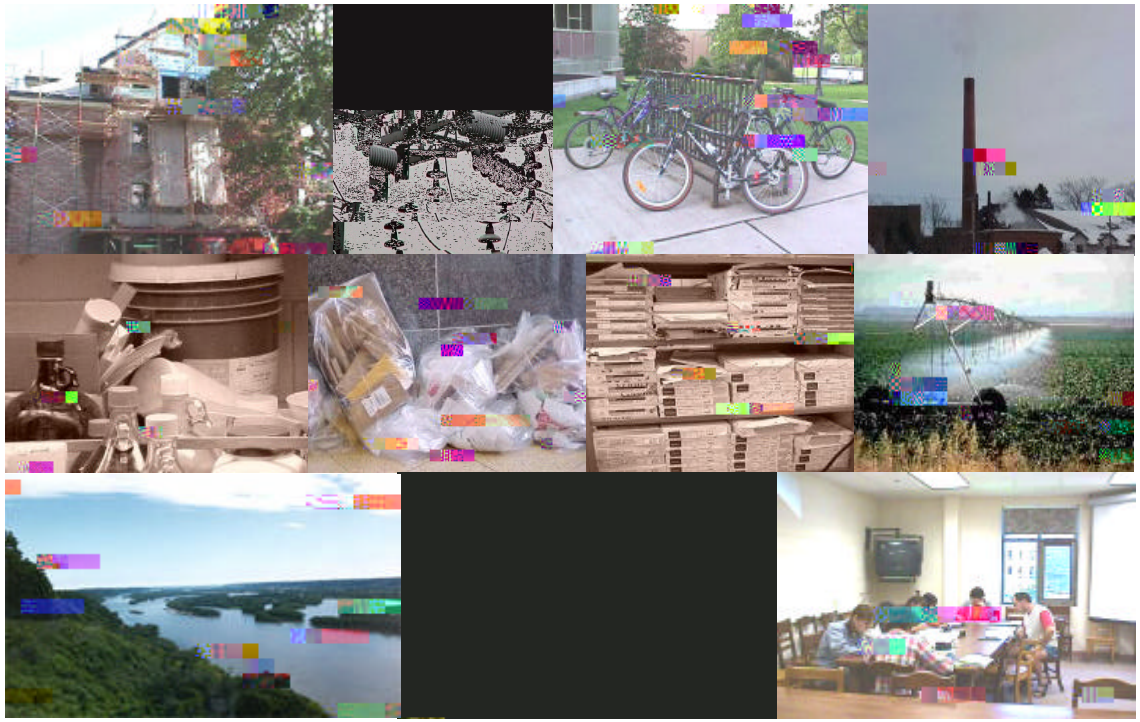

Mount Allison University
Environmental Audit-2000

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	Environmental practice has not changed.
F	Environmental practice has worsened.

These grades appear in the executive summaries and at the end of each chapter in the report.

Buildings

There are a total of 43 buildings on campus. In the two years since the last audit

Transportation

The university fleet has increased by one vehicle since 1998. The amount of

Solid Waste

Since the time of the last audit, little effort has been made to minimize the amount of solid waste produced by the universty. Between September 1998 and September 1999, Mount Allison sent approximately 305.7 tonnes of garbage to landfill. This shows a significant increase from the previous year, when 224-269 tonnes were sent[4]. Unfortunately, the university does not have an accurate means of measuring the volume of waste, and these figures are estimates at best. The recycling program has not changed since 1998 and participation is still limited, thus failing to meet the performance indicator on recycling. A random sample of a day's worth of garbage showed that approximately 50 percent of garbage consists of materials that can be recycled in the current program. Efforts are currently being made to improve recycling on campus by increasing the amount of recycling bins and creating better signage to accompany these bins. It is imperative that all members of the university strive to minimize the amount of waste produced in their daily lives. It is recommended that the university make funds available for the purchase of a scale with which to measure the volume of solid waste before it leaves the campus, and that the Wet Dry Solid Waste program be implemented on campus within a one year period.

Grade Assigned: D

Paper

Mount Allison's paper consumption has increased since the 1998 audit, which reported that 4 498 218 sheets of paper were consumed between 1997 and 1998. The total paper consumed in 1998-1999 was approximately 6 450 000 sheets. This increase is due to the inclusion of specialty paper in this year's total, as well as increased business at Reprographics. Some progress has been made in reducing paper wastage on campus. The library has recently switched to an electronic notice system for overdue books. The new contract for printers and photocopiers will result in further savings due to the fact that double siding will be a default setting. In keeping with the performance indicator contained in the Purchasing section of the policy, recycled paper is purchased and made available to the university community, though the recycled and post-consumer content remains relatively low. It is recommended that the university include a section on paper in the Environmental Policy and that it make recycled paper more widely available to various academic and administrative departments.

Grade Assigned: C

Food

In 1999-2000, the Mount Allison community consumed approximately 10 205.77 kilograms per week of food and beverages. The addition of beverages in year's total makes it higher than that reported in the last audit. However, the consolidation of two meals halls into one has reduced wastage overall. It is recommended that Sodex'ho Alliance offer an organic options for at least one meal per week and that this be implemented in the near future. It should be noted that the organization of the Food chapter differs from the last audit and from the policy. Details on solid waste, cleaning products, and packaging at Sodex'ho Alliance are addressed in the Solid Waste and Hazardous Materials chapters in this year's report.

Grade Assigned: C

Water

In 1999 Mount Allison was billed for 178 382 000 litres of water. Due to a change in the metering and billing system since the time of the last audit, it is

[4]There is a discrepancy between the volume of garbage listed in the 1998 audit which states 224 tonnes, and the figures contained in a report produced by the Grounds Manager in April 1998 which states 269.87 tonnes.

difficult to make any comparison between the two volumes reported. In keeping with the performance indicator for this section, efforts have been made to reduce water consumption on campus, including the repair of water leaks in the heating system and the retrofitting of fixtures with more efficient ones. It is recommended that alternatives that further reduce water usage or eliminate it altogether (e.g. composting toilets) be investigated.

Grade Assigned: C

Finances

There has been virtually no change in the environmental practice or performance in the university's finances, although the level of awareness about the need to include environmental concern in this area of operation has perhaps increased. Mount Allison does not yet have an environmental purchasing policy, although some efforts are made to include environmental concerns when spending money from the university budget. A contract was signed with Canon to lease photocopiers and printers with double-sided as the default option. In addition, recycled paper is now available at the bookstore. None of the university's investments are ethically screened. It is recommended that the university pass an environmental purchasing policy in order to ensure that the stipulations contain in the Environmental Policy govern purchasing in the future. It is recommended that the university make the current investments portfolios available to the public. It is also recommended that an ethical fund be established for the pension plan.

Grade Assigned: D

Education

Acknowledgements

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

The Environmental Issues Committee for ensuring that the audit process begun in 1998 was continued. Jeff Lamb for his advice on just about everything. Perry Eldridge for continuing to serve as the man behind the machine that is Mount Allison. Sarah O'Keefe, Hillary Lindsay, and Yuill Herbert for recalling long-forgotten details of the last audit.

The following people must be thanked for their help with all the details contained in the report: Audrey Kenny, Deanne Ward, Pamela Lusas, Alix Mann, Debbyust about everyme88 TJe eoeD003Wyr

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Purpose of the Audit

This report is the second 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 purpose of that audit was 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, three students, Jacques Breau, Kate Kennedy, and Anna Kirkpatrick, were hired to conduct the second audit during the summer of 2000. The second report is intended to act not only as a comprehensive update of Mount Allison's environmental accountability since the 1998 report, but also as an assessment of the performance indicators of each article in the university's Environmental Policy. The policy was created as a means of ensuring that the various levels of responsibility in the university community continue to work towards making Mount Allison a leader in environmental performance. Subsections within each chapter of this report identify the performance indicators pertaining to that area of concern, and gauge the extent to which those indicators are being met. In some cases, the performance indicators of the current policy were found by the auditors to be ineffective measures of progress or were not fully researched. In these cases, changes have been suggested. Wherever possible, this year's auditors have tried to expand the scope of the research done in each chapter in order to provide the most comprehensive view of the university's actions as possible.

Environmental Action on Campus

Since 1998, environmental action on the Mount Allison campus has been centred primarily on the Environmental Policy and a number of campaigns by the Blue-Green Society, the leading environmental group on campus. The goal of these projects has been to raise the level of environmental literacy while actively minimizing environmental impact.

The Environmental Policy concept emerged prior to the last audit and was developed by the Environmental Issues Committee. In May, 1999 the policy was passed by the Board of Regents. It contains a general policy and a set of performance indicators in each of the 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". In September 1999, the Blue-Green Society and the Orientation Committee created "Green Orientation" to inform incoming students of the policy and to encourage them to adopt environmentally friendly living habits, such as recycling and reducing consumption of water, energy, and paper. Reusable mugs were given to each student and china used at the outdoor barbecue. Two students gave a presentation on the policy and its dependence on individual commitment at one of the evening events during the week. In the spring of this year, three students were hired as "Green Ambassadors". Their job was to raise 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.

The Blue-Green Society's work since the last audit has been focussed on various campus greening projects, the provincial Protected Areas Strategy campaign, and raising awareness about the World Trade Organization. The campus greening group has worked to install paper recycling bins in all residences, improving the level of recycling and reuse of paper in the library.

The Protected Areas Strategy was built around the report drafted by Dr. Louis

human understanding of the various issues since 1998 have been included.

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. This year, the food chapter deals exclusively with food; details of the cleaning products and solid waste associated with Sodex'ho are included in the hazardous waste and solid waste chapters.

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 is contained after the last chapter. 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 a total of 43 buildings on campus. In the two years since the last audit was conducted, there have been a number of notable changes to campus buildings. Over this period, two buildings, French House and 16 Rectory Lane, have been demolished. Significant renovations and repairs have been performed on the heating plant, Barclay building, Centennial Hall, the Athletic Centre, Hart Hall, the Tantramarsh Club, Bigelow House, the CLT, Jennings and the PEG. When renovating and repairing existing buildings, and when constructing new ones, the university aims, wherever possible, to make use of environmentally-friendly technology. For example, the new Dunn Building(formerly the PEG) uses triple layered insulation, recycled paint on the interior walls, and Wattstopper technology in the bathrooms. In addition, much of the waste from the renovation was recycled.

Environmental Significance

On a global scale, human-built structures have a major impact on the natural environment. Buildings have the potential to influence the environment in a number of ways. The materials from which they are constructed as well as their overall design contribute to a building's environmental impact. Materials used in building construction are one source of risk to the environment. Use of some materials, such as tropical woods, results in the depletion of scarce resources. Other materials, such as asbestos and lead have the potential to contaminate the areas where they are found. The way a building is constructed also has the potential to influence the environment. Poorly designed buildings that do not take environmental concerns into consideration (that, for example, do not make provisions for recycling facilities) and are not built to last can result in unnecessary environmental damage. Buildings designed to be long-lasting will ultimately be better for the environment and more cost-efficient than those which must be replaced after a relatively short time. Thus, more sustainable buildings are those made from environmentally sound materials and designed to last.

While buildings have an undeniable impact on the natural environment, there are a number of steps that can be taken to improve a building's environmental standing. These include using products such as recycled bricks, "lumber"made from recycled plastic, and recycled or low-toxicity paint. Design features such as positioning buildings to take advantage of passive solar heating, using energy efficient lighting and heating systems and providing adequate insulation will also help to minimize environmental impact. The environmental impact of some building materials can be found in figure 4.1.

Figure 4.1-Environmental Impact of Common Building Materials

Substance	Found In	Environmental Impacts
Asbestos	Concrete Additive, Plaster, Insulation, Panels and Decking, Ceiling and Wall tiles, Siding	Mutagen
Poly Chlorinated Biphenyls (PCBs)	Transformer Oil Capacitors in Fluorescent lights	Acts as an endocrine imitator causing numerous genetic defects including cancer.
Chlorofluorocarbon (CFCs)	Air Conditioners, Refrigerator coolant (Freon)	Ozone Depletor, Greenhouse Gas
Lead	Solder, Old Piping and paints	Poison; causes organism damage and death
Petroleum Products	Storage Tanks	
Mercury	HVAC controls	Diminishes oxygen and biodiversity
Tropical Wood	Plywood, Siding, Wall frames	Destruction of rainforests
Asphalt/ Tar	Roofing	Irritant, possible carcinogen

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."

The performance indicators for this section are as follows:

- "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 mandate of this department is to "provide students, employees and the university community with a safe, clean and comfortable environment which supports the educational, residential and extracurricular goals of the university, while acting in a financially responsible fashion." (Facilities Management Mission Statement) This work is carried out by 5 carpenters, 2 plumbers, 1 electrician, 4 stationary engineers, 1HVAC technician and assistant, 2 utility workers and 43 custodians (there are also a number of casual custodians). The activities of these staff members are overseen by the Director, the Technical Services Manager, the Custodial Senior Supervisor, the Trades Supervisor and the Project Manager. The need for repairs, renovations, or construction of new buildings is reported to the director. When there are sufficient funds available, the director requests design proposals from architects. The contract is then awarded to the lowest bidder.

Audit

During the 1999-2000 academic year, Facilities Management spent approximately $2 436 465 on minor repairs and major renovations to campus buildings. In 1998-1999, approximately $2 416 080 was spent on repairs and renovations. Full details of projects undertaken since 1998 are included in Appendix A. A number of projects were listed in the 1998 audit as awaiting funding. Of these, renovations on the PEG and the changeover from the McConnell meal hall to the new Jennings meal hall have been completed.

