1 R0008 60 ml
1 R0009 60 ml
1 R0010 60 ml
1 Roo11 60 ml
1 R0012 60 ml
1 (4x4 litres) Ultra Pool Secure
1 (50 kg) of Oxybrite

Oct 01
30 (20 Litre) of Atlantic 12

Dec 01
30 (20 litres) of Atlantic 12
4 (x 4 litres) of TLC

Feb 02
40 (20 litres) of Atlantic 12

Appendix P - Paper Use Totals:

Department	May 2000 to April 2001 Totals	May 2001 to April 2002 Totals	Difference	Two year Total
Biology	201765	198355	-3410	400120
Chemistry	106594	129658	23064	236252
English (incl Windsor Theatre)	72460	64629	-7831	137089
Fine Arts/Owen's	55007	58828	3821	113835
History	80571	63238	-17333	143809
Mathematics/Computer Science	40312	64580	24268	104892
Modern Languages	89408	103750	14342	193158
Music	74829	81432	6603	156261
Philosophy/Rel Studies/Classics	68262	80793	12531	149055
Physics	52224	56274	4050	108498
Psychology	83583	114646	31063	198229
Social Sciences	290853	289040	-1813	579893
	0	0	0	0
Athletics	76765	98355	21590	175120
Computing Services	17519	42977	25458	60496
Dean's Office	46467	60469	14002	106936
DSS	5840	8287	2447	14127
External Relations	121568	139951	18383	261519
Facilities Management	81240	93197	11957	174437
Financial Services	214717	181193	-33524	395910
Human Resources	46689	60961	14272	107650
Library Admin	101511	80939	-20572	182450
President's Office	129072	196661	67589	325733
SAS (incl Massie)	281192	319998	38806	601190
Student Services	165213	161961	-3252	327174
	0	0	0	0
RSTP/Dobson	60222	60612	390	120834
Grants	52587	69838	17251	122425
Meighen Centre	11225	13123	1898	24348
	0	0	0	0
Printing Labs	155000	125000	-30000	280000
Library Photocopiers	480000	425000	-55000	905000
SAC, CHMA, Sodexho, Pub	56944	119257	62313	176201
Exam Booklets	91821	80126	-11695	171947
Book Store	507264	713832	206568	1221096
				8275684

Appendix Q - Water consumption in cubic meters for Jan 1, 2000-June 30, 2002

Building	Jan 1-June 30, 2000	July 1 to Dec 31, 2000	Jan 1-June 30, 2001	July 1-Dec 31, 2001	Jan 1-June 30, 2002
Allison Gardens	1832	3,315	1,588	4399	2051
Athletic Centre	8493	5,932	7,424	4768	4271
Avard-Dixon	591	335	275	319	314
Barclay (Chemistry)	11338	9,095	9,363	9971	8977
Baxter	17	39	61	0	0
Bennett / Bigelow	4016	4,189	5,205	4125	5829
Bennett Carriage Hse	410	309	339	292	350
Bermuda	1117	1,165	1,154	992	1000
Biology (Flemington) + Coastal Wetlands Facility	2160	3,088	1,952	3182	3,306
Black House	90	123	37	35	43
Canadian Studies/Anchorage/External	123	43	69	46	28
Centennial Hall	325	248	405	450	413
Central Stores/Fawcett Building	101	72	92	81	102
CLT/Bennett Building	63	101	272	72	125
Colville	241	30	17	205	202
Conservatory	917	1,041	1,252	750	585
Convocation Hall	384	170	407	194	336
Crabtree	2554	7,468	2,647	7978	1694
Cranewood	220	227	304	114	121
Cuthbertson	288	223	334	258	299
Edwards / Thornton	4726	4,502	4,061	4417	4251
Facilities Mgmt Bldg	134	109	137	140	143
Fine Arts	461	598	456	331	331
Harper / Jennings	11826	12,225	10,815	11169	11288
Hart Hall	2374	2,296	2,430	1025	3,941
Heating Plant	3085	2,155	2,555	1745	2635
Hunton	1935	1,952	1,738	1967	2035
Library	782	1,758	1,657	2012	3703
McGregor	407	324	206	182	252
Monastery	679	474	565	488	463
Owens Art Gallery	546	919	444	291	322
Palmer	2476	2,377	2,721	4224	2244
Dunn Building/PEG	620	655	784	952	1600
Presidents Cottage	207	467	645	688	258
Sprague	24	28	14	20	15
Student Centre/University Centre	2105	2,475	2,419	2928	3078
Trueman/McConnell	13418	6,725	10,842	9722	6251
Windsor	6468	5,970	6,116	6617	4800
York St Children's Ctr	235	229	281	191	191
Football Field				4963	1489
Total Water Used (m3)	**87788**	**83451**	**82083**	**92303**	**79336**
Total Cost ($)	**70230.4**	**66760.8**	**65666.4**	**73842.4**	**63468.8**
Total Water Used 2000	**171239**				
Total Water Used 2001	**174386**				
Total Increase In Water Used 2000-2001	**3147**				

