Preface

There is often a feeling of inevitability associated with environmental degradation. Its human nature; a necessity for a healthy economy. People do not want to make sacrifices in the lives theyve worked hard to build. The problems seem overwhelming, and often quick fixes appear the best way to deal with new environmental inconveniences. Yet sun screen will not fill the holes in the ozone, bottled water can not replace the polluted streams, and air conditioning is not the solution to global warming. The environmental situation is grave, but it will not be cured by band-aids. Environmental recovery is not a hopeless dream; it simply requires a dedication to live in harmony with the environment, and consider its protection as an intregal part of ones life.

When it comes right down to it, environmentalism is simply common sense. The earth does not exist for the sole purpose of exploitation by human beings. Humans are but one species out of millions on the planet and our dependency on the environment is far greater than the environments dependency on us. For these reasons everyone must treat it with respect. Each person must take responsibility for the choices they make and the outcomes of those choices.

This audit outlines the choices made by individuals at the University and by the University as an institution. It outlines the effects that these choices are having on the surrounding ecosystems and makes recommendations on how to decrease their environmental impact. The audit is not about guilt or sacrifice. It is about making the right choices. The right choices are those that consider not only the students of Mount Allison, but also the well being of the environment and its protection for future generations.

Acknowledgements

This audit would never have happened without the help, encouragement and patience of a great many people:

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Countless other people helped with research and all the little details including those below: Mark Henchey, Roger Smith, Jack Stewart, Debby Wynberg, Tim Bezel, Audrey Kenney, Ronald Eickhold, Dr. Ronald Aiken, Vince Smyth, Chris Hunter, Dr. Douglas Campbell, Linda Schaefer, Michelle Strain, Thaddeus Holownia, Mike Wheaton, George Dashner, Ettienne Roussell, External Relations Office, Wendall Richards, Dale Creelman, Dave Stewart, Alix Mann, Jeff Hollet, Sam Millar, Amelia Clarke, Mark Purdon, Peter Crawshaw, Glen Wilson, Michelle Chase, and Mike Murphy. We would also like to thank all those others who aided in times of need with tasks such as photocopying, editing, advice and so on.

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Executive Summary

Mount Allisons environmental practices reflect the lifestyle of the average Canadian; a citizen who puts out their recyclables with the trash once a week, and who usually remembers to turn off their lights when they go to work. There is nothing exceptional about Mount Allisons environmental practices, in either direction.

Similar to initiatives at other universities, Mount Allison has

adopted a recycling program for drinking containers and paper products, and has followed the power saving (and money saving) trend of adopting energy conservation measures.

This extent of environmental action still leaves Canadians consuming more than three times their fair share of the worlds resources (Wackernagel, 86). It remains a far cry from environmental responsibility for both the average citizen and Mount Allison.

As an institute of higher learning, Mount Allison has been entrusted with the role of a community leader and should strive to set an exceptional example, but in the past, the university's environmental responsibility has been characterised by unexceptional practices.

The university is now taking steps to rectify this situation. In pursuit of a community leadership role, an Environmental Policy Steering Committee was formed during the school year of 1997/1998. The committee's purpose was to examine the possibility of implementing a Comprehensive University Environmental Policy. Such a policy would be the first of its kind in Canada. With the aim of gathering information and presenting recommendations to the steering committee, this audit was conducted during the summer of 1998. The audit examines all environmental inputs and outputs of the university; water, energy, food, paper, air, transportation, buildings, hazardous materials, solid waste, finances, and education. The following summary outlines findings in each of the areas.

Paper

1.22 sheets of paper are used every second the University is running. Copier paper, letterhead, and external mailings at Mount Allison are bleached and contain no recycled content. Due to a new interuniversity tender, paper prices have decreased, but Mount Allison now has minimal purchasing leverage over its paper supplier. It is recommended that Mount Allison contact other universities within this tender and urge them to convert to a recycled alternative. This shift would increase the demand for recycled paper and lower its price. Workshops to teach staff and faculty how to significantly decrease paper consumption should be undertaken at the beginning of each school year.

Solid Waste

Every year the average Mount Allison student sends over 99.5 kg of waste to landfill sites. Currently, paper products and drinking containers are recycled by the university. All other waste produced outside the meal halls contributes to landfill pollution. It is recommended that wet and dry garbage receptacles be established in key areas on campus and yard waste be composted as mulch. Through education and structural changes the university should aim for an 80% reduction in waste by the year 2020.

Hazardous Materials

Over 3.64 litres of toxic chemicals are used for each student on Mount Allison campus.Sources of hazardous materials on campus include; herbicides, toxic cleaning agents, science research and the non- regulated flow of hazardous materials into residences. The audit recommends that a fund be established for the purchase of micro- scale science research equipment and all herbicides and pesticides be permanently banned from the campus.

Food

The average Mount Allison student in residence consumes over 272 kg of food during the school year; or 1.1 kg per day.
Food served in meal halls is chosen for it price and quality. It is recommended that Sodexho Marriott introduce organic options into the menu and switch to 100% recycled napkins. An educational campaign to increase awareness on napkin, packaging and meat consumption should be launched by Sodexho Marriott.

Energy

The University's main sources of energy are approximately 12% hydro, 6.5% nuclear and 76.5% fossil fuel based. The current electricity system gives Mount Allison little choice over its energy sources, however the possibility of pending deregulation would provide more options. An effort is made by Facilities Management to replace old appliances with energy efficient models and campus energy consumption is controlled by a centralised computer system. It is recommended that the University seriously examine possibilities for alternative energy use on campus and apply for exemption from NB power regulations. The current energy conservation measures on campus should be expanded and all funds saved should be directed back into environmental energy projects. A campaign to eliminate energy waste on both structural and behavioural levels would increase energy efficiency and savings.

Water

Currently when old fixtures are in need of replacement, a water efficient model is installed. It is recommended that all fixtures be retrofitted if they are not going to be replaced within the next year and that an educational campaign be launched to change wasteful water consumption habits of the Mount Allison Community.

Buildings

Buildings on campus are always built to code standards and construction is contracted to the lowest tender. It is recommended that an environmental impact analysis be completed before the construction of any building, and that the university favour Green designs and construction methods when they are less than 5% more expensive than conventional alternatives.

Funding

The University receives $15,305.80 per year in funding for each student enrolled at the institution. University funding is supplied by the government, tuition fees, investments and private donations. All procurements on campus are conducted through a central purchasing office that buys products from three tender levels; inter-university tenders, university tenders, and casual tenders. It is recommended that green products be favoured when they are less than 5% more expensive than alternatives. Mount Allison should then utilise this commitment to environmental responsibility as a positive marketing tool when canvassing for funds. Sources which provide funding or are contracted by the university should give full disclosure of environmental practices and abide by practices compatible with the Valdez principles. A complete audit of university investments, trends in procurement purchases and research funding should be conducted. Environmentally irresponsible sources should then be eliminated.

Education

Environmental education at Mount Allison consists of an Environmental Studies Minor and a suspended Environmental Science Double Major. There are also several courses with at least some environmental content. It is recommended that a mandatory three credit first year course be established with a focus on practical solutions to environmental degradation. An Environmental Certificate should be implemented to award students who complete at least one other course with a focus on environmental issues.

These summaries outline the main areas of environmental accountability on campus. In each area there are individuals making a concerted effort to encourage environmental conservation. To ensure that these efforts are practised university - wide and continue in the future, a Comprehensive Environmental Policy is highly recommended. Such a policy would include the components outlined in Figure 1.

This outline for an environmental policy has given environmental

cost a weight of 5%. This weight is only 1% higher than the rise in tuition experienced by students this year . Although financial benefits cannot be used as a marker of environmental progress, if the policy is utilized effectively as a marketing tool, many of it implications will encourage funding. In addition, most recommendations outlined in this audit which require initial capital costs will save the university significant amounts of money in the future.

Mount Allisons mission statement currently includes a commitment to *provide a rigorous liberal education of high quality.*. for the *development of the whole person*, yet it is often recognized that the best way to educate is by example. A strong committment to environmental responsibility by Mount Allison University would provide students with an example of leadership, initiative and vision deserving of an exceptional educational institution.

Figure 1 Components of Environmental Policy

Components of a Proposed Environmental Policy		
Energy Policy		energy conserving products and design be favoured when their initial costs are less than 5% more expensive
		a fund be established to provide capital for environmentally responsible energy projects (alternative fuel sources for heating, electricity and transportation)
Building Policy		favouring green building design (recycled materials, passive energy, energy efficiency) when initial costs are less than 5% more expensive
Finance Policy		university favour funding from environmentally friendly sources
		buy environmentally friendly alternatives if they are less than 5% more expensive.
		request full disclosure from all companies concerning environmental policies and practices
Education Policy		revise the mission statement to include the phrase: All students upon graduating will possess the knowledge, skills, and values to work towards an environmentally sustainable future.

1. History of Environmental Action on Campus

Environmental activities at Mount Allison were initiated in the 1980s by a student group named SWEEP[1]. Lead by a former student named David Fancy, the group worked with an affiliated SWEEP group still active in Tantramar High School. They organized an environmental resource library on campus, participated in beach clean-ups and began recycling programs on campus. Members of the group collected bottles and cans from residence buildings and delivered them to Wheatons.

In 1991, the Mount Allison branch of this group was disbanded and the Blue/Green society was founded by a group of students including Amelia Clarke. For the first two years of existence the group had an elected president and executive committee, but gradually converted to a consensus-based structure with a floating chairperson. The Blue/Green society expanded the existing recycling program to include academic building collections and paper recycling. In 1993, the University took on the program and Blue Green moved on to different campaigns. Two waste audits were done on campus during this period; one by the Blue Green society in 1992 and another by Amelia Clarke as a thesis project in 1994/5. The society was involved in causes such as Clayoquot Sound, James Bay II and in 1993 hosted an Atlantic Conference on the environment, attracting 150 participants. A topic at this conference sparked interest among some members of Blue/Green and the Friends of Christmas Mountains group was soon formed. This group existed independently of Blue/Green and campaigned to stop the logging of New Brunswick's old growth forests. In 1994 they blockaded a logging road and participated in protests, rallies, marches, hunger strikes and conducted media pieces on the issue.

Environmental action within the administrative sector began in 1982 with an extensive Energy Efficiency Project. Buildings on campus were retrofitted, ventilation systems were upgraded and the entire main campus was hooked up to a centralized energy monitoring database located in facilities management. This system regulated energy use and orchestrated the start up and shut off time of many large electrical sources, thereby reducing the demand peaks for power. The project was funded in part by the NB government and cost $200 000. It was designed to save the university $400 000, however, exact results were difficult to establish as new electrical demands were quickly added and more equipment arrived on campus.

In 1993, the Facilities Management department took responsibility for the campus recycling program on campus. Finally, in January of 1996, an environmental audit was performed by ADI engineers and consultants group to assess the impact of Mount Allisons emissions.

Discussions with previous students revealed that a Canadian Rural

[1]Information on student environmental groups was obtained through interviews with Amelia Clarke, a founder of the Blue/Green society of Mount Allison.

Studies class on sustainable and rural communities included a project on environmental auditing completed by every student in the course. The auditors were unable to find records of these previous audits and the course was apparently cancelled in 1995.

There are presently two groups on campus with an environmental focus. The Blue/Green society is a student interest group dealing with issues from global warming to recycling. The Friends of Christmas Mountains was a campaign group aimed at protecting the last stand of old growth forest in New Brunswick. It is now beginning to focus on other environmental projects, including the New Brunswick Protected Areas Campaign.

After presentations to the board proposing that Mount Allison adopt a comprehensive environmental policy, an environmental policy steering committee was formed by the president to examine the ideas and possibilities in 1997. Members of the steering committee include representatives from students, staff, faculty and the Sackville community. This marks the first official time that all sectors of the Mount Allison community have met to address environmental concerns. This audit is a result of that committee and will hopefully bring changes to Mount Allisons current environmental impact.

1.1 Purpose of the Audit

The concept of an environmental audit was introduced last year as a means of measuring the environmental impacts of Mt. Allison. A proposal was drawn up by Yuill Herbert of the environmental steering committee, and in May of 1998 funding was received from a government grant and the Facilities Management department. With these funds, two students, Sarah OKeefe and Hillary Lindsay were hired to conduct the audit over a three month period and present a written report on their findings.

The audit's purpose is fourfold:

1) **To account for the environmental resources which flow through Mount Allison University.**
2) **To unite the various sectors of the university community through comprehensive environmental data.**
3) **To educate the student, staff, faculty and community**
4) **To initiate changes leading to a more environmentally sustainable campus.**

The first goal of the audit is to research and report on environmental imputs of Mount Allison University. Every resource entering the university environment, from food, to electricity, to funds is quantified. The use of this resource on campus is then identified and it's disposal or exchange is charted. Statistics such as electricity consumption per resident and environmental practices of contracted companies are used as markers of the university's environmental impact. Graphs, research and databases are provided to display these statistics.

The second purpose of the audit is to contextualize these statistics. It answers the question; How are my actions impacting the

ecological world in which I live? Instead of compartmentalizing statistics, the audit synthesizes these figures to create a coherent vision. Not only does this comprehensive vision break down barriers between the individual and the environment, but also between various levels of the university community. When information is easily accessible, miscommunication and misunderstandings among university sectors is minimized and actions become more united. Subsections within the report outline the global effects of each resource entering the university. In this way, the audit aims to unite one's daily actions with their environmental and community impacts.

By increasing awareness and accountability, the audit educates students, faculty, staff and the larger community. The audit report will incorporate information on local and global activity in each resource area. It findings will hopefully be made accessible to the public via radio, news, Internet and in the form of the written report.

Finally, the purpose of the audit is to initiate change. The end of every subsection includes a series of concrete recommendations. These recommendations will outline the actions that every sector of Mount Allison University can take to improve their environmental responsibility. The actions range from structural changes, such as revising university policy, to behavioural changes, including reductions in water consumption. Their impacts may vary in size, but each recommendation aims to transform Mt. Allison into a more environmentally responsible campus.

1.2 Organization of the Audit Chapters

The auditors have designed this report hoping that it will be used as a practical and comprehensive guide to Mount Allison University. The following is a brief roadmap of the audit designed to make it easier for a reader to access the information that he/she needs.

The Report begins with an ***introduction*** which provides an overview of the environmental and social context of the university.

Each resource is then examined in individual ***audit chapters*** using the following categories:

Responsible Parties is an outline of the organization and duties of the department that is responsible for the resource. (i.e.Heating is controlled by Facilities Management)
Environmental Significance provides relevant information on the general state of this resource in the environment.
(i.e. Carbon dioxide emissions from fossil fuel heating causes global warming)
The Audit is the section which addresses the current state of the resource and it's use at the university.
Case Studies provide examples of environmentally responsible actions taken by other universities to manage the resource.
Recommendations is an outline of the concrete actions that are aimed at all members of the Mount Allison community. These are divided into recommendations for:

External Sources
Senior Administration
Staff
Faculty
Students

All additional information used in the report is listed in the Appendixes or in the Bibliography. Both of these sections are located at the end of the report.

2. Natural History

In order to preserve and protect an environment, it is necessary to understand the natural history of the region. Often, activities which encourage one form of ecosystem destroy another.

Mount Allison must be equipped with a basic understanding of

natural forces in the region, before any analysis of campus activities and their environmental impact can be made.

The university is located in Sackville, New Brunswick; a small town of approximately 5,500[2] residents covering an area of 74.2km squared.

The university owns a total of 516,078 cubed metres of land, all within the town limits. The surface area of each property can be found on Chart 1.

Currently, Mount Allisons central campus has large segments of parkland, connected by pedestrian paths. There are 955 trees on the main campus. 803 of these are single trees and there are 3 groves consisting of;

72 white birch trees
30 sugar maples
50 sugar maples

This list of tree species illustrates only a small fraction of the highly diverse arbatrorium that exists on campus.

The quarry owned by Mount Allison has filled with water and is an unmaintained property full of local shrub vegetation.

The farm owned by Mount Allison is currently used free of charge, by a local farmer who grows corn on the land. There is also a small grove of native flora on the property.

The Marsh property of the university is leased for a minimal fee to the town of Sackville. It is used as a tourist attraction and a waterfowl park.

[2]Number from census of 1991. This does not include the university student population.

2.1 Ecological History

Mount Allison University's main campus was built on the drained marsh ground of the Cumberland Basin in New Brunswick. This basin was originally a shallow fresh water lake surrounded by peat bogs. A gradual subsidence of the land brought it below sea level, and slowly a salt water bay developed in place of the lake. The subsidence caused greater tidal currents in the area, eroding the permocarboniferous sandstone bedrock of the region. This erosion caused a gradual build up in some areas, forming natural dykes.

Human influence on the marsh was first introduced by the native Mi'kmaq settlements of New Brunswick. They utilized the nutritious cattail tubers of the region for food and construction materials, while hunting and fishing provided valuable additions to their diet.

With colonization in the seventeenth century, the salt marsh was drained and dyked for use as hay meadows and pasture land. Dykes were built seven to eight feet above the normal tide level, and one way gates called aboideauxs were used to halt salt water intake at the mouth of the dyke streams. Soil of the drained marsh beds is alkaline and fertile. To preserve the agricultural benefits of the land, the Midgic marsh was redrained in 1955. Tidal influence was completely shut off from all four entrance rivers in 1960, with the construction of the Tantramar river aboideaux.

Between 1967 and 1970, Canadian Wildlife services bought over 2415 hectares of marshland around Amherst and in the Jolicure area. These marshlands were allowed to convert back to their natural state, and have been designated as National Wildlife Areas. Following this trend, the 22-ha Sackville Waterfowl park was flooded in 1988, and after construction of a boardwalk trail system, it was opened for ecotourism in 1989. 10 ha of this park is owned by Mount Allison University and is rented to the town of Sackville for a minimal fee.

The Cumberland Basin bay has a tempering influence on the climate making inland areas more susceptible to extreme temperatures than the shore. The climate information for the Moncton region is listed below. These are averages for the period between 1961 and 1990;

These conditions are ideal for the salt meadow grass associated with the region. The grasses and marsh conditions are also used as the feeding grounds of many waterfowl .
(See Appendix A for flora and fauna species names)

According to the report by George Boyer, and commissioned by Canadian Wildlife Services, existing marsh ridges around the campus rise to approximately 100 ft. above sea level. Recent studies predict that the rise in sea level caused by global warming will allow water to burst through existing dykes and reclaim the marshlands within 50 years. An increase of this size would flood much of the Mount Allison campus.

3. Paper

3.1 Introduction

Four million, nine hundred and twenty-two thousand, one hundred and ten sheets of bleached, non-recycled paper were bought by Mount Allison University between May 1997 and April 1998. (See Charts 18 and 19 for quantities of letterhead and printer/copier paper bought) This translates to 1.22[3] sheets *every second* that the school was up and running. Paper bought by the university contains no recycled content and only an estimated 35-50% is recycled after being used. Education, new procurement policies, and new university policies could dramatically reduce this excessive waste.

3.2 Responsible Parties

Each department is responsible for ordering their own paper through Department Support Services.

3.3 Environmental Significance

The careless waste of paper in Canada reflects the attitudes of past generations when the world forests seemed unending and air and water were clean and safe. Today, it is clear that trees are being cut down faster than ever before and pollution is becoming an increasing problem. Our excessive paper consumption is largely a cultural habit rather than a necessary practice. We can no longer afford to indulge the attitudes and actions of the past.

In the United States 98% of the forest has been logged at least once (Serrill, 52) and the average US citizen is consuming twenty-seven times the paper of the average citizen in the developing world. (International Institute for the Environment and Development) Over consumption of paper is costing us natural resources and is creating further problems through air and water pollution.

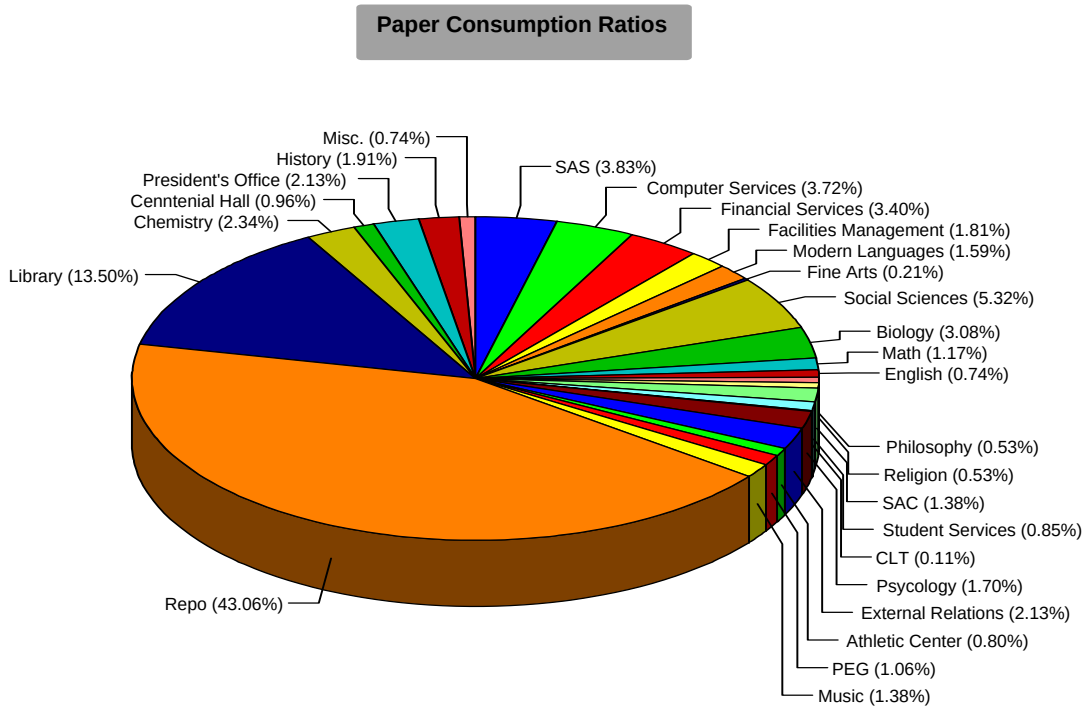
Many countries in Europe and all over the world have exhausted their forest resources making places like Canada look like a vast unspoiled wilderness. Our wilderness is far from unspoiled however, and what remains is seriously threatened. Half the land in Canada is covered in forest, but 56% of this is considered commercial forest, and 28% is managed for timber production. Two thirds of Canadas wildlife species live in forests, and 41 of these species are threatened or endangered. (The State of Canadas Forests 1995, Natural Resources Canada, Canadian Forest Service). Clearcutting of ancient rainforests in BC continues to generate controversy as century old trees along with countless species are lost forever. In 1994 an acre of forest was clear-cut in Canada every 14 seconds.(Greenpeace, *No Fish, No Forests, No Future?:1994).*

Clear-cut logging not only destroys the biodiversity of a region, but

[3]Assuming most paper was used during a 40 hour work week 7 months of the year.

also creates significantly less jobs than Ecoforestry (i.e. selection logging). (Greenpeace, *Clearcuts Or...:1994).*

In an electronic age when our paper use should have decreased,



individuals are using twice as much paper as they did in 1960. Paper is responsible for one third of our municipal solid waste.