In the past two years, the university has done a great deal of work in improving the buildings on campus so that they abide by federal building regulations as well as environmental standards. Under the direction of the Technical Services Manager, an extensive process of upgrading the heating systems and energy efficiency of the entire campus has begun. As is mentioned in the Energy chapter, a number of buildings have been fitted with upgraded heating controls that allow for fine tuned temperature control. The system has also had numerous leaks patched and had better insulation added to the pipes so as to minimize energy and heat loss. Recaulking the windows and joints of various buildings has also helped to prevent moisture and cold air from infiltrating through the envelope of these structures. An asbestos abatement project has been underway at the university for some time now, directed by the Project Manager, Ron Eickholt. No specific information on the program was supplied to the auditors. When buildings are built or extensive renovations done, all energy and water fixtures installed are efficient models. Beyond this, individual retrofits are considered only where significant wastage is noted.

Some of the companies contracted by the university include Siemens, Arsenault Architecture Firm. The International Chamber of Commerce (ICC) drafted 16 Principles of Environmental Protection. Siemens became a signatory to this ICC Charta in July 1992, thus committing the company to implement these principles. The 16 Priciples can be found at www.iccwbo.org/sdcharter/charter/principles/principles.asp.

The university does not yet adhere to a policy of hiring contractors on the basis of environmental practices, and an environmental impact analysis is not yet a standard procedure. However, advances have been made on the part of Facilities Management to ensure that environmental considerations are stipulated in contracts before they are tendered. This has been demonstrated recently with the renovation of the PEG building. Efforts are being made to recycle as much of the waste materials from the project as possible. While solar panels were considered for the new structure, funding was not secured for this

Ashland, Wisconsin opened its Environmental Living and Learning Centre. This building, designed to house 114 students, incorporates a wide range of environmental principles into its design. “Among the special environmental features is a 120-foot 20 kilowatt wind tower to be located at the northeast corner of the building. Three photovoltaic arrays will provide efficient active solar energy collection and help study the efficiency -- one array is stationary, a second one tracks the sun's path horizontally, and the third tracks both horizontally and vertically to maximize solar gain. Fourteen solar panels placed on the roof of the south wing will preheat hot water for use by residents. Composting waterless toilets in two of the apartments will provide a demonstration of their function and efficiency. The apartments have passive solar design and share two greenhouses. Cedar shakes on exterior walls were not transported from western states, but grown in the nearby northern forests of Michigan's Upper Peninsula. Other structural wood components were similarly grown and milled in the nearby region to reduce the impact of transportation on the environment.” The building has “low flow, water saving fixtures throughout building and two waterless, composting toilets in the south wing”. In addition, the building has made use of a wide variety of environmentally-friendly materials:

- “Organic based linoleum flooring instead of petroleum-based vinyl
- Cellulose (recycled paper) attic insulation with a R-value of 45 and fiberglass and foam insulation with a R-value of 25 for exterior walls
-

6. Make a commitment to favour structural designs which have a smaller environmental impact when these designs are less than 5% more expensive than alternative proposals and are compatible with the architectural makeup of the campus. 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.

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

8. Establish a data base to record and address maintenance issues as quickly as possible. This should be assessable 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.

9. When replacing building materials, recommend the use of environmentally friendly alternatives (e.g: paint, lights, ventilation etc.)

10. Make an effort to recycle waste such as wood and metal. Reduce the use of toxic chemicals whenever possible. Buy nontoxic alternatives.

For Faculty:

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

For Students:

12. Take the initiative to kindly report facility defects you notice to Facilities Management staff, by phone or by e-mailing fixit@mta.ca

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Energy

Introduction

Between June 1, 1998 and May 31, 1999, 11 754 265.7 kilowatt hours of electricity were consumed at Mount Allison. These totals show a 1 620 936.7 kilowatt hour increase in annual consumption compared to 1997-1998 totals. Although energy efficiency has increased on the campus through maintenance of various systems, building renovation, and an energy conservation program begun in the 1980's, the overall energy consumption has also increased. This increase can be attributed to a larger number of energy users. The university's oil consumption has decreased since 1998 (the oil consumption in the 1997-1998 fiscal year was 2 537 648 litres) by approximately 255 012 litres in 1998-1999 fiscal year and 430 628 litres in 1999-2000. The drop in oil consumption can be partially attributed to more efficient systems, but it is primarily due to milder winters.

Environmental Significance

The production and consumption of energy is the source of numerous environmental concerns. "Canadians consume more energy per capita than any other country"[1] and though this is typically attributed to the cold winters, there are in fact a number of

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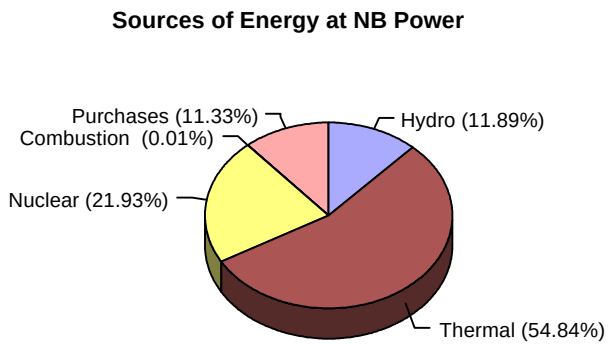

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The buildings heated with light oil make use of a furnace on the premises. This system works as would any domestic oil furnace, the oil is brought on site and is burnt inside the furnace and the resulting heat is used to heat the air which is pumped through air ducts. Between May1, 1998 and April 30, 1999 Mount Allison purchased 151 481 litres of Light Oil at an average of 13 cents per litre. In the following year, the consumption was reduced by nearly half to 84 220 litres, but at an average cost of 37 cents per litre. This drastic drop in consumption is likely due to a milder

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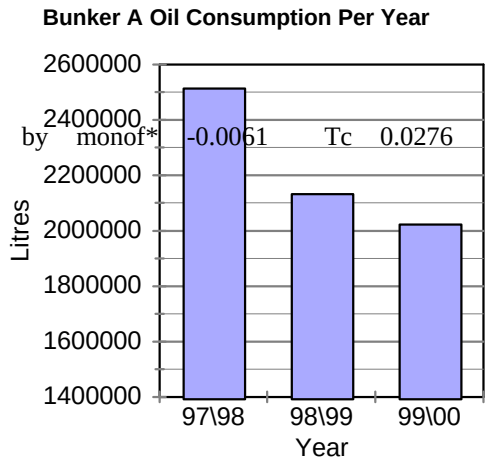

a standard winter setting.

Ventilation systems are also major consumers of energy, particularly where they are not well-suited to the air flow of the building or the demands resulting from fumes. In 1998, the Fine Arts building underwent improvements in its ventilation system. Since then, plans have been made to bring other buildings on campus up to standard. Currently, ventilation in the Barclay building is being upgraded with better controls, and more energy efficient exhaust fans. Information on ventilation and heating systems found withhin buildings on campus can be found in Appendix F.

metering system is fully operational, these figures can be used to locate discrepancies between the energy load demanded by the various equipment in these buildings and the consumption measured by the meters.

Alternative Energy Sources

Since the last audit, renewable sources of energy such as solar, wind, and geothermal have become more accessible as the number of suppliers of this equipment has increased and the efficiency of the technology has improved. Mount Allison has begun to take advantage of these technologies with a proposal to install solar shingles into the roof of the Student Centre, though this decision is subject to outside funding being secured. The auditors also followed up on the research done in 1998 on the feasibility of supplementing the university's current energy supply with energy generated by a wind turbine that would take advantage of the strong winds on the Tantramar marsh. A more complete description of solar and wind technologies and the logistics of implementing these alternatives at Mount Allison is contained below. The question: "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" was asked in the Environmental Audit Campus Questionnaire; 116 out of 118 respondents answered yes, although many people are only willing to support it if it is deemed financially feasible.

Solar

Solar power is created by harnessing the low-energy radiation of the sun. Solar power can be divided into two main categories: solar thermal power, which harnesses the heat of the sun, and photovoltaic (PV) power, which transforms the sun's light into energy. Solar thermal power can be used on a small scale for "water heating systems by using a flat plate collector to capture heat from the sun."[9] On a small scale, Photovoltaic cells can provide electricity for a wide variety of uses. "PV systems are easy to operate, rarely need maintenance and do not pollute the environment."[10] Mount Allison could make use of solar thermal power by installing a solar water heater in one building. If the project was successful, it could be implemented in other buildings. The university is already investigating ways to utilize photovoltaic power. Projects under consideration include the addition of solar panels to the newly-renovated P.E.G building and using solar shingles when repairs are made to the roof of the Student Centre this summer. In the case of both solar thermal power and photovoltaic power, there would higher costs associated with set-up. However, after this initial stage, costs would be off-set by savings on energy bills and government support.

Wind

"Almost all wind turbines producing electricity consist of rotor blades which rotate around a horizontal hub. The hub is connected to a gearbox and generator, which are located inside the nacelle. The nacelle is where all the electrical components are located, the electrical switch boxes and the control system, and this is the large part at the top of the tower. Most wind turbines have three blades which face into the wind; the wind turns the blades round, this spins the shaft, which connects to a generator and this is where the electricity is made. A generator is a machine that produces electrical energy from mechanical energy, as opposed to an electric motor which does the opposite. Wind turbines start operating at wind speeds of 4 to 5 metres per second (around 10 miles an hour) and reach maximum power output at around 15 meters/second (around 33 miles per hour). At very high wind speeds, i.e. gale force winds, (25 metres/second, 50+ miles/hour) wind turbines shut down."[11]

In discussions with a number of people (at Mount Allison, NB Power, and the Atlantic Wind Energy Test Site, among others) the auditors assessed the feasibility of supplementing the power bought from NB Power with wind energy. The Tantramar marsh has been identified as one of the top two sites in the province in terms of the wind regimes necessary to generate power using a wind turbine. The

9

university farm property has been identified as a potential site for a turbine as it would require no leasing of land, and is relatively close to the campus. Connecting the turbine to the campus would have to be considered, a buried wire was suggested as one possibility. Connecting the smaller turbine into the main university power system might not be as advantageous as using it to power a single building. This is because it would be hard to measure the actual savings in kilowatt hours if the energy generated by the turbine were included in the total figures. These figures reflect a number of factors including other energy saving measures like retrofits, as well as increases in overall demand as more equipment such as computers are brought onto the campus each year with the increase in student population. By using the turbine to power a single building, results would be more easily measurable. As the farm is closest to the Satellite houses, it might be most feasible to begin by connecting to one of these residences. A second option is the new residence which would be an ideal way to institute renewable energy without the complication of

than the conventional system, the payback period was less than one year. The payback occurred through energy savings. Additional cost for the duct work was in this case not an issue since air conditioning was going to be installed regardless. Even though the building has more than doubled in size the electric bill is only $633 more than the charge for the previous building. Other energy conservation measures were also installed during the renovation, such as T8 flourescent light fixtures, passive solar design ideas, good insulation and Low E glass for windows.

Recommendations

For Senior Administration:

1. Develop a policy to use alternative energy sources whenever possible.

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

3. 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.

4. Indicate to NB Power a desire to purchase renewable energy.

For Staff:

5. 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.

6. Equip more rooms with *Wattstopper* technology.

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

8. 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.

9. 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.

10. 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.

For Faculty:

11. 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.

12. 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 a few of the overheads as possible (without compromising the students“gseyaor 1 Tw (Secure funds to hir .22 -

initiative to turn some unused computers off; new arrivals can easily turn them on again.

For Administration, Staff, Faculty and Students:

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

18. 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.

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

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

Figure 5.1- Review of Current 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 meters required to establish a baseline have been installed, but are not yet running. When readings can be taken, a baseline will be established.	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.	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, despite the cost difference. More research needs to be done on the feasibility of using renewable energy sources on this campus.	No change proposed.
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.	No change proposed.
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 do not yet take full advantage of energy efficiency and renewable energy technology.	No change proposed.

Letter Grade: C

Transportation

Introduction

While the university fleet has increased by one vehicle since 1998, the amount of use these vehicles get has not changed dramatically since then. One bike rack has been installed since the last audit and there are plans to install another this year. Of the students, staff and faculty who responded to the Environmental Audit Campus Questionnaire, 27.73% most commonly travelled to and from the university by car.

Environmental Significance

Fossil fuel propelled forms of transportation impact our natural environment in many ways: infrastructure, sound pollution, and air pollution. Transportation also generates waste, both from oil and in the body of the automobile. It also affects our personal health and environment by making us less active (driving instead of walking or cycling).

"In 1995, fossil fuel propelled forms of transportation were responsible for more than 27 percent of Canada's total greenhouse gas emissions. For individual Canadians, transportation accounts for almost half of greenhouse gas emissions, primarily due to automobile use."[1] The most notable greenhouse gas emitted from the use of automobiles is carbon dioxide. When carbon dioxide is released into the atmosphere in quantities that cannot be naturally regulated by the earth's coping devices, it combines with other greenhouse gases trapping heat in the atmosphere. This phenomena is called the greenhouse effect and causes global warming, "an increase in the near surface temperature of the Earth."[2] By using our cars less and choosing instead to walk or bike we can significantly reduce our effect on the planet's climate.

Today, the demand for gasoline is at its highest ever. As demands continue to rise, world supplies of this nonrenewable resource are steadily approaching depletion. This spring, gasoline prices surged as high as 85 cents per litre when the Organization of Petroleum Exporting Countries limited production of petroleum. Natural gas prices are also on the rise and it is anticipated that supplies will not be sufficient to meet current demand.. By reducing our dependency on automobiles, and by switching to alternatives to these fuels, we can secure a more sustainable means of transportation for the future.

With less traffic congestion in the municipality and around campus, the concentration of emissions is reduced. Figure 12.1 is a chart of the top three pollutants emitted from automobiles, along with health and environmental impacts [3]

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[1] http://www.davidsuzuki.org/

[2] http://www.epa.gov/globalwarming/glossary.html

[3] 3Adapted from the Automobile Emissions, Individual Health and the Environment chart on Environment Canada's Greenline website: www.ec.gc.ca/emission/2-6e.html

By reducing our dependence on automobiles as a means of transportation for distances that can easily be walked or cycled, we can slow the accumulation of these pollutants and thus reduce the environmental and health impacts caused by nitrogen oxide, carbon monoxide, carbon dioxide, and others.

