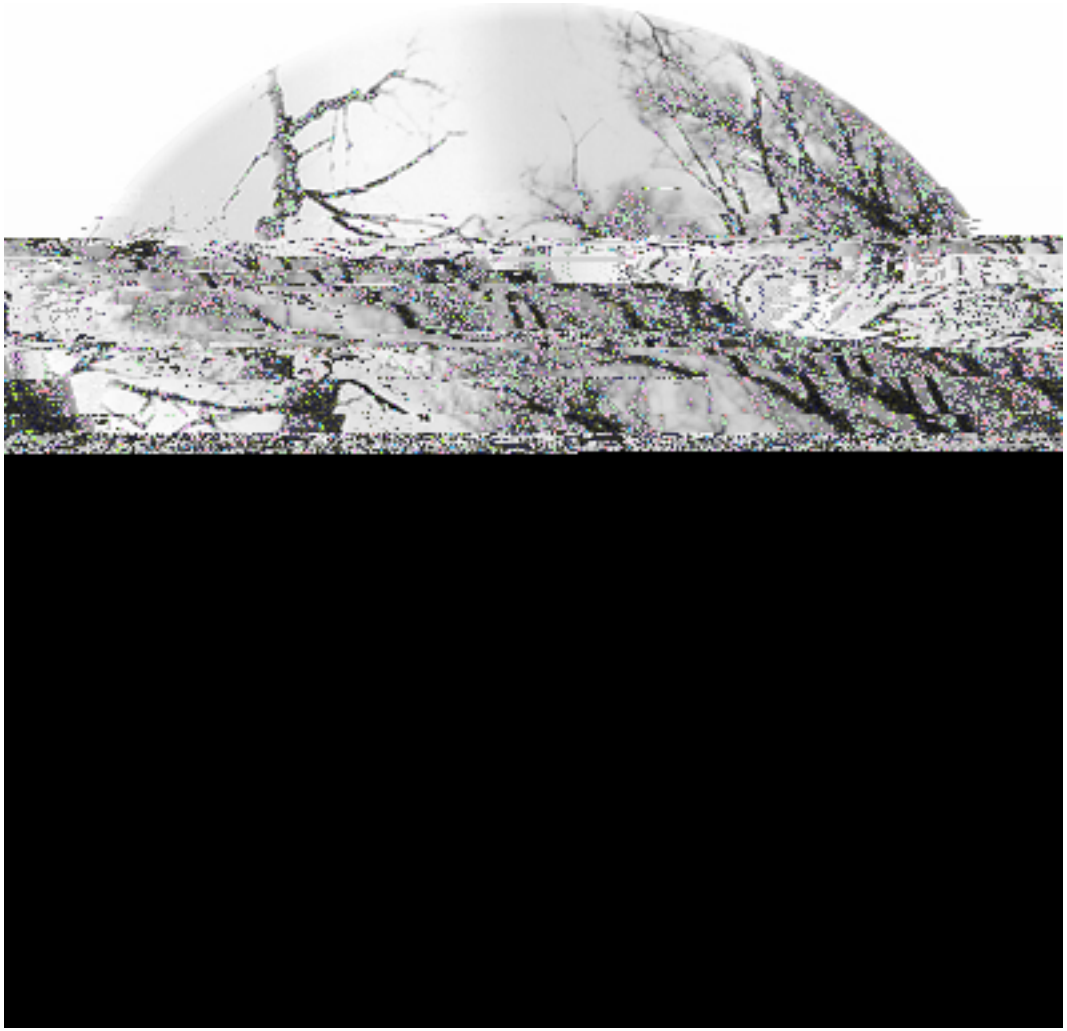


Preface

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.

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,

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)

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 environm

ecological world in which I live? Instead of compartmentalizing

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.