Recycled paper, besides sparing the trees, uses 29-70% less energy to produce (One World) and emits fewer pollutants into air and water. (Waste Watch)

Knowing all this, one must conclude that excessive paper consumption at Mount Allison is an irresponsible act. An overwhelming number of respondents to the Environmental Audit Survey, cited paper wastage as the greatest source of waste on campus.

3.4 Paper Consumption At Mount Allison

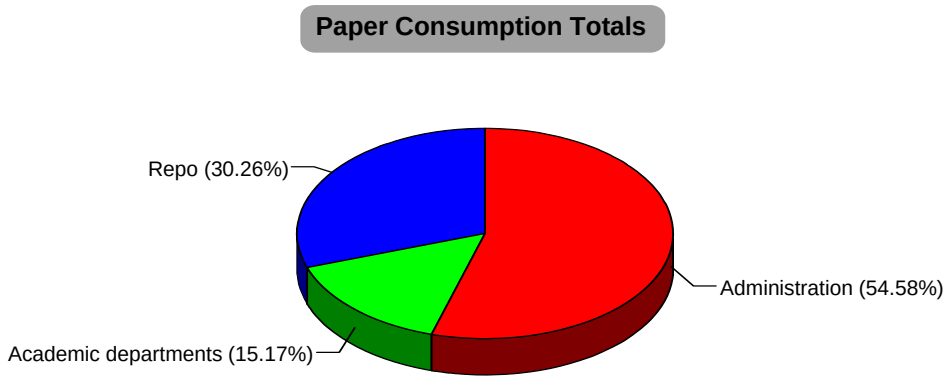
Paper is bought by the university from Unisource. 95% of all paper products which Unisource sells contains recycled fibre (this does not necessarily mean it contains post consumer content).

With the exception of commodity grades i.e. photocopy paper and #2 envelopes the price of the recycled products are the same. However with these commodity papers, there is a premium price to pay to have recycled content in the sheets. It usually costs 5-7% more due to the physical location of the commodity mills. All of our suppliers in the past five years have addressed the environment issues put forth by the media and public. They have changed the way they make paper from acid based sizers to alkaline based sizers and have mostly become environmentally chlorine free in their bleaching process
(Unisource Canada, Brian Klaus, Sales Manager).

For the buying quantities of different departments on campus, see charts 18 and 19. Paper bought by Unisource is bleached and has

zero recycled content. The results of our Staff and Faculty Environmental Audit Survey showed that 100% of respondents would be willing to use unbleached and/or recycled paper. Xerox offers a top of the line recycled paper (safe in copiers and printers) for fifty cents more per case than their regular printer/copier paper (the cost would be further reduced as Mount Allison would be buying a significant amount). The paper has over a 50% recycled content and 20% post consumer content.

Letterhead used by the university has no recycled content. There is letterhead available with a 55% recycled and 25% post consumer waste content for the same price. The recycled letterhead is not currently being used because it can not be purchased with the Mount Allison Crest as a watermark. The watermark used on the recycled letterhead is the company name (Royale) with the three arrows that symbolize recycling.. The watermark is only noticed when looking closely at the letterhead. (See appendix I for a piece of the recycled letterhead)
(For chart s of quantities of letterhead purchased by departments se e chart 18)



Paper towel is bought by the university from Unisource as well. It is 100% recycled with 80% post consumer content. The use of cloth dispensers have not been considered as they are thought to be labour intensive (they must be changed and washed) and unsanitary. Whether this method would be more environmentally friendly is questionable when the energy to wash the cloth and cleaners and the bleach used to sanitize them is considered.

Toilet paper is purchased from GH Wood and is 100% recycled. An excessive amount of toilet paper was being bought (more than the quantity purchased by Queens University) because students were stealing it and using it off campus. Since the University has switched to the large rolls, usage has decreased by 50%.

Seventy-five percent of paper consumed at Mount Allison is in the administrative sector. However, over fifty percent of this sectors paper is used in Central Stores (Repo) which does most major copying for academic departments.

Central Stores does all the copying for the university excluding the small jobs which departments do themselves. All copying at Repo is done on both sides, unless otherwise specified. The list of what Repo copies includes:

- course outlines, exams, tests, quizzes, handouts
- lab manuals
- reports for board of regents, faculty council and senate
- posters, flyers, brochures
- bulletins
- office forms

- packages for conferences, orientation, registration
- exam booklets
- tickets, programs
- staff telephone book

This endless and varied list keeps one staff member copying full time and a second busy with press design and finishing. Two notable absences from the list are the printing of the Course Calender and The Record. The course calender is approximately 128 pages of newsprint and over 2250 copies are distributed. The record is approximately 40 pages long and is distributed three time a year to 18,000 alumni; this totals 2160000 pages of unrecycled paper. In addition, the external relations office sends out approximately 30600 pages of mailings to alumni, organizing events and fundraising drives. This quantity is not included in calculations of on-campus paper consumption and most of it is printed by McCurdys Printers or Quebecor Printers Incorporated. (For a copy of their environmental policy see appendix H.)

The library is the second largest consumer of paper on campus, accounting for 13.55% of all consumption. This is almost entirely attributed to the four photocopiers that are located in the basement and on the ground floor for student use.

The remaining areas of paper consumption are the academic departments (see Graph 9) and other administrative areas which together account for 43.25% of total paper usage. They use comparatively smaller amounts of paper because all their large copying jobs are done at Central Stores (See Graph 10).

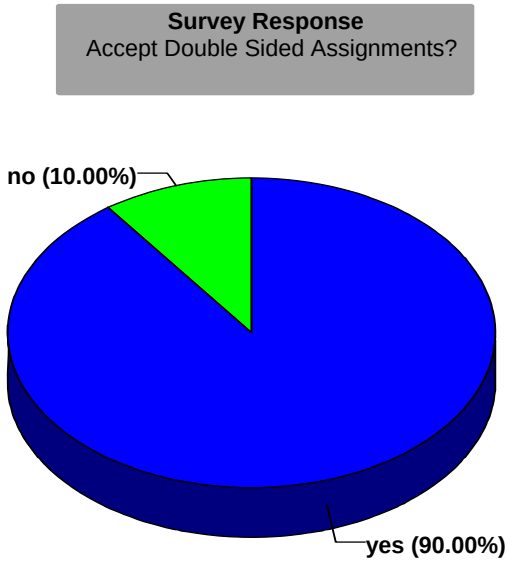
A bulk E-mail policy was recently approved for Mount Allison. For the Bulk E-mail Policy see Appendix C. There has been mass E-mail systems in the past but they were stopped due to system errors and complaints from recipients. This new system could be used as an alternative to the large amount of inter-university mail that is currently on paper.

Every student, prospective or current, receives a course calendar to select courses, and new students receive a Prospectus and application forms through the mail. The Mount Allison Web site has, among other things, the Prospectus, the Academic Calendar, and application forms. These can be used as alternatives to their paper counterparts. Last year approximately fifty students applied to Mount Allison via the Web and during the coming school year this practice will be further encouraged. The Record, Mount Allisons Alumni bulletin, does not appear to be on the Web site.

72% of professors responding yes or no to the question Would you accept assignments via E-mail? answered yes. (See Graph 11) Each professor already has a drop box that can be used by students to send in assignments. The main objections to the email method were problems with marking and the absence of notation needed by some departments (i.e. Math). 90% of professors responding yes or no to the question Would you accept assignments double sided? answered yes. This represents a relatively high acceptance rate of students taking environmental initiative (See Graph 12).

Photocopiers on campus are made by Xerox and are composed almost completely of recycled parts. This fact is not often advertised by Xerox because they are afraid people will assume the A campaign that was carried out by the Blue Green Society on campus last year, was designed to encourage students to *reuse* one sided paper *before* recycling. Cereal boxes that had been cut and painted were attached to the sides of Ergon boxes in the library and in some residences. The boxes each had signs encouraging students to place one sided paper in the box. This paper could then be used for photocopying, rough work, class notes, etc..

There are 43 paper recycling bins in academic buildings (see Appendix O for locations of bins in academic buildings) and several more in residences. It is estimated that only 35-50% of all paper used on campus actually gets recycled. A program, designed by Tim Bezel last year, to increase paper recycling participation was not implemented because of an estimated cost of $36 000 and an increased workload for custodial staff.. The program would supply every secretary and student with a box containing a recycled reusable plastic bag to put paper in which would then be emptied by custodians.



Up until this year Ergon has handled paper recycling at Mount Allison. Newsprint, coloured, and white paper could be recycled. Starting this year all paper will be going to the penitentiary to be shredded and made into hay (bedding) for the animals. The penitentiary will take almost anything including cardboard, but excluding paper that is high gloss such as magazines.

3.5 Case Study

Brown University is currently testing a paper with 25% post-consumer waste and 75% virgin content that is competitively priced. Browns Graphic Services Department has also been running a 50% recycled sheet with 10% post-consumer waste in the student copy centre. (**Brown Is Green!** Web site)

3.6 Recommendations

For Senior Administration:

1. Switch to the recycled letterhead

Create a policy stipulating that all copier paper be unbleached and of 50 % recycled 10% post consumer content or the paper with the highest post consumer[4] recycled content for an increased cost of

[4] "Recycled content can be a misleading figure as this is paper that is reused but has never left the factory (leftovers). Post Consumer Recycled content comes from paper that has been used by consumers and then recycled.

1. Begin selling unbleached recycled paper in Central stores for students

2. 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 Allisons commitment to the environment

3. Replace at least one of the library photocopiers with the more expensive model that will automatically print on both sides. Make sure the photocopier is clearly marked. Savings in paper cost will offset the increased cost in the photocopier.

4. Make it policy to have Repo 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. In addition posters could be printed on both sides to be put on doors and read from both sides through the glass.

5. Inform all contracted companies of the universitys concerns, and ask all things to be printed on both sides and on recycled paper.

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

7. Request that Unisource 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.

8. Stop giving course calendars to upper year students. Students can use the Website instead. Upon request students could receive a calendar for special circumstances.

9. Give prospective students the option of using the Mount Allison Website for information and applying instead of a package received in the mail.

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

For Faculty:

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

12. Inform students that assignments not submitted via E-mail must use both sides of the paper. This may be a result of reusing paper that was only used on one side or the assignment may be printed on both sides.

13. Appoint yourself as an environmental representative in your department and hold a training session on environmentally friendly practices in the office and classroom. Include how to copy on paper that has already been used on one side, how to copy on both sides, what can be recycled, energy conservation etc. For information on how to do this, or any other questions on how to conduct and what to include in a training session contact Hillary Lindsay at hblndsy@mta.ca.

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 that you dont have to.

16. Suggest a department 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 box.

19. Consider using part of the departments budget for a paper shredder so confidential documents can be recycled.

For Staff:

20. Appoint yourself as an environmental representative in your department and hold a training session on environmentally friendly practices in the office Include how to copy on paper that has already been used on one side, and how to copy on both sides. For information on how to do this, or any other questions on how to conduct a training session contact Hillary Lindsay at hblndsy@mta.ca.

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 as much as possible and not printing anything that you dont 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 departments 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 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.

28. When purchasing new printers, and photocopiers, consider ones with energy saving and paper saving component. Retrofit departmental Hewlett Packard

29. Laser jet printers with the component that will allow it to print automatically on both sides. The cost will be offset in the paper savings.

For Students:

30. Encourage the SAC office to purchase recycled paper products

31. Ask your professor if you can hand in assignments single spaced and/or double sided or via E-mail. If told that you cant ask why not?

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

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

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

35. If you live in residence keep a box for 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 pick it up if you call them.

36. 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.

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

4. Solid Waste

4.1 Introduction

Last year Mount Allison sent 224 tons of garbage to landfill. This quantity would have been significantly more if it was not for the recycling programs and the diversion of food waste to a pig farm. Recycling is not however the final solution to the environmental crisis. There are several decisions made along the way *before* that step that can reduce significantly solid waste on campus.

4.2.1 Responsible Parties

Facilities Management

4.3 Environmental Significance

The catch phrase Not in my backyard is becoming more and more difficult to satisfy in a time when cities are overwhelmed with solid waste volume and running out of landfill sites. It was estimated in 1996 that 90% of the worlds garbage ends up in landfill. This figure includes Municipal Solid Waste, industrial and construction waste. In 1988 the Canadian Government cracked down on the amount of garbage produced. A commitment was made to decrease solid waste going to landfill to 50% of 1988 levels by the year 2000. Recycling in European and North American cities have in the space of a decade reduced the amount of household waste more than 50%, and some cities are aiming for 90% (Flavin, 82) This is significant and important progress. Recycling uses up less of the earths resources. There are two Rs however that come before Recycle that are even more important.

Reduce - Often one will use something without even considering if it is really needed or if something more environmentally friendly could be used in its place.

Reuse - There are often ways to reuse something several times before it is sent to landfill or recycled to reduce the amount of new things that must be bought.

4.4 Solid Waste At Mount Allison

The majority of solid waste that the university produces comes from the residences. This amount peaks in September and April primarily due to students moving in or out of their rooms. A waste composition study done by Amelia Clarke in November 1994 found that solid waste on campus consisted 32% waste, 52% recyclable on or off campus, and 16% compost. This study was done when there was a recycling program in place so recyclables were those additional to the ones already being recycled that had been put in the garbage instead. These figures are probably still relatively accurate as the recycling system has changed little since 1994.

Facilities Management picks up the waste from individual

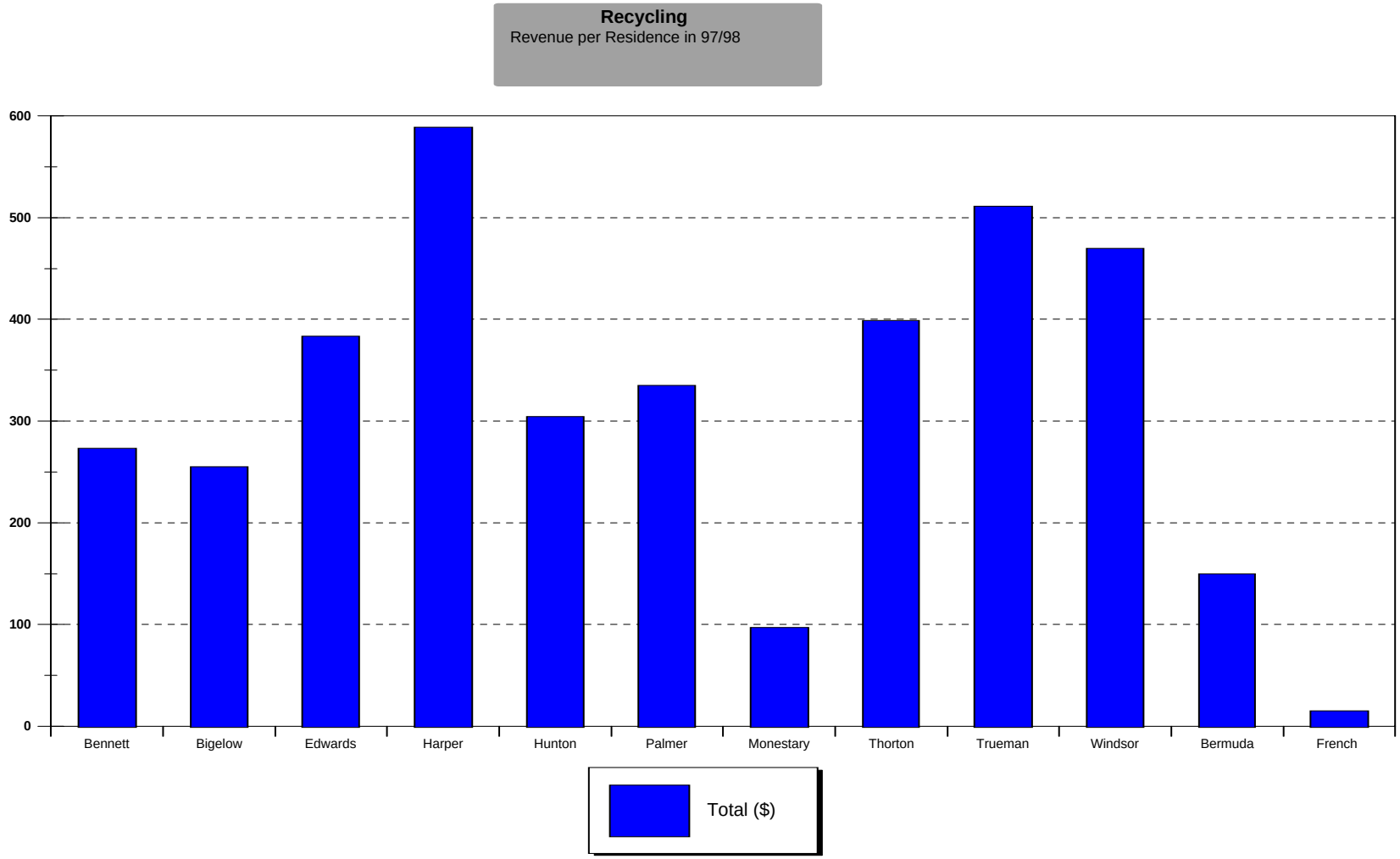
buildings on campus and *Tantramarsh Sanitation* then takes it to *Westmorland-Albert Solid Waste Corporation*. The drinking containers from each floor of each residence are deposited in a main bin by recycling representatives. *Valley Glass* goes around to all the individual buildings to pick up all recyclable drinking containers. *Valley Glass* also cleans out the bins and returns them so the excess liquid from bottles and cans do not produce sanitation problems. Paper was picked up by *Ergon* for recycling until last year, but starting in September of 98 it will go to the Westmorland Penitentiary . (For more see PAPER). Hazardous Waste is disposed of by the Chemistry department. (See Hazardous Waste) Yard Waste (branches, grass clippings, leaves) is kept separate from other garbage and is picked up by *Beale and Inche Construction.* All wood scraps from Carpentry are burned by the University.

Westmorland was originally sorting garbage at the landfill site, separating recyclables and compostables from the rest of the waste. This method was a failure however as when wet and dry garbage were put in bags together, recyclables such as paper became contaminated and could no longer be recycled for profit. Sometime last year the garbage ceased to be sorted and all of it was going to landfill. The company is currently under new management which hopes to have a new system up and running in six months. This system will require the university to have a wet and a dry garbage and could increase tipping fees substantially. Sorting will be done as follows:

Wet Garbage- Green Bag	**Dry Garbage- Blue Bag**	
food scraps including 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 plastic bags/bottles containers/ posters pencils/pens nylons potato chip bags Styrofoam telephone directory utensils wrapping paper printer cartridges etc, etc, etc

This new system, if implemented by Mount Allison, will require two things. Containers for the DRY bag will have to be washed out which is not currently necessary. Secondly an education campaign will be necessary so people know what goes in which bag.

Figure 2 Waste System



In 1989 a student run campus organization began recycling newspapers, cans, plastic and glass. In September 1994 the recycling program was institutionalized with the university becoming responsible for organizing contracts, janitorial staff handling the paper, and recycling reps becoming a component of each residence constitution. Mount Allison currently recycles drinking containers and paper (See Paper).

Originally recycling was done by *Wheatons* but 5 years ago *Valley Glass* became responsible for picking up and recycling drinking containers. The company handles:

- glass bottles
- juice boxes
- plastic bottles
- cans

Residences would receive from *Valley Glass* whatever the going rate was for each item. Mount Allison essentially got exactly what they would have received if theyd brought the recyclables to a depot themselves but transportation was free. Last year Harper created the most revenue from recyclables with almost six hundred dollars but Edwards topped the list in per capita ratings with the equivalent of over five dollars a person. (See chart 16 and Graph 15). It is assumed that the majority of drinking containers in residences get recycled as facilities are convenient and it is of direct benefit to the house. Approximately three quarters of drinking containers recycled are for non-alcoholic drinks, the other one quarter is containers for alcoholic beverages

Recycling of drinking containers in academic buildings in another matter, our survey found 7 recycling bins. This is less than the number of pop machines in academic buildings which is 11. With the knowledge that recycling is significantly more effective if convenient and easy, this system probably leads to significant wastage as it requires people to carry their containers home or to bring them to another building.

The contract with Valley Glass has finished and starting in September a new company, or the same company with a new contract will take over. Wheaton is one of the companies that the university is considering. Unlike Valley Glass Wheaton is located in Sackville which would mean a decrease in transportation pollutants. Mount Allison will use the company that makes the best offer.

Approximately 165.6m2 of grounds debris (leaves, clippings, twigs, etc.) is collected over the year. This is then transported by *Beale and Inche Construction* to a site/landfill four or five kilometres away. The transportation of the material costs the university about $500.00 a year. The university buys around eighty cubic yards of mulch every couple of years from *Goguen Lumber* in Cocagne for five to six hundred dollars. Our own grounds waste is not used as mulch because of a concern that clippings from plants that may have been diseased could harm other plants.

4.5 Case Study

One of the first and best campus recycling programs in the country is C.U. recycling, which was begun in 1976 at the University of Colorado at Boulder. The program-which is overseen by the University of Colorado Student Union and staffed by a recycling services director, students, and community service volunteers-collects separated recyclables from every campus building. Over 60% of the students and staff regularly participate in the effort.

In 1989 alone, 635 tons of newspaper, glass, aluminum, office paper, cardboard, phone books, batteries, and plastics were collected, as well as yard waste; 300 gallons of used motor oil; 40 cubic yards of used clothing, books, and appliances; and 25 boxes of used textbooks to be given to libraries of developing nations. To reduce the amount of waste generation, the university is training its staff to use electronic mail, encourages double-sided copying, as well as the use of recycled paper products, reusable mugs, retreated tires, and washable dishes. In all, 22 to 25 percent of the total waste stream was diverted. The program is supported by extensive public education campaign, which includes press releases, public service announcements, newspaper articles, and audio-visual materials, as well as orientation for incoming freshmen. Future plans include a household-hazardous-waste-reduction program. Alternative chemical-waste disposal, and increased recycled-product procurement. (Smyth, 1994)

4.6 Recommendations

4.6.1 For Senior Administration:

To maximize the amount of waste that gets recycled but at the same time minimize costs and complications, we recommend Mount Allison does the following:

1. In addition to regular garbage cans outside add a bin for recycling drink containers outside of both the STUD and the library.

2. Use the same recycling set up in academic buildings as currently being used in residences. Each floor of all academic buildings should have a easily accessible small bin for drinking containers (perhaps located where the paper recycling box already is). A recycling rep on each floor could be responsible for periodically emptying this container into a large one on the main floor.