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 are 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)

University Vehicles

Responsible Parties

The University vehicle fleet is the responsibility of the Director of Facilities Management.

Audit

The Mount Allison University campus is a designated pedestrian area which is accessed only by university vehicles. No public vehicles are allowed to travel on campus grounds. However this is not always the case, many members of the university community park their vehicles on campus or are dropped off next to their respective buildings (this sometimes occurs for medical reasons).

There have been three new vehicle purchased by the University since 1998. The use of University vehicles is as follows:

3. Garbage/Moving truck
4. 4X4 truck used for snow plowing and miscellaneous tasks in the summer
5. Three pick-up trucks to transport plumbing, carpentry and custodial tools and supplies
6. Two vans to transport electrical and carpentry tools and supplies
7. One van for the Heating and Ventilation crew
8. Support Services van for delivering mail
9. Sodex'ho Alliance van for delivering food

All of the vehicles are powered by gasoline except for the garbage truck which is powered by diesel.

The recent increase in gas prices, coupled with a growing awareness about the impact of fossil fuels on the global climate, has led to a variety of alternatives to fossil fuel burning engines being introduced on the vehicle market. In the past year, the range of technologies has soared with the manufacturing and testing of electric cars, clean-burning diesel engines, hybrids and fuel-cells.

A variety of automobile manufacturers have seized upon these new technologies. This spring Daimler-Chrysler, GM, Ford, and Toyota all unveiled "green" vehicle models for sale at prices significantly lower than was anticipated just a few years ago. The majority of these alternatives are being installed in compact cars based with the understanding that smaller automobiles use less resources to create and run and are thus more environmentally friendly overall.

Among the selection of clean-burning diesel fuel technologies is Westport Innovations Inc. of Vancouver, British Columbia. This concept "attempts to cut

air pollution by allowing diesel engines to run on clean-burning natural gas"[4]. Because Mount Allison's vehicle fleet is comprised of vans and trucks, as opposed to compact cars, clean-burning fuels and more efficient engines are likely the most feasible alternatives in the range of "green" transportation technology on the market today.

Case Studies

Diesel

Biodiesel is fuel which is made from regular diesel and biological oils such as vegetable oil or soy bean oil. This alternate fuel can either be used at a 100% pure level or mixed (usually at 20%) with traditional diesel. "Biodiesel can be operated in any diesel engine with little or no modification to the engine or the fuel system."[5]

"Deer Valley School District, located in Phoenix, Arizona, has over 120 buses running on B20 (20% biodiesel, 80% diesel), and are about to consolidate with another district and expand the program."[6]

"All 64 vehicles in the ARS (Agriculture Research Service, United States Department of Agriculture) fleet in Beltsville, Maryland are running on B20. The vehicles are all high usage versus high miles and are used regularly over the 6,700 acres of ARS property. The vehicles include tractors, dump trucks, tractor trailers, bucket trucks, combines, choppers, small riding mowers, and the visitor shuttle bus."[7]

Propane

Propane is a by-product of the oil refining process and of natural gas extraction. There is a propane refuelling station in Memramcook, and the possibility of constructing a small refuelling station in Sackville. A gasoline engine can be easily retrofitted to run on propane by a certified expert. This conversion requires only five new parts: a converter, which is a combination vaporizer and pressure regulator; an air-gas mixer, similar to a carburetor, that mixes air and propane; a dual-control processor, which is a small computer that adjusts fuel delivery; a lock-off filter/valve, which stops the flow of fuel to the engine; and a propane tank.

since then, approximately $4000 is spent each year repairing and replacing turf damaged by pedestrian traffic on the lawns. In order to preserve the vegetation, it is imperative that pedestrians and cyclists keep to the walkways.

Case Study

"The Purple and Yellow Bike Project is a fleet of used bikes that are available for use on the University of British Columbia campus. Bikes are locked with same keyed locks, giving all members access to all bikes. Whenever you see a bike, you are free to unlock it and ride it away. And the person that left it there will have to find another one."[9] This project is currently in its second year of operation with as many as 400 participants.

The relatively small size of the Sackville area makes it ideally suited for a similar program that might expand beyond the campus and into the surrounding town area. The UBC project works on a co-op style system where members join for a minimal fee and have access to the services that the co-op provides, which include bike repair, bike repair workshops and the use of the purple and yellow bicycles.

Recommendations

For Staff:

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

6. Install a bicycle rack at the entrance of the Barclay building.

Air Quality

Introduction

In 1998, 13 312 290.89 kg of greenhouse gases were emitted through electricity consumption and combustion of fossil fuels to heat the campus[1]. A one year period between 1998 and 2000 produced about 5 654 472.9 kg of greenhouse gas emissions. The significant drop in the amount of emissions can be attributed to the relatively milder winters that the area has been experiencing in the past two years

Figure 7.1

Chemical	Common Sources	Impact
Methane (CH_4)	Emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from the wastes in municipal solid waste landfills, and the raising of livestock.	A greenhouse gas. 20x more effective in trapping heat than CO_2. Annual growth rate is 2%.
Nitrous Oxides (NO_x)	Combustion of fossil fuels and solid waste, agricultural and industrial activity	Destroys ozone and causes acid rain. Increasing at a rate of 0.3% per

Current Environmental Policy

The university currently has no policy concerning air quality.

Responsible Parties

The Mount Allison community influences air quality in a number of ways. Consumption of fossil fuels for heating and electricity, the wastes sent to landfill and the fuels consumed by university vehicles all contribute to air quality.

Audit

Air quality at Mount Allison is loosely governed by the New Brunswick Clean Air Act, which regulates the amount of potentially harmful gases an individual, corporation, or institution can emit into the air.

After the completion of a Greenhouse Gas Emission Questionnaire[4] a rough estimate of the emissions (in kilograms) produced by Mount Allison in a two year period (1998-2000) was calculated. The gases examined in the survey are carbon dioxide, sulphur dioxide and methane. This questionnaire was created by the Canadian Mortgage and Housing Corporation and was published in the Calgary Herald (Saturday, May 20, 2000)[5]. The questionnaire investigated four different sources of greenhouse gases: buildings, transportation, waste and food. A copy of the questionnaire can be found in Appendix H.

[4]This questionnaire was constructed using information from various other questionnaires and studies.

[5]This questionnaire is only a working version; a final version will be available in the fall of 2000.

Buildings:

Buildings emit greenhouse gases both in the construction stages and in the operation stages. The embodied energy is the energy used to construct the structure, transport building materials and fabricate building materials. The emissions corresponding to this aspect of buildings was calculated using the total square footage of all university buildings. The total emissions from embodied energy on campus is roughly 560 803.62 kg.

The operation of buildings obviously requires a significant amount of electricity and, in our case, heating oil. Electricity bought by the university is derived mainly from hydro, nuclear and thermal sources (refer to figure 11.1 in the energy chapter), all of these energy sources are non-renewable sources (here hydro electricity is considered non-renewable because it is on a macro scale and results in the flooding of vast, mostly forested areas and its consequences on the natural environment: habitat loss, methane emissions from decomposition, loss of carbon sinks; nuclear is not considered renewable because of the amount of waste it produces). Since none of the power supplied to Mount Allison is from renewable energy sources all power supplied to the university results in emissions. The amount of emissions was calculated using the kilowatt hours that appeared on the electricity bills for each building on campus. The resulting emissions are approximately 10 935 752.55 kg.

Oil used to heat buildings is either burnt in the central heating plant or in the individual houses that are off the main campus. The university, in this case, is a direct emitter of harmful greenhouse gases. The emissions resulting from the total oil burnt is 373 193.25 kg.

The total emissions for buildings calculated using this questionnaire amounts to 11 869 749.42 kg. According to the questionnaire, “a typical Canadian household of two adults and two children in a 2,500sq-ft house with one car would score about 27 650kg per yer.”

Transportation:
The university operates ten vehicles in their fleet. Since a new work-order system that requires the logging of mileage has just recently been established there is no exact account of kilometres driven by the fleet vehicles. The auditors were able to tabulate a four month period for three utility vehicles: the electrical van, the plumbing truck and the HVAC truck. These entries were then made into a rough monthly average of 427.83 kilometres. Fuel efficiency was found on the United State's Environmental Protection Agency's fuel efficiency web site (www.fuelefficiency.gov). With fuel efficiency and the rough estimate of mileage it was possible to determine the approximate amount of emissions produced by the operation of the service vehicles on campus. The total emissions calculated for the use of university vehicles is 33 166 kg.

The university operates both hand pushed and ride-on lawn mowers as well as weed-wackers. All of these require gasoline for there operation. The amount of fuel or the fuel efficiency is not known and therefore the emissions from these can not be determined. This manufacture of this equipment also requires a certain amount of embodied energy which could not be determined from this survey.

A significant amount of energy, and therefore emissions, is required to manufacture and distribute vehicles. The embodied energy within a vehicle corresponds directly to the size of the vehicle: the bigger it is the more energy is needed to produce it. The spare parts required by a vehicle are another potential source of embodied energy. The total embodied energy for the university fleet is 3 625 kg.

The total emissions from transportation amounts to 36 791 kilograms.

Waste:
Energy is used to create the items that eventually become part of the solid waste stream. The embodied energy from our solid waste comes from the manufacturing, storing and transportation of the product before it reaches the commercial sector. After the product has served its intended purpose and is discarded more energy is needed to transport, sort and dispose of the item. In addition, wastes in landfills are source of methane gas. Recycled materials are also included in this calculation since they also have embodied energy from the manufacturing process and will also need to be transported to a facility which will further process the items. The total emissions released amounted to approximately 185 775 kilograms.

Food:
In the years following the green revolution, high production agriculture has become a large source of energy consumption. Fuel to run farm equipment; energy required to manufacture chemical fertilizers and herbicides/pesticides; energy, paper, and plastic used to package foods and energy required to process foods all contribute to green-house gas emissions. Food energy obtained from animal sources requires more energy inputs than a vegetarian diet would. Eating local and organic foods also lowers emission levels. Approximately 1 050 people eat in the Sodex'ho Alliance meal hall at Mount Allison, resulting in the release of approximately 1 806 000 kilograms of green house gases since 1998.

According to the calculations made using the Greenhouse Gas Emission Questionnaire, Mount Allison University has emitted a total of 13 889 995.42 kilograms of greenhouse gases between June 1, 1998 and May 31, 2000.

In 1998, the Mount Allison University campus had approximately 955 trees, including three groves of birch and sugar maple. Although these numbers are from two years ago, there have only been a few trees that have been cut down. Trees are a carbon sink and therefore offset some of the emissions produced by Mount Allison. The auditors have no information on the amount of CO_2 absorbed by the trees on campus. The S.A.C. is currently working with the Tree Canada Foundation in developing a tree planting project that would take place on the old university farm property. This project would focus on planting species native to this area.

In 1998 a stack emissions study was started by Facilities Management. The goal of this study was to assess the amount and quality of emission put into the atmosphere while heating the campus with the university's two boilers located in the physical

pollute the atmosphere.

13. Reduce energy and heat consumption whenever possible. (See chapter on Energy)

Letter Grade: D

the health of people and ecosystems around the world. Following this consideration, decisions must be made to reduce or eliminate reliance on these substances accordingly. Some of the most significant hazardous materials, their use, and their effects are contained in Figure 8.1.

Figure 8.1

Chemical	Use	Effects
PCBs	Found in paints, dyes, copy paper heat transfer fluids and lubricants.	Highly toxic and carcinogenic
Dioxins	A family of chemicals used in lawn care, agriculture and forest management. It is also produced as run-off from pulp and paper mills, and is created in the combustion of PCBs.	A defoliant and mutagen.
SO_2	Produced through the burning of fossil fuels.	Causes chlorophyll loss at concentrations as low as 2ppm. Cereal crops are damaged at levels less than 50 ppm and pine trees cannot survive when annual concentrations exceed 0.07-0.08 ppm.
Ethylene	Found in many cleaning agents.	Causes injury to flowers and plant life.
Fluorides	This group of chemicals is emitted by metal refineries and fertilizers.	Damage to fruit trees: every increase of 50 ppm of atmospheric fluoride levels decreases the average yield of a fruit tree by 27%

Physics Department and are licensed through the Atomic Energy Control Board[5] (the license can be found in Appendix J). Use of this material is limited to the Barclay, Flemington and P.E.G. buildings, and a research lab in St. Andrews, New Brunswick. Because of the shift away from research using radioactive materials, and because the material is quite expensive, when used in the classroom, all labs are done in micro-scale. What little radioactive materials that are currently purchased are funded through the operating budgets of the individual departments or specific research grants.

There are two categories of radioactive materials used in the Physics Department: those that are covered under the Atomic Energy Control Board License and those that do not require a license. As research shifts away from radioactive materials in the Physics Department, very little material of either category is being purchased, used, or disposed of. According to department faculty, only a few sources were purchased for teaching and these particular sources did not require a license. What little material is possessed by the department is labelled and stored in a refrigerator. The most recent inventory of radioactive materials possessed by the department is contained in Appendix K. Because radioactive materials are only useful when still radioactive, for material to be considered waste (ie. not useful in experimenting for radioactivity) it must be neutral and thus is not considered radioactive waste by disposal companies. When the Physics Department tried to dispose of their radioactive waste recently, they were told to dispose of it as they would any other garbage on campus. As of yet, the department is still storing this material until an alternative method of disposal is found. As a general statement, the handling, and disposal of radioactive material in this department is as per Atomic Energy Control Board (AECB) regulations.

There are no radioactive materials used by the Chemistry department, although the Barclay building is licenced to accommodate Biochemistry research which uses some radioactive materials.

As per the general trend noted in the Physics and Chemistry departments, the Biology department is no longer using much radioactive material in its research labs. What little is still contained in the department tends to be devoted to teaching, although some is still used for research. Carbon 14 and Tritium are the main radioactive elements currently being used. The department houses a refrigerator for storing these elements. Wastes are disposed of in two ways: gases are vented out of the fume hood and liquid wastes are evaporated and disposed of in the garbage.