Top Water Consumers

	2000
Building	
Harper / Jennings	24051
Barclay (Chemistry)	20433
Trueman	20143
Athletic Centre	14425
Windsor	12438
Crabtree	10022
Edwards / Thornton	9228
Bennett/Bigelow	8205
Biology (Flemington)	5248
Hart Hall	4670
Heating Plant	5240
Palmer	4853
Student Centre	4580
Allison Gardens	5147
	2001
Harper / Jennings	21984
Barclay (Chemistry)	19334
Trueman	20564
Athletic Centre	12192
Windsor	12733
Crabtree	10625
Edwards / Thornton	8478
Bennett/Bigelow	9330
Biology (Flemington)	5134
Hart Hall	3455
Heating Plant	4300
Palmer	6945
Student Centre	5347
Allison Gardens	5957

Appendix R - Residence Water Use Comparison

Building	Number of	Jan 1-June 30, 2000	July 1 to Dec 31, 2000	Total for 2000	Cubic Meters Per Capita	Jan 1-June 30, 2001	July 1-Dec 31, 2001	Total for 2001	Cubic Meters Per Capita
Bennett / Bigelow	181	4016	4,189	8205	45.331	5,205	4125	9330	51.54696133
Carriage	11	410	309	719	65.364	339	292	631	57.36363636
Bermuda	33	1117	1,165	2282	69.152	1,154	992	2146	65.03030303
Colville	10	241	30	271	27.100	17	205	222	22.2
Cuthbertson	12	288	223	511	42.583	334	258	592	49.33333333
Edwards / Thornton	152	4726	4,502	9228	60.711	4,061	4417	8478	55.77631579
Harper / Jennings	171	11826	12,225	24051	140.649	10,815	11169	21984	128.5614035
Hunton	88	1935	1,952	3887	44.170	1,738	1967	3705	42.10227273
McGregor	9	407	324	731	81.222	206	182	388	43.11111111
Monastery	18	679	474	1153	64.056	565	488	1053	58.5
Palmer	90	2476	2,377	4853	53.922	2,721	4224	6945	77.16666667
Trueman	170	13418	6,725	20143	118.488	10,842	9722	20564	120.9647059
Windsor	224	6468	5,970	12438	55.527	6,116	6617	12733	56.84375
Total Water Used (m3)		**48007**	**40465**	**88472**		**44113**	**44658**		
Total Cost ($)		**38405.6**	**32372**			**35290.4**	**35726.4**		
Total Water Used 2000		**88472**							
Total Water Used 2001		**88771**							
Total Increase		**299**							

Building	Cubic Meters Per Capita		
	1999	2000	2001
Bennett / Bigelow	46.78	45.331	51.547
Carriage	69.81	65.364	57.364
Bermuda	70.79	69.152	65.030
Colville	54.8	27.100	22.200
Cuthbertson	55.33	42.583	49.333
Edwards / Thornton	60.71	60.711	55.776
Harper/Jennings	89.68	140.649	128.561
Hunton	52	44.170	42.102
McGregor	82.3	81.222	43.111
Monastery	58.2	64.056	58.500
Palmer	69.08	53.922	77.167
Trueman/McConnell	237.43	118.488	120.965
Windsor	57.5	55.527	56.844