3. Sodexho Marriott and the residences are two areas where there is a large quantity of waste used. For Sodexho Marriott this is primarily packaging and napkins and in residences this would consist of a very large variety of things. It is for these reasons that we recommend that both a wet and dry garbage be utilized in these locations.

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

4.6.2 For Staff:

5. Further research the possibility of mulching and composting yard waste on campus. With proper composting methods the concerns over the spread of disease might be avoided.

4.6.3 For Faculty and Staff:

6. Ask suppliers of products to minimize packaging and inquire as to whether theyll pick up and reuse bubble paper, Styrofoam packaging pieces, etc..

4.6.4 For Students:

7. 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:

8. Being a regular attendee of Blue/Green meetings and updating the residence at house meetings.

9. Posting signs over bins instructing what can and cant be recycled and ensuring that they are followed.

10. Perhaps setting up containers for reusables like yogurt containers and plastic bags and taking them to the appropriate location; (preschools and the Salvation Army respectively)

11. Putting out a box in September and April when students are packing or unpacking to take to the Salvation Army. (clothes, books, etc)

12. Obtaining a box from Blue/Green to attach to the bin for paper recycling that can hold one-sided paper for reusing.

4.6.5 For Staff, Faculty, and Students:

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

14. If living off campus *Wheatons* (536-1160) will pick up recyclables and also give information about what can and

can not be recycled.

15. 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.

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

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

18. Educate those around you if you notice them throwing out something which could be recycled.

19. 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?
    - Enhances organization's image?
    - Is it reusable or recyclable?

(University of Pennsylvania, *Campus Environmental Audit - Purchasing:* 1996*)*

5. Hazardous Materials

5.1 Introduction

The substances investigated in this chapter are classified by the compensation liability act of the United States as *Any substance that, when released into the environment may cause substantial danger to public health, welfare or the environment (*Major Environmental Issues Facing the 21st Century). Their augmented environmental impact requires a thorough audit of their use on campus. Further information on this section may be found in other chapters which deal with hazardous emissions such as the chapters on Air Quality, Energy and Buildings.

The universitys numerous sources of unaccounted hazardous waste are compounded by five major areas in which hazards or toxic chemicals are used on campus: the science laboratories, photo studios, cleaning materials (cleanser, polish), building materials (paint), and internal/external pesticides. This use of toxic chemicals is often justified by the argument that the health, safety or convenience of the Sackville community should never be sacrificed, yet this same argument often discourages their use. Currently, over 8 186.5 litres of toxic chemicals are used on campus each year, averaging 3.64 litres per student.[5]

The presence of toxic substances on campus may enhance the aesthetic, antiseptic, or convenient environment of Mount Allison on a daily basis, but the negative repercussions of their use are unavoidable. Toxic substances found on Mount Allison campus include known carcinogens, water pollutants, explosives and extremely corrosive materials. A complete quantification of their use on campus is therefore essential in an assessment of Mount Allisons environmental responsibility.

This chapter of the report has been divided into subsections outlining, the source, an audit, case studies and proposals for each sector using toxic materials on campus.

5.2 Environmental Significance

It is a fairly safe assumption that all the ingredients necessary for modern chemicals can be found on or in the earth. Yet when these ingredients are purified, concentrated and combined they create certain chemicals capable of causing great destruction. These chemicals are considered Hazardous Materials and humans have created many of them to fill a convenient function in modern society. As these substances accumulate they cause global warming, cancer, acid rain and other global changes. Some of the most significant hazardous chemicals and their effect on the environment are listed in Figure 3.

[5]This figure does not include radioactive chemicals, CFCs from fridges, cleaning agents used in Sodexho Marriott facilities, pesticides, herbicides, fire extinguisher contents or hazardous materials brought onto campus by contracted companies.

Figure 3 Harmful Chemicals

Chemical	Background
PCBs	Found in paints, dyes, copy paper heat transfer fluids and lubricants.
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. It is a Defoliant and a mutagen.
SO_2	This chemical is produced through the burning of fossil fuels and causes chlorophyll loss at concentrations as low as 2ppm Cereal crops are damaged by SO_2 levels less than 50 ppm and pine trees cannot survive the damage when annual concentrations Of Sulfur Dioxide exceed 0.07-0.08 ppm. Levels in the NB region have been reduced from 5.6 million tons/a in 1970 to 2.3 million tons in 1987 through government regulations
Ethylene	Found in many cleaning agents, it causes injury to flowers and plant life.
Flourides	Emitted by metal refineries and fertilizers, these chemicals damage fruit trees, every increase of 50ppm of atmospheric fluoride levels decreases the average yield of a fruit tree by 27%(Theodore, 1996). The average Canadian household now disposes of approximately 34.88L of hazardous waste per year(Macleans, 1990). Such hazardous chemicals cause destruction or mutation to natural ecological systems, do not biodegrade quickly and diffuse quickly throughout an ecological region.

5.3 Science Research

5.3.1 Responsible Parties

All professors order their chemicals on an individual basis. Once on Mount Allison property, the laboratory technician is responsible for the treatment of hazardous science chemicals. The technicians role is to collect, package and prepare the hazardous chemicals for disposal.

All radioactive waste on campus is regulated by Jack Stewart, from the Biochemistry department. Funds to purchase these chemicals comes from the operating budget of the chemistry and biochemistry departments.

5.3.2 Audit

Every professor orders chemicals to fit their needs through one of many large chemical supply companies. All chemical orders are received and reviewed by Roger Smith. This avoids duplication of orders. The use of restricted drugs and all radioactive chemicals requires a licence which is provided by the federal government. An inventory database tracks the arrival date, location and use of every chemical ordered. The only significant standing orders are orders for chemicals are bought by the departments for use in first and second year laboratory experiments. There is no data base or information board set up for the sharing of excess chemicals to reduce waste, however, when a professor changes jobs or research, their extra chemicals are made available to other professors. Other universities such as Dalhousie have a data base of extra chemicals available to anyone who requests them. Unfortunately, Mount Allison does not use this exchange system because most chemicals listed are not needed and no assurances can be made on their state or components. Whenever possible third and fourth year laboratories are done using micro scale chemistry. Micro scale work reduces cost and toxic waste by using chemicals in minute quantities. Dr. Wittla is currently revising the first year laboratory handbook and hopes to include some micro scale experiments, however the conversion to micro scale involves large start-up costs for the new laboratory equipment and manual needed by each student.

Apart from trace chemicals, which may enter the waste stream while washing equipment, no chemicals are put down the drain. In order to minimize inappropriate disposal practices, education of all lab participants in safety measures is done by the department. Waste is separated by chemical type and collected in large jugs.
Some chemicals are neutralized and disposed down the drain. These all comply with the town water by-laws and have a pH between six and seven.
These jugs are emptied into sacs or packs and all the packs are packaged with vermiculite in barrels. The barrels are stored on the ground floor of Barclay in the corner of the chemical supply warehouse until they are full and are removed by Laidlaw.

Last year's chemical waste is outlined in Figure 4.

Figure 4 Lab Chemicals

Lab Pack Category	Quantity
Acids (A), Bases (B), Organics (D), Oxidisers, Cyanides(J), Air Sensitives (HA), Selenium	45 gallons
Halogenated Solvents	90 gallon
Water Based Solvents	68 gallons
HW Water Sensitive	135 gallons

The majority of the chemicals disposed fell under the B and D lab pack categories. In contrast, removal of the cyanides is paid by the kg and very small quantities are used.

Laidlaw takes this toxic waste to their Deberts facility, located just outside of Truro. When contacted, Laidlaw was unable to provide information on the disposal methods of these compounds at the Deberts site, but assured the auditors that every attempt was made to recycle mercury from batteries and dispose of all chemicals in the safest possible fashion.

The Physics labs, Flemington, Barclay and the Research Laboratory are all licenced to possess, import and use the following radioactive substances: Radium 226, Carbon 14, Hydrogen 3, Phosphorus 32, Rubidium 86, Sulfur 35, Europium 152, Thallium 201, Polonium 212, and Strontium 80. Of these chemicals, Carbon 14 and Phosphorous 32 are used in significant quantities by the biochemistry department. (For the Radioisotope licence see appendix T)

Radioactive materials cannot be easily destroyed, and are recognized mutagens of the natural environment. Proper disposal of these substances is therefore essential to avoid dangerous situations. Mount Allison fully abides by conditions outlined in its radioisotope licence agreement with the Atomic Energy Control Board. The disposal methods are reviewed annually by the board and steps are taken to comply with their recommendations. The radioisotope license is available from the auditors or Jack Stewart.

5.3.3 Case Studies

Bowdoin College has researched and established a series of micro scale experiments under the guidance of Dana Carvey. She has published Micro Scale Labbook (3rd edition) for use in undergraduate organic laboratories. Micro scale allows chemical quantities to be cut by 75% and the smaller quantities help to speed reactions. This decreases the time many chemistry students spend waiting for their reaction results. The smaller quantities have allowed Bowdoin to reduce student lab costs from $8 000.00 (American) per lab to $1 000.00 per lab (Kerry, 1995).

5.3.4 Recommendations

For Senior Administration:

1. Establish a fund to be used in the future to implement micro scale labs wherever possible. A kit appropriate for third and fourth year labs costs approximately $500 per student. After the initial capital costs of new lab equipment the pay off from decreased chemical use will begin.

2. Provide funding incentives by giving reimbursement to professors who have saved money by using chemicals procured through the inter-university chemical databases.

For Faculty:

3. Set up a chemical exchange board in the lounge or electronically where professors can post orders they are planning in the future. In this way, professors can

avoid the waste of ordering the same chemical twice and having unneeded excess.

4. Use the board to advertise extra chemicals that researchers are willing to sell or trade to another professor or researcher

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

6. Continue to use micro scale methods in your experiments and laboratories whenever possible. Inform new or visiting researchers of this effort when they arrive.

7. Advertise chemical surpluses on the exchange board.

8. Post signs up in the laboratories explaining the effects of toxic laboratory chemicals on wildlife when they are poured down the drain.

For Students:

9. Always work with one or two laboratory partners if everyone is doing the same experiment.

10. Never flush chemicals down the sink.

11. Encourage the use of micro scale equipment. Suggest that this be given as a graduating class gift.

12. Recycle chemicals whenever possible and use the exchange board established in the chemistry buildings for senior research.

5.4 Photographic Chemicals

5.4.1 Responsible Parties

Thaddeus Holownia of the Fine Arts department is responsible for the purchase and treatment of photographic chemicals on campus. The chemicals are bought using funds from the Fine Arts operating budget.

5.4.2 Audit

The chemicals are ordered in one large bulk quantity at the beginning of the year from Kodak and Agfa. Both of these companies have environmental policies, however, according to both Kodak and Agfa there are no alternative or environmentally responsible alternatives to the chemicals they supply. The chemicals arrive in concentrated solutions packed in non-recyclable plastic containers.

Product name and quantity of photo chemicals bought each year by the department are listed below:

Figure 5- Quantities of Chemicals used in Photo Lab

Product	Quantity
TMax RT developer	15.2-19 litres
Dektol Developer	456 litres
Rapid Fix	380 litres
Hypoclearing Agent	38 litres
Rapid Selenium Toner	19 litres
Flexicolor Developing Kit	19 litres kit
E-6 Developing Kit	15 litres kits

Product information on these chemicals was requested from Kodak, and material data information can be found in the appendices under hazardous materials.

These chemicals are diluted with water and used in the basement of Hart Hall for photo processing. After use, all chemicals except the Rapid Selenium Toner are thrown down the drain. The toner is collected and given to Roger Smith for disposal with the chemicals removed by Laidlaw. Last year 4171 litres of selenium toner fluid were removed by Laidlaw.

In discussions with Kodak, the auditors discovered that it is against the environmental regulations to flush Fixer down the drain due to its silver content. Fixer is flushed down the drain in very small quantities. The photo department has been notified of the infraction and will be collecting Fixer waste this year for proper disposal.

5.4.3 Case Studies

At the University of Arts in Philadelphia, Pennsylvania, a questionnaire was used to determine that less than half the students knew there was a hazardous waste disposal procedure. Only 32% thought they had been thoroughly informed of hazards associated with the art materials, and fewer believed these policies were enforced.

Based on the results, students designed a comprehensive health and safety program outlining steps to be taken to ensure adequate health and safety precautions were taken. These included:

- training seminars for faculty and shop supervisors
- student workshops
- monthly inspections
- new student orientation programs
- workshops teaching seniors how to set up an environmentally sound studio when they graduated.

(**Campus Ecology**, April Smith)

5.4.4 Recommendations

For Faculty:

13. Conduct workshops for first year students to ensure everyone is aware of disposal methods for chemicals.

14. Conduct workshops for senior staff teaching them methods for establishing an environmentally sensitive studio.

15. Reuse, recycle and share chemicals whenever possible.

For Students:

16. Learn proper disposal methods of chemicals

5.5 Cleaning Materials

5.5.1 Responsible Parties

Cleaning Materials on campus are bought by two departments: Facilities Management and Sodexho Marriott. Facilities management accounts are managed by the Custodial director, while Sodexho Marriott cleaning supplies are controlled by the director of Sodexho Marriott at Mount Allison.

5.5.2 Audit

Facilities Management cleaning supplies are ordered on a monthly basis from various companies, while Sodexho Marriott purchases all supplies from *Ecolab* through a standing order. Facilities Management staff keeps record of the products they require and submit these to the Custodial Senior Supervisor.

Charts 13 and 14 lists all cleaning supplies used by Facilities Management, including the product name, supplier, quantity, chemical makeup, and health impacts of the chemicals. Health impacts are an accurate indication of the environmental impacts of these substances because all tests measuring a chemicals toxicity are performed on small animals and organisms. Currently over 4785 litres of cleaning supplies are used by the Facilities Management department every year, or 2.13L are used per student. Notable among the chemical ingredients were hydrogen chloride, phosphoric acid, ethylene and ammonium hydroxide. These are all poisonous and harmful to the environment.

Of all cleaning companies contracted by the university, only SC Johnson Wax has an environmental policy. The policy includes goals such as the reduction of VOCs in all products to less than 25% of their total makeup, and a 50% reduction of air emissions, and solid waste. In the 1980's SC Johnson embarked on a waste reduction program and by 1990 had eliminated all waste water discharge from its primary European plant. Meanwhile, the companys primary US manufacturing operation reached a 64% reduction in wastewater emissions, a 60% reduction in VOCs and used methane gas from a local landfill site to produce 33% of all steam power necessary to run the plant.

Chandler, another supplier of Mount Allison cleaning supplies was under a 3-year contract which ended on August 31st, 1998. Chandler supplies large quantities of a glycol ether based detergent to the university.

Ecolab products bought by Sodexho Marriott are dispensed from sacs or unrecycled plastic containers by a dispensing mechanism. This allows the product to be used efficiently and dilutes it properly for disposal into the waste stream. Facilities Management products come in smaller plastic containers. Sacs and bottles which can be reused, are recycled by the company or Mount Allison.

All cleaning products used by the university enter the waste stream eventually. However floor polish may take a more diffuse route than toilet bowl cleaner. Once in the waste stream, it flows to the lagoon for sludge settlement. The waste soon evaporates or exits into the ocean. (Please refer to the water audit for more information)

5.5.3 Case Studies

The Chignecto School board of Nova Scotia recently switched to a green line of cleaners called Envirosolutions which are sold by Swish distributers. The schools report that the products are equally effective and time efficient, while being non-toxic and totally biodegraded within 30 days of their use. The cost

of these products is 5-10% more expensive than comparable toxic cleansers. Full disclosure is provided by Envirosolutions and all products have a certificate of compliance from the OECD specifications board.[6]

5.5.4 Recommendations

For Senior Administration:

17. Set aside funding incentives for the Facilities Management department to buy environmentally responsible products when they are comparable in price by 5% to alternative products.

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

For Staff:

19. Post signs wherever toxic substances are used on campus and the reasons for their use.

20. Use nontoxic and biodegradable options in cleaning methods whenever possible.

5.6 Shop Chemicals

5.6.1 Responsible Parties

The Electric, Plumbing and Carpentry shop of the university is responsible for the structural maintenance of all buildings on campus.

[6]Information obtained through interviews with Leo Arsenault, Branch Manager of Swish products.

Chemicals used by these shops are ordered from various suppliers on a monthly basis by Wendell Richards, Trades Supervisor of the carpentry shop. Requests are brought to him by staff or included in a maintenance request by the administration of Facilities Management. Funds for these materials are taken from the Facilities Management budget.

Please refer to Chart 15 for a list of each product used on campus, its supplier, quantity, chemical makeup and environmental impact on campus. The shop uses over 760 L of Hazardous materials every year. A large portion of this is paint and paint thinning products. The total does not include fire extinguishers around campus or powdered substances such as plaster of paris. Most shop chemicals are bought for a certain task and are used efficiently for financial reasons.

All materials used by the shop, including packaging, are disposed into the general solid waste stream. Exceptions to this rule are scrap wood, which is burned on university property, and oil based paints which are wrapped and sent to a hazardous waste landfill site. Whenever possible, extra supplies from one maintenance job are saved and used at a later date for other jobs. This decreases costs and waste production by the shop.

5.6.2 Recommendations

For Staff:

21. Buy environmentally responsible products whenever they are less than 5% more expensive than their alternative products.

22. Notify the Mount Allison Community whenever toxic substances are used with signs and identification notices at the site and in the community media.

23. Request full disclosure of policies and procedures

from all companies supplying toxic substances to the Mount Allison community. Divest from those companies with violations of environmental regulations.

24. Recycle wood scraps as wood chips for mulch, or return them to the lumber supplier for use in wood boards.

5.7 Herbicides and Pesticides

5.7.1 Environmental Significance

Mount Allison University is located in a town famous for its water fowl park. Up to 50% of the chemicals that are applied to lawns, gardens and crops to ward off weeds and insects end up in ground or surface water. (Environment Canada, Getting Greener). Chemicals can build up in the food chain and have harmful health effects. Two notable books have warned us of this, **Silent Spring** and **Our Stolen Future**. Vincet Garry of the University of Minnesota found that birth defects in children of pesticide applicators in heavy use areas increased by a rate of 100%. Although Mount Allison is certainly not in as high risk a situation as this, the findings do lead to questions of the harm that the chemicals being used could have in the future. Garry also implicated several endocrine disrupting compounds including 2,4 D, which is used on campus as a herbicide, in higher rates of anomalies such as urogenital defects (Source: **Our Stolen Future**). For every reputable scientist who warns of the dangers of chemicals on the lawns there is probably an equally reputable one who sees no problem with herbicides or pesticides The question becomes: Is the appearance of the campus worth the uncertainty of the damage it might be doing to the ecosystem or the to health of those who enjoy the grounds? As an institution concerned about the environment, Mount Allison must look closely at the statement it is making to prospective and current students by spraying the grounds.

5.7.2 Responsible Parties

The maintenance of Mount Allison grounds is the responsibility of the Grounds Supervisor who is assisted by approximately 6 full time grounds staff.

5.7.3 Pesticide and Herbicide Use At Mount Allison

The campus grounds reflect directly on Mount Allison as an institution. To those who have been trained to expect and admire a perfect lawn, Mount Allisons grounds are impressive. A perfect lawn however, often means that it has been sprayed with chemicals.

Between 1983 and 1994 the University ceased all applications of fertilization and pesticides. In the summer of 1998 Mount Allison practised a complete spraying program. For the past several years the program has involved two applications of fertilizer, insecticide and herbicide, costing the university approximately $8000 dollars a year. All applications are done by a licensed applicator using all safeguards required by regulations.

The application of both the herbicide and insecticide (but especially the insecticide) was strongly protested by the Biology Department as well as other concerned individuals. This summer these objections resulted in a reduced spraying program.

The new program involves one, rather than two applications of the herbicide. The ingredients for the herbicide application are as follows:

Figure 6 Chemicals in Herbicides

Herbicide	Chemical Components
Mecoprop:	2-(4-Chloro-2-methylphenoxy)-propanoic acid

Dicamba:	3,6-Dichloro-2-methoxybenzoic acid
2,4-D:	(2,4-Dichlorophenoxy) acetic acid

It is believed that one application will eliminate the weeds early in the season and although some may reappear late in the season, they will not be numerous enough to damage the health of the grass. The insecticide was not applied this summer. With no current signs of cinch bugs on campus, the application would have been for preventative reasons only (cinch bugs are burrowing insects which damage grass root structure). If cinch bugs appear, the grass will be treated with insecticide. This new Reduced Spraying Program has reduced spraying costs by 50% or $4 000 (one students tuition).

Herbicides can only be used 30 metres back from the swan pond because of regulations limiting the use of chemicals around water. The area does not receive any additional maintenance despite the lack of spraying. The herbicide is not applied to the lower field or Landsdowne field as they are almost completely weeds and spraying them would leave nothing but dirt. The lawns around the houses are also left natural as they are not part of the central campus, receive less traffic and are seen less by visitors.

Lawns are mowed approximately once a week using both ride on lawn mowers and hand mowing. The grounds are not watered as only a few buildings have outdoor taps. Watering anything requires about 61 metres of garden hose which, apart from being inconvenient, also interferes with water pressure. This maintenance schedule is similar to Dalhousie. At Dalhousie all grass on campus is cut every 1 to 1.5 weeks and the campus is not watered unless new sod has been laid down. Dalhousie banned all herbicide and pesticide use on campus several years ago.

Of the staff and faculty that responded yes or no to the question: Do you support the spraying of the campus with herbicides in order to maintain a weed free campus? 78.6% answered no.

Facilities management has looked into alternatives to the spraying. The alternatives are believed to be to:

1) **Do nothing:** This could result in an invasion of cinch bugs and would definitely result in various weeds on the lawns.