10. 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, is responsible for the purchase of chemicals for the photography lab. Paul Griffin, the photography technician, is 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

Disposal of all hazardous waste, except selenium toner, from the photography department is done by flushing the spent chemical into the wastewater stream without treatment. The selenium toner is collected throughout the year and is disposed of by Science Stores when the quantity is sufficient.

Although fixer has notable silver content it continues to be flushed down the drain with the other chemicals, despite the department's plan to rectify this infraction of American environmental regulations two years ago. 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 8.2 Quantities of Chemicals used in Photo lab (May 1998 to May 2000)

Product	Quantity
TMax RS developer	**304 litres**
Dektol Developer	**1140 litres**
Rapid Fix	**1710 litres**
Hypoclearing Agent	**76 litres**
Rapid Selenium Toner	**19 litres**
Flexicolor Developing Kit	**19 litres kit**
E-6 Developing Kit	**30.4 litres**

Printmaking and Lithography

The printmaking studio uses numerous different types of chemicals, most of which are hazardous both to the human body and to the natural environment (a complete list of chemicals used by the printmaking department can be found in Appendix L). Varsol is now being used as a cleaning agent instead of lithotine, which is a more volatile and expensive chemical. The Varsol is recycled into a machine parts washer and is used until it is no longer useful for cleaning. When no loner useful, the Varsol is stored until a sufficient amount can be disposed of through Science Stores. A small amount of Varsol is lost through evaporation during its use. The facility uses two 45 gallon drums of Varsol in a year.

Various types and concentrations of acids are use in the printmaking process. Most acids are diluted to a 10:1 concentration, but some solution are more concentrated depending on the intended use and the desired result. All acids are neutralized with sodium bicarbonate before being poured into a marble vat where it is further neutralized before being disposed of into the wastewater stream. All acids go through this procedure when they are handled by the staff. Students, on the other

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 the responsibility of the pesticide company granted the contract for a given session. 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 at Mount Allison has fluctuated over the last two decades. Between 1983 and 1994, the university ceased all applications of fertilization and pesticides, as a result of improper application of a broadleaf herbicide and poor equipment. When spraying resumed it was through a licensed landscaping company contracted by the university. Between 1994 and 1997, a complete spraying program was practised. This involved two applications of fertilizer, insecticide, and herbicide which cost approximately $8000 per year. The company contracted to apply these materials varied, depending on the bids received each year.

Since the publication of Rachel Carson's book Silent Spring in 1962, there has been a gradual rise in public resistence to pesticides. The government of New-Brunswick`s House of Commons Environment Committee has recently published a report on the use of pesticides in the province. One recommendation put forth by the report is a five year plan to phase out and eventually ban the cosmetic use of pesticides in the province. Here at Mount Allison, some members of the university community have taken up this cause and are pushing for a ban on campus pesticide use. In response to this pressure, a reduced spraying program began in the summer of 1998 and continues today. This program involves a single application of herbicide. In response to the question: "Do you support the spraying of the campus with herbicides in order to maintain a weed free campus" in the Environmental Audit Campus Questionnaire, 97 of 119 respondents answered no.

The reduced spraying program is significantly cheaper, costing the university approximately $4000, a savings of 50%. It is understood that under this program, insecticide will be applied only if cinch bugs (burrowing insects which damage grass root structure) are sighted, and has not been applied since 1997. Though the reduced spraying program represents a willingness on the part of the university to acknowledge the environmental and health risks involved in pesticide use, many members of the university and local community would like to see a complete ban of these materials on the Mount Allison campus. This desire has been heightened by the recent decision by the municipality of Halifax, Nova Scotia to instill a ban on landscape pesticides throughout the city. However, pesticides are, at this point, considered to be the only financially feasible means of ensuring the healthy looking grounds which are generally perceived to be a direct reflection of a healthy university. The Grounds Supervisor informed the auditors that the increased maintenance and watering that was required to keep a pesticide-free campus aesthetically healthy and safe (for liability reasons) would cost the university approximately $30 000 in labour. Spot spraying was also suggested as a method of further reducing the amount of herbicides used. This would involve spraying only those areas that received extensive traffic and/or where grass was weakening. However, this was not selected as it was predicted to be less cost-effective and thought to pose more of an inconvenience to the university community overall because it could not be done in one weekend the way a general spraying can. Nonetheless, the Grounds Supervisor continues to research alternatives to chemical herbicides, including one fungus-based product that should be available in the next two years, as was mentioned in the last audit (p. 37).

The spraying program for 2000, included one application of a set of three herbicides, the same as those sprayed in 1998 and 1999, as well as one application of granular fertilizer See figure 8.3 for full ingredient list.

Figure 8.3

Herbicide	Chemical Components
Mecoprop:	2-(4-chloro-2-methylphenoxy)-popanoic acid
Dicamba:	3,6-Dichloro-2-methoxybenzoic acid
2,4-D:	(2,4-Dichlorophenoxy) acetic acid
Fertilizer	**Chemical Components**
28% nitrogen fertilizer: urea(in granular form):	NH2-CO-NH2

Indoor pesticides are used to exterminate insects and rodents within buildings.

Responsible Parties

Cleaning materials are purchased by two departments: Facilities Management and

There are currently 42 full size refrigerators on campus and every year residents bring mini fridges for personal use. As old refrigerators are replaced or left behind by

Figure 8.4 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	One application of herbicides is applied each year, pesticides are used only if pests are sited. Spraying is limited to problem areas.	The term 'required' should be backed with further definition and specifications as to areas and types of pesticide permitted on campus.
Micro-scale laboratories are used	The micro-scale method is increasingly being implemented at this university, especially in first-year chemistry laboratories.	No change proposed.
Effective, environmentally friendly cleaning supplies are used.	Cleaning supplies tend not to be purchased with price foremost in mind. Human health is the primary factor in purchasing.	Change policy to encourage custodial staff to evaluate cleaning products based on a broader environmental impact, beyond human health.
The transportation of all hazardous materials is monitored.	Hazardous materials are monitored in a series of smaller systems, including the Fine Arts department and Science Stores. A university-wide monitoring database has not yet been established.	A target date should be set for the implementation of a university-wide monitoring system to track the transportation of hazardous materials to and from the university.

Letter Grade: D

Solid Waste

Introduction

In the past year Mount Allison sent 305.7 tonnes[1] of garbage to landfill. This shows an increase of between 30 and 80 tonnes[2]. There are still many areas where this volume could be further reduced. The auditors found that many members of the university community do not know what and where to recycle on this campus. The number of recycling containers on campus is inadequate, both within buildings, and on the grounds. Remedying both these problems may in future reduce the amount of recyclable material going to landfill each year. At the same time it is very important that the university take into account the other two R's: reduce and reuse. These concepts are examined throughout the audit when discussing purchasing and use of various resources both natural and otherwise.

Environmental Significance

Solid waste operates on a direct input-output relationship, simply meaning that a percentage of what is produced and consumed is present in landfills. In recognizing this direct relationship, human beings worldwide are gradually coming to understand that the solution to overflowing landfills is not more landfills, but a drastic change both in the level of consumption and the means of disposal. The three R's approach has, in the last decade, become the most popular solution to both consumption and disposal, the three R's being Reduce, Reuse, and Recycle. Most likely because it demands the least in terms of personal lifestyle change, recycle

napkins from Scott, made with 100% virgin fibre. The auditors were informed that white napkins are purchased for aesthetic purposes, but that with sufficient student support, the director would consider switching to recycled napkins. Overall, the number of napkins used has decreased from 1.5 cases to 1 case per day since the opening of the new Jennings. This is likely the result of the individual napkin baskets placed in each table in the new facility, replacing the dispensers that were once located at the entrance to the meal hall.

Recycling

The university first began separating out recyclable materials in 1989. This began as a student initiative, but was institutionalized in 1994 and made the responsibility of the custodial and grounds staff in terms of containers, collection, and transportation from the campus through contracted recycling facilities. The scope of the program remains virtually unchanged since its beginnings, with paper products and beverage containers being the two types of materials recycled by the university. Currently, paper is sent to the Dorchester Penitentiary where it is shredded and used as animal bedding. This began in September 1998, prior to which time paper was picked up by Ergon. Between September 1998 and September 1999 approximately 3 238 bags of paper were sent to the Penitentiary. For the past two years, beverage containers have been recycled by Wheatons, although this was done by Valley Glass for five years prior. The Wheatons depot located at the Industrial Park in Sackville accepts both glass and plastic containers (for information on the quantity of beverage containers recycled from October 1998 to April 2000, refer to Appendix R). The collection of both paper and beverage containers is similar to the collection of waste destined for landfill. Individuals deposit their recyclables into the appropriate bins on their floor or building, after which custodial and/or grounds staff transfer the material to central locations. In the case of paper, material is collected in a room on the ground floor of Harper Hall

In food services, recycling has changed little since the last audit. Paper products are recycled wherever feasible. Cardboard cannot be recycled as it requires too much space to store on site. A cardboard baler would minimize the amount of space required to store boxes. Cans are not recycled because rinsing them would require additional labour and wages, which the company cannot afford at this time.

Despite the relatively long history of recycling at Mount Allison, participation in the program remains quite low. When conducting an examination of the composition in a days worth of garbage from Centennial Hall, the auditors found it contained approximately 50% recyclables and 50% waste[4]. The study done by Amelia Clarke in November 1994 showed 52% recyclables on average. These figures, show virtually no change in the level of recycling taking place on this campus[5]. In the Environmental Audit Campus Questionnaire sent to all members of the university community, 56% of those who responded answered no to the question "Do you feel you have an adequate understanding of recycling on this campus?" Although the recycling system on campus has changed little since 1994, there appears to be a lack of understanding within the university community which may be contributing to a lack of participation.

As was predicted in the last audit, the municipality of Sackville recently (1999) switched to the Wet-Dry system introduced by Westmorland-Albert Solid Waste Corporation. Some of the confusion associated with recycling on the university campus may have to do with the implementation of a system that is incongruent with the university's. As of yet, Westmorland-Albert is not accepting waste from institutions, although they plan to phase this in over the next year[6]. The Custodial Supervisor is currently researching the logistics of implementing the program when the phase-in begins.

The Wet-Dry garbage separation system is a simple measure used to divert the maximum amount of solid waste from landfill. The basis for the proper working of the system is public participation. Garbage in the home is separated into a blue bag (for the dry garbage) and a green bag (for the wet garbage). The garbage is then picked up by the municipality at curb side and transported to the Westmorland-Albert facility. When the garbage arrives on the site it is separated into its respective pile. The Dry garbage goes through a series of sorting stations where recyclables such as paper, plastics, metal and cardboard are removed (the facility will remove and sell any recyclable for which there is a market). The garbage that is not separated for recycling is sent to landfill. The Wet garbage is mechanically sorted to

[4] This percentage was obtained from a composition study of a day's worth of garbage produced by Centennial Hall in May, 2000. This building was selected as one of the buildings on campus that runs closest to the typical September-April capacity in the summer months.

[5] Amelia Clarke's figures were referred to in the 1998 Audit and assumed to be relatively accurate at that time as the recycling system had changed little since then.

[6] Information obtained through a telephone interview with Marc Ducette, public relations at Westmorland-Albert. May 2000.

remove all that is not compostable (this is done by sifting the waste, the smaller bits of garbage are sent to be composted). The compostable materials are then sent to long horizontal silos where they will become compost over time. The garbage that is not sent to the compost silos is diverted to landfill. The sorting of the garbage into Wet and Dry is done as shown in figure 9.1.

Figure 9.1

Wet Garbage- Green Bag	Dry Garbage- Blue Bag	
-food scraps -animal waste -sawdust -ashes -bandages -feminine hygiene products -lint -plants -serviettes -vacuum cleaner waste -paper towels -facial tissues	-aluminum cans -pie plates -foil paper -plastic bags -binders -books -glass/metal/ plastic -bottles -cardboard -bubble packaging -cereal box liners -clothes -coat hangers -drink boxes -deodorant -combs -computer discs -audio/video cassettes -egg cartons -frozen juice containers -furniture -leather	-magazines -milk cartons -overheads -packaging -paint brushes -pizza boxes -bottles -containers -posters -pencils/pens -nylons -potato chip bags -Styrofoam -telephone directory -utensils -wrapping paper - printer cartridges -etc, etc, etc

The amount of material going to landfill from this university could potentially decrease if the Wet-Dry system were implemented. It is important to note that while the system is designed to be as simple and all-inclusive as possible, there are a number of steps an institution of this size can take to get the most out of waste material beyond the two bag approach. This includes on-site composting and separation of paper from the Dry material. Mount Allison could reap the benefits of creating its own fertilizer from the compost, and could continue to donate its recyclable paper to the Dorchester Penitentiary.[7] To supplement the changeover, better signage and more recycling containers around the campus (both inside and outside), could also improve the current system.

Case Studies

Acadia University

-cardboard

composted since the early 70's... The windrow is turned with front-end loaders on a regular basis, as time permits or as needed (approximately every 2-3 months). The resulting compost is used for greenhouse potting soil, fill for tree holes, and topsoil. Branches and tree parts are collected and chipped. The wood chips are used on campus gardens and walkways."

- **"Backyard" composting** is used for smaller scale operations such as "Minota Hagey Residence and the Environmental Studies coffee shop. In 1996, students made 3-bin composters for implementation at Colleges and other small coffee shops, where this type of composting is recommended."

- **"Vermicomposting** is the process of using earthworms and other micro-organisms to convert organic waste into a dark, nutrient-rich soil conditioner." This method is recommended for office use. Currently several offices on the Waterloo campus are using this method.

5.

By using organic waste to produce compost, not only does the university have an inexpensive source of fertilizer for house plants, gardens, shrubs, lawns and trees but a significant quantity of waste is diverted from the landfill. (http://www.adm.uwaterloo.ca/infowast/composting.html)

Recommendations

For Senior Administration:

1. Make funds available to purchase a cardboard baler for Jennings Hall.

2. Secure funds for the implementation of an effective campus wide recycling program.

For Staff:

3. In addition to regular garbage cans outside add a bin for recycling drink containers next to all garbage cans on the main campus grounds.