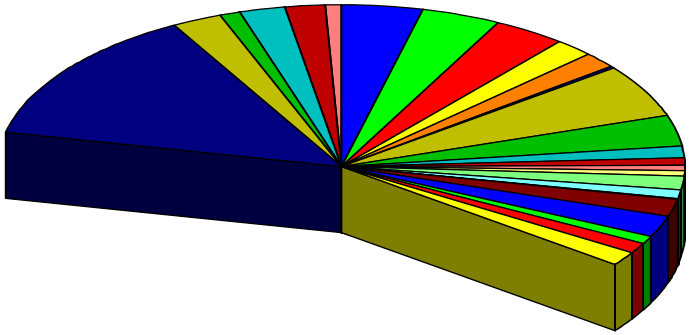
3. Paper

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

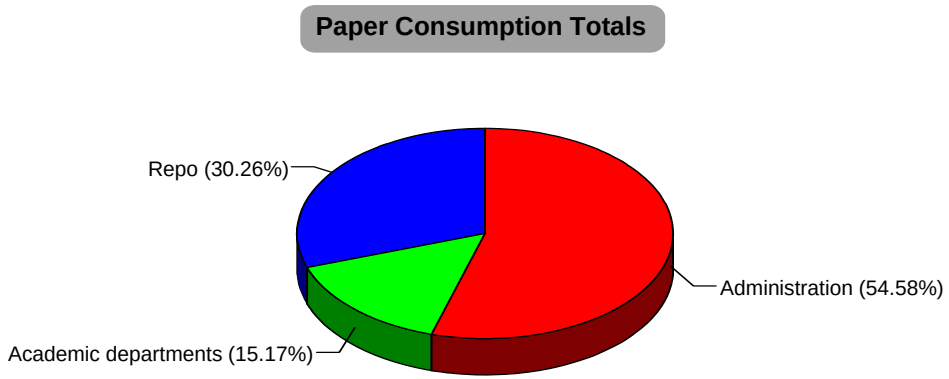
[3]Assuming most paper was used during a 40 hour work week 7 months of the year.



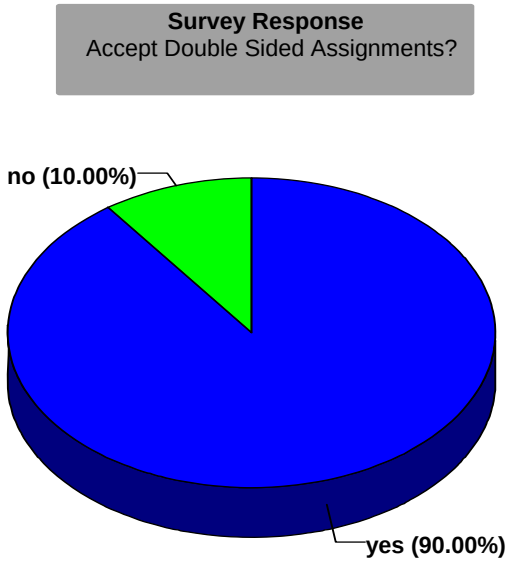
zero recycled content. The results of our Staff and Faculty Environmental Audit Survey showed that 100% of respondents would be willing to use unbleached and/or recycled paper. Xerox offers a top of the line recycled paper (safe in copiers and printers) for fifty cents more per case than their regular 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



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.
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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.

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:

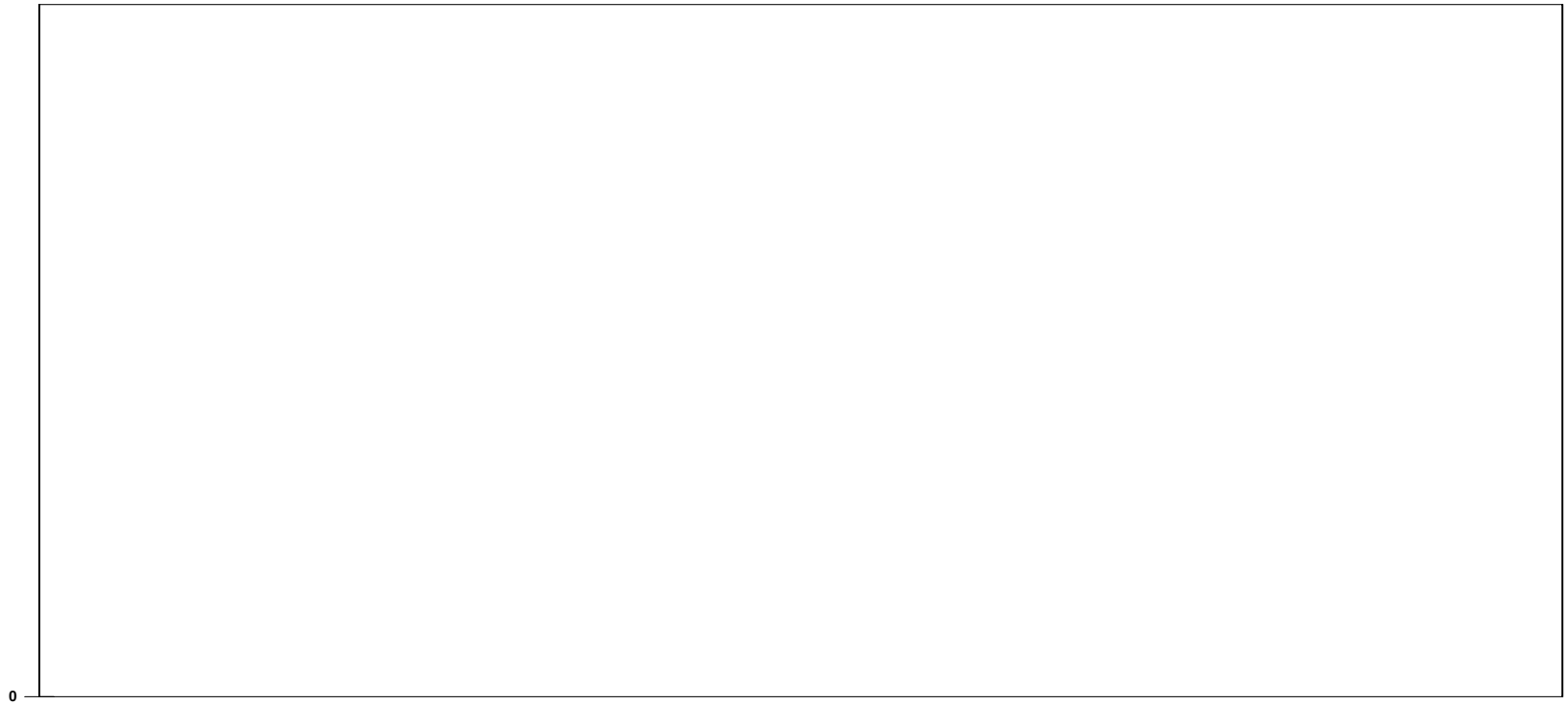
20. Appoint yourself as an environmental representative in your department and hold a training session on environmentally friendly practices in the office Include how to copy on paper that has already been used on one side, and how to copy on both sides. For information on how to do this, or any other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