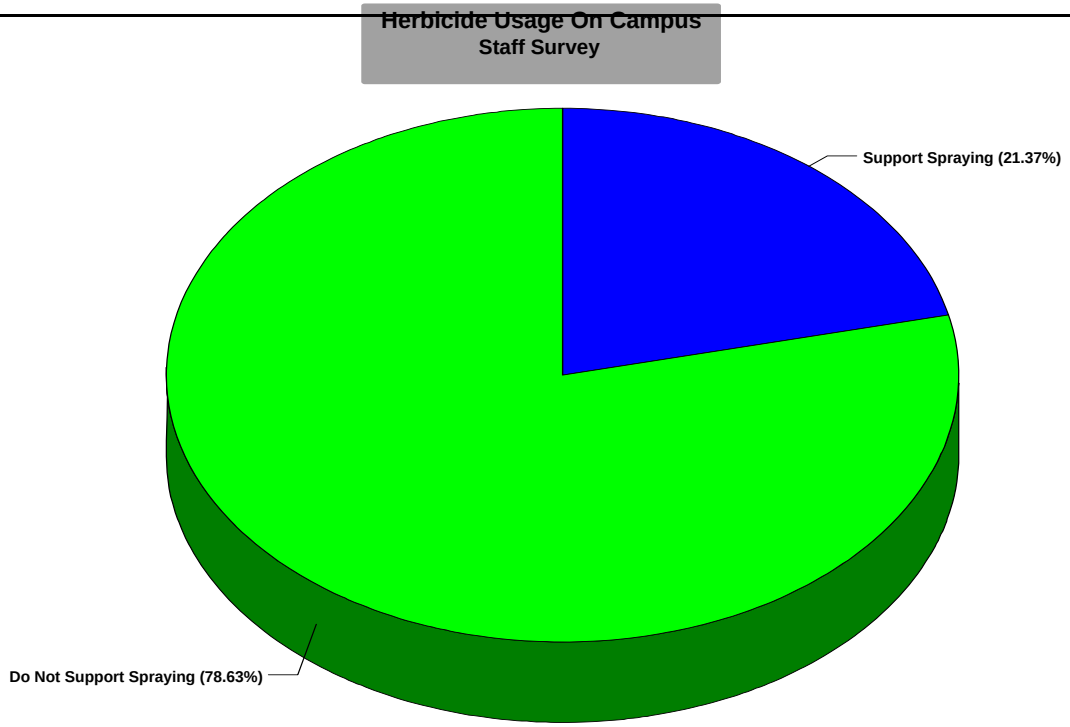
2) **Increase Turf Maintenance:** Regular watering, mowing, and fertilizing would result in strong and healthy grass which could resist competition from weeds. The additional labour costs alone of this alternative is estimated at exceeding $30 000.

3) **Use less toxic or organic products:** Facilities Management is unaware of any cost effective alternatives. There is a new biological product, based on a fungus, that is currently being tested. This product is being considered but will not be available until the year 2000.

There remains controversy on campus about whether even one application of the herbicide is necessary. There are arguments to both sides:

For Spraying:

- A well manicured lawn reflects positively on the university, attracting potential students
- Spraying increases the strength of the grass which means that it holds up better to traffic
- Spraying the football field makes it safer for the athletes as they are less likely to slip in the mud and



injure themselves

skin and can cause various health problems including rashes, liver damage and neurological symptoms.(Dr. Campbell)

- As a university implementing an environmental policy, and as one situated in a town famous for its waterfowl park, spraying does not reflect the values that Mount Allison should be demonstrating.

- As an institution centred around education, Mount Allison has the opportunity to teach the community that weeds are not necessarily a problem but only natural, that a lawn sprinkled with weeds does not necessarily signify a lack of care for the grounds but rather care for the environment.

Against Spraying:

- These herbicides are all chlorinated derivative of benzene, a class of molecules which includes an increasing number of known or suspected carcinogens and toxins (Dr. Campbell Assistant Professor of Biology at Mount Allison)

- The precise organic solvents [used] in the preparation [of these herbicides] are trade secrets. In general, this class of chemicals can penetrate

5.7.4 Case Study

Dalhousie banned pesticide and herbicide use on campus several years ago. The only fertilizer they use is bonemeal (from fish or meat byproducts) which contains no toxins and is used in flower and shrub beds to assist in growth. Dalhouse receives few complaints and many compliments regarding campus grounds.

5.7.5 Recommendations

For Senior Administration:

25. Lift any pressure being applied to the grounds maintenance staff to keep the campus completely weed free.

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

27. Spray athletic fields only as a safety precaution and only until an organic substitute becomes feasible. Spraying should be kept to an absolute minimum and use the least toxic herbicide available.

For Staff:

28. Stop all usage of pesticides and herbicides on university grounds excluding athletic fields.

29. Continue to actively investigate organic alternatives for lawn care. (look into the possibility of corn gluten)

30. If Mount Allison does make the switch to chemical free grounds, make sure that people know about it through signs, articles in Times and Transcript and The Argosy, etc..

31. Replace warning signs that appear after a spraying with signs reading This lawn is pesticide and herbicide free. Advertise the fact that Mount A. has taken an environmental initiative. For every student unimpressed with the imperfection of the grass, the University will surely gain two impressed with the environmental initiative.

For Faculty and Students:

38. Do not spray your own lawns with chemicals and educate those around you who do.

5.8 Other Sources of Hazardous Waste

Not only are current hazardous substances a concern, but earlier sources continue to pollute the campus.

The only location on campus previously exposed to hazardous materials is Support Services property. This property was used as a foundry between 1852 and the 1980's. Stoves, boilers and cast products were produced, and during the war explosives were also manufactured on the site. To the auditors knowledge no records were kept of hazardous spills in the area, and no chemical clean up of the area was performed. The site is currently used as a parking lot and tourist information center (ADI Ltd., 1996).[7] The university community also brings chemicals onto campus via the use of photocopiers, the personal possessions of residents and the materials used by contracted companies.

Photocopiers use inks and fusing oil which are slightly toxic. Chemicals are bought from Xerox through monthly orders submitted to central stores and funds for payment are taken from each departments budget. Some of this paper is bought back by students who use the copiers with a markup that pays for the rental of the copier machines. (For a list of all chemicals used by the photocopiers see char t 20).

These chemicals are spread onto the paper used and then discarded into the waste stream, regardless of whether the paper is recycled or not.

Styrofoam products made with CFCs, minifridges filled with CFCs and non-biodegradable cleaning agents compose a significant portion of household hazardous waste. At Mount Allison these substances are bought on campus by residents and, with the exception of refrigerator fluid, most are disposed

into the waste stream.

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 students, the university collects them and pays $50.00 for the reclamation of the refrigerant (CFCs), thereby diverting them from the waste stream. There are no figures for the quantity of these products used by residents and there are no regulations relating to what can or cannot be brought onto residence property, apart from conventionally forbidden drugs. Batteries containing mercury cause damage to fish and aquatic ecology when released, however, they are rarely recycled by students. Rechargeable batteries are available at the Sackville Home Hardware, and other batteries can be dropped off at Wheatons to recycle their mercury.

Other sources of Hazardous waste are brought onto campus by companies contracted for larger maintenance jobs. Tasks such as tarring the roofs, and cleaning the stone facing are done by external companies who are under no obligation to provide information on the products they use to their consumers. The auditors found no records of the type or quantity of hazardous wastes used by these companies.

5.8.1 **Recommendations**:

For Senior Administration

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

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

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

For Students

35. Use the residential fridges in kitchens, instead of minifridges installed in each residence room.

36. Request information on the chemical ingredients of products that you purchase. Avoid products with toxic components and any companies refusing to provide ingredient disclosure.

6. Food

6.1 Introduction

Agricultural use and food production have an immense impact on land ecology, changing its soil structure, chemical makeup and plant species. Therefore, the food humans choose to eat has a significant impact on the environment. The Mount Allison community consumes a large quantity of food and an analysis of its use on campus is an integral part of the universitys environmental accountability.

6.2 Responsible Departments

With the exception of meals served at the Presidents Club and Cranewood, all food on campus is prepared and served by Sodexho Marriott. Recommendations for changes in food service are made through an ideas exchange board posted in each dining hall, or through the administrative branch of the university. Changes are implemented by the director of Sodexho Marriott at Mount Allison, Mark Henchey.

6.3 Environmental Significance

Food sustains and replenishes human life, however the chemical contents, packaging, waste and inefficiency of many food sources is causing serious damage to the environment. Ensuring that this world is able to sustain human nutritional needs involves a concerted effort to reduce waste and maximize the efficiency of our food. This need for nutritional efficiency is obvious at a time the human population is growing at a rate of 2%, while environmental degradation reduces agricultural yields by 1% per year. (Time, Special Issue 1989) The earth is currently able to ***sustain*** the nutritional needs of 5.5 billion inhabitants on a vegetarian diet. Unfortunately, it is only able to support 3.7 billion people on a diet which derives 15% of all calories from animal products or 2.8 billion people on the North American diet of 25% calories from animal products (Myers, 1993). As the worlds population nears 6 billion such statistics indicate the agricultural capacity of the earth is being exceeded drastically. In fact, while technology continues to increase agricultural yield per hectare by only 2% (Hallowell, 22), over 23 million hectares of agricultural land are lost due to the agriculture exploitation each year (World Resources Institute, 1996).

In the continuous quest for more agricultural land, 100 acres of old growth rainforest burn every minute. This destroys a plot of trees that consumes 3 billion grams of CO_2 every year. In addition, the flames from these trees contributes 6% of the carbon dioxide emissions considered responsible for global warming (Time, 1989). This burned land is then used predominantly for livestock grazing; a crop with inefficient nutritional value, but high cash returns. A large demand for meat raises the price of cattle far above their nutritional value and encourages inefficiencies in the use of agricultural land.

Tempering this need for nutritional efficiency are health concerns caused by the widespread use of herbicides. Consumer demand for inexpensive, unblemished foods has increased the use of chemicals by producers. The runoff from these herbicides contaminates rivers, streams and household wastewater with estrogen and dioxin based chemicals. These chemicals are considered contributors to the problems of acid rain, ozone depletion and global warming. For information on the chemicals please see environmental significance in chapter 5.

Not only is diet a source of environmental concern, but the packaging of food contributes to solid waste and toxic chemicals worldwide. 50% of all solid waste produced by the average consumer comes from packaging in the form of plastics, styrofoam and paper (Macleans, 1989). Most of this packaging cannot be recycled because of its food contamination and is discarded in one of the many acres of landfill around the globe. Over 80% of all household wastes could be diverted from landfills by eliminating packaged products or washing, sorting and recycling these packaging materials.[8]

6.4 Food Consumption At Mount Allison

The food consumption at Mount Allison is divided into two sectors. The off campus students, staff, faculty and university staff comprise the first sector. This population is only restricted in their food consumption by market forces and buy their groceries from the grocery or restaurant suppliers of the region. The second sector is the residential food plan recipients who receive meals from Sodexho Marriott. Students pay a board fee, and are granted unrestricted food consumption in the university meal halls.

With over 1 050 people on the residence meal plan, food is a major product imported onto the campus. In 1986 the university entered a standing contract with Sodexho Marriott Food Services regarding the preparation and procurement of all food used by the university. This contract will end in the year 2006, but in the case of unsatisfactory service, termination of the agreement may occur within 90 days. Sodexho Marriott is a food service company which buys dried goods from Clover Distributors. Other major Suppliers include:

[8]Information obtained through information with Westmoreland Solid Waste Corporation representative Bill Slater, June 9, 1998.

Figure 6 Food Suppliers

Supplier	Product
Baxter Milk	Dairy
Bens Bread	Bread
Maxwell House	Coffee
Elmira	National Poultry Contract

All of these companies were contacted for information on environmental policies or procedures however, with the exception of McCains, which were unable to provide the auditors with any information. McCains is in the process of forming an environmental policy, but was unable to predict the date of its implementation.

Approximately $ 38 000 is spent by Sodexho Marriott every week on groceries during the eight month academic year. The total mass of these groceries is more than 280 255.12 kg every academic season, and the average Mount Allison student consumes over 272.06 kg of food during their eight months on the meal plan. 41% of the average quantity consumed by each student is from meat and may be smaller than the mass noted due to the weight of bones. Over 40% of the average mass is from milk products. Groceries are packaged in a variety of materials, including wood crates, cardboard, hard plastic containers and cans. None of the products purchased by Sodexho Marriott are organically grown or chosen for their lack of chemical additives.

Non-edible products bought by Sodexho Marriott include napkins, styrofoam dishes and cleaning supplies. The napkins are supplied by Swan White, a division of Scott paper, and have no recycled content. Approximately 4 525 to 6 030 napkins were required for every meal last year but this year quantities have decreased to 3 005 for unknown reasons.

The Styrofoam dishes are used for most meals outside the meal halls (picnics, conferences) and for emergencies. This totals approximately 4 000 cups, 4 500 large plates, 3 000 small plates and 9 000 items of cutlery used every year. The Styrofoam is CFC free, but is not recycled. It is used for all conferences with over 100 participants, unless the conference organizers are willing to pay a higher fee for china.

Food in New Brunswick is delivered by truck from an average distance of 2 400 km (this includes large distances for tropical fruits etc). Food at Mount Allison is served in Jennings and McConnell. McConnell serves an average of 600 while Jennings serves 450 people from their kitchens every day. Plans have been made to close McConnell and open a renovated Jennings dining hall capable of providing meals to the entire campus. With the exception of twelve students living in French House, all residents are on the Sodexho Marriott Meal Plan. Residents present their meal card and photo identification at the entrance to meal halls where it is stamped by a Sodexho Marriott employee. The dining halls operate as a cafeteria/buffet combination. Main course dishes and desserts are served in the cafeteria lines, while salads, bread, soups, pasta and fast foods are offered on a buffet. Food is served in each meal hall for 6.5 hours per day.

Sodexho Marriott uses approximately 1 700 washable plates per meal. The use of reusable materials saves over one million paper or styrofoam dishes per year, but uses uncalculated quantities of water and cleanser to wash them. The industrial dishwasher runs continuously for 9 hours per day in both kitchens and uses boiling water to sterilize dishes. No water or energy quantities used in the dishwashers were listed on the product information tags, however water does not run constantly but instead fills up three large basins for pre-wash, wash and rinse.

Both liquid and solid food scraps are collected from plates, serving trays and kitchen waste into a 75 litre pail. Unserved meat is the only food which is reused. It is added to soups offered at the next meal. In McConnell, the food scraps produced each day are as follows:

- Breakfast: 1 pail
- Lunch: 2 pails
- Dinner: 2-2.5 pails
- Salad Room Scraps: 0.5-1 pails

Sodexho Marriott currently refrigerates these scraps and pays a farmer to remove them. The farmer boils the scraps and reuses them as pig feed.

Additional waste is discarded in the following ways:

Figure 7 Waste Disposal at Marriott

Recycled	Reused	Garbage

pop cans	ice cream buckets, mayonnaise and other 5 gallon buckets	big cans
glass jars	plastic bags reused in Athletic department for ice	cereal boxes (50 boxes per day)
oil from fryers recycled by bass river company for car oil.	hand towels	hard plastic containers
cardboard (total of 6, 1.5 cubic metre bins per day)	potato chip boxes	juice concentrate containers (12 per day)
		chip bags
		napkins
		other packaging

Sodexho Marriott also runs the Golden A cafe as a separate food service on campus. Food is bought on an individual basis and all the dishes are disposable Styrofoam models. There is currently a mug board where frequent customers can leave their reusable mugs, however, all other condiments, entrees and snacks are packaged in plastics or Styrofoam and discarded in the garbage cans. The Golden A does have a dishwasher but disposable dishes are used instead as it is feared that china dishes would be taken out of the eating area and never returned.

6.5 Case Studies

At St. Francis Xavier all disposable dishes are made of paper, these are CFC free and easier to recycle. The amount of slop produced is 90 lbs of compostable waste per meal. This is all composted, including paper products such as napkins.

Motivated by a desire to serve healthy food produced by sustainable agricultural practices, students and administrators at Hendrix College conducted a comprehensive review of

campus food resources in 1986. This Local Foods Project analysed the sources, distribution methods, and preparation of techniques of the meals in the school dining hall. The study found that 95% of meals served on campus came from out of state, even though agriculture in an important part of the Arkansas economy. Changes in campus food operations resulted in a dramatic increase in the use of locally and organically produced food sources.
(Smith, 55)

6.6 Recommendations

For Sodexho Marriott:

1. Request product information regarding ingredients, and processing practices from all companies which supply Sodexho Marriott food through Clover Distributors and other suppliers. Make this information available to students in the form of small signs on food serving containers.

2. Buy only those products which meet or exceed the standards outlined by the National Ecologo labelling system.

3. 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 halls.

4. 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 a period of four years until most meals include an organic option.

5. Switch to recycled napkins.

6. Switch to Environmentally Friendly cleaning supplies.

7. Switch to reusable dishes for conference and picnic use. Inexpensive plastic models with recycled content are available at many large department stores.

8. Continue the food and cardboard recycling activities currently in progress

9. Continue to use reusable dishes.

For Senior Administration:

10. Request product information regarding ingredients, processing methods and suppliers for all food items supplied by Sodexho Marriott.

11. Request the use of environmentally and socially responsible food products which meet or exceed the standards outlined by the National Ecologo labelling system, whenever the approved product is comparable in price and quality.

12. Support the establishment of one meal hall, in order to reduce waste and increase the efficiency of food usage.

For Students:

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

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

15. Support the establishment of one meal hall to cut food and energy wastage by 50%.

16. During a meal use only one plate, glass and bowl. This will reduce water used in the dishwasher.

17. Encourage Sodexho Marriott to switch to recycled napkins.

18. Reduce the use of napkins from 3 per meal to 1 per meal.

19. Organize a team to clean out the tin cans used. These can then be sold to the local recycling depot for a profit. (Due to high unionized wages, Sodexho Marriott cannot afford to hire someone to clean these cans)

20. Reduce portions and meat content from your diet.

7. Energy Consumption

7.1 Introduction

Our societys reliance on modern day conveniences, has

reached a point of unconscious habit. At Mount Allison, without any direct repercussions, (we do end up paying indirectly) it is easy to forget that wasteful energy use has its monetary and environmental consequences.

7.2 Responsible Parties

The Technical Services Manager in Facilities Management is responsible for equipment that consumes energy on campus.

7.3 Environmental Significance

There are several reasons why Mount Allison should decrease energy consumption and consider more sustainable energy alternatives whenever possible. Each time that a light is left on when no one is in the room, or the heat is turned up rather that putting on a sweater, the environment suffers the needless consequences. Safe disposal of radioactive nuclear waste continues to be a problem. The dams that have been built for hydro power have had devastating effects on water systems and surrounding wildlife. The burning of fossil fuels and coal is polluting our air and emitting dangerous greenhouse gases. With consumption of energy in Canada being the largest per capita in the world, (Stem, 1991) we must take significant responsibility for the problems that over-consumption has created.

To halt this environmental degradation, we must first reduce the amount of energy we consume by decreasing use. Consumption can be further decreased with more efficient, energy saving systems and devices. Finally, one can turn to alternative sources to help with remaining energy requirements.

For every kWh of electricity produced by an alternative source (i.e. wind, solar), a kWh produced by burning fossil fuels is saved. (Alternative energy sources do not replace electricity from nuclear power stations because they operate at base load which means they are working the whole time they are available.)

Figure 8 Pollutants saved with Renewable Energy Sources

Compound	Amount Saved per kWh
Carbon Dioxide	936-1079 grammes
Sodium Dioxide	14-16.4 grammes
Nitrous Oxide	2.92-5.3 grammes

Source: Parliamentary Office of Science and Technology, 1994, Select Committee Briefing. Environmental Aspects of Wind Generation.

7.4 Energy Consumption at Mount Allison

Mount Allison buys all its electricity from NB Power. In 1990 NB Power adopted an environmental policy. The statement is as follows:

NB Power is committed to the achievement of excellence and innovation in protecting the environment of the province while meeting its mandate to provide economic and reliable energy to the people of New Brunswick. NB Power considers that the environmental performance of its facilities is as important to its customers as the quality of the service they receive.

(NB Power Environmental Report 1996)

For statements of NB Powers environmental responsibility with concerns to Leadership, Environmental Standards and Guidelines, Environmental Audits, Environmental Protection Plan, and Partnership, See Appendix B.

During the fiscal year of 1996/97 NB Power, sources were approximately 20% nuclear, 20% coal, 16 % Hydro, 12% heavy fuel oil, 11% Orimulsion, and 21% purchases. The high percentage of purchased power was due to lower than expected production at the Point Lepreau plant. (NB Power, *Building Value Annual Report:* 1997)

Between June 1, 1997 and May 31, 1998 Mount Allison consumed 10 133 329 kWh of electricity. This cost the University $888 191.36. Most buildings on campus are not individually metered which makes it extremely difficult to target the houses consuming the most electricity. Twenty one houses off the central campus including Bermuda House and the Canadian Studies Building are billed separately for electricity. The remaining locations are billed through the Facilities Management building meter. There are six buildings heated by electricity; Sprague House, Central Stores, Owens, Bermuda House, Carriage House, Cuthbertson House, and Facilities Management. Approximately 66% of their total electricity consumption is used for heating, equaling approximately 1.28 kWh/sq.foot spent per month on heating. Most buildings adhere to this average however Cuthbertson levels are extremely high with 84% or 10301.8kWh/month of electrical consumption used for heating. This could be due to the buildings lack of adequate insulation in the basement and attic.

Mount Allison is billed for electricity in two ways. During each pay period (of approximately 1 month) the university has a demand charge and energy charge. Demand charge is a fee for the highest number of kWh the university required for 15 minutes or more during the pay period. Demand at Mount Allison usually peaks around 10 am when most of the campus is up and running. The energy charge accounts for the majority of the bill and charges the university for every kWh used. During 97/98 the electricity metered through the Physical plant cost an average of 7.53 cents/kWh.

There are three different sources of heating power on campus.

Some off campus housing (Bermuda House, Cuthbertson, etc.) and Facilities Management, are heated with electricity supplied by NB Power. The PEGs heating is supplemented by electricity for areas where pipes could not be used. Hesler House, Baxter House, Black House, Canadian Studies, Central Heating, Colville House, Cranewood, French House, McGregor House and the Monastery are all heated with light oil . Between May 1 1996 and April 30 1997, Mount Allison used 112 482 litres of liter oil fuel costing $35 470.81. (See Chart 17) The rest of the campus is heated with bunker A oil, also supplied by *Imperial*. Between May 1 1996 and April 30 1997 Mount Allison used 2 491 400 litres of bunker fuel oil, costing the University $433 898.37. (See Chart 17). In total the university used 28832509.11 KWh for heating, at a cost of 1.6 cents per KWh. The oil is heated to 140 degrees Celsius in the boilers and the heat is used to evaporate water into steam. The steam then travels through pipes under forty-five pounds of pressure per square inch until it reaches a building where pressure is reduced fifteen pounds. The steam is used to warm the water which travels through the building, heating it. The steam eventually turns to condensation and returns to the heating plant. *Imperial Oil* supplies the oil to heat the rest of campus. Imperial Oil received an "A" in both "Environmental Performance" and "Environmental Management" from Shopping With a Conscience: The Informed Shoppers Guide to Retailers, Suppliers, and Service Providers in Canada.

Residences and academic buildings are heated during Christmas Break to maintain the inside temperature and prevent pipe systems from freezing. Temperature targets in all buildings is between 18 and 21 degrees.

Since last year Mount Allisons electricity bill has gone up over $40 000. This rise is probably a result of both an increase in rates from NB Power and an increase in the quantity of energy consumers on campus (i.e. more computers) outweighing the energy efficiency measures that have been taken. Indeed, several initiatives have been made over the past couple of years to decrease Mount Allisons energy consumption:

- To help solve the problem created by students, staff and faculty failing to turn off lights when leaving a room, automated light controls with both heat and movement sensors have been installed in key areas. The sensors made by *Watt Stopper* have been put in Avard Dixon washrooms, labs, and classrooms and have halved the energy consumption in most locations. Other areas such as the mail room in the STUD are being considered as prime locations for light control censors.