4. Label garbage cans with a sign reading: Please put all paper, cardboard, and drinking containers in the bins provided.

5. Sodex`ho Alliance should pursue the possibility of recycling more of their solid waste materials. These materials could either be picked up by _, or be

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For Faculty and Staff:

9. 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 Students:

10. 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 Staff, Faculty and Students:

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

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

13. 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.

14. Daycares, kindergarten class rooms etc. will often gladly take old yogurt containers, etc. for arts and crafts.

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

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

17. 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 9.3 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 is still a major issue at Mount Allison University. The amount of paper consumed has increased since 1998.	Establish specific policies on paper consumption with target dates for implementation.
An effective recycling program is maintained across campus.	In order to increase participation, the current recycling program requires improved signage, and more bins.	Adopt the time line proposed in this audit to accompany the existing performance indicator.
Furniture is offered for sale or donation prior to disposal.	Limited 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 sent to landfill.	No change proposed.

Letter Grade: D

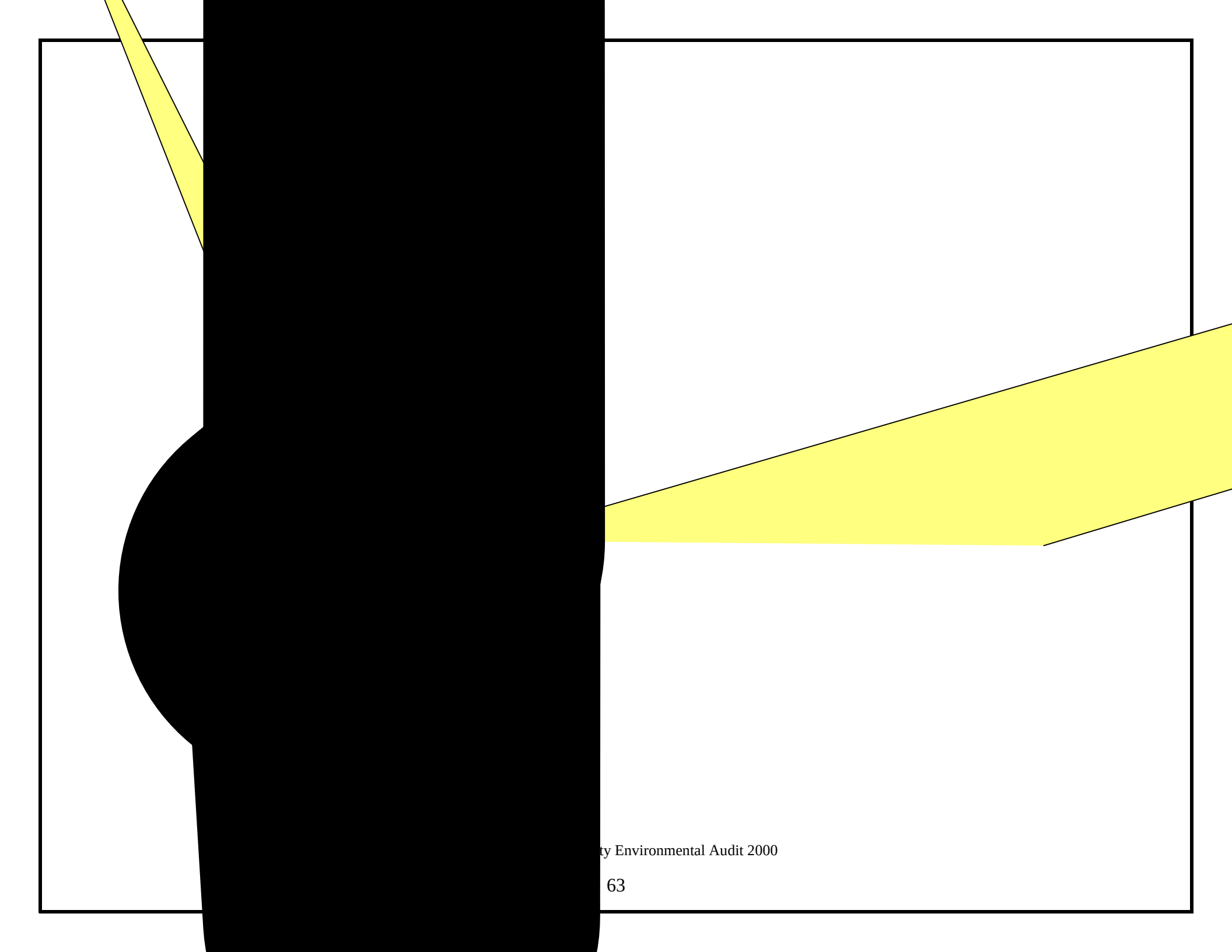
Paper

Introduction

The last audit reported that 4 498 218 sheets of paper were consumed between 1997 and 1998. The total paper consumed in 1998-1999 was approximately 6 450 000 sheets. This increase in paper consumption has two sources. First, the 1997-1998 total did not include speciality papers such as coloured and card stock paper (it is estimated that approximately 900 000 sheets of speciality paper were consumed during 1997-1998). The remaining increase can be attributed to higher paper consumption at Repro Graphics in 1999-2000 (approximately 630,000 sheets).

Environmental Significance

Consumption of paper products has a direct and significant impact on the natural environment. In the past, we used Canada's size and seemingly endless resources to justify our wasteful habits. However, we can no longer ignore the connection between the products we consume and the health of our environment. According to the State of the World 2000 report, "[i]n 1997...the world produced 299 million tons



assignments this way".

Case Study

The University of Vermont has introduced a competitively-priced copier paper which is 60 per cent post consumer content and chlorine free. This paper is bleached with oxygen or hydrogen peroxide instead of chlorine, thus eliminating a source of harmful dioxins. The university's decision to convert to chlorine free, recycled paper is supported by a policy which calls for using "paper with a minimum of 30% recycled post consumer waste whenever possible. A preference has also been set for paper produced without chlorine bleaching."
(http://esf.uvm.edu/envcncl/paper/paper.html)

Recommendations

For Senior Administration:

1. Create a section on paper consumption for the Environmental Policy, complete with performance indicators.

2. Make a commitment to eliminate purchases of all paper products containing old growth wood fibre.

3. On all paper bought by the university be sure that it states clearly the recycled content. This should be something that the university is proud of and advertises. Prospective students and alumni alike will be impressed with Mount Allison's commitment to the environment.

4. Continue to investigate the possibility of offering higher post-consumer content paper.

5. Make it policy to have Repro print on both sides of the paper whenever possible. The only time it would not be possible would be when there is only one page of information.

6. Inform all contracted companies of the university's concerns as to paper wastage, and ask that all things to be printed on both sides and on recycled paper.

7. Make it university policy that all intra-university communication and as much external communication as possible be done on E-mail to save paper.

8. Request that Xerox disclose the forest management practices of the timber companies that supply the pulp. Almost all recycled paper has some virgin wood used in its manufacturing.

9. Encourage prospective students to use the Mount Allison website for information and applying instead of hard copies received in the mail.

10. Contact other Universities under the inter-university tender and urge them to switch to recycled paper.

11. 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 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, and energy conservation tips.

For Faculty:

12. Inform students that assignments must use both sides of the paper, either by printing double-sided or by using paper already used on one side.

13. Encourage students to submit shorter assignments via E-mail and allow students to use this method when submitting longer essays as well.

14. Reuse all departmental 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.

15. Reduce your own paper consumption by using E-mail as much as possible and not printing anything you don't have to.

16. Suggest a departmental policy that all copying be done on both sides of the paper

17. When possible, use overheads instead of handouts.

18. Keep a box in your office and classrooms for paper that you empty periodically into the main recycling boxes in your building.

19. Consider using part of the department's budget for a paper shredder so that confidential documents can be recycled.

For Staff:

20. Stop giving course calendars to upper year students. Require that students use the website instead. Upon request students could receive a calendar for special circumstances.

21. Reuse all departmental 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.

22. Reduce your own paper consumption by using E-mail and not printing anything that you don't have to.

23. Make a department policy that all photocopies are done on both sides of the paper.

24. Keep a box in your office for paper to be emptied periodically into the main recycling box

25. Consider using part of the department's budget on a paper shredder so confidential documents can be recycled.

26. Print all exams and exam booklets on both sides of the paper. Provide extra paper at exam locations for students who will need it for rough work.

27. Put signs on all garbage cans reading: "Please put paper, cardboard and drink containers in the appropriate bin for recycling."

For Students:

28. Encourage the SAC office to purchase recycled paper products.

29. Ask your professor if you can hand in assignments single spaced and/or double sided or via E-mail. If told that you can't, ask why not.

30. Read books on course reserve in the library rather than photocopying the pages.

31. Use posters minimally, and if you do make them, use paper that has already been used on one side.

32. Reuse all one sided paper (to print assignments on the other side, for signs, for rough work, for class notes, etc.)

33. If you live in residence, keep a box in your room to be emptied periodically into the main recycling bin. If you live off campus, keep paper products and all other recyclables separate (including cardboard) and Wheatons will come and pick them up. Call 536-0351.

34. When buying new paper, buy unbleached and with the greatest post-consumer content you can find. If the store does not carry recycled paper, request it.

35. Student groups could make desk top boxes out of cereal containers and distribute them to staff and students to use for recycled paper.

Letter Grade: C

Food

Introduction

In 1999-2000, the Mount Allison community consumed approximately 10 205.77

- 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 Sodex'ho Alliance. Under the direction of Mark Henchey, Sodex'ho Alliance 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

With the exception of the food served at the President's Cottage and at Cranewood, all food on campus is prepared by Sodex'ho Alliance. 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.

Since the opening of the Jennings meal hall, the Director of Sodex'ho Alliance has noticed a shift in food consumption patterns. Whereas the McConnell meal hall offered vegetarian options next to non-vegetarian items, the new facility includes a separate vegetarian section. The Director estimates that since Jennings' opening, consumption of vegetarian entrées has increased by six times (from approximately 30-50 vegetarian dishes a meal to 300 vegetarian dishes a meal). However, the majority of the students consuming vegetarian dishes also consume meat dishes.

While this would seem to indicate an improved vegetarian menu, all of the twelve vegetarians who responded to the Environmental Audit Campus Questionnaire felt there were too few vegetarian options available at the meal hall.

Currently,the information available on the ingredients of individual dishes is limited. In many cases, the only way of knowing if a dish is compatible with one's diet (for example, if it contains ingredients one is allergic to or if it is vegetarian) is to consult a member of the Sodhex'ho staff. In the future, the Director hopes to have available for student reference a binder containing the nutritional information and ingredients of all dishes offered.

Sodex'ho Alliance has a national food purchasing contract with Serca Foods (formerly Clover Distributers). Because of the large-scale nature of the contract it is at times difficult to determine the source of food purchased. The auditors contacted Serca, as well as Ben's Bakery (which supplies Sodex'ho's bread) and Baxter Milk (Sodex'ho's dairy supplier). Ben's Bakery reported a number of environmental initiatives including emission controls on their ovens, a recycling program and diversion of its food scraps to a pig farm. Despite this, Ben's does not make use of organic or locally grown ingredients and has no environmental policy. The auditors were not able to obtain information on the environmental practices of Serca Foods or Baxter Milk.

post-consumer food composting, source reduction strategies, cooperative arrangement with organic farmers and shelters, and constant innovation. Two percent of Bates' fruits and vegetables are locally and organically grown. All food scraps are diverted from the landfill, and some resulting compost is returned to the campus for use in plantings; local farms compost pre-consumer food scraps, and use post-consumer food scraps for pig feed. All pre-consumer food waste is composted by a local farmer who mixes it with the city of Lisbon's yard trimmings. (Bates receives a certain amount of compost back each year.) All post-consumer food waste is collected in the dish room by specially designed strainers, and hauled to a pig farmer for feed. Bates' Food Service supports the local economy by buying locally grown organic food whenever possible. A collaborative purchasing effort by the Maine Organic Farmers and Gardeners Association, the Maine Department of Agriculture, the University of Maine Cooperative Extension, the Executive Chef at Bates, and other Bates key players led to a loose co-op of local farmers who provide seasonal, organic food for the College. Bates' emphasis on locally produced, organically grown food provides economic stability to local organic farmers, helps protect the environment by reducing transportation and pesticide impacts, and provides healthy, high quality food to the Bates community. An outreach component of the program, started in 1992, is to provide Hope Haven Gospel Mission, a Lewiston Christian soup kitchen and shelter, with food on a daily basis. Each day, uneaten food from the Bates cafeteria is picked up and used to feed poor and homeless city residents. The food from Bates feeds fifty to a hundred people daily." [2]

Recommendations

For Sodex'ho Alliance:

1. Purchase products made without chemical additives or pesticides, whenever they are less than 5% more expensive in price. Label these products or ingredients as *Organic* in the meal hall and Golden A Café.

2. Begin offering an organic option in the meal hall by providing one meal with organic components every week. With sufficient student demand, increase this quantity over four years until most meals include an organic option.

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

4.

Figure 11.1 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Changes to Performance Indicator
Packaging and waste are minimized.	Targets have not been established to reduce packaging and waste.	No change proposed.
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	Majority of food not purchased from local sources.	No change proposed.
Information regarding ingredients and processing practices are made available to students	The Director of Sodex'ho has plans to make available to students a binder listing the ingredients and processing practices of all dishes served in the meal hall.	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. The Golden A Café utilizes Styrofoam and picnics/outdoor functions also used Styrofoam.	Indicate where and in what circumstances that china or reusable plastics should be used.
Food and cardboard recycling programs are used.	Food is currently being sent to a pig farm and used as pig feed. Cardboard continues to be recycled.	No change proposed.