Appendix S - Registration in environmental courses

	Year				
Course	**97\98**	**98\99**	**99\00**	**00\01**	**01\02**
ANTH 2501	0	0	36	46	20
BIOL 4251	0	0	28	0	37
CHEM 3011	15	15	6	5	10
ECON 3801	20	19	16	25	43
GEOG 2101	205	257	319	275	273
GEOG 3101	0	0	0	90	52
GEOG 4101	32	34	25	15	28
PHIL 3721	28	0	42	0	35
SOCI 3611	0	0	28	0	7

Appendix T - The Talloires Declaration

(copied directly from Mount Allison University Environmental Audit-1998)

The Talloires Declaration

We, the presidents, rectors, and vice chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources.

Local, regional, and global air and water pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. These environmental changes are caused by inequitable and unsustainable production and consumption patterns that aggravate poverty in many regions of the world.

We believe that urgent actions are needed to address these fundamental problems and reverse the trends. Stabilization of human population, adoption of environmentally sound industrial and agricultural technologies, reforestation, and ecological restoration are crucial elements in creating an equitable and sustainable future for all humankind in harmony with nature.

Universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals possible. Thus, university leaders must initiate and support mobilization of internal and external resources so that their institutions respond to this urgent challenge.

We, therefore, agree to take the following actions:

1.Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future.

2.Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward global sustainability.

3.Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate, and have the awareness and understanding to be ecologically responsible citizens.

4.Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate, and professional students.

5.Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.

6.Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information

exchange in environmentally sustainable development. Expand work with community and non-governmental organizations to assist in finding solutions to environmental problems.

7.Convene university faculty and administrators with environmental practitioners to develop curricula, research initiatives, operations systems, and outreach activities to support an environmentally sustainable future.

8.Establish partnerships with primary and secondary schools to help develop the capacity for interdisciplinary teaching about population, environment, and sustainable development.