- To limit demand costs, a computerized system has been installed to shut down equipment when consumption is nearing peak demand.

- Florescent light bulbs have replaced a large number of the incandescent ones on campus.

- Low flow showers have been installed in 7 of the residences (less water used means less energy used to heat the water.)

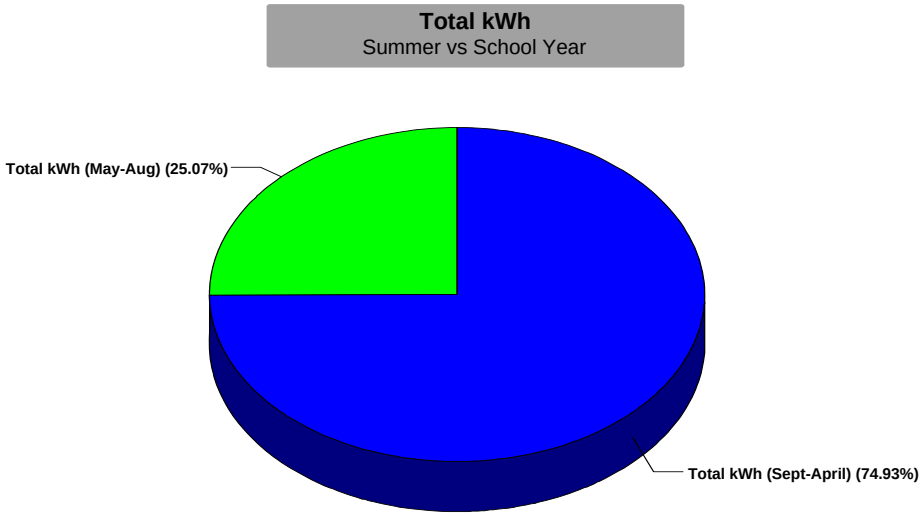
- Heat reclamation is used in the kitchens.

Despite these positive measures, there still remains a needless waste of energy on campus.

The many computers on campus are significant consumers of energy. All PCs are now bought solely from *Dell*. In the past, the university has also bought computer hardware from *Apple* and *Digital.* There are approximately 450 computer systems on campus with 75-125 new ones bought each year. All monitors since 1996 are Energy Star, and all new computers bought by the university contain a feature that will shut them off automatically if they are not in use. However, these computers do not make up the majority that exist on campus.

Statistics show that computers are only used 10-20% of the time they are on, meaning that as much as 90% of the energy used is being wasted. A high end computer system that is always on costs about $124/year, a basic system $92/year. A basic system that is turned off at night and on weekends will cost $30/year, and one turned on and off all day will cost $19/year.(Natural Resources Canada, A Guide to Buying and Using Energy Efficient Office Equipment: 1995). Computers in labs and in the library are normally left on all day, all night, all weekend, and sometimes even during holidays as well. Students often leave their personal computers on for long hours for convenience, but also with the belief that turning a computer on and off damages it. This may have been true in the 80's, but today if a computer will not be used for a half hour or more, it should be turned off. It is important to note that a Screen Saver is not the same as an Energy Saver! A screen saver protects the screen of the monitor but does nothing to reduce energy consumption.

Lighting is another significant area of electricity usage on campus. Light bulbs are supplied by *Liteco* and *Litemore*. Among the buildings surveyed by the auditors 15 176 florescent light bulbs and 4 694 incandescent lights were counted. This means that approximately 75% of lights on campus are of the energy saving variety. Compact fluorescents use 75% less energy and last 13 times longer than incandescent bulbs. Compact fluorescent bulbs may cost more to purchase but by replacing a 75 Watt bulb with a fluorescent one, $57 can be saved over the bulbs lifetime. This also translates into 10 000 hours of energy saved or 681.8 kg. of greenhouse gases being kept out of the air (Country Side, Green News Volume 3, Number 3, page 46: July 1992). Fluorescent lights have been installed in most areas of frequent use on campus, such as bathrooms and hallways. Several classrooms have more than one light switch enabling one to use as much or as little electricity as needed. Unfortunately, all lights are usually turned on whether they are needed or not, and left on after use. This is the primary source of waste from lighting; lights are turned on and then forgotten. Classroom lights are routinely left on overnight, and residence rooms often remain lit all day while students are in class. Bathroom lights are generally on 24 hours a day. Several hall lights in academic buildings and residences are left on 24 hours a day, *all* year (including the summer months). The waste of energy can be more clearly understood when considering Mount Allisons electricity bill for the summer. 25% of Mount Allisons energy bill comes from the months of May, June, July, and August, and the average number of kWh used per month in the summer is 634 539.75 compared to 949 345.74 kWh used per month during the school year. Considering the fact that most students do not use campus facilities during the summer, the costs seem high. The campus is used for different activities in the summer (conferences, summer school, research) but hardly to the degree it is used during the year. It would be safe to say that lighting practices such as the ones listed above probably contribute to a large portion of the high energy bill in the summer.



Heating is a third area of energy use. Poor ventilation in several buildings causes staff and faculty to open office and classroom doors in the dead of winter. 79% of respondents to the Environmental Audit Survey stated that the ventilation in their building was fair or worse (42% stated that it was poor or very poor). Most heating in residences is controlled both by a central heating system and room thermostats. Both heating methods have their advantages and disadvantages. Heating is sometimes abused in rooms where it can be controlled. For example, smokers may crank heat up full blast and keep all windows open to maintain good air quality. The system also allows those who wish to conserve energy to do so, however because residents are not billed directly, these people are few and far between. In area where heat is controlled only by the centralized heating system, problems of excessive heating by individuals is avoided, but this system creates other problems. Buildings are sometimes over-heated, forcing people to open windows in the winter to cool rooms down.

Several of these problems could be more easily dealt with if better communication existed between the university and Facilities Management. Most people do not know who to inform if a building is overheated, or if a faucet leaks. Last year Facilities Management contact information could be found nowhere in the Student Directory. This problem is being addressed and Facilities Management will attempt to have increased communication with the university in the coming year. This will be helped by the E-mail address fixit@mta.ca. Students, staff, and faculty can use the internet to ask questions, send complaints, or make recommendations to Facilities Management staff.

Energy Survey

As part of the audit, an energy survey was conducted on 30 of the main buildings on campus. The survey consisted of recording the number of lights, their wattage their estimated hours of use per month during the school year. (See chart 4 for all assumptions made). The auditors also considered the electricity needed by fridges, computers, washers, dryers, hot water for showers and any other miscellaneous energy consumers on campus. All survey totals, except one, had a lower average number of kWh used per month than the metered amount. (See Chart 3). It should also be noted that the metered amount was an average of energy consumption over the whole year (September 1997 - August 1998) and the auditors calculations were made with the assumption that residences were fully occupied (i.e. school year only). The difference was often substantial (for the main metre the difference was over 300 000 kWh or approximately $22 600 a month at 7.53 cents per kWh). The Owen's Art Gallery, Jennings Meal Hall, and the Pub were not surveyed by the auditors, which could affect the figure significantly.

Further discrepancy is due in part to the fact that the auditors did not include kWh used for heating. Both the PEG and Facilities Management are heated at least partly by electricity, and this added a substantial amount to the electricity bill. There are also sources of electrical consumption in buildings that were probably missed by the auditors. This aside, the obvious explanation for the difference between the NB power consumption figures and those calculated by the auditors, is that lights, computers, etc. are left on even longer than the generous assumptions mad by the auditors. If these results are accurate, the education of the university population on electricity conservation would have a significant impact.

As would be expected, kWh/square foot/month of the residences was higher than that of the academic buildings. Thorton had the highest total in this category with 1.55kWh/sq foot/resident and also had a substantially higher kWh/resident/month than other residences with 466.85. (the next down was Edwards with 344.95kWh/resident/month). (See Chart 5) The high electricity use of Thorton can be explained by the fact that only 20% of Thortons lights are Fluorescent in comparison to an average of 75% on the rest of the campus. (See Chart 11) Following Thorton in kWh/resident/month are Edwards, Trueman, and Windsor with respectively 33%, 46%, and 48% of their lights fluorescent. This clearly establishes the link between fluorescent lights and energy savings.

The Athletic Centre has by far the greatest number for kwh/square foot/month at 1.54 (the next down is the Fine Arts building with 0.87kWh). Although the Athletic centre has a relatively high number of fluorescent lights (86% of the lights are fluorescent) it also houses some very large energy consumers. Perhaps the greatest of these are the showers, using an estimated 57 610.82kWh/month for hot water, and costing the university 4338 dollars *a month.* The quantity spent could be greatly reduced with low flow showers. Showers using 9.4L/min rather than 40L/minute, would save Mount Allison almost 3000 dollars *a month.*

The survey also revealed other energy and money saving measures. If the below steps were taken for a year, and the university was charged 7.53 cents/kWh, the following savings are estimated:

- If fridges in the residences were turned off during the summer months, $1639.85 would be saved.
- If hall lights were turned off in residences during the summer months, $10 707.79 would be saved.
- If movement and heat sensors were installed in the bathrooms of all buildings, assuming this would cut usage in half, $8235.49 would be saved.
- If residents showered for five minutes rather than ten, $5156.68 would be saved.

7.5 Alternative energy sources:

The photovoltaic effect is the direct conversion of sunlight into electricity. The systems need no fuel, are very reliable, and are virtually nonpolluting. However the industry is still relatively new and therefore capital costs are quite expensive in comparison with conventional electricity. However if the cost took into consideration externalities such as pollution and mining impacts photovoltaic systems would be considered cost effective. PV has high initial costs but fuel is free and maintenance minimal so in a longer term perspective (ie 20 years) it becomes highly cost effective.

7.5.1 Wind:

The global wind power industry is already at 2 billion dollars a year, and its growing at a rate of 25% annually. (Flavin, 46) Many people are predicting wind energy to be the power source of the future.

Presently NB Power will not allow us to produce more than 500 Horse Power of energy at any given time. This is because NB Power has invested a significant amount of capital into the production of electricity to ensure that they can supply everyone in the province with the power they need. If customers began pulling out, the company would be left with huge debts. Mount Allison would require the permission of the Lieutenant Governor of New Brunswick to be exempted from this law. Another of the problems with wind energy and to a lesser extent solar energy, is that generation periods are not always consistent with the peak demand, necessitating some method of energy storage. On a scale as large as a university, batteries are impractical. NB Power has no buy back policy for electricity. However, these restrictions could very well dissolve in a few years with the expected deregulation of power in New Brunswick. For this reason Mount Allison should look seriously into the possibilities of wind power now.

Carl Brothers at the Atlantic Wind Test Site in PEI said a feasibility study can cost anywhere from nothing to$25 000 depending on what is needed. It would likely be quite inexpensive if students or staff were willing to do some of the leg work, taking wind measurements etc.. A tower on the farm property Mount Allison owns would be ideal for mounting testing instruments.

Mount Allison is situated next to the Tantramar marshes, one of two sites in New Brunswick suited to wind energy development, due to a high wind regime. Wind energy feasibility is dependent on the mean annual wind speed(MAWS). Although some wind speed testing was conducted by a consultant in Amherst, this information has not been made public and so the feasibility of wind energy remains unknown to the university. Generally, in order for the payback period to be considered economically viable, the MAWS must be at least 6 m/s, above which payback becomes increasingly rapid. A rough figure in an Environment Canada publication called Wind Energy Resource Maps for Canada. (Walmsley, JL, Morris, RJ. Wind Energy Resource Maps For Canada. Report ARD 92 003 E Atmospheric Research. October 25, 1994) contains data derived from hourly analysis of 144 wind testing station. These maps show that Sackville could have a MAWS of between 15 and 20 km/h or 4.167m/s and 5.56 m/s. Wind energy at a good site usually cost between eight and ten cents per kWh. Although this does not appear the ideal situation economically, with environmental considerations it is well worth investigation.

7.5.2 Solar Hot Water Heaters:

The technology for solar hot water heaters has improved significantly over the last few years. They will now work in temperatures well below freezing and many models have a built in back up heater which can meet all hot water needs when there is no sunshine. Although initial purchase and installation price is significantly higher than conventional hot water heaters, the extra cost can be recovered over time through lower energy bills. Solar hot water heaters are also a hedge against inflation, as prices of electricity and oil rise, the cost of energy from the sun is unaffected.

7.6 Case Study

As a medium-sized university with over 5,000 undergraduates and graduate students, the energy resources consumed annually at Brown University are substantial and expensive. Each year Brown consumes 55 million kilowatt-hours of electricity, 23, 000 barrels of heating oil, and 204 million cubic feet of natural gas, costing more than $6 million.

In 1991, Brown created the Brown Is Green (BIG) program to investigate the potential for minimizing both energy consumption and the associated economic and environmental costs of day-to-day campus activities. BIGs first project was to incorporate an energy efficient lighting scheme in dormitory renovations which now saves over $16,000 annually. Another early project was to hire a paid student intern to investigate

energy consumption in campus buildings. The intern discovered that laboratories were significantly over-lit and that occupants tended to leave lights on unnecessarily. Students have also analysed appliance purchases in terms of total operating costs rather than initial equipment expenditure. They proposed revamping the lighting of exit signs, as a creative incentive system for students to reduce their own energy bill. (**Blueprint For A Green Campus**, 30)

7.7 Recommendations

For Senior Administration:

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

2. Hire a student to seriously research the possibilities of alternative energy use on campus. (Perhaps a thesis?)

3. Consider installing separate metres for all the main buildings on campus. It is extremely difficult to isolate problems or track progress with only one metre.

4. Direct money saved from energy conservation into other energy conserving measures.

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 could be considered.

For Staff:

6. Security guards locking up at night could turn off all computers and all lights in classrooms. This could save significant amounts of energy.

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 computer labs reminding students that if they are working past lock up time to turn off their computers when they leave.

10. If residences begin to be individually metered, houses could begin paying their own energy bill, thus giving monetary incentives to save.

11. Choose one or two large residences to use for summer visitors (ie Trueman, Palmer). Shut down all other residences completely, this includes, fridges, hot water heaters, hall lights, etc. Energy bills for the remaining houses during the summer months should be $0.

12. Create a policy that limits what students can bring into their dorms. ie all minifridges must meet *Energuide* guidelines, only one fridge per room, etc.

13. Persue the possibilities of wind energy with a feasibility study.

For Faculty:

14. 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 it better for the computer.

15. On sunny days consider if it is necessary to have

lights on. If you teach in a classroom with more than one light switch use as few of the overheads as possible (without compromising the students eyes)

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

17. Turn off lights that arent being used.

18. If applicable to your class, assign projects that would consider feasibility of alternative energies on campus. A physics student may wish to perform a study on wind patterns in the area.

For Students:

19. 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.

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

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

22. 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.

23. If you have heating controls in your room, use them responsibly, consider putting on a sweater rather than cranking the heat.

8. Water

8.1 Introduction

Although Mount Allisons water source appears to be in no danger of drying up, increased water conservation can conserve what we have and also save the university money. Currently the bulk of Mount Allisons water consumption comes from labs. The second largest location of consumption are from residences with showers, sinks, kitchens and other sources of domestic consumption.

8.2 Responsible Parties

The Technical Services Manager in Facilities Management is responsible for the metering of water on campus as well as ordering water fixtures.

8.3 Environmental Significance

Canadians are fortunate enough to have the largest supply of fresh water per capita in the world (Environment Canada, 1994). The supply may seem endless, but this is no reason to be careless with such good fortune. Consumption in North America is excessive compared to other parts of the world, While a US family may rinse and flush away as much as 2 000 litres of water a day, families in some parts of the developing world survive on as little as 150 litres, and they often have to travel several kilometres to obtain the precious fluid (Serrill, 18). Conservation of present water sources will result in fewer problems later. An April report by the United Nations and Stockholm Environment Institute predicted that by the year 2025 two thirds of the worlds population will be affected by water shortages (Serrill, 18). The less water we use, the less well have to treat with chemicals, and the less energy well need to heat water for showers and sinks.

8.4 Water Consumption at Mount Allison

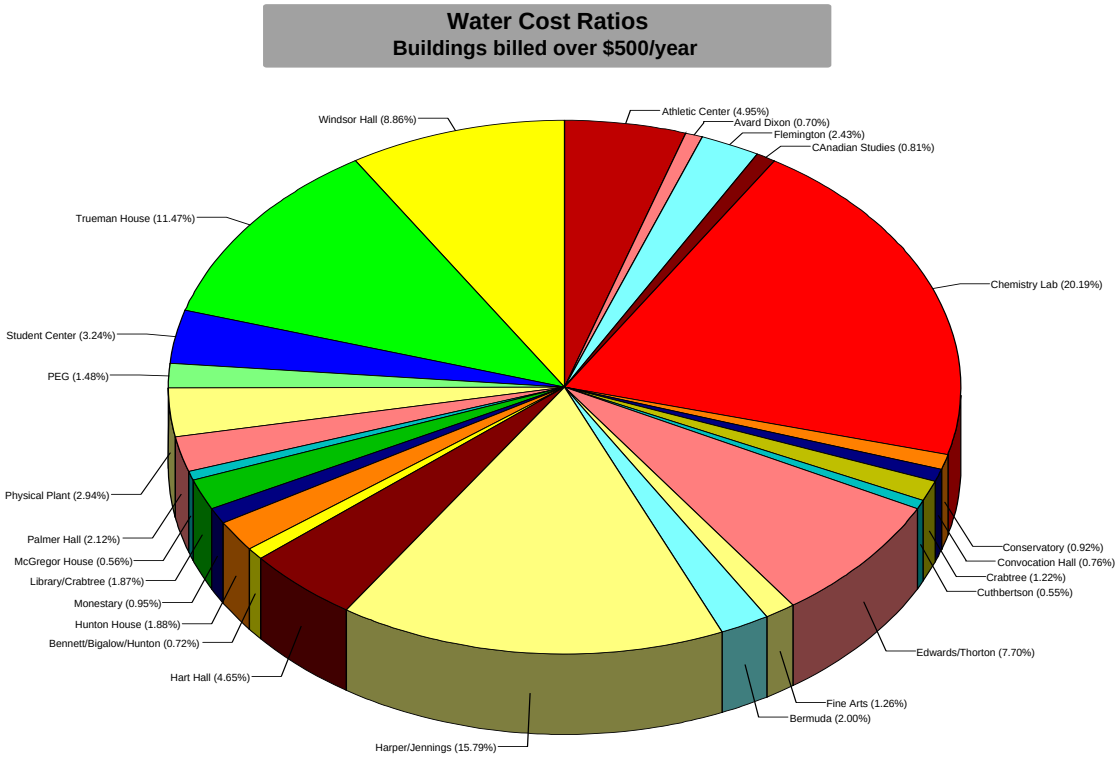
According to Sackville water records, Mount Allison spent over 113 thousand dollars last year on water; thats 73 314 000 litres of water. If we assume there are 2250 students attending Mount Allison, this equals 32 584 litres per student every year or 135.8 litres every day of the school year. This cost is 50% lower than the price payed in 1995/96 when the university was charged using a metering system. Prior to metering, the total cost of water in the town was simply divided among the number of residences. Unfortunately, the metering and billing methods of the Town of Sackville are somewhat dubious and these figures may not be completely accurate.

The water Mount Allison uses comes from the town of Sackville water system which is fed by an underground reservoir (400 feet below ground level). The reservoir level is monitored and therefore not in danger of drying up. The water is first treated with chlorine, and then it is filtered through a sand bed filter system. This process consumes some of the chlorine so the water is then rechlorinated. Water costs us approximately 75 cents per metre cubed. Water was previously stored in an open reservoir but will soon be transferred to a treatment plant 20 feet below ground. This new system is hoped to prevent problems of undrinkable water due to bacteria such as those experienced in the fall of 1997.

In descending order, the locations with highest consumption costs on campus are the Chemistry lab, Harper/Jennings, Trueman/Sodexho Marriott, Windsor, Edwards/Thorton, Athletic Centre and Hart Hall.(See graph 1) The Chemistry Lab uses large amounts of water for cleaning equipment, and for water aspirators used to create vacuums during experiments. Significant water use in Harper and Trueman is due to their large size and residential function, with both building attached to dining halls. Trueman also has the most inefficient sinks and showers of all residences. (See Chart 2) Windsor has the highest number of residents on campus, and Thorton/Edwards are close behind. Edwards water fixtures are the second most

inefficient.(See Chart 2). The 61 showers in the Athletic centre spew out an excessive amount of water. The average flow of showers is 33.2L/min, (The campus water efficient showers use 9.4L/min). Facilities Management is reluctant to replace these showerheads because the Athletic Centre is one of the buildings due for a renovation under the Capital Campaign. Showers replaced now would require an initial payment and although the showers would save water in the interim, they would be redone only a few years later. The surprising amount of water consumed in Hart Hall is due to the photo lab. A 2 inch diameter pipe used for the sandbed filter system in the lab was running constantly. This system has since been replaced with a more efficient one which does not use as much water in the backwash cycle and is less likely to fail, as the other system was prone to do.

Flushtron toilets are used in Thorton, Bennett, Harper, Trueman, Windsor, Edwards, Avard Dixon, Library, Athletic Centre, Convocation Hall, Hunton, and the PEG..



They use significantly less water than the old toilets at approximately 9.4 litres per flush . Old toilets have tanks that use twice that amount, although the tanks that they are now being replaced with use only 3.6 litres. Flushtron toile can not replace those with tanks or vice versa because each uses a different plumbing system. It has been estimated that Mount Allison has saved 8000 cubic metres of water since replacing some toilets with flushtrons.

A survey of water fixtures on campus was conducted. Results from this survey can be found on Chart 2, and the conclusions were the following;

- There are 21 non-flushtron (22.5L) toilets in residential buildings. Assuming that each resident uses the toilet three times per day, the toilets are flushed 260.4 times per day, using 5859 L of water. Low flow toilets (1.6L) would reduce this to 416.6 L.
- There are approximately 410 sinks in the residential buildings. They use approximately 82 839.5L/day. Low flow sinks (3.3L/min) would decrease this quantity to 16995L/day
- There are approximately 171

showers in residential buildings. They use approximately 114 944.4L/day. Low flow showerheads would reduce this quantity to 92700L/day.

Water used outside the university buildings is minimal compared to that used indoors. University grounds are not watered due, in part, to a very inefficient watering system. University vehicles are washed every two weeks if they need it. A significant amount of water is used by the fountain in the swan pond. In season, when the fountain is in use it sprays 50 litres of water per minute. This water is not recirculated and overflow goes into the marsh. The quantity of water used by the fountain was not recognized until the town realized the university was not paying for this water. In fact, it was the town which was paying the cost of approximately $10 000 a year. When requested to pay the fountain water bill, Mount Allison considered shutting it down. However, because the pond is a tourist attraction the town did not want the university to do so. A proposal that the town pay for a well to be dug to supply the fountain water, at the cost of about $3500 plus HST, is to be funded by the Rotary Club.