Letter Grade: C

Water

Introduction

In 1999 Mount Allison was billed for 178 382 000 litres of water. No comparison can be made because the billing system was changed in 1998 from a fixture oriented system to a system that actually meters the amount of water used. The data for the amount of water used in 1998 was not available to the auditors because of the change in the billing system.

Environmental Significance

basins which run at approximately 3.79 litres per minute. Print washing requires the basin to have water flowing through them for no more than one hour for a fibre based print and five minutes for a resin coated print. During the academic year, wash basins are often found to be running all night long, this prematurely wears the filter system and adds additional cost to its operation.

Allison Gardens uses water in the winter months to maintain an ice surface in the building. Three years ago the Icemaking Plant was altered to include a closed loop that would continuously recirculate the water used to make ice.

The 1998 audit recommended that the Chemistry department seriously consider a recirculation pump for the aspirator. This measure would save a great amount of water from being used, but would remain economically and environmentally unfeasible since the energy needed to operate the pump would not offset the cost for the water consumption and would consume energy produced by non-renewable resources.

The water used in the heating system is part of a closed loop and therefore the system has minimal water input. Some water is lost through inefficiencies such as leaks in the buildings or in the steam pipes. There is considerable amount of effort put into making the heating system leak free since this makes it more energy efficient and therefore more economical..

Outdoor water use is still of little concern compared to the indoor use. The turf on campus is currently still not being watered in part due to the lack of an efficient watering system. In the summer of last year, the water source for the swan pond fountain was converted to a well. Previous to the town's water metering system the amount of water utilised by the fountain remained unknown and paid for by the town. After the implementation of the metering system the university considered shutting the fountain down instead of paying approximately $10 000 for the water bill. The town, which regards the fountain as a tourist attraction, proposed that a well should be dug to supply the fountain its necessary water. The town and the University funded the well.

As part of the 1998 audit, a survey of water fixtures on campus was conducted to estimate the areas where retrofits should be made. This survey was not repeated for this report as the amount of retrofits since 1998 has been very minimal and because no record of individual retrofits is kept by the Facilities Management department. Such records would allow for a more accurate understanding of how and where water savings are occurring on campus.

Case Studies

In 1993, the University of British Columbia added the C.K. Choi building to its campus. Among other environmentally friendly features, the building uses excellent water conserving techniques and equipment "Composting toilets installed in this project do not require water for flushing. City water is generally only required for the 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 8,000 gallon subsurface cistern) and recycled gray water from the building. Projected water usage is approximately 300 gallons per day."(www.iar.ubc.ca/choibuilding/matsuzaki.html)

Recommendations

For Staff:

1. 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.

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

3. Wash vehicles only when needed.

4. Conserve water on a individual basis.

For Faculty:

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

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

7. Conserve water on a individual basis.

For Students:

8. Limit shower length to about 8 minutes.

9. Turn off water taps when brushing your teeth.

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

11. Post a sign in your residence bathroom asking people to conserve water.

Figure 12.1 Review of Current Environmental Policy

Current Performance Indicators	Current State of Affairs	Proposed Changes to Performance Indicators
Water efficient models are installed when replacing any water fixtures on campus.	Water fixtures are replaced by more efficient models unless the building is up for renovation in the near future.	No change proposed.
Projects are undertaken to decrease water usage.	Projects are undertaken to make various systems more efficient (which in turn decreases water usage), but no education or awareness projects have been undertaken by the university.	Specify the different types of projects that should be pursued to decrease water consumption both on the facilities aspect and on the personal aspect.
Longevity and water efficiency are primary considerations when purchasing water fixtures.	These two factors are considered when purchasing water fixtures.	No change proposed.

Letter Grade: C

Finance

Introduction

As was the case in 1998, the allocation of funds per department is determined by the budget committee and approved by the board. Figure 13.3 illustrates the direction of funds to the various academic and administrative departments and the percentage of total funds directed to each of these areas[2].

Figure 13.2 Funding per Department

Department	Amount in 1998-1999	%	Amount in 1999-2000	%	Amount in 2000-2001	%
Faculty of Arts	4 971 409	13.9	5 081 823	13.2	5 392 019	14.1
Faculty of Social Science	2 230 933	6.3	2 584 075	6.7	2 787 609	7.3
Faculty of Science	4 281 371	12.0	4 341 390	11.3	4 478 131	11.7
A06 Tc -0.09 Tw (4 478 131%18TD .000496 06o7) Tm6brary unding per Department						
11.7A066						

[2]This information is taken out of the Mount Allison University 1999-2000, and 2000-2001 Budgets. The data for 1998-1999 is adjusted from the original budget for that year, which was used in the 1998 audit report.

This break-down shows a decrease in the percentage of funds directed to the Faculty of Arts and the Faculty of Science in 1999-2000, though the percentage of funds being directed to all three academic faculties is budgeted to increase for the next academic year.

The academic departments receive additional funding for research puposes from

specified company and the invoice paid following the delivery of the product to the end user. Roughly 4000 request forms are processed through the purchasing department each year.

The university purchasing policy has not changed since 1998. The auditors were informed that currently no formal policy exists within the purchasing department to govern purchasing on environmental grounds. However, informal control is exerted by the department to ensure that things such as energy efficiency are taken into account when departments purchase equipment. Thus, suggestions are limited to the purchasing manager's knowledge of environmentally friendly alternatives.

The percentage of survey respondents in favour of a policy that allowed for the purchase of environmentally friendly products that were more expensive than the unfriendly alternative are as follows: 32% of respondents favoured a policy that allowed for a 10% increase in price, 46% favoured a policy that allowed for a 5% increase, 19% favoured a policy that allowed for the purchased of products equal in price, and 3% favoured various other purchasing policies. These numbers indicate a relatively strong willingness on the part of the university community to increase the amount of spending for the sake of the environment. It also indicates support for the policy which currently governs this increase.

The university has standing contracts with a wide variety of companies for items purchased on a regular basis. Common items that are price-sensitive to volume or large quantities are purchased through an cooperative tenders with other universities within the Maritimes. Wherever possible, the university standardizes specifications for frequently purchased equipment such as computers and printers. The choice of supplier frequently results from a competitive process or government contract that emphasizes quality, price and service issues. Over the past year, university tenders that followed the public tendering process contained a request for information on the environmental practices and policies of bidding companies, although this was by no means the deciding factor in awarding a contract.

Financial Services actively evaluates order placement and invoicing systems for efficiency and value. Current contracts with Grand and Toy for office supplies and Dell Computer Corp. for personal computers employ internet order processing.

Figure 13.4 Major Suppliers and Environmental Conduct

Company/ Organization	Product	Environmental Policy
Blue Cross	Insurance	No information available
Cardinal Construction	Construction	Cardinal Construction does not have an environmental policy
CIBC Mellon	Financial Services	No information available
Dell Computer Corporation	Computers	Dell's environmental policy can be found at http://www.dell.com/us/en/gen/corporate/vision_003_environ.htm
Imperial Oil	Heating Oil	Imperial Oil's environmental policy can be found at http://www.imperialoil.ca/community/environ 2.htm
Jones Masonry	Stone Work	No information available
Sodex'ho Alliance	Food Services	No information available
NB Power Commission	Electricity	NB Power's environmental policy can be found at http://www.nbpower.com/en/enviro/ performancereport/Envir_E_corp.pdf
Sun Life of Canada	Life Insurance	No information available
Town of Sackville	Water	The Town does not have an environmental policy.

University Investments

The University's long term financial investments are in its General Endowment Fund, approximat lwproximat lwproximv$n8eents a8h Endowmenn it; tciaBnviron

that it is nearly impossible to trace the environmental or social accountability of the end companies being supported by the university's investment. Ethical Investment funds and managers are one way to bridge this gap. Ethical Investments promote selective investment based on the environmental and social practices behind the commodities represented by market values. Ethical Investment managers create portfolios of companies that have passed an ethical screening process. Currently, Mount Allison does not employ an Ethical Investments manager, however one of the managers of the university's Common Fund investments is working to create a portfolio of environmentally and socially responsible corporations.[5]

In the spring of 2000, the Students' Administrative Services V.P. Finance, Ted Rutland, produced a report entitled "Aligning Investment with Mission: The Case for Mission-Based Investing at Mount Allison". This report outlines the history and rationale behind screening investments to ensure that they align with the investor's mission. In the case of a university such as Mount Allison, it is critical that investments reflect the social and environmental lessons taught in courses, as well as upholding the university's "espoused virtues of morality and altruism"(p.4). The fourth chapter of the report gives retroactive proof of how the university might have gained by screening out six of the corporations in their investments portfolio that did not match the institution's mission. It was proved that Mount Allison would have had on average, a 3 percent higher return each year of screening between 1994 and 1999. The report ends with a proposed missions-based investing policy that could be adopted by the Board of Regents University Investment Committee. The report is scheduled to be presented at the next Board of Regents meeting this fall. Any action on this front will depend on how the report is received by the committee.

In response to the survey, 60% of respondents indicated their support for Ethical Investments. 14% answered no, while 26% answered non applicable. Most of these people included a statement saying they did not know enough about the concept to answer one way or the other. Should the university pursue an Ethical Investments manager, information on the rationale and benefits of this decision should be made available to the public. It is very likely that with a better understanding of this new form of management, most members of the university community would give their support.

[5]Information obtained from David Stewart, Vice President Administration, August 2000.

Case Study

In 1987 the Associated Students of UCLA developed a policy allowing anyone from the campus community to scrutinize the companies with whom ASUCLA did business. As a result in 1989, they stopped purchasing *General Electric* products because of their numerous environmental violations.

Recommendations

For Senior Administration:

1. 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." (http://www.environmentalchoice.com/index_main.cfm)

2. Sign the Valdez Principles and abide by them in all business transactions (see Appendix U for the Valdez Principles)

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

4. 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.

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

6. 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.

Figure 13.5 Review of Current Environmental Policy

Current Performance Indicators	Current State of Affairs	Proposed Changes to Performance Indicators
Photocopiers and printers minimize the required use of paper.	Under the new contract agreement with Canon most of the printers and photocopiers on campus will have double-sided printing/copying as a default.	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.	Recycled 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 hardwo2v51ristore		

Education

Introduction

A number of both academic and extracurricular programs at Mount Allison seek to educate students on environmental issues. The university curriculum offers a number of courses with some degree of environmental content. As environmental issues become recognized as contemporary concerns, the number of courses with environmental and ecological concepts has increased. The Environmental Studies and Environmental Science majors have been established since the last audit. The construction of the new Coastal Wetlands Research Facility this year will enable further environmental research as well as partnerships between the university and the local community, thus contributing greatly to the implementation of the Environmental Policy in the Curriculum section. In addition, initiatives led by the Blue Green Society and by the Green Ambassadors have served to educate the university community on environmental issues.

Environmental Significance

The world is currently faced with a vast array of environmental challenges. Among these are the pollution of oceans and rivers, deforestation, water shortage and the threat of global climate change. If these problems are to be addressed, it is necessary that citizens be well educated on environmental issues. Universities have an important role to play in this process. Universities are "leaders in education, innovation, research, and information distribution." [1] Furthermore, universities bring together those with academic expertise and students who represent future citizens and decision-makers. As such, universities have a unique opportunity and a responsibility to act as leaders in environmental sustainability. Given the pervasive nature of environmental problems, all university graduates should have at a least a basic understanding of these issues. By learning about the causes, consequences and possible solutions to environmental degradation, students are better prepared to address these problems.

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 of the policy 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.

[1] Sierra Youth Coalition Sustainable Campuses Resource Package p.4

- 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

research station but as a means of bridging the gap between governmental and university-based studies in this area. This can in turn provide the model for work on local environmental concerns through a research station that allows the gathering and analysis of Sackville and Tantramar specific data.

There are a number of courses currently offered that either include some environmental content or focus specifically on environmental issues. With the exception of Geography 3101, Environment and Development, which was introduced this year, all courses have been listed for at least the past two years. See figure 14.1 for environmental course listings for 2000-2001.

Figure 14.1

Environmental Courses	

direction of the university. Should one of the academics hired have a background in environmental science and/or studies, environmental education stands to improve with research specific to these fields of expertise.

The Blue Green Society has carried out a number of awareness campaigns designed to educate the campus community on environmental issues. During the 1999-2000 academic year, this included campaigns on the World Trade Organization and climate change. In 1998-1999, attention focused on the New Brunswick Protected Areas Strategy and Earth Day. In addition, society meetings, which are open to all members of the university, provide a forum for environmental speakers and presentations on a wide range of topics.

Two separate initiatives have been taken to promote the university's Environmental Policy passed in May, 1999. During Orientation Week in September 1999, the policy was introduced to frosh through "Green Orientation" events, which included handing out reusable mugs, providing china and a mug washing station at the outdoor barbecue, a presentation on the policy at Convocation Hall, and handing out environmentally friendly living tips at registration. These events were designed to raise the profile of the policy and impress upon new students the idea that Mount Allison is working toward becoming a leader in environmental excellence. In February 2000, three students were hired to act as Green Ambassadors. The primary responsibility of this job was to publicize the policy among students, staff and faculty. 55 per cent of survey respondents claimed to be familiar with either the Environmental Policy or the last Environmental Audit. As these two documents become further integrated into the decision making process at Mount Allison, it is predicted that the level of familiarity will increase. Of the staff, students and faculty who responded to the survey question "Do you feel you are adequately educated on environmental issues?", only 34.5% responded yes. This suggests that a large portion of the university community still need to be educated on environmental issues in general and on specific initiatives undertaken on the Mount Allison campus.

Case Study

Widener University in Chester, Pennsylvania has introduced a course on campus environmental issues for first year students entitled "Campus Ecology and Environmental Stewardship". The course covers a wide range of topics including "energy and water use, purchasing, dining services, solid and liquid wastes". Students study environmental initiatives on other campuses and carry out a research project in which they examine "campus operations at Widener University and explore solutions that both reduce environmental costs while also reducing campus operations costs". The course aims to instill in students "a set of learning outcomes that match key components of urban ecological literacy." (http://www.science.widener.edu/~grant/courses/campus.html)

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. 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.