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.

buildings on campus and *Tantramarsh Sanitation* then takes it to *Westmorland-Albert Solid Waste Corporation*. The drinking containers from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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 ede university buys aro0T.0024 Tw -chep

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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

5.3 Science Research

5.3.1 Responsible Parties

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.

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

4. Use the board to advertise extra chem

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 1 Rb025(Mats)s12 eib02(n-tests)Tj0.0006 Tceseforw 13.87t clesJ0.000TdChaJ0.007Tdhemists Tc 006 Tc 0.0024 Tw 0 -24acili

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

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.

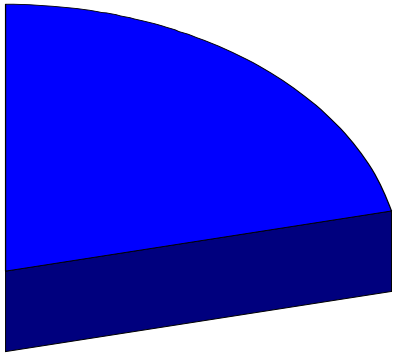
There remains controversy on campus about whether even one application of the herbicide is necessary. There are arguments to both sides:

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



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

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

6. Food

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 envir

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

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%.

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

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*

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 08 Tc 0,gitr mbt
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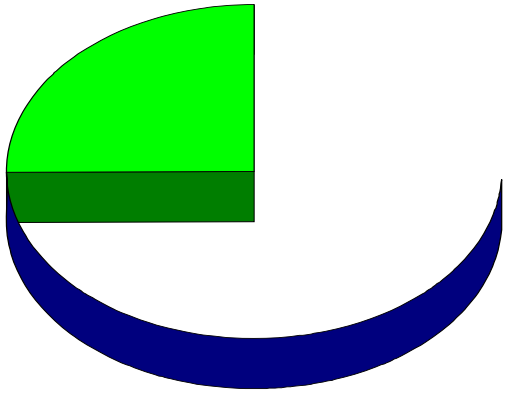


Further discrepancy is due in part to the fact that the auditors did not include kWh used for heating. Both the PEG and Facilities Management are heated at least partly by electricity, and this added a substantial amount to the electricity bill. There are also sources of electrical consumption in buildings 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.

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.

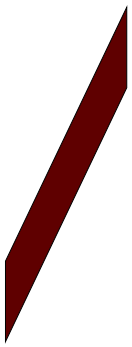
18. If applicable to your class, assign projects that would consider feasibility of alternative energies on campus. A physics student may wish to perform a study on wind patterns in the area.

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

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



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.

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

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

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

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.

Substance	

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

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

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

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

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		

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

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

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

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 ght ints177.5602 00 1 Tf0.005lfll vofessors how to green

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.

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 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].

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

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.

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

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

3 from Chysics 3511, 2538

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3801 Environmental Economics
Prerequisites: 1000 or permission of the department

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.

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Prerequisites: None
The ecology m

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 Environm