Sewage is treated in Sackville by the aeration method. Every day 5.8 million gallons of water are channeled into a large lagoon (Clarke, 10). There the water sits to allow waste to settle at the bottom. Water from the top then flows back into local streams/rivers and into the Bay of Fundy. The resevoir is drained when needed to clean the sludge off of the bottom. The Lagoons were last dredged in 1991/92 and the sludge was sent to a landfill site.

8.5 Case Study

Brown University has taken several water-saving initiatives:

Low-flow Showerheads and Toilets

A retrofit of low-flow showerheads was completed in all dormitories in 1991 and 1992. The heads reduce flows from an original 3.5 gallons per minute to approximately 2 gallons per minute, average. The original estimated savings from the project was 5.6 million gallons per year. A recent follow up study indicated user satisfaction is high and savings are higher than originally estimated (Figure 4). In the spring of 1993, a retrofit project of 190 fixtures was completed in all athletic facility buildings. A newer showerhead was used in these installations that avoids some of the problems of clogging and "cold aeration" associated with earlier types of showerheads. Renovations to dormitory spaces now include specifications for 1.5 gpm toilets and flush valves.

Process Cooling

Major renovations in laboratory building mechanical systems include improved water management. Measures include improved process cooling systems for laboratory equipment that significantly reduce water consumption of older "once-through" cooling systems.

Campus Water Audit

A complete audit of water metre quantity, accuracy, and locations was recently completed by The Department of Plant Operations. There are 292 metres for 252 buildings. A student study investigated other campus audit efforts and explored opportunities to conduct comprehensive audit with the local sewage authority . The study included estimates of the potential savings of comprehensive retrofit measures. On the basis of the students' estimate that 34% savings are possible by continuing the types of conservation measures Brown has been implementing. Brown could save approximately 120 million gallons of water (160,000 hcf) annually after all measures are completed. This could equate to annual savings of nearly $300,000.

Source: **Brown Is Green** web site

8.6 Recommendations

For Senior Administration:

When replacing plumbing systems make it a university policy to incorporate water efficient designs (consider grey water options) and fixtures (shower heads, toilets, and faucets), and retrofit old buildings.

1. In the new design for the athletic centre, incorporate low flow showers.

2. Challenge residences to reduce their water usage with the agreement that the one that saves most per capita will receive the net amount the house saved.

For Staff:

3. Replace shower heads in McGregor and Thorton as soon as possible

4. Wash vehicles a maximum of once a month

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 etc. all together rather than individually).

7. The Chemistry Lab may also want to seriously consider a recirculation pump for the aspirator.

8. Conserve water on an individual basis

For Students:

9. Limit shower length to about 8 minutes

10. Turn off sink taps when your brushing your teeth

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

12. Use biodegradable shampoos, soap etc.

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

9. Air Quality

9.1 Introduction

Mount Allison is fortunate enough to be situated next to the most productive filtration device in the world. Every year marshlands consume 1.1 kg of CO_2 per square metre, thereby filtering out millions of pollutants from the waste stream (http://dolphin.upenn.edu/~peenenv/audit/). For this reason, the three manifestations of air pollution- global warming, smog and acid rain, remain at respectable levels in the Sackville area. Unfortunately, every academic year over 1 406.6kg of Carbon Dioxide, 4.22kg of Nitrous oxides and 19.7 kg of volatile organic compounds are emitted into the atmosphere by each student at Mount A through electrical consumption. 12814.4 kg of CO_2 per student are emitted every year by the combustion of fossil fuels used to heat the campus. An assessment of air pollution and air quality at Mount Allison is therefore a good indicator of its environmental impact. In pursuit of this, a study of stack emissions from the boilers is currently being conducted by Facilities management.

9.2 Responsible Parties

Air pollution on Mount Allisons campus originates from electricity sources, heating sources, transportation sources and the use of volatile organic chemicals (VOCs).

9.3 Environmental Significance

Carried by wind currents around the world, global air pollution reveals itself in the form of smog, acid rain, global warming, and ozone depletion.

Smog is formed when nitrous oxides and volatile organic compounds react with sunlight to produce ground level ozone. Although atmospheric ozone is a precious commodity, when it is trapped at ground level, the ozone creates noxious yellow clouds that induces asthma and lung damage. Levels below 82 ppm are considered safe.

Acid Rain is caused by sulfur dioxide and nitrous oxides that enter the atmosphere through the burning of fossil fuels and industrial exhaust. In fact, electrical generation accounts for approximately 75% of all US emissions of SO_2, and 38% of all Nitrous Oxide emissions. These chemicals are converted to sulfuric acid and nitric acid when they come into contact with water and produces a rain that is 25 times more acidic than pure rain water. When it reaches the ground, this water corrodes millions of dollars worth of plant life every year and kills many lakes entirely. (Acid Rain Report, Can. Green plan on Environment 1992) In the last decade, Canada has responded to this crisis with stringent regulations outlined by Clean Water Act. The result has been a 50% decrease in SO_2

levels throughout the eastern provinces.

Global Warming is caused by large amounts of carbon dioxide, chlorofluorocarbons, nitrous oxides and methane in the atmosphere. The chart below lists these chemical sources and their effect on the global climate (Penn Environmental Audit, 1996.

Ozone Depletion is caused primarily by the release of chlorofluorocarbons into the environment. When chlorine and fluorine is added to drinking water, a dangerous combination is made that encourages the formation of CFCs. Other sources of CFCs include the coolant used in refrigerators, cleaning solvents, packing materials and air conditioner fluid. After formation, these CFC molecules are virtually indestructible to any natural biodegradation system. They float into the stratosphere and destroy ozone molecules by attracting one of their oxygen atoms. In fact, one CFC molecule has the ability to destroy over 100,000 molecules of atmospheric ozone.

Reduction in the ozone layer leaves the earths mantel more vulnerable to the damaging ultraviolet rays of the sun. These are non visible rays which cause mutations to plant and animal life on earth.

Within the last decade, much has been done to reduce the emissions of air pollutants in industrialized countries. The Montreal Protocol of 1988(Government of Canada Report, 1992) called for a global reduction in the use of CFCs and its acceptance by over 150 countries has translated into huge reductions in ozone depletion. Similarly, levels of Sulfur Dioxide, Nitrogen Dioxide and Carbon Monoxide have decreased from a national average of 10 safety level exceedences in 1972 to less than 1 exceedence in 1992 (State of the Environment report, 1994). Unfortunately, developing countries cannot afford to discourage industrial growth with regulations on pollution emissions and they continue to expel large volumes of toxic chemicals every year. These enter the global air stream and are breathed by ecological communities that may be continents away.

9.4 Air Quality at Mount Allison

NB Power is the current supplier of electricity to the university. It is a crown corporation and is therefore regulated by the government. *Imperial Oil* supplies the oil used to heat the university campus and all buildings owned by the university. Both of these contracts are maintained by Financial Services under the direction of the controller and the Purchasing Manager. The seven vehicles owned by Mount Allison are maintained by Facilities Management and are the responsibility of the director; two more are run by Sodexho Marriott and Central Stores. Student and community automobile use is unregulated by the university and no means of centralized transportation other than taxis exist within the Sackville community. A small percentage of the student population use automobile transportation to get to school. In the staff environmental survey, 47% of all respondents used their cars to travel into work. Most goods transported onto campus arrive in vehicles owned by companies under contract. These include: *Coca-Cola, Imperial Oil,* Food Supplies, Paper and Book supplies, chemicals and technological equipment from Dell.

Figure 9 Impacts of Common Chemical Pollutants

Chemical	Impact
Methane(CH_4)	20 X more effective in trapping heat than CO_2. Produced by anaerobic organisms and bovine waste. Annual growth rate is 2%.
Nitrous Oxide(NO_2)	Produced by bacteria, fertilizers and combustion of fossil fuels. Destroys ozone and causes acid rain. Increasing at a rate of 0.3% per year and is currently 29% of earths atmosphere. All cars release approximately 10.7 million tons per year.
ChloroFlouroCarbons (CFCs)	Used as coolants, in packing materials and solvents. Traps heat 20,000 X more effectively than CO_2. It is not destroyed or dissolved by any natural substance and is therefore indestructible. One CFC molecule can destroy over 10,000 molecules of ozone. It has an atmospheric growth rate of 5-7% per year.
Carbon Dioxide(CO_2)	Blamed for 50% of all global warming. Levels have risen 25% in the last 150 years, and now compose 0.3% of atmosphere. Rainforest consumes 1-2 kg of carbon per square metre per year. Field of crops consumes only 0.5 $kg/m^2/a$. Annual rate of increase is 0.4% per year, or 10 to the tenth metric tons. Caused by burning of fossil fuels. Electrical generation accounts for approximately 35% of all US emissions of CO_2.

Volatile organic chemicals are used on campus by the carpentry and cleaning department as well as the students. Material information sheets listing these chemicals are provided for employees by university department heads, however, the use of VOCs by the student body is unregulated.

NB power derives 20% of their energy from coal, 12% from gas and approximately 10% from noxious pollutants. Assuming that each of these forms releases approximately 1kg of CO_2 and 3g of nitrous oxides per Kwh, the university emits

422 862 .8kg of CO_2 and 12 686 kg of Nitrous Oxides into the atmosphere every year to satiate its electrical demands.

In addition to electricity, 2491400 litres of heavy oil are burned every year in order to provide the campus with heat.

There are 9 vehicles on campus and together they release approximately 49420 kg of CO_2 into the atmosphere. For every additional vehicle used by a member of the Mount Allison community, 7060000 g of CO_2 are released into the atmosphere. For every gallon of gas burned 11000g of CO_2 enters the air.

Toxic fumes are also released by the chemistry department, however, these are in extremely small trace quantities and are filtered before they are released. The auditors did not investigate the disposal or filtration method of these fumes.

The largest portion of Sackville air pollution arrives from the Northeastern United States and the industrial regions of southeastern Ontario. 81% of surface air parcels from the Fundy Hills area arrives from the US, while 56% of the ceiling parcels arrive from the Great Lake region. The long travelling distances of these air parcels causes the unindustrialized region of Sackville to have slightly elevated smog levels. Between May and September, the Fundy Hills region had 52 hours of smog exceedences. In comparison, Point Lepreau, (home of the NB power generating station) had 275hrs and the region of Shearwater had 25hrs of exceedences. Of these exceedences, 40% occurred at night, but smog requires sunlight to form. This statistic

suggests that a large portion of Sackville smog was not created here, but arrived in air parcels.

9.5 Case Studies

The University of Kansas established an Environmental Ombudsperson office in 1990. The office is responsible for researching the campus environmental impact and implementing programs that contribute to environmental progress. In the first 6 months of its Freon recovery program, the office recaptured 3400 lbs of Freon, or about half of the total purchases by the campus, saving the university $15 000.

The project was part of the office's effort to reduce the use of ozone depleting compounds including freon, chlorofluorocarbons, halons found in fire extinguishers, and carbon tetrachloride found in laboratories.

9.6 Recommendations

For Senior Administration:

1. Implement systems to reduce energy consumption such as those suggested in the energy audit.

2. When the cost of the alternative energy source is less than 5% more expensive, commit to implementing energy sources which do not create air pollution (e.g. Wind and solar energy) For more information, please refer to the chapter on energy.

3. Research and replace halon fire extinguishers with less toxic alternatives wherever possible.

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

For Staff, Faculty and Students:

5. Car Pool.

6. Car pooling in pairs travelling 14 km per day, reduces emissions by 50% and eliminates 75 lbs of hydrocarbons, 30lbs of nitrous oxides, 550 lbs of carbon monoxide and 9900 lbs of carbon dioxide from the atmosphere every two weeks.

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

8. Reduce energy and heating consumption whenever possible. (see chapter on energy)

10. Transportation

10.1 Introduction

Traffic in Sackville is generally not a large concern, however global warming is of great concern and alternative modes of transportation should be used whenever possible. The small campus and town make it an ideal location for cycling and walking.

10.2. Environmental Significance

Todays culture relies heavily on the convenience of automobiles. The quick trip to the corner store for a forgotten ingredient. The warm and dry interior on a cold and rainy day. Unfortunately, like many other conveniences, we often turn to cars out of habit rather than necessity. This reflex does not come without a cost. Cars in Canada account for 10% of Carbon dioxide emissions which are a key cause of what is being called: the greenhouse effect or global warming.(Source: Environment Canada, Office of Environmental Citizenship, Atmospheric Environment Service: A Matter of Degrees, A Primer On Global Warming, 1993) Global warming is a result of gases like Carbon Dioxide trapping the heat from the sun and causing an increase in the mean surface temperature of the earth. The effects of global warming will be far reaching and have terrifying implications, from violent storms to severe draughts to the extinction of countless plant and animal species. Already, green house effects can be seen. Increased temperatures are causing glaciers to shrink and rising sea levels are to blame for disappearing coastlines. Despite all this, no country outside of Europe, including Canada, will meet the Rio Earth Summit target of stabilizing green house gas emissions to 1990 levels by the year 2000. Canadas emissions have already increased 8-13% *above* 1990 levels.

Although individual impact may be small, no one is exempt from taking responsibility for their actions. Among other things, using cars as little as possible is a key method to decrease Carbon Dioxide emissions in Canada and to therefore slow and eventually stop the effects of Climate Change.

10.3 Transportation At Mount Allison

Mount Allison has been innovative in its campus design. The central campus, enclosed by Salem St, Main St, and York St, is almost exclusively for pedestrian use. The only exceptions to this rule are the seven vehicles owned by the University and operated by Facilities management, Sodexho Marriott, and Support Services. They are used for the following services:

- Garbage/Moving truck
- Snowplowing vehicle used for miscellaneous tasks in the summer
- Pick-up truck to transport plumbing tools and supplies
- Van to transport electrical tools and supplies
- Pick-up truck to transport carpentry tools and supplies
- Van to transport carpentry tools and supplies.
- Pick-up truck to transport custodial tools and supplies
- Support Services van for delivering mail
- Sodexho Marriott van for delivering food

The garbage truck is run on diesel and the remaining are fuelled by gas. There are several car companies that are now offering green vehicles. Ford has a two-passenger delivery van which is powered by electricity called the *Ecostar*. They also have an electric truck called the *Ford Ranger EV*. Honda has a car called the *EV Plus* which is also powered on electricity. Electric vehicles are typically best for those who use them for less than 100 miles a day. Mount Allison vehicles have low mileage as they are almost exclusively used around campus. Propane is also a more environmentally friendly alternative to gasoline as it is cleaner burning. GM has three different vehicles: the *Vectra, Omega,* and *Combo* that are duel fuel (propane and gas). Propane is available at the Irving by the highway. Toyota has done

significant research into greener vehicles, including fuel cell technology. These alternatives are still significantly more expensive than regular vehicles (especially the electric ones). See the Ford, Honda, GM and Toyota websites for more information.

Pedestrians has been encouraged by a winding path system designed to follow the natural movement of students and faculty around campus and to minimize damage to the grounds caused by undesignated pathways. Unfortunately students continue to create their own pathways as shortcuts across campus. This apparently harmless activity actually cost the university $4000 last year to repair and replace damaged grass. In addition, last fall, a large Oak tree in front of Centennial Hall had to be cut down as its root system had been destroyed when the earth around its base was compacted by pedestrian traffic.

Transportation by foot or bike is also encouraged by the small size of Sackville and the high percentage of students that live in residence. There are six bike racks on campus with a total capacity for about 50 bikes.

Mount Allison does not charge for parking. It is believed that this would be counter-productive as Sackville does not have any metres so parking would shift onto the streets.

To encourage car-pooling a new Drive board has been put up in the STUD. Some students are already active car-poolers for financial reasons.

According to the Environmental Audit Survey, 49% of staff and faculty at the university use a car to get to work, 36% walk or cycle, and 15% use a combination of car and walking or cycling. The distance traveled by those who drive to work varies from 0.5 km to 60 km, with an average distance of 13.1km. 43.5% of respondents live 5 km away or less. (See Chapter 12 for the Environmental Audit Survey Results)

10.4 Case Study

In the fall of 1993, six highly fuel efficient compact service vehicles were added to the Connecticut College fleet. The vehicles have a rating of approximately 48 miles per gallon, as opposed to the normal van in the fleet that has a rating of approximately 8 miles per gallon. This 600% improvement in gas mileage has lightened the college's fuel costs and has significantly lowered the amount of greenhouse gas emissions from the college fleet.

These extremely low maintenance vehicles are considered a great success, and the college aims to eventually replace most of the fleet vehicles with them. (Connecticut Green website)

10.5 Recommendations

For Senior Administration:

1. Bike racks are currently located outside the STUD, Avard Dixon, the PEG, Athletic Centre and the Library. Additional racks outside Flemington, Barclay, the CLT and Centennial Hall would encourage faculty and off campus students to bike rather than drive to class.

2. Hedges planted in areas where people cut corners could prevent this problem of pedestrian damage.

3. When purchasing a new vehicle the university should seriously consider a green alternative. Besides being better for the environment it would be an extremely good education and PR tool.

For Staff and Faculty:

4. Staff and faculty should be encouraged to car pool as well, and to use the drive board in the STUD.

For Staff, Faculty and Students:

5. For those staff and faculty that live 5 km or less from the university campus, cycling or walking to work is a realistic possibility for most months of the year.

11. Buildings

11.1 Introduction

A building is essentially similar to a human body. It must be maintained on a daily basis and long term plans must be implemented to insure that its health is protected. In the case of damage or disrepair, there must be funds which have been set aside to pay for the repair of its structure. Buildings and humans share another characteristic; they are both made of materials taken from the earth and will both return to the earth at some time. The use of these materials and their resulting impact on the ecosystem necessitates that a comprehensive survey of campus buildings be included in an environmental audit of the campus.

The minimization of environmental impacts in the design of Mount Allison buildings has been a peripheral concern to date. .Although fund restrictions have been cited as reason for this oversight, many options such as passive solar design, optimal use of building materials and building location involve no additional cost. Environmental initiatives have been limited to the retrofitting of fixtures around campus, in an effort to save energy and money**.**

11.2 Responsible Parties

All buildings on campus are maintained by the Facilities Management Department. This department employs 3 carpenters, 2 plumbers, 1 electrician, 1 heating technician, 2 utility workers and 40 custodians to address the daily maintenance needs of all buildings owned by Mount Allison. Their tasks are directed by the director, the technology services manager, the custodial senior supervisor, the project manager and the trade supervisor. The aims of the department are 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).

The department is responsible for the upkeep and minor repairs of all buildings on campus. A need for repairs, major renovations, or the construction of a new building is reported by employees to the Facilities Director. When funds are sufficient, the director requests proposals from the architects to design the project and prepare drawings and specifications for construction. The contract is then tendered out and the lowest bidder awarded the contract. After final approval from the president, a contract agreement is drawn between

the company and the university. Under normal proprietor agreements, the procedures and materials used by a contracted company are not disclosed.

11.3 Environmental Context

Construction and Development waste comprises one third of all solid waste produced in Canada. This represents approximately 11 million tonnes of waste. Included are such substances as the following (Fischer and Leff, 1996)

Figure 10: Some Common Building Hazards

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 Florescent 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	Taken from rainforests

The adverse effects of these substances could be controlled if they were recycled and used in future buildings. Preserving and designing efficient buildings reduces needless pollution and environmental degradation.

11.3 Buildings on Mount Allison Campus

Approximately $1.5 million is spent each year on building maintenance, however there is a list of deferred maintenance projects totaling 25 million dollars which needs to be addressed. The construction of most new buildings on campus is accomplished only with the support of large grants from government sources or Capital Campaign funds. The Capital Campaign is a large campaign requesting donations from alumni and private businesses. The fund is aimed at academic,

Athletic, and building facilities at Mount Allison. $8.1 million dollars is hoped to be raised for building projects including;

- Improvements to the Library.
- Renovations on the Athletic Centre.
- Renovations on the University Centre.
- Renovations on the PEG.
- The closing of the McConnell meal hall which will be vacated due to the opening of a renovated Jennings meal hall.

The university is requesting funds to complete a full building assessment survey on campus, however, there is currently no long term campus building plan or building restoration plan. To the auditors' knowledge there is no involvement by neighbourhood groups in monitoring campus expansion issues. In the past, this lack of harmonization has caused oversights and conflicts in building plans.

The map in Appendix W lists all names and the location of all buildings on university property. There are currently 47 buildings on campus covering a total of approximately 300,000 square feet. Twelve of these buildings totaling 18 323 square feet have wood frames, while most of the others have steel or concrete frames.

The stone facing on most buildings was taken from a local quarry owned by Mount Allison. Chart 9a-c lists the age, use and structure of every building on campus, however information concerning the insulation of buildings was not found.

There are over 3041 windows on campus and 497 of these are single paned. (See chart 12 for information on widow quantity per building) Every square metre of single glazed windows releases 2.45 W more of heat per Kelvin difference of temperature between the outdoor and indoor , and the single paned windows on campus cover a surface area of approximately 985.65 square feet. Assuming on an average day in Sackville there is a 10 degree difference between the indoor and outdoor temperature, over 9487 KWh of heat are lost every year due to the single panes. This translates into $64,137.58 per year where heating costs are an average of 6.76 cents per kWh (NB Power, 1997). Such a sum does not include the additional heat loss caused by the wind velocity of the region.

Approximately 20 buildings on campus were purchased by the university, or given as a donation. The others were designed and constructed under contract by various firms. Notable among these firms is Foundations of Canada Ltd, Brown Brisley and Brown Assoc. and Arsenault Architecture Firm. To the auditors knowledge, no environmental guidelines were outlined in any contract agreements with these companies and the companies have no environmental policies of their own. Furthermore, there are no recorded attempts made by the university or the contracted companies to reduce the environmental impact of the building through construction or design, apart from adherence to the building codes of the time. Mount Allison University continues to have no comprehensive building policy. Recently, however, a step was taken in this direction when environmentally responsible building design options were requested for the renovation of the PEG.

With renovations and repairs, the university continues to upgrade its building structures to meet federal building standards regulating plumbing, electricity, and insulation, however many of the older buildings still fall short.

General Maintenance of the buildings performed by the carpentry shop is done using water based paints and non-toxic materials wherever possible. There are also a number of maintenance activities contracted out to other companies. Work such as retarring the roofs (approx. Every 10 years), cleaning or re-pointing the exterior stone facing, and cleaning the windows is done by companies contracted by the university. (See hazardous materials and procurement section for more information)

All solid waste produced by the general maintenance of these buildings, is discarded by the carpentry shop and removed by Tantramar Trucking and Sanitation to the landfill in Moncton. Notable exceptions to this disposal method are wood scraps and oil based paint. All wood scraps are burned, while the small quantity of oil paint containers used on campus are wrapped in plastic and removed to a hazardous waste landfill site.