4. Introduce a “Green Certificate” program similar to one currently used at Princeton University. This certificate would be awarded to all students who

Survey Responses

To increase awareness concerning the environmental practices and beliefs of the university community, and to assess any change in this level of awareness since the 1998 audit and the passing of the Environmental Policy in 1999, a survey was sent out to all staff, faculty and students in May via mass E-mail. The survey and its results are as follows:

Environmental Audit
Campus Questionnaire

This summer Mount Allison University has hired three students to conduct a comprehensive environmental audit on campus. In order to provide the auditors with a better idea of environmental issues on campus, the faculty, staff and students are asked to complete this short, easy survey. We hope you will take the time to answer each question as honestly as possible. To complete the survey type an X in the appropriate space or fill out your response. Please answer only the questions that are relevant to you.

To return the completed survey by E-mail, send the attachment to enviroaudit@mta.ca. If you wish your response to be anonymous, surveys can be printed and returned to box #304, however, all responses will remain confidential. Thank you for your help.

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

[ ] Yes [ ] No

119 respondents
yes: 66
no:53

2. Are you familiar with the university's first Environmental Audit, conducted in 1998 ?

[ ] Yes [ ] No

114 respondents
yes: 63
No: 51

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

[ ] Car [ ] Bicycle [ ] Foot

119 respondents
car: 33
bicycle: 5
foot: 74
combination: 7

4. Do you car-pool regularly ?

[ ] Yes [ ] No [ ] N/A

114 respondents
yes: 11
no: 29
NA: 74

5.Woul1 iato condbthisdeans 1998 ool reguf th/TT0 9.72 Tf 0.0191 Tc -0.0621 Tw 36 -12 Tc

NA: 54

7. How far do you live from campus ? (Km)
113 respondents
on: 14
<5: 83
<20: 6
>20: 12
average: 5.63km

8. Would you use unbleached and/or recycled paper if it was offered ?
[ ] Yes [ ] No
118 respondents
yes: 116
no: 2

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
112 respondents
10%: 36
5%: 52
equal: 21
other: 3

10. Would you prefer the university invest in "Ethical Investment" funds over standard investment funds ? Please comment.
[ ] Yes [ ] No [ ] N/A
97 respondents
yes: 58
no:14
NA: 25
**Those who responded no or NA often cited lack of knowledge on the ethical investments concept as their rationale.*

11. Do you support the spraying of the campus with herbicides in order to maintain a weed free campus ?
[ ] Yes [ ] No
119 respondents
yes: 22
no: 97

12. Do you feel you are adequately educated on environmental issues ?
[ ] Yes [ ] No [ ] N/A
99 respondents
yes: 34
no: 65

13. Would you consider the ventilation, heating and cooling in the building you work/live in on campus to be: (please indicate the name of the building that you work/live in)
[ ] Very poor
[ ] Poor
[ ] Fair
[ ] Good
[ ] Excellent
Building:
99 respondents
very poor: 23
poor: 27
fair: 25
good: 17
excellent: 7
Most of the complaints came from the Library and Barclay, although no

building received a majority of the 'poor' or 'very poor' responses.

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

118 respondents
yes: 116
no: 2
** A number of respondents stipulated that they would only support alternative energy sources that were economically feasible for the university.*

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

Paper, water, and electricity were cited most often.

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

Composting toilets, and low flow fixtures were often cited.

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

[ ] Yes [ ] No

118 respondents
yes: 52
no: 66

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

44 respondents
very poor: 2
poor: 2
fair: 17
good: 18
excellent: 5
** Many people were not well-versed on the disposal methods for hazardous waste or were not aware of any such materials being used in their department.*

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

There were very few responses to this question.

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

There were very few responses to this question.

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

1. Would you eat organic food were it offered ?

[ ] Yes [ ] No

61 respondents
yes: 54
no: 7

2. Are you vegetarian ?

[ ] Yes [ ] No

63 respondents
yes: 12
no: 51

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

[ ] Yes [ ] No
12 respondents
yes: 0
no: 12

4. Do you support the use of reusable containers, and/or reduced packaging overall in food services on this campus ?
[ ] Yes [ ] No
60 respondents
yes: 59
no: 1

Faculty only
1. Would you accept assignments via E-mail from students ?
[ ] Yes [ ] No [ ] N/A
29 respondents
yes: 17
no: 11
NA: 1
** Those who responded no often cited difficulty reading off the computer screen and difficulty making comments without a hard copy as rationale.*

2. Would you accept assignments double sided from students ?
[ ] Yes [ ] No [ ] N/A
30 respondents
yes: 27
no: 2
NA: 1

3. Would you accept assignments on one-sided paper (paper which has been used on one side) from students ?
[ ] Yes [ ] No [ ] N/A
26 respondents
yes: 22
no: 2
NA: 2

4. Would you support a departmental purchasing policy which favoured environmentally friendly products, equal in quality to the unfriendly alternative, at a cost;
[ ] 10% more expensive
[ ] 5% more expensive
[ ] Equal in price
[ ] Other
26 respondents
10%: 12
5%: 9
equal: 4
other: 1

5. Do you feel your knowledge of environmental issues is adequate to incorporate environmental concepts into your daily teaching ?
[ ] Yes [ ] No [ ] N/A
28 respondents
yes: 16
no: 7
NA: 5

6. Do you incorporate environmental content into any of your teaching material ?
[ ] Yes [ ] No [ ] N/A
29 respondents
yes: 15
no: 8
NA: 6

7. What initiatives have you or your department taken to decrease your environmental

impact ?
Answers included reusing paper, recycling, introducing more courses with environmental content, placing material on the departmental website instead of printing it, and using email for communications.

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enovations				Renovations Prior to 1998 Audit		Renovations Since 1998 Audit	
Use	Date Built	Floor Area	Basement Floor Area	Date of Renovations	Renovation Type	Date of Renovations	Renovation Type

Appendix B-Building Materials

Building	Structure	Ext. Wall	Roofing
Flemington	Concrete	Stone	Asphalt shingles
CLT	Concrete/Steel	Masonry Block	Asphalt shingles
Con Hall	Concrete	Masonry Brick	Asphalt shingles
Crabtree	Reinforced Concrete	Stone	Inverted
Fawcett	Steel	Siding	Steel
Gairdner Fine Arts	Reinforced Concrete	Stone	Flat roof
Harper	Steel and concrete	Brick	Flat roof
Hunton House	Steel and concrete	Brick	Flat roof
Jennings	Reinforced Concrete	Brick	Flat roof
MacGregor	Wood	Wood siding	Asphalt shingles
Pavillon Bousquet	Wood	Brick	Asphalt shingles
Owens Art Gallery	Concrete	Stone	Asphalt shingles
Palmer	Reinforced Concrete	Stone	Asphalt shingles
President's Cottage	Wood	Wood siding	Asphalt shingles
Allison Gardens	Steel	Masonry Block	Asphalt shingles
Sprague House	Wood	Wood	Asphalt shingles
Thornton	Steel and concrete	Brick	Asphalt shingles
University Centre	Reinforced Concrete	Stone	flat and shingled
Windsor Hall	Reinforced Concrete	Brick	Flat roof
Library	Reinforced Concrete	Stone	Inverted
PEG	Reinforced Concrete	Stone	Flat roof
Trueman/Tweedie/McConnell	Concrete	Stone	[redacted]
W	Reinforced Concrete	Masonry Brick	Flat roof

Appendix C-Energy Consumption for June 1998-May 2000

BUILDINGS	1998	Sprague	Hess	Cuthbert	Bousquet	Fawcett	Colville	Baxter	McGregor	Cdn. studies	Crane*	Carriage*	Bermuda'	Phys.Pl.*	Heat Pl.	Hillcrest	Rink	Farm	Daycare	Bl.House	Total cost/month	Total kwh/month	Cost/year	kwh/year
JUNE	Cost	139.81	42.14	192.31	335.94	524.22	88.81	143.2	138.79	78.36	99.4	180.32	481.21	48557.26	162.81	154.23	370.68	33.19	121.98	177.01	52021.67			
	kwh	2007	390	2809	2880	4960	997	2007	1925	690	1256	2760	5040	640000	1600	2275	3840	28	1160	1753		678377		
JULY	Cost	106.24	78.57	117.42	294.32	372.28	84.24	109.63	120.6	63.89	128.3	196.36	534.7	46666.86	147.96	94.72	303.87	34.04	88.57	157.89	49700.46			
	kwh	1383	901	1417	2400	3840	933	1383	1587	534	1276	2541	5200	618000	1440	1169	3120	40	800	1547		649511		
AUGUST	Cost	80.82	74.72	101.61	637.94	311.29	71.12	98.43	114.34	76.88	122.27	164.99	502.74	45810.74	147.96	89.77	303.87	34.26	88.57	151.49	48983.81			
	kwh	680	847	1123	1470	3200	749	1238	1470	674	1164	1958	4880	606400	1440	1077	3120	43	800	1478		633811		
SEPTEMBER	Cost	166.2	72.65	184.89	643.25	562.85	122.97	108.44	139	139.24	206.69	204.91	847.1	75967.77	162.81	145.19	695.18	35.61	118.27	186.2	80709.22			
	kwh	1600	818	2671	6400	5440	1631	1424	1929	1346	2733	2700	9200	1055600	1600	2107	5760	62	1120	1852		1105993		
OCTOBER	Cost	276.67	118.5	394.32	719.72	929.08	144.24	165.55	173.68	137.12	209.62	410.14	1176.42	66002.28	164.78	290.92	5044.04	74.52	172.26	264.78	76868.64			
	kwh	2760	1544	6375	7120	9600	1948	2398	2482	1304	2690	6329	13520	856800	1600	4673	59280	520	1680	2670		985293		
NOVEMBER	Cost	492.09	139.73	594.84	789.47	1437.17	166.8	176.72	205.88	158.95	222.22	479.89	1568.42	69730.78	179.89	426	5446.86	~	361.67	338.84	82916.22			
	kwh	5080	1924	9994	7840	16320	2351	2594	3059	1536	2911	7579	18880	911000	1760	7110	67440	~	3640	3460		1074478		
															22407	47754	46706	6246.93	~	486.29	298.17	78167.41		

Appendix D-Light Oil Consumption May 1998-April 2000

May 98-April 99	Litres	Cost	
May	3080	731.07	
June	2459	557.09	
July	1603	350.25	
August	1251	260.39	
Sept	2248	504.45	at approximately 24 cents/litre
Oct	5381	1325.93	
Nov	70826	2657.58	
Dec	12012	2663.38	
Jan	19108	4043.23	
Feb	9896	1976.37	
March	14032	2887.08	
April	9585	2303.75	
Total	151481	20260.57	
May 99-April00			
May	3267	822.79	
June	814	190.96	
July	3303	839.84	
August	0	0	
Sept	144	42.89	at between 25 and 36 cents/litre
Oct	4142	1350.89	
Nov	11943	3983.93	
Dec	9122	3096.37	
Jan	17987	6885.17	
Feb	13697	6279.01	
March	11290	4661.77	
April	8511	3146.32	
Total	84220	31299.94	

Appendix E-Bunker A Oil Consumption May 1997-April 2000

41185

May 97-April98	Litres	Cost*
May	220644	39709.85
June	35372	6646.75
July	109588	20420.63
August	80753	15360.02
Sept	76402	15059.6
Oct	241855	48404.23
Nov	240574	51272.51
Dec	360333	79905.89
Jan	328587	66296.64
Feb	288474	52794.84
March	324578	54003.41
April	205890	32792.59
Total	2513050	482667

May 98-April99		
May	82348	14037.2
June	41185	7279.65
July	76526	13404.68
[redacted]	81840	14042.29
Sept	82043	12647.16

:862 re19733.44 452.4 TD -0.04j ET 1 53.44 32 302.64 74.28 12.24 re2e.44 366.36 TD 0 0 0 rg -0.037 281 r(32792.59) Tj ET 1 1 1 rg 1 53.44 32 3

Appendix F-Ventilation and Heating

Building	Heating	Ventilation
Flemington	Hot water baseboards	Ventilation system with steam coil in auditorium for heat
CLT	Hot water baseboards and radiant panels	None
Convocation Hall	Hot water baseboards	Ventilation system with seven reheat steam coils
Crabtree	Hot water baseboards	Three ventilation systems with numerous AC units
Fawcett	Electric baseboards and electric forced air units	None
Gairdner Fine Arts	Hot water baseboards	None
Harper	Hot water baseboards	Eight roof top exhaust fans
Hunton House	Hot water baseboards	Two roof top exhaust fans
Jennings		
MacGregor	Oil fired hot air (forced air)	None
Pavillon Bousquet	Oil fired hot water baseboards	None
Owens Art Gallery	Electric heat	Two ventilation systems, both with hot water coils, humidifiers and cooling coils
Palmer	Hot water baseboards	None
Persident's Cottage	Hot water baseboards	None
Allison Gardens	Hot water baseboards	heat source low pressure system
Sprague House	Electric baseboards	None
Thornton	Hot water baseboards	Two roof top exhaust fans
University Center	Hot water baseboards	Two ventilation systems with steam coils
Windsor Hall	Hot water baseboards	Roof top exhaust fans
Library	Hot water baseboards	Ventilation system with hot water heating coils
PEG		
Trueman/Tweedie	Hot water baseboards	None
McConnell	Heat from steam coils in ventilation	Ventilation system with steam coil
Athletic Center	Hot water baseboards	Two ventilation systems with steam coils and one dehumidification unit
Avard-Dixon	Hot water baseboards	Ventilation system with steam coil
Barclay	Hot water baseboards	Three heating and ventilation units for hallways and one system for machine shop
Baxter House	Oil fired hot air (forced air)	None
Cranewood	Oil fired hot air (forced air)	None
Bennet House	Hot water baseboards	Two roof top exhaust fans
Bermuda House	Electric baseboards	Washroom exhaust fan system
Bigelow House	Hot water baseboards	Two roof top exhaust fans
Black House	Oil fired hot water baseboards	None
Carriage	Electric baseboards	None
Anchorage	Oil fired hot water baseboards	None
Centennial Hall	Hot water baseboards	None
Chapel	Hot water baseboards	One ventilation system with hot water coil
Colville House	Oil fired hot air (forced air)	None
Conservatory	Hot water baseboards	Ventilation system with hot water coils
Cuthbertson	Electric baseboards	None
Edwards	Hot water baseboards	Two roof top exhaust fans
Facilities Management	Hot water baseboards	Two air exchangers
Hart Hall	Hot water baseboards	One ventilation system with Glycol heat reclaim and electric coils

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.