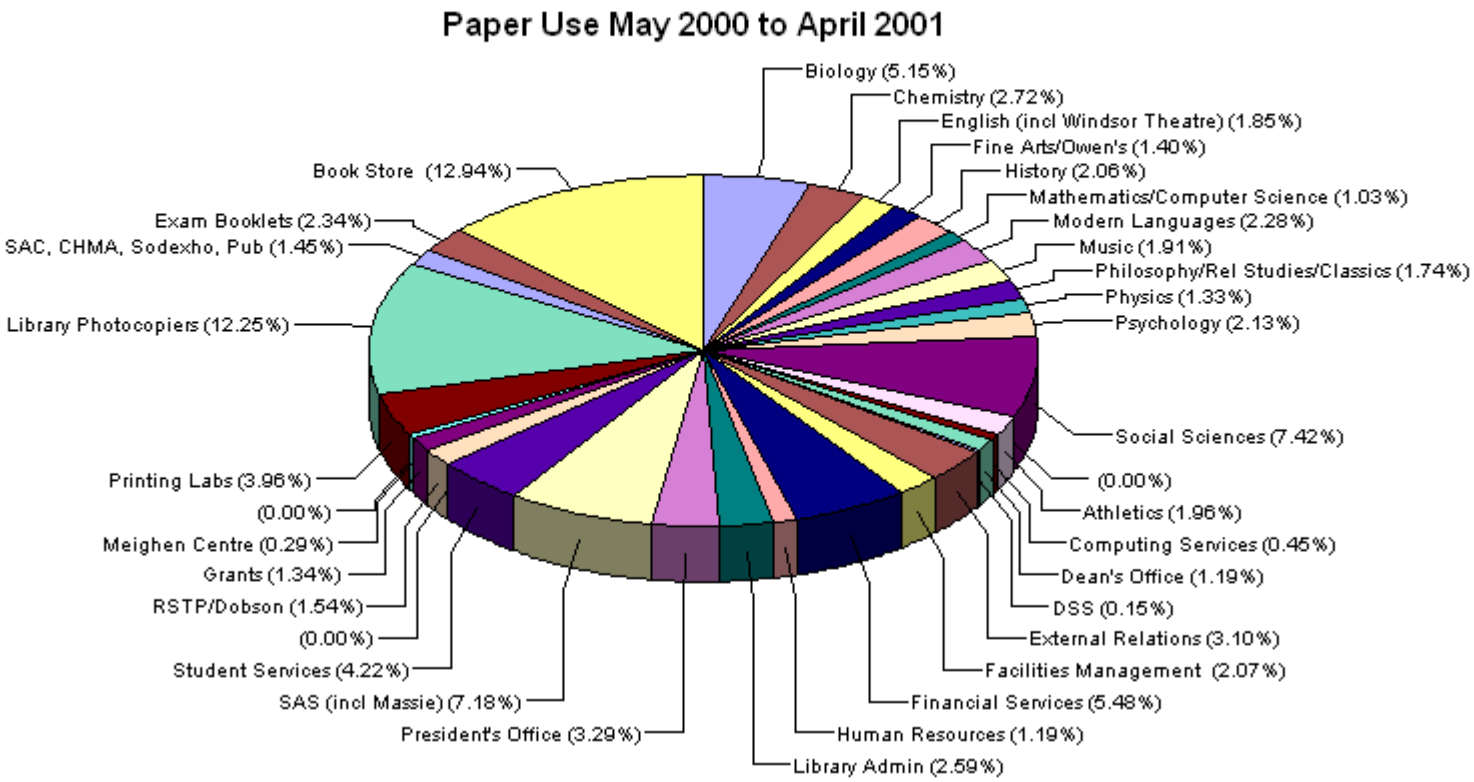
9.Work with national and international organizations to promote a worldwide university effort toward a sustainable future.

10.Establish a Secretariat and a steering committee to continue this momentum, and to inform and support each other's efforts in carrying out this declaration.