11.4 Case Studies

Audubon Society of America

The restoration of the Audubon House was a major success in the history of environmentally friendly building design. The House was built in 1891 and covers 98,000 square feet. The restored building

[35]Single panes release 5.05 w/m2 Kelvin and double panes release 2.61 w/m2 Kelvin. Information provided by George Dashner, NB Power and http:www.roofhelp.com/rvalue.htm, July 17, 1998.

now uses 62% less energy than the conventional New York City code-compliant office buildings. Energy efficient features including a thermal shell and efficient lighting fixtures saves the Society $10,000 each year, reducing Audubons energy costs by 64%. The basic renovation and design costs were completed at a cost of $122 per square foot. This is well within the average market rate of $120.12/sq. foot for projects in the area. The office design reduces watts of electricity used for lighting from 2.4 Watts per square foot to 0.6 watts. The use of a gas fired chiller/heater eliminates all sulfur dioxide emissions and reduces nitrous oxide emissions by 60%.

Source: http://www.audubon.org/nas/ah/index.html

11.5 Recommendations

For Senior Administration:

It is proposed that an Environmental Building Policy be implemented on campus. This policy would demand the following items:

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

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

3. An obligation be made 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 carpet/tile, furniture
   d) Low toxicity floor and wall coverings
   e) Retrofitted 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.

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

5. Encourage the reduction of toxic chemicals by providing funds for the purchase of non-toxic alternatives.

6. Establish a long term building plan for the university. This should outline tentative construction dates for future buildings and those needing replacement within the next 30 years. Set goals on capacity, energy use, building quality and

design. Begin a long term building fund.

7. Conduct an assessment of all buildings on campus. Take note of areas that will need replacement or repair within the next 10 years. Continue to keep accurate and accessible records of building maintenance done.

For Staff:

8. As the front line in building maintenance, staff members are often aware of a building defect long before it is corrected or replaced. Staff members should be encouraged to get feedback from faculty and students on the problem areas of every building and record their concerns.

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

10. When replacing building materials, recommend the use of environmentally friendly alternatives. E.g. paint, lights, ventilation etc.

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

For Faculty:

12. Support extending the Facilities Management fund for specific and selected problems and projects (e.g. new ventilation systems, renewable energy systems)

13. Support the implementation of the environmental building policy

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

For Students:

15. Kindly report any building defects you notice to Facilities Management Staff, by phone or E-mail at fixit@mta.ca.

16. Treat buildings with the same care you give your own multimillion dollar belongings. Directly or indirectly you will be paying for repairs and construction of all buildings on campus.

12. Finances

12.1 Introduction

The prerequisite for the arrival, use and disposal of all resources on campus is financial funding. Without these funds, food, paper and even faculty would not be obtained by the university. It is therefore essential to examine the sources and use of these funds in order to complete a comprehensive analysis of Mount Allisons environmental impact.

12.2 University Funding

The university is a public corporation which receives its funding from the following sources. This reflects a 1.6% reduction in the provincial operating grant of the university and a 3.2% increase in fees for a full-time student in residence from last years budget.

The consolidated funds received for this year total $34 438 058.00. If it is assumed that there are 2250 students on campus, the funds available per student are:

Figure 11: Funding Sources

Source	Dollars
Alumni Donations	61.00
Book Sales, Conference Rentals	1178.50
Residence fees	7362.08
Student Fees	5816.02
Endowment and Trust Funds	872.43
Total funds per student	**15, 305.80**

The environmental accountability of these sources vary.

The provincial government of New Brunswick has a department of environment dedicated to:

providing leadership in protecting and enhancing the environment and thereby contributing to the environmental, social and economic sustainability of NB for present and future generations".
Source: **http://www.gov.nb.ca/environm/index.htm**

However, the government does not have a comprehensive environmental policy or purchasing policy distinct from those outlined in the Federal Canadian Green Plan.

As young, educated adults of the First World, the student body represents the most powerful group of consumers in the world. Their representative body, the Student Administrative Council makes attempts to use responsible office practices, but currently has no

environmental policy. To the auditors knowledge, the groups which rent university property for conferences are not screened for environmental responsibility. The Alumni are represented by the Mount Allison Alumni Association and they have no official environmental guidelines in place. 2190600 sheets of paper are used every year in mailings by the Alumni and External relations office and none of this is recycled. Decisions concerning the allocation of these funds and the operation of the university are controlled primarily by the Board of Regents. The distribution of funds within Mount Allison is currently as follows: Each student's portion of $15 305.80 is divided among university departments:

Figure 11- Funding per Department

Department	Dollars
Faculty of Arts	2204.00
Faculty of Social Sciences	933.65
Faculty of Science	1897.90
Academic Affairs and Continuing Education Department	749.98
Computing Services	459.17
Library receives	765.29
Facilities Management Department and Capitol Projects	2999.93
University Services	2066.28
Residences, Food Services and Bookstore	1984.40
Other Budgets	1040.79
Interfund Transfers	229.58
Total	**15 308.80**

This breakdown gives a crude analysis of the areas in which the university spends its money.

The allocation of funds to each department in both academic and non-academic sectors is determined by the budget committee and approved by the Board.

Funding for research purposes is received from sources separate from those listed above. According to the financial statements of April 30, 1998, the university faculty received $1 223 049.00 for funding. The major sources of this funding were:

Agency……..$

SSHRC (Social Sciences and Humanities Research).124,615
MRC (medical research fund of NB)…….. 17,367
NSERC (National Research Council of Canada).…..682,150

Each of the professors applies for research funding on an individual basis. It is therefore unclear exactly what research projects are being conducted on campus. Many of the biology and biochemistry projects focus on environmental ecology and Dr. Ollerhead of geography department is currently researching shore erosion in the region. There are potentially many more ongoing research projects which effect the environment, however, the auditors were unable to obtain information on them.

12.3 University Procurement

Faculty or staff wishing to buy a product with university funds submit a request form to the purchasing manager, Dale Creelman.

For such products as lights, fuel and office supplies, the university has standing contract agreements with a tendered company. When one of these products is ordered, the order is automatically filled by this company.

Products bought in extremely large quantities and bulk such as computers and paper are bought through an inter-university tender. Under an inter-university contract, all universities in the Maritime region join together to purchase from one company in order to maximize their purchasing power.

Contract proposals are accepted every year through a central inter-university purchasing office and the lowest suitable bidder is chosen. The auditors were unable to contact the inter-university purchasing office, for information regarding. the existence of environmental policies.

In order to obtain information on the environmental accountability of those companies currently under contract, major suppliers were contracted for information on product information and environmental conduct. The request letter can be found in appendix X and the replies were as follows:

Figure 13 Major Suppliers and Environmental Conduct

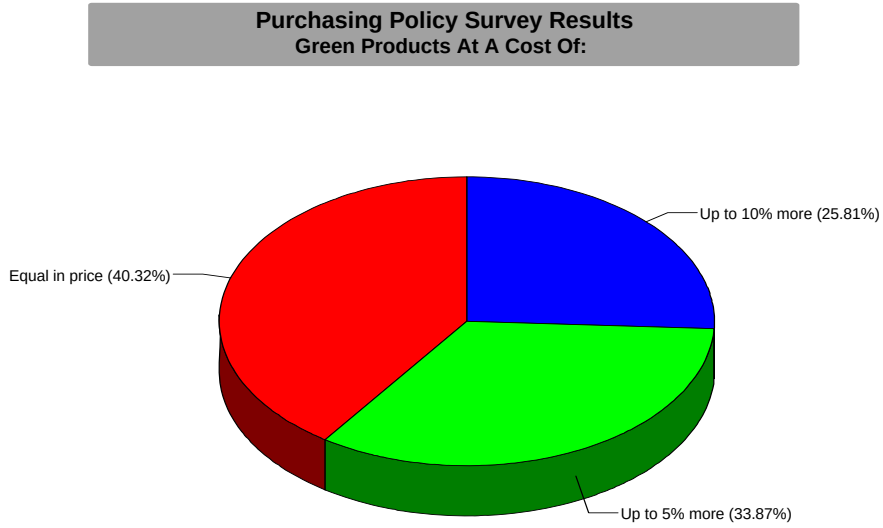
Company	Product	Response

Imperial Oil	Heating Oil	None
Apple Canada	Computers	None
Dell Computer	Computers	None
Digital	Computers	Environmental Health and Safety Will conduct business in manner that conserves the environment and protects safety and health of its employees, customers and community Also has programs in regulated material management, waste minimization, ozone depleting substances elimination program and product take- back and material ecoverytatement
Cumberland Pest Control	Pesticides	Requested information remain confidential
Datarite	Printer toner	None
Kodak	Photography	Website lists environmental procedures and product information
Eddy Group	Plumbing	None
Grand and Toy	Office supplies	Product list of over 400 national environmentally friendly products. Corporation uses waste reduction program. Prints all flyers on recycled paper with vegetable inks.
Litemore	Light bulbs	None
McCurdy Printing Ltd.	Printing	None
Quebecor	Printing	Enviro printer program is a commitment to protect the environment and to the responsible use of our natural resources. Committed to working with governments, workers and community in industry to develop policies and practices that will help ensure a healthy environment for this and future generations (see Appendix H for company guidelines)
Company	**Product**	**Response**
Unisource	Paper	95% of all paper products which Unisource sells contains recycled fibre (this does not necessarily mean it contains post consumer content). *With the exception of commodity grades ie. photocopy paper and #2 envelopes the price of the recycled*

		products are the same. However with these commodity papers, there is a premium price to pay to have recycled content in the sheets. It usually costs 5-7% more due to the physical location of the commodity mills. All of our suppliers in the past five years have addressed the environment issues put forth by the media and public. They have changed the way they make paper from acid based sizers to alkaline based sizers and have mostly become environmentally chlorine free in their bleaching process" (Unisource Canada, Brian Klaus, Sales Manager) .
Xerox	Photocopier	Since 1990 they have had 74% decrease in solid waste, 150% increase in factory recycle rate and since 1989, a 95% reduction in releases. Environmental Policy *Committed to the protection of the environment and the health and safety of customers, employees and neighbours. This commitment is applied worldwide."* Extensive environmental procedures in place (for list of principles on design, manufacture, procurement, marketing, distribution, maintenance, reuse/recycling and disposal see appendix I) Environmental website; http://www.xerox.com/environment.html

Products ordered in smaller quantities or on a sporadic basis are not covered by the standing contracts and are bought from the supplier with the lowest price. These companies are under short term contract agreements and environmental guidelines are generally not requested from them.

Mount Allisons purchasing control is reliant on its contract agreements. In these documents the desired specifications and product use is defined. There are currently few environmental specifications in contract agreements. Purchasing control is limited further by financial restraints. The monetary advantages of buying in bulk often outweigh the advantages of choosing an environmentally friendly product. Because some products are bought through a consortium there is very little purchasing control by the university.



The money used to pay for any ordered product is deducted from the departmental budget of the staff or faculty. The auditors requested, but did not receive, information concerning the total purchasing expenditures of the university and the purchasing expenditures of each department. The auditors also requested information concerning the proportion of expenditures attributed to inter-university tenders, university tenders and casual tenders, however this was not received. Without this information it is impossible for the auditors to assess the direct control Mount Allison wields over the products and contracts it receives.

The budgets are spent at the discretion of the department, therefore some departments may choose to spend money on computers or paper, while others will spend it on research.

The university currently abides by the purchasing policy found in Appendix M**.** It stipulates that all contracts must be established by a contract agreement and records must be kept of all business transactions in research, travel and casual purchases.

These are the only official guidelines for purchasing used by Mount

Allison, however, due to the high percentage of funding Mount Allison receives from the provincial government, the university also uses the Atlantic Procurement Agreement as unofficial purchasing protocol. The agreement states that all expenditures on service contracts over $25 000 all goods over $50 000 and all construction over $100 000 are open to public bidding. The proposed contract must be publicly advertised and proposals must be accepted from all suitable tenders. The lowest and most qualified tender is then chosen by the purchasing manager and a contract agreement is drawn. Traditionally, contract agreements concerning Facilities Management have included a series of conditional clauses outlined in the Crown Constructions Act. However I s inclusion was not mandatory and is currently being reviewed.

University Investments

The University investment policy is determined by the Board of Regents investment committee. They select managers and set investment policy on an annual basis.

There are currently 8 separate investment portfolios. Five of these are endowment funds, two are pension funds and one is a short term investment managed by the university and comprised of Royal Bank term deposits and GICs. The investments managed by the university are comprised of a $127K bond managed by the President. Of the remaining investments:

18.4 million is held by Royal Trust and invested by Jaroslowsky Fraser, 39.3 million is held by Canada Trust. $13.4 million of this is managed by Guardian Capital Inc.and the rest is managed by Burgundy Asset Management Ltd.

The auditors did not obtain information on the investment policies of either the bank in which the funds reside or the management firms.

12.4 Case Studies

- The state of New Jersey has a purchasing policy under which agencies must buy recycled products whose cost is within 10% that of the comparable virgin product. This policy gives departments the flexibility to make environmentally friendly purchasing decisions

  Sourrce : **Http://www.princeton.edu/~perc/Percchaps.htm**

- Hampshire College in Massachusetts developed a comprehensive socially responsible investment policy in the 1970's which favour holdings in companies that provide a safe and healthy work environment and demonstrate innovation in environmental protection with regard to product development, adherence to regulations, pollution prevention and waste reduction.
- UCLA 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.

12.5 Recommendations

For Senior Administration:

Sign the Valdez Principles and abide by them in all business transactions (see Appendix U for a copy of the Valdez Principles)
Conduct a complete environmental audit of research projects at Mount Allison and encourage sources to divest funding from those projects with negative implications to the environment and invest in environmentally friendly research.

Conduct a comprehensive audit of all university investments and provide a unified investment portfolio for the public
Establish an Environmental 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.

13. Education

13.1 Introduction

Currently students entering Mount Allison who do not possess the interest or initiative to learn about environmental issues will often leave having gained little or no enlightenment on the subject. Those students who do take courses with environmental content will often complete them still lacking awareness concerning the concrete environmental impact of their actions. Without this understanding, they may fail to accept individual responsibility for their environment.

13.2 Responsible Parties

The University Senate handles the academic affairs of the university.

13.3 Environmental Significance

It is imperative in this time of environmental degradation that students entering the workforce in any field, do so with the dedication and knowledge needed to undo the damage which has been done to the planet; damage described by TIME magazine as The next generations biggest challenge. Not only are graduates with a specialized green knowledge needed (environmental law, engineering, architecture, journalism, planning) but also those with a general environmental literacy who can use their knowledge to make responsible choices as parents, politicians, secretaries, business people, etc., etc..

13.4 Environmental Education At Mount Allison

Mount Allison is currently offering an interdisciplinary Environmental Studies Minor. The minor consists of 24 courses from Geoscience, Geography, Economics, and Philosophy. See appendix D for courses required.

The Environmental Science Double Major was temporarily suspended in Senate this spring. The suspension was triggered by the retirement of a Geoscience professor and supported by many Faculty who felt the program was an inadequate combination of courses with an overly demanding course load. The program is currently under revision and will probably be reintroduced some time this year. In the mean time students entering Mount Allison have been informed that there will be an Environmental Science Major of some kind offered but it may not be the one currently listed in the 1998/1999 course calendar. See Appendix E for the courses required for the original Environmental Science Double Major.

Mount Allison has a total of six courses in Chemistry, Economics, Geography, Geoscience, and Philosophy, which focus on environmental issues. See appendix F for these courses, their descriptions, and prerequisites.

With two exceptions, all of these courses are designed for third or fourth year students possessing a solid background in the subject of choice. Although advanced courses on specific environmental issues are needed and valuable, the prerequisites required for these courses may stop students with majors and interests outside of these five departments from taking the courses.

Mount Allison has courses in Biology, Canadian Studies, Commerce, Geography, Geoscience, History, Political Science, Religious Studies, and Sociology/Anthropology with some environmental content. See Appendix G for these courses, their descriptions and prerequisites.

These courses better represent the academic spectrum of the university with 9 out of 28 departments included. The majority still require prerequisites but there are six which do not.

It is worth noting that several other courses at Mount Allison contain at least some reference to the environment. This often results from the initiative of the professor. For example, in Dr. MacMillans English courses on Canadian Literature, she addresses the ideology of colonialism and imperialism and their implications for the environment. Dr Bogaard weaves environmental content into the Philosophy courses *The History of Science* and *The Philosophy of Science*. Dr. Read includes discussions concerning his research on the neutralization of waste run off in his first year Chemistry course. Although most courses are traditionally taught without addressing environmental issues, the problems and resulting solutions are so broad that they can be integrated into almost any area. Three quarters of the professors who responded to the survey question Do you incorporate environmental content into any of your courses? answered yes. Among the courses that professors listed were: Biochemistry, Native Flora; Geography, Economic Geography, Urbanization, and Regionalism; Geoscience, Dynamics of The Earth; Chemistry, Introductory Chemistry and Chemistry In Modern Society; Physics, General Astronomy, General Physics, Classical Waves, Computing Techniques for Scientists, and Application of Physics in the Life Sciences; Math, Mathematics for Life and Environmental Science; German, Goethe and Schiller, and German Culture and Society from 1870 to the Present; English, Canadian Literature from the Beginnings to 1914, and Literature by Women in the Twentieth Century; and Commerce, Fundamentals of Marketing; Fine Arts, Intermediate Painting. Although a professors understanding of environmental content may vary from a passing comment to several lectures, the list is proof that the environment is connected to everything from waves to war.

The initiative of the teaching staff is showing up in other areas in the form of proposed courses. The Philosophy department is hoping to introduce a first year course that tackles environmental issues. The hiring of a new professor in the Sociology/ Anthropology department with a background in resource management has sparked plans of reintroducing *Ecological Anthropology* and perhaps a new course or two on ethnobotany and traditional resource management. The Geography department also has plans to reintroduce a course on hydrogeology.

Environmental education *outside* the classroom is usually generated through student initiatives. The school year of 1997/98 saw a climate change campaign and press conference, an environmental speakers series, a conference on globalization and the role of youth, an educational art exhibit on International Rivers Day, a campaign to encourage reuse of paper, a Buy Nothing Day campaign, a Protected Areas Strategy campaign and several articles in the campus paper. These events were carried out mainly by members of the Blue Green Society, Friends of Christmas Mountains, and WUSC (World University Services of Canada). A notable event next year will be a Distinguished Speakers Series focusing on the environment.

13.5 Case Studies

Tufts Environmental Literacy Institute:
In 1990 Tufts President Jean Mayer and Dean of Environmental Programs Anthony Cortese launched the Tufts Environmental Literacy Institute (TELI) with the goal that each of the 7 800 students at Tufts would graduate environmental literate. The institutes central feature is a two-week intensive summer workshop in which a multidisciplinary group of faculty comes together to learn about environmental literacy. The workshop is designed to increase environmental knowledge and provide a forum for discussing how environmental information can overlap with the goals of specific courses. (**Blueprint For A Green Campus**)

13.6 Recommendations

For Senior Administration:

1. 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 universitys mission statement.

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

3. Develop a mandatory first year course, which would focus on the problems 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 have successfully completed the mandatory first year course on the environment (if implemented) as well as one other course with a focus on environmental issues. Other methods of earning the certificate might include the completion of two courses with environmental focus, or one with environmental focus and two others with significant environmental content etc. etc. This certificate would be included on the students diploma upon graduation.

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

For Faculty:

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

2. Research environmental issues applicable to your field and green first year courses with high enrollment.

3. When discussing an environmental problem in class be sure to carry through on the subject by informing students of actions they can take. For example: While discussing Global Warming in a Geoscience class, be sure to mention that turning off lights and computers when not in use and walking or cycling rather than driving can help to reduce the greenhouse effect. These suggestions may seem obvious, but it is only through the constant reinforcement of these actions that they will become second nature.

For Students:

1. Take the initiative to educate yourself on environmental issues through books, newspaper, television, etc.

2. Encourage faculty to green their courses through questions and comments in class.

3. Invite guest speakers to your society meeting to discuss relevant environmental issues. For example; The commerce society could have someone speak about environmental cost analysis, or the film society could show a documentary on the destruction of the rain forest

4. Organize and advertise an event such as a Mount A. Earth Day to educate students on environmental issues.

5. Teach by example, bring a reusable cup to *Tim Horton's*, and a reusable bag to the grocery store.

14. Environmental Audit Survey

To increase awareness concerning the environmental practices and beliefs of university employees, a survey was sent out to all faculty and staff in July via mass E-mail. The survey and its results follow:

This summer Mount Allison University has hired two students to conduct a comprehensive environmental audit on campus. In order to provide the auditors with a better idea of campus life, the faculty and staff 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 press the reply code and place an X in the appropriate box or fill out your response. If you wish your response to be anonymous, surveys can be returned to box #2247, however, all responses will remain confidential. Thank you for your help!

1. What method of transportation do you use to commute to work every day?

146 respondents.
69 travel by car.
57 travel by foot or bike.
20 use a combination of car and either foot or bike. Those that used a combination alternated depending on the season/weather, stuff to carry, day of the week, etc., etc.

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

Distances ranged from O.5km to 60km.

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

100% of those that responded to this question answered yes. A few of those who responded stipulated that for some things they would prefer regular paper (ie formal letters)
Rationale: *A common response was simply Why not?*

4. Would you accept assignments via E-mail?

144 respondents
yes: 70
no: 27
N/A: 47

Rationale:

Those that answered yes, included as their reasons:
- *decreased paper use*
- *efficiency*

Those that answered no included as their reasons:
- *too difficult to read and mark (would have to print up anyway)*
- *subject does not lend itself to easy computer usage (some math and language courses requiring special notation)*

5. Would you accept assignments double sided?

143 respondents
yes: 87
no: 10
N/A: 46

Rationale:

Those that answered yes commonly noted reduced paper wastage. Reasons for not accepting assignments double sided included difficulty marking.

6. 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
[ ] equal in price
[ ] other

137 respondents
10%: 36
5%: 48
equal: 53

Rationale:

Respondents noted that the only way that quality and variety will increase and prices decrease for environmentally friendly products is if a market develops for them. Concerns included whether or not the university could afford a policy requiring the purchase of a more expensive (albeit better for the environment) product.

7. 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

132 respondents
10%: 34
5%: 43
equal: 47

Rationale:

See rationale for #6

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

[ ]Yes [ ]No

129 respondents
yes: 27
no: 102

Rationale:

Responses to this question were generally quite passionate. Those who supported herbicide use believed they were necessary to maintain a good image for Mount Allison. Those against herbicides expressed concerns for the health of people and the surrounding environment, as well as money spent in an area they felt was of no use to the university community.