•Tj ET 27 full-size pick-up, full-sized SUV: 725 Tc 0.72 4354 5309the a (PER6480 TD 0.0355 0 Tc72 re 21.6 0.02 Tc -0.05 Tw (Operatill car: 9) Tj 0 -12.1Seng d V228 Tc -0.0528

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

If 3680571

•.042 Tc 0 Tw (iency is ex4ressed RkO02-2sen belowa 12 Tc -0.0402 Tw (I) Tj 0.72 re f .01f 054 TD /F0 9.72 1174 22 Tc Embo1 car: 524)31j -36 -r. it in the

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 ch7p53196.0601,52.00 sqTj 0.04326ste

Appendix I-Science Stores Hazardous Waste Disposal 1999

	Unit	Total

Appendix J- Atomic Energy Control Board License Renewal

Atomic Energy Control Board / Commission de contrôle de l'énergie atomique

Ottawa, Canada
K1P 5S9

DIRECTORATE OF FUEL CYCLE
AND MATERIALS REGULATION

Registered
Your file / Votre référence

Our file / Notre référence
15-1-4021

November 1, 1998

Jack Stewart
Mount Allison University
TransCanada Hwy 106
Sackville, NB E0A 3C0

SUBJECT: Extension or Revocation of Radioisotope Licence No. 03-04021-99-REV2
Licensed Activity: 837-laboratory studies-3 to 9 laboratories
Licence Expiry Date: January 31, 1999
Application Submission Date: January 1, 1999

This letter serves to notify you that the above noted licence issued to Mount Allison University will expire on January 31, 1999, and to advise you what licensing actions are required at this time.

Atomic Energy Control Board (AECB) Proposal to Extend the Valid Period of Your Radioisotope Licence

It is anticipated that early in 1999 the Atomic Energy Control Act will be replaced by the Nuclear Safety and Control Act.

As a transitional measure to provide time to prepare for the implementation of this new legislation, the AECB proposes to extend for two years the valid period of expiring radioisotope licences that meet certain criteria. This extension replaces the usual licence renewal thereby deferring the usual pre-renewal assessment.

We will only extend those licences whose records lead us to believe that health and safety are not being compromised by deferring the usual pre-renewal assessment. Compliance inspections will not be affected by these proposed measures and will be performed as usual.

It has been determined that your licence meets the extension criteria and therefore in accordance with section 27 of the Atomic Energy Control Regulations, you are hereby notified that the AECB proposes to extend the valid period of your existing licence, 03-04021-99-REV2, by amending the expiry date to January 31, 2001. If you agree to this extension proposal please complete the attached agreement [redacted] and return it to the AECB no later than January 1, 1999.

This proposed measure applies only to the expiry date of your licence. It will continue to be your responsibility to keep us informed of any changes you wish to make to your operations which might affect your licence.

If you do not agree with this proposed extension, please complete the attached renewal application or disposition form in accordance with the following instructions.

.../ 2

Canada

Fax/Télécopieur (613)995-5086

Appendix K-Inventory of Radioactive Materials May 2000

Isotope	Description	Activity	Quantity	Total activity
Cs137	sealed orange disk	5 microCi	1	185 kBq
Co60	sealed orange disk	1 microCi	4	148 kBq
Sr90	sealed green disk	0.1 microCi	3	11.1 kBq
Tl204	sealed green disk	1 microCi	2	74 kBq
Tl204	sealed yellow disk	10 microCi	1	370 kBq
Tl204	sealed yellow 1/2 disk	unlabelled	2	unknown
Ra226	in wooden boxes	5 microCi	2	370 kBq
Po210	cloud chamber	<0.1 microCi	2	<7.4 kBq
Sr90	cloud chamber	<0.1 microCi	2	<7.4 kBq
unknown	labelled 1 mrem/h	unknown	1	unknown
unknown	6cm diam. plastic disk	unknown	1	unknown
unknown	14 items, wrapped in black plastic	unknown	14	unknown

Appendix L-Hazardous Materials used in Printmaking Studio 1999-2000

Description	Purchased (99/00)	Used (99/00)
Nitric Acid	15.6 litres	12 litres
Acetic Acid	2.4 litres	0
Hydrochloric Acid*	0	0
Phosphoric Acid*	0	0
	0	2.4 litres

Appendix M- Indoor Pesticide Use (November 1997-November 1999)

Chemical	Active Ingredient	Use	Amount Used
Ficam W	Bendiocarb	spiders, sliverfish, ants	100 grams

Appendix N-Hazardous Materials used in Custodial (

Company	Product	Quantity used	Use	Toxicology Data
	Ambio Care	0	odour control	skin and eye irritant
CSS International	Vision	243.84 litres	rug detergent	skin and eye irritant, slightly hazardous if ingested
	Super Selection	1947.73 litres	floor finish	skin and eye irritant
CSS International	Servosept	0	disinfectant	carcinogenic (classified SUSPECTED); skin, eye and digestive tract irritant
	Servopro	87.4 litres	floor detergent	very hazardous for eye contact, skin irritant
CSS International	Rodian Strip	283.65 litres	floor finish striper	skin, eye and mouth irritant
	Flash Up	72.39 litres	floor finish restorer	slightly hazardous for the skin and eyes
CSS International	Rodian Klean	30.4 litres	floor detergent	skin, eye and mouth irritant
	Neutrac Auto	57 litres	neutralizer	skin, eye and mouth irritant
CSS International	Linocel NG	624.03 litres	floor sealer	skin and eye irritant
	Complex Orange	216 litres	degreaser	slight to moderate toxicity if swallowed, skin and eye irritant
		3ET hB 1 1 rg 266	g266cleaner	will cause burns to skin

Appendix O- Cleaning Materials Used in Food Services 1999-2000

Product	Quantity
Solid supra (dishwasher soap)	294.9 kg
Solid fun (pot washing soap)	145.2 kg
Stainless Soak (cutlery soap)	154.3 kg
Dynamic green Dininghall	?*
Dynamic yellow Kitchen floor	?
DermaKleen hand soap	352L
Ster-back Sanitizer	?
Lime-away	128L
Glass cleaner (windows)	?
MicroMax D (dish rinse)	?
Rinse Dry	?

*In many cases the director of food services was unable to tell the auditors how much of a product had been used. This was a result of the move from McConnell to Jennings meal hall.

Appendix P- Products used in the Shop

Product	M.S.D.S Date	Use	Toxicology Data
Adhesive Anchor	Dec 1994	Adhesive	
Ambio Care	Dec 1999	Odor Control	
Bondfast	Exempt *	Odor Control	
Cement Paint #200	Exempt	Liquid	
CF 100/120 R1	May 1994	Solvent	
	Feb 1993	Lubricant	

Appendix S-Water consumption in cubic meters for 1999-2000

Building	Jan 1 to June 30, 1999	July 1 to Dec 31, 1999	Jan1 to June 30, 2000
Allison Gardens	2 638	4 578	1832
Athletic Centre	5 272	5 112	8493
Avard-Dixon	207	362	591
Barclay Bldg	7 838	8 490	11338
Baxter	14	14	17
Bennett / Bigelow	4 543	3 925	4016
Bennett Carriage Hse	388	380	410
Bermuda	1 091	1 245	1117
Flemington	3 884	2 490	2160
Black House	84	93	90
Canadian Studies	241	173	123
Centennial Hall	287	293	325
Central Stores	84	87	101
CLT	59	50	63
Colville	305	243	241
Conservatory	967	745	917
Convocation Hall	230	110	384
Crabtree	3 645	9 348	2554
Cranewood	184	175	220
Cuthbertson	409	255	288
Edwards / Thornton	4 530	4 699	4726
Facilities Mgmt Bldg		140	134
Fine Arts	499	445	461
Harper / Jennings	8 267	7 069	11826
Hart Hall	2,534	2,571	2374
Heating Plant	32	1,940	3085
Hess Hse	2	241	
Hillcrest	12	16	21
Hunton	1 998	2 580	1935
Library	1 062	617	782
McGregor	423	318	407
Monastery	483	565	679
Owens Art Gallery	63	62	546
Palmer	2 962	3 255	2476
Physics & Eng Bldg	540	806	620
Presidents Cottage	254	198	207
Sprague	11	7	24
Student Centre	2 627	2 321	2105
Trueman	17 624	22 739	13418
Windsor	5 309	7 570	6468
York St Children's Ctr	250	203	235
Totals	81852	96530	87809

Appendix T- Mount Allison University Students' Administrative Council Environmental Policy

Mission Statement

Increasingly the world is significantly impacted by global issues, whether they be economic, social or environmental. In Canada we consume a disproportionate amount of the

University and the student body.

4. The SAC will monitor its social and environmental impact by conducting an audit a minimum of every two years. This will include:

4.1 an environmental audit

4.2 a comparison of the SAC's environmental and social impact to ten key indicators;

4.3 a social audit of business dealings; and

4.4 a financial audit.

5. A standing committee of the SAC, composed of both members of the SAC and students at large, will be responsible for:

5.1 implementing and ensuring compliance with the policy;

5.2 coordinating the audits of the SAC;

5.3 recommending changes to the policy when needed; and

5.4 acting as a liason body between the University and its Environmental Issues committee.

Appendix U-The Valdez Principles

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

In 1989 the coaliton for Environmentally Responsible Economies developed a set of ten principles for corporate environmental responsibility called the 'Valdez Principles'.These principles are designed to commit businesses to protecting the environment through their actions and policies and are one way of evaluating university and corporate responsibility.

Introduction

By adopting these principles, we publicly affirm our belief that corporations have a responsibility for the environment, and must conduct all aspects of their business as responsible stewards of the environment by operating in a manner that protects the earth. We believe that corporations must not compromise the ability of future generations to sustain themselves.

We will update our practices continually in light of advances in technology and new understandings in health and environmental science. In collaboration with CERES, we will promote a dynamic process to ensure that the principles are interpreted in a way that accomodates changing technologies and environmental realities. We intend to make consistent, measurable progress in implementing these Principles and to apply them in all aspects of our operations throughout the world.

The Valdez Principles

1. Protection of the Biosphere

We will reduce and make continual progress toward eliminating the release of any substance that may cause environmental damage to the air, water, or the earth or its inhabitants. We will safeguard all habitants affected by our operations and will protect open spaces and wilderness, while preserving biodiversity.

2. Sustainable Use of Natural Resources

We will make sustainable use of renewable natural resources such as water, soils, and forests. We will conserve nonrenewable natural resources through efficient use and careful planning.

3. Reduction and Disposal of Waste

We will reduce and where possible eliminate waste through source reduction and recycling. All waste will be handled and disposed of through safe and responsible methods.

4. Wise Use of Energy

We will conserve energy and improve the energy efficiency of our internal operations and of the goods and services we sell. We will make every effort to use environmentally safe and sustainable energy sources.

5. Risk Reduction

We will strive to minimize the environmental, health and safety risks to our employees and the communities in which we operate through safe technologies, facilities, and operating procedures, and by being prepared for emergencies.

6. Marketing of Safe Products and Alternatives

We will reduce and where possible eliminate the use, manufacture,or sale of products and services that cause environmental damage or health or safety hazards. We will inform our customers of the environmental impacts of our products or services and try to correct unsafe use.

7. Environmental Restoration

We will promptly and responsibly correct conditions we have caused that endanger health, safety or the environment. To the extent feasible, we will redress injuries we have caused to persons or damage we have caused to the environment and will restore the environment.

8. Informing The Public

We will inform in a timely manner everyone who may be affected by conditions caused by our company that might endanger health, safety, or the environment. We will regularly seek advice and counsel through dialogue with persons in communities near our facilities. We will not take any action against employees for reporting dangerous incidents or conditions to management or appropriate authorities.

9. Management Commitment

We will implement these Principles and sustain a process that ensures that the Board of Directors and Chief Executive Officer are fully informed about pertinent environmental issues and are fully responsible for environmental policy. In selecting our Board of Directors, we will consider demonstrated environmental commitment as a factor.

10. Audits and Reports

We will conduct an annual self-evaluation of our progress in implementing these Principles. We will support the timely creation of generally accepted environmental audit procedures. We will annually complete the CERES Report, which will be made available to the public.

Appe74 332.52 52096lix V-Curriculumsource: Mount Allison University Course Cal96lar

3 from Geoscience 2031
3 from Philosophy 1651, 2701 or 3511
3 from Philosophy 3721
3 from Environmental Science 4903

Natural Sciences Stream

3 from Biology 2301, 2401
9 from Biology 3331, 3341, 3351, 3361, 3371, 3551, 3711, 4001, 4701 or other group 1 or Group 3 Biology courses with permission of the Department
9 from Geography 3101, 3711, Geoscience 1001, 2101, 2401, 3111
3 from any Biology, Geoscience or Geography at the 3/4000 level

Physical Sciences Stream

12 from Computer Science 1711, Math 2111, 3531, Physics 2801
12 from Math 2121, Physics 3311, 3351, 3511, 3601, 3701, 4601, or with permission of the Head of the the appropriate Department, other third or fourth year Physics or Mathematics courses with significant environmental relevance.

Chemical Sciences Stream

6 from Chemistry 2221, 2321
12 from Chemistry 3011, 3311, 3411, 3421
6 from any other Chemistry at the 3/4000 level

Appendix W-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.

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