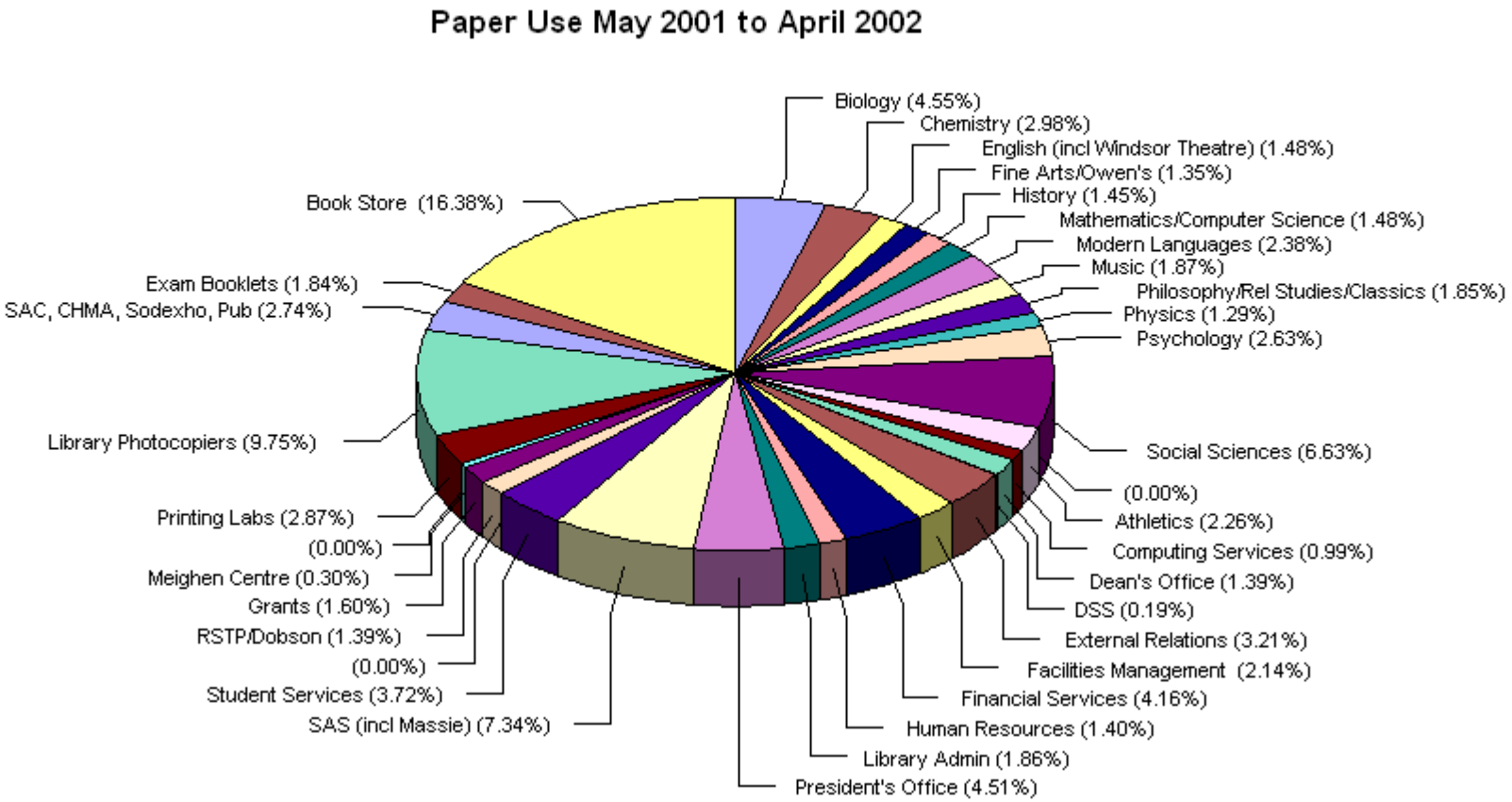
Charter Signatories (Titles and Affiliations in 1990):

Jean Mayer, President and Conference Convener, Tufts University, Massachusetts, USA
Pablo Arce, Vice Chancellor, Universidad Autonoma de Centro America, Costa Rica
L. Ayo Banjo, Vice Chancellor, University of Ibadan, Nigeria
Boonrod Binson, Chancellor, Chulalongkorn University, Thailand
Robert W. Charlton, Vice Chancellor, University of Witwatersrand, South Africa
Constantine W. Curris, President, University of Northern Iowa, USA
Michele Gendreau-Massaloux, Rector, l'Academie de Paris, France
Adamu Nayaya Mohammed, Vice Chancellor, Ahmadu Bello University, Nigeria
Augusto Frederico Muller, President, Fundacao Universidad Federal de Mato Grosso, Brazil
Mario Ojeda Gomez, President, El Colegio de Mexico, Mexico
Calvin H. Plimpton, President Emeritus, American University of Beirut, Lebanon
Wesley Posvar, President, University of Pittsburg, Pennsylvania, USA
T. Navaneeth Rao, Vice Chancellor, Osmania University, India
Moonis Raza, Vice Chancellor Emeritus, University of New Delhi, India
Pavel D. Sarkisov, Rector, D.I. Mendeleyev University of Chemical Technology, Russia
Stuart Saunders, Vice Chancellor, University of Cape Town, South Africa
Akilagpa Sawyer, Vice Chancellor, University of Ghana, Ghana
Carlos Vogt, President, Universidade Estadual de Campinas, Brazil
David Ward, Vice Chancellor, University of Wisconsin, Madison, USA
Xide Xie, President Emeritus, Fundan University, People's Republic of China

Appendix U Paper Use by Department (percentage of total paper use) May 2000 to April 2002



Appendix V Paper Use by Department (percentage of total) May 2001 to April 2002



Appendix W Total Paper Use May 2000 to April 2002