9. Do you incorporate environmental content into any of your courses?

[ ]yes [ ]no [ ]N/A

136 respondents
yes: 38
no: 14
N/A: 84

Rationale:

The large number of N/A responses could be due to professors believing that the environment was not applicable to their subject rather than the response of non-professors.

If yes, which one(s)?
See Education

10. Would you consider the ventilation in the building you work in to be:

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

136 respondents
Very Poor: 26
Poor: 31
Fair: 50
Good: 24
Excellent: 5

Common complaints came from the library, conservatory, and chemistry building. People were more contented in Avard Dixon and the CLT.

11. What areas of wastage do you see in your department and around campus?
An overwhelming number of respondents cited paper as an area of major wastage on campus. Other areas of concern were unneeded lighting and heating.

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

Suggestions included:
- greater use of E-mail
- more recycling containers
- educating people on energy conservation

13. What initiatives have you or your department taken to decrease your environmental impact?

The most popular and often the only response was recycling paper.

As an example of what a department can do on their own initiative here is one persons response:

The Social Sciences took the initiative four years ago to buy blue boxes for each member of the Faculty to have by their desks. It took awhile for some people to use them effectively but now everyone uses them as a matter of course. We also recycle cans and bottles on our own. Phone books are saved and carted to any groups which collects them for fundraising. We also encourage all our staff to photocopy double-sided whenever possible. A number of us try to turn off lights whenever we see them left on inappropriately. We purchased a shredder in 1995 to shred documents which cannot go in the regular recycling. The shredded material can then be sold to a recycling firm. We shred enormous amounts of paper each year. We have also saved the unused portions of test/exam booklets and have them made into scratch pads. It saves us buying scratch pads and our "home-made" cost much less. We almost never throw out padded envelopes we receive in the mail. We reuse them. We reuse computer disks from outdated software. We reuse binders and duo-tangs from old student assignments and outdated handbook

15. Bibliography

15.1 General

ADI Limited, Environmental Review January 19, 1996 Draft, Moncton, Canada: ADI Limited, 1996

Body Shop Environmental Audit, http://www.thebodyshop.ca/whats_in_shop/taking_action/environmental/audit, [June, 1998].

Campus Earth Summit, Blueprint For A Green Campus: The

Campus Earth Summit Initiatives For Higher Education, Washington DC, USA: The Heinz Family Foundation, 1995.

Campus Environmental Audit: University of Pennsylvania, http://dolphin.upenn.edu/~pennenv/audit/, [June, 1998].

Dixon, Thompson, and Serena van Bakel, A Practical Introduction to Environmental Management On Canadian Campuses, Ottawa, Canada: National Round Table On The Environment And The Economy, 1995.

Environment Canada, What We Can Do For Our Environment, Canada: Minister of Supply and Services, 1991

Jeff Lamb, Director of Facilities Management at Mount Allison University. Interview by auditors, June 1998, Sackville, N.B.

Dale Patterson, Dale, Canadian Wildlife Services. Interview by auditors, June 1998, Sackville, N.B.

Princeton Environmental Reform Committee (PERC) Home Page, http://www.princeton.edu/~perc, [June, 1998].

Smith, April A., Campus Ecology: A Guide To Assessing Environmental Quality and Creating Strategies For Change, Venice, California: Living Planet Press, 1993.

University of Oregon Campus Recycling Program, http://darkwing.uoregon.edu/~recycle/, [June, 1998].

Wackernagel, M., Our Ecological Footprint, Canada: New Society Publishers, 1996.

Watgreen: Greening the Campus, http://www.adm.uwaterloo.ca/infowast/watgreen/, [June,1998].

15.2 Natural History

Boyer, George F. Birds of Nova Scotia-New Brunswick Region Occasional Paper #8 2nd edition C.W.S. 1972.

Gillies, John, Sackville Waterfowl Park, Sackville N.B.

McKennah, Colin, Canadian Wildlife Services. Interview by auditors, June 1998, Sackville, N.B.

15.3 University Structure

Barbara Cambell, Director of Community Development and Public Relations for town of Sackville. Interview by auditors, June 1998, Sackville, N.B.

Chris Hunter Housing Manager at Mount Allison University. Interview by auditors, June 1998, Sackville, N.B.

Sam Millar, SAC President at Mount Allison University. Interview by auditors, May 1998, Sackville, N.B.

David Stewart, VP Administration at Mount Allison University. Interview by auditors, June 1998, Sackville, N.B.

Mount Allison University By-Laws

Mount Allison University 1998-1999 Budget

Renaissance Sackville, Sackville New Brunswick: Where You Belong, Renaissance Sackville: `Sackville, Canada, 1996

15.4 History of Environmental Action on Campus

Amelia Clark, Sierra Youth Coalition (former student at Mount Allison University). Interview by auditors, August 1998, Sackville, N.B.

Mark Purdon, former head of Friends Of Christmas Mountains. Interview by auditors, August 1998, Sackville, N.B.

15.5 Energy

Achar, Rajani, Nitikin, David, Otto, Kay, and Pellizzari, Paul, Shopping With A Conscience, Ethicscan Canada Ltd: Etobicoke, ON, 1996.

Atlantic Wind Test Site, Wind Energy Systems: A Buyers Guide, CANMET: Cape North, PEI, 1997.

Canada Centre for Mineral and Energy Technology, Technologies For A Cleaner Environment: Energy Efficiency, Alternative and Renewable Energies, Minister of Supply and Services:Canada, 1991.

Canadian Wind Energy Association, Wind Energy: Basic Information, CanWEA: Calgary, Canada, 1997.

Canadian Wind Energy Association, Wind Energy In Canada: An Action Plan to 2000, CanWEA: Calgary, Canada, 1997.

Canadian Wind Energy Association, Canadian Wind Energy Industry Directory, CanWEA: Calgary, Canada, 1997.

Carl Brothers, Wind Test Site. Interview by auditors, August 1998, Sackville, N.B.

Peter Crawshaw Network Manger in Computer Services at Mount Allison University. Interview by auditors, June 1998, Sackville, N.B.

George Dashner, Energy Management Specialist at NB Power. Interview by auditors, June 1998, Sackville, N.B.

Perry Eldridge, Technical Services Manager at Mount Allison University. Interview by auditors, June 1998, Sackville, N.B.

Electric Power Act, Queens Printer For New Brunswick: New Brunswick Canada, 1996.

Flavin, Christopher, TIME Special Issue: Our Precious Planet, Clean As A Breeze, November, 1997.

Landis and Staefa, Facility Efficiency Consulting Overview, Landis and Staefa: 1998.

Natural Resources Cananda, Renewable Energy Deployment Initiative, Her Majesty The Queen in Right of Canada: Ottawa, Ontario, 1998

Natural Resources Canada, Solar Water Heaters: A Buyers Guide,

NB Power, NB Power Environmental Report 1996, NB Power: Fredericton New Brunswick, 1996.

NB Power, Monthly Electric Rates October 1, 1997, General Service II; Balance kWh costs

Raye, Thomas, Photovoltaic Systems: A Buyers Guide, Natural Resources Canada: Ottawa, Canada, 1995.

STEM Report, Savings through Energy Management, Report fpr Centennial CVI. Guelph, Ontario.

Glen Wilson, NB Power. Interview by auditors, June 1998, Fredriction, N.B.

15.6 Hazardous Waste

Acid Rain: Building on Success, Government of Canada Report, Se

Dr., Ronald Aiken, Head/Professor of Biology at Mount Allison University. Interview by auditors, July 1998, Sackville, N.B.

ADI Ltd, Environmental Review performed, January 1996

Dr., Douglas Cambell, Assistant Professor of Biology at Mount Allison University. Interview by auditors, July 1998, Sackville, N.B.

Carson, Rachel, Silent Spring, New York: Fawcett Crest Printing, 1962.

George DeBenedetti, Professor of Economics at Mount Allison University. Interview by auditors, June 1998, Sackville, N.B.

Information taken from the Pennsylvania Environmental Audit, http://dolphin.upenn.edu/~pennenv/audit/

Audrey Kenny, Custodial Supervisor at Mount Allison University. Interview by auditors, July 1998, Sackville, N.B.

Kerry, Julian Ecodemia, National Wildlife Foundation, Washington, D.C. 1995, pg. 160-66)

Macleans, Solutions At Home, September 17, 1990 pg. 44ptember 1992 .

Mike Murphy, Manager of Environmental Services in Facilities Management at Dalhousie University. Interview by auditors, July 1998, Halifax, NS

State of the Environment Reporting, Environment Canada Reporting, SOE Bulletin #94-2 Feb, 1994

Jack Stewart, Dean of Science at Mount Allison University. Interview by auditors, August 1998, Sackville, N.B.

Theodore, Mary K. And Louis Major Environmental Issue Facing the 20th Century .1996 Prentice-Hall

Wynberg, Debby, Supervisor of Grounds at Mount Allison University. Interview by auditors, July 1998, Sackville, N.B.

15.7 Solid Waste

Tim Bezel, Custodial Manager at Mount Allison University. Interview by auditors, May 1998, Sackville, N.B.

Clarke, Amelia., Modelling and Analysis of Waste Flow in a Campus Ecosystem, Focusing on the Human Impact, Amelia C. Clarke: Sackville New Brunswick, 1995.

Geography 4521, Recycling Plan for the Community of Sackville and Mount Allison University, Geography 4521: Sackville, New Brunswick, 1998.

Pagen, Jeffery Landfill-Safer by Design, March 1996

Vince Smyth, Director of Administrative Services/Security. Interview by auditors, June 1998, Sackville, N.B.

15.8 Education

Jeff Hollet, Assistant VP at Mount Allison University. Interview by auditors, July 1998, Sackville, N.B.

Mount Allison University, Mount Allison University Calendar 1998-99, Mount Allison University: Sackville, New Brunswick, 1998.

15.9 Procurement Policies

Dale Creelman, Purchasing Manager at Mount Allison University.

Interview by auditors, June 1998, Sackville, N.B.

15.10 Water

Environment Canada, A Primer on Fresh Water: The Environmental Citizenship Series, Environment Canada, 1994.

Michelle Chase, Sackville Town Hall. Interview by auditors, June 1998, Sackville, N.B.

Serrill, Micheal S., TIME Special Issue: Our Precious Planet, Wells Running Dry, November 1997.

15.11 Air Quality

Tom Clare, Canadian Wildlife Services. Interview by auditors, June 1998, Sackville, N.B.

15.12 Food Services

Endangered Earth Update Time Dec. 18, 1989,

Information obtained through information with Westmoreland Solid Waste Corporation representative Bill Slater, June 9, 1998.

Hallowell, Christopher, TIME Special Issue: Our Precious Planet, Will The World Go Hungry?, November 1997.

Mark Henchey, Director of Food Services at Mount Allison University. Interview by auditors, June 1998, Sackville, N.B.

Macleans, The Environment, Sept. 1989, pg.44

Myers, N. What Ails the Globe. Interntaional Wildlife, 1993.

Time Dec. 18, 1989, Endangered Earth Update

15.13 Paper

Serrill, Micheal S., TIME Special Issue: Our Precious Planet, Ghosts of The Forest, November 1997.

Michell Strain, Manager of Support Services at Mount Allison University. Interview by auditors, July 1998, Sackville, N.B.

Theodore, Mary and Louise, Major Environmental Issues Facing the 20th Century: 1996.

16. Appendices

consistency with industry standards and internal procedures

Environmental Protection Plan
NB Power provides a framework of objectives and procedures to Assisi its employees in meeting utility commitment of environmental protection

Partnership:

NB Power strives to ensure its Environmental Policy is respected by all its partners including contractors, consultants, and suppliers of goods and services.

(NB Power Environmental Report, 1996)

Appendix C Bulk E-Mail Policy

Electronic mail is a very useful communication tool, used every day in University academic and administrative activities. It is also a convenient method for distributing information to the University community (using a bulk or mass mailing).

Bulk e-mail is an e-mail message that is addressed to a large number of people in the University community.

This policy seeks to promote the timely distribution of information to members of the University community via electronic mail while avoiding two common problems:

1. Large mailings have the potential to cause system performance problems.

2. Too many informational messages diminish the usefulness of e-mail as a tool for distributing information recipients will often delete such messages without reading them if bulk e-mail messages become a nuisance.

This Policy will be administered by Computing Services.

Computing Services will make available a system to allow designated users to easily send e-mail to the following target groups: all members of the University community, all students, or all staff.

In order to send messages using this system, a departmental representative must be authorized under this policy. Authorization can only be given by a Vice-President. Authorization will normally be granted with the following restrictions:

1. Bulk e-mail messages will only be used for University business.

2. Bulk e-mail message will only be sent when they concern a matter of interest to most members of the target group.

3. Initially departments will be limited to one such message per week. This restriction can be overridden by a Vice-President in a specific case. This restriction will be reconsidered once we have sufficient experience with these messages to determine the problems this restriction causes and the capacity of the system to handle these messages.

4. Bulk e-mail messages to students are only to be sent by departments authorized to do so because each such message will increase e-mail traffic on that day by about 10%. This authorization will normally be given to departments that must communicate with students regularly to conduct University business (e.g. SAS).

This policy may be revised from time to time as feedback from users is received.

Appendix D Environmental Studies Minor

To earn a minor in Environmental Studies 24 credits must be earned from the following courses:
3 from Geoscience 1011, or 1021, or 2031, or, 2101.
6 from Geography 2101 and 4101
9 from Economics 1000 and 3801
3 from Philosophy 3721
3 from Geography 3531 or Economics 3821 chosen in consultation with a program advisor.

Appendix E Environmental Science Double Major*

This program is offered only as a double major (environmental science major with second major in one of Biology, Chemistry, Math, or Physics) of 99 credits earned from the following courses:

21 from Geoscience 1001, 1011, 1021, 2031, 2101, 2501, (or 2401), 3111
3 from Physics 1051
3 from Physics 3511, 3521
9 from Chemistry 1001, 1021, 3411
9 from Biology 1001, 1501, 2101
3 from Math 1111
3 from Math 1121, 1131
9 from Economics 1000, 3801
Biology
9 from Biology 2301, 2401, 2601
3 from Chemistry 2141
3 from Biochemistry 2001
9 from Biology 3101, 3301, 3341, 3351, 4001

15 from Biology at 3000 and 4000 levels

Chemistry
3 from Physics 1551
3 from Math 2121
12 from Chemistry 2141, 2151, 2221, 2321
9 from Chemistry 3011, 3411, 3421
12 from Chemistry 3141, 3211, 3221, 3311, 3331
Math
6 from Math 2311 and 2321
9 from additional Math at the 2000 level
24 from the 3000 and 4000 levels or Math or Math/Computer Sciences
Physics
6 from Math 2111 and 2121
12 from Physics 1551, 2251, 2701 and 2801
9 from Physics 3101, 3811, and Engineering/Physics 3701
12 from Physics at the 3000 and 4000 level, Engineering 3601

Appendix F Environmental Courses

Chemistry

3011 Environmental Chemistry
Prerequisites: 2141 (or 2131), 2221, 3411; or permission of the department
This course examines the chemical aspects of the environment and will draw heavily upon the analytical, organic, inorganic, and physical chemistry background of the student. The implications of human activities on the atmosphere, water resources, and the soil will be explored. Some of the topics discussed will be environmental monitoring, waste management, acceptable limits, risk/benefit analysis and economic/social issues. Student practical work will involve projects in analytical chemistry, recycling, waste treatments as well as in researching and reporting on environmental chemistry topics. It is recommended that this course be taken in the final year. (Mount Allison 1998/99 Course Calender)

Economics

3801 Environmental Economics
Prerequisites: 1000 or permission of the department
The application of economic analysis in the study of environmental problems. Students will examine when and why markets often fail to allocate sufficient resources to environmental conservation, and will critically assess different policy instruments available to correct for the fundamental market failure. Using the analytical methods developed in this course, the following type of policies will be examined: measures to control air and water pollution, the disposal of hazardous wastes, the protection of endangered species, and the control of cross border pollution, including the Canadian Green Plan. (Mount Allison 1998/99 Course Calender)

Geography

2101 Natural Resources Management
Prerequisites: None
This course explores the characteristics, extent, and sensitivity of natural resources. It emphasizes how humans manage these resources and includes a critical evaluation of the concepts of sustainable development and environmental friendliness. (Mount Allison 1998/99 Course Calender)

4101 Seminar In Environmental Issues
Prerequisites: One of the Geosciences 1011 or 1021 or 2031; Geography 1201 or 2101; or permission of the Department
This course examines the current state of scientific knowledge related to various contemporary environmental issues and the public policy implications of these issues. (Mount Allison 1998/99 Course Calender)

Geoscience

2031 Global Change
Prerequisites: None
An introductory level course dealing with the interaction of the environment with the Earth-particularly those aspects of the environment influenced by civilization and vice versa. The course gives an overview of major natural processes and geologic hazards which influence civilization, with detailed consideration of natural flooding, land slides, coastal processes and erosion, earthquakes and volcanoes as well as hydro Geoscience and ground water. It also deals with the effect of civilization on the physical environment-particularly on surficial deposits and near surface crystal rocks or bedrock eighth contamination of ground water and surface waters by waste disposal (including nuclear waste): Acid Rain, Radon gas and the Greenhouse Effect. (Mount Allison 1998/99 Course Calender)

Philosophy

3721 Environmental Ethics
Prerequisites: Six credits in Philosophy; or permission of the Department
After reviewing the traditional attitudes toward the environment, this course will explore recent attempts to apply ethical analysis to such problems as pollution and conservation. We will pay particular attention to the ways in which problems of preservation and challenge us to extend our traditional norms and values. To what extent, for example, does growing sensitivity to our natural environment require of us a new environmental ethic: and oblige us to recognize animal rights?
(Mount Allison 1998/99 Course Calender)

Appendix G Courses with Environmental Content

Biology

Although these courses dont necessarily deal with humans impact and connection with the environment, they do offer and understanding of ecology and ecosystems.

1211 World Ecosystems
Prerequisites: None

2101 Population and Community Biology
Prerequisites: Biology 1501; or permission of the Department

3501 Native Flora (Vascular Plants)
Prerequisites: Biology 2301; or permission of the Department

3011 Evolution
Biology 2601; or permission of the Department

Canadian Studies

2000 An Introduction to the Study of Canada
Prerequisites: None
This course includes lectures on Canadas environmental history.

3400 Contemporary Canadian Issues
Prerequisites: Canadian Studies 2000; or permission of the Director of Canadian Studies
This course allows student to pursue a topic of special interest which changes every year. One of the potential choices looks at Canada and the environment.

Commerce

3371 Issues In Business and Society
Prerequisites: Commerce 2131 and 2301; or permission of the Department
Business and the environment is one of the topics examined during this course.

Geography

2221 The Developing World
Prerequisites: None
As a portion of this course the decline of traditional land systems and resource use is examined.

3201 Geography and Public Policy
Prerequisites: Third year standing and at least one full Social Science credit.

Geoscience

1001 Introduction to Oceanography
Topics covered include marine ecology
Prerequisites: None

2101 Coastal Oceanography
Prerequisites: None
Special Attention is given to sea level changes, erosion and pollution problems.

History

3360 Culture and Society in Modern Europe
Prerequisites: Second year standing and at least six credits in History at the 1000 or 2000 level; or permission of the Department
Includes a look at the emergence of a mass consumer society.

Political Science

4311 Canadian-American Relations
Prerequisites: Political Science 2301; or permission of the Department
Environmental issues is but one of the themes in this course on the post 1945 Canadian-American Relationship

Religious Studies

1651 Contemporary Myths

Prerequisites: None
The ecology myth is one of the myths examined in this course.

2221 World Religions and World Concerns
Prerequisites: Six credits from the Humanities 1600 series; or Sociology/Anthropology 1001, 1011, or six credits from Geography 1201, 2101.
World religions and their relationship to world problems including populations, pollution, ecology and resource distribution is examined in this course.

3541 Contemporary Ethical Issues
Prerequisites: Six credits from the Humanities 1600 series, or Religious Studies 2501 or 2511, or Philosophy 2701; or permission of the Department
Ecology is one of the ethical issues tackled.

Sociology/Anthropology

3611 Public Controversies
Prerequisites: Six credits in Sociology/Anthropology at the 2000 level; or permission of the Department
Particular attention will be paid to social, technological, scientific, and environmental controversies in a comparative context.(Mount Allison 1998/99 Course Calender)

Appendix H Quebecor Printing Environmental Policy

The following guidelines have been established for the conduct of Quebecor Printing Inc:

- Utilize methods and processes designed to reduce air and water pollution and energy material usage.
- Promote the production and use of recycled materials to our customers.
- Promote and invest in the development of natural or non-hazardous products and methods in the printing process that are compatible with a clean and healthful environment.
- Promote environmental awareness and responsibility among our employees our customers and communities.
- Implement programs to reduce waste and recycle residual wastes. Other remaining wastes will be disposed of in a manner consistent with sound environmental practice.
- Respect environmental regulations and apply responsible environmental standards for the construction, renovation and maintenance of any Quebecor Printer facility. Whenever possible, integrate energy systems using sources of renewable energy.

All Company operations will be reviewed on a regular basis to ensure that they are being conducted consistent with the above guidelines. In addition, these guidelines will be updated as required to ensure that they meet the Company's commitment as a leading enviro-printer in the industry.

(Environmental Policy of Quebecor Printing Inc.)

Appendix H Xerox Environmental Policy

Xerox carries several Energy Star and Environmental Choice Compliant Products

- Ozone emission levels are up to 50 times lower than regulatory limits
- Reduced and returnable packaging, and a supplies return program (copy and printer cartridges, toner containers, and waste toner) with no cost to customers
- Principles of Xeroxs Environmental Policy are as follows:

a) Protection of the environment and the health and safety of Xerox employees, customers, and neighbours from unacceptable risks takes priority over economic considerations and will not be compromised.

b) Xerox operations must be conducted in a manner that safeguards health, protects the environment, conserves valuable materials and resources, and minimizes risk of asset losses.

c) Xerox is committed to designing, manufacturing, distributing and marketing products and processes to optimize resource utilization and minimise environmental impact.

d) All Xerox operations and products are, at a minimum, in full compliance with applicable governmental requirements and Xerox standards.

e) Xerox is dedicated to continuous improvement of its performance in Environment, Health, and Safety.

f) Xerox has a goal of waste-free products manufactured in waste-free factories to enable waste-free offices.

(Xerox and the Environment: A Natural Partnership)

Appendix J Mount Allison University Mission

Mount Allisons mission is to provide a rigorous liberal education of high quality primarily to undergraduate students in a co-education, intimate residential environment. In providing this education the University chooses to concentrate on a limited number of programs so as to preserve their quality. The liberal nature of education means both breadth and depth in academic programs, as well as the development of the whole person through involvement in extracurricular activities such as music, drama, art, athletics, community involvement, spiritual development, university governance and other activities.

Appendix K Valdez Principles

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 regularily 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.