Georgia College & State University

White Paper on Waste Disposal and Recycling

A Document to Explain and Explore Waste Management Practices on GCSU Campus

Produced jointly by students in ENSC 4950-
Environmental Waste Audits (Fall 2006)
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Executive Summary

Currently, GCSU is producing prodigious amounts of waste which costs the university thousands of dollars to dispose of. While across the nation, recycling is saving money and resources, GCSU sends its waste to landfills. However, recycling is a lucrative process that will ultimately save the university considerable funds.

The university could save thousands of dollars from reducing the amount of waste taken to the landfill, and possibly earn thousands of dollars in revenue from selling these materials. GCSU has had recycling programs in the past which have failed, because of a lack of support, but today the program is in high demand. Nearly a fifth of the student/faculty body has shown their support through petitions, voluntary recycling programs, and websites promoting the re-institution of a program at GCSU.

An evaluation of GCSU waste has been preformed. It shows that the majority of GCSU's waste stream is potentially recyclable. In fact, nearly seventy percent is recyclable, white paper being the highest at thirty-three percent. The success of the waste audit proves that there are currently enough recyclable materials in the GCSU waste stream to create a significant difference and earn a profit.

GCSU is a part of a network of Universities that are already involved with waste management programs and should, therefore participate at the forefront of this innovative waste management. The problems faced in the past can be overcome by a carefully laid plan that includes proper facilities, a capable workforce, and a coordinator dedicated to the program.

The world we live in is finite. The resources we depend on are imperative for life. The money that GCSU can save and earn from a recycling project does not compare to the positive environmental impact it would create. In this time of environmental crisis, it is important that GCSU take action.

Background Information

The Status of Waste Disposal at Georgia College & State University

Currently, Georgia College & State University generates upwards of 700 tons of solid waste each year. About 40% of that waste is paper, another 15% could be composted, and 15% is recyclable plastic, aluminum, steel, or glass. Only 30% of our present waste stream really needs to be landfilled, but it goes into the ground underutilized because we do not have an efficient recycling program in place.

The waste is collected in several large bins which are hauled by Sinclair Disposal Service to one of several regional landfills. The cost of this important service is fairly inexpensive, only about $10/student/year for the bin rental, hauling, and tipping fees. The additional cost of paying custodians to collect and process the waste is calculated into their normal job description. As far as we know, no other fees are collected to dispose of our waste, so it only costs us about $60,000/year to have all our paper and other recyclables magically disappear.

Unfortunately, that is not the end of the story. Across the nation, landfills are collecting about 245 million tons of municipal solid waste per year (Porter 2007), and serving their purpose to the point of exhaustion. As waste facilities fill up with excessive amounts of garbage, options for new landfills become increasingly difficult to locate, permit, and construct. Understandably, not everyone wants to live near a landfill.

We believe that our university is built on a sense of civic and global responsibility, and that we should promote sound ethical and environmental principles. In our school's mission statement, we contend that we "provide communities and employers with graduates who exhibit professionalism, responsibility, service, leadership, and integrity."

Continuing to dispose of valuable natural resources in a world threatened with an ever-increasing population and a constantly diminishing environmental resource base is not characteristic of exhibiting "professionalism, responsibility, service, leadership, and integrity."

Our mission statement goes on to maintain "a commitment to public service, continuing education, technical assistance, and economic development activities that address the needs, improve the quality of life, and raise the educational level within the university's scope of influence."

We are throwing away future resources and wasting money today because we are not promoting sound economic development. We have the educational resources necessary to improve the quality of life in Georgia, but in the regard of waste management and recycling, we are failing in our commitment to public service.

The materials we dispose of today are resources for the future, and do not only belong to today's individual, but also to our descendants. Our decision to bury them in massive garbage heaps makes little sense when there are so many more economical and ecologically efficient alternatives- namely recycling.

And in addition to the ethical reasons, a comprehensive solid waste management plan can benefit schools by:

- Saving resources and energy
- Reducing waste disposal costs
- Providing an educational opportunity to learn about resource management and the economics of supply and demand (Porter 2007).

Where Does Our Trash Go?

When a GCSU student or employee is finished with a bottle of water or wants to dispose of a banana peel or the wrapper of a Chick-Fil-A sandwich, chances are that she will discard that material in one of the 143 stylish waste receptacles scattered at convenient locations across campus (see photo). These containers are one-dimensional in that they only accept waste, and do not allow for separation of recyclables. At regular intervals during the week, these bins are emptied by campus custodial staff, and the bags of waste are taken in a pickup truck to a transfer facility at the south end of Centennial Center parking lot.

If a student or employee is in an office or a classroom, and he wants to empty his notebook of several reams of white office paper, he might choose to discard the material into any one of hundreds of small waste bins. These bins collect a daily allowance of paper, food wrappers, cans, bottles, and other unneeded spoils of education. Each classroom and office generates waste daily, from old exams and yesterday's newspaper to uneaten bagels and burnt-out light bulbs. Usually, this waste is commingled: recyclables and non-recyclables are all mixed together, and the custodial staff deposits the contents into a large waste receptacle which is transported to the transfer bins at Centennial. Exceptions to this rule are the few facilities which have dedicated trash dumpsters, including Sodexho's school cafeteria and two trash compacters at Bobcat Village.

GCSU assists in operating over one dozen student residence halls. When a student living in one of these large, modern facilities wants to throw out an empty pizza box or a defunct portable television set, it will most likely end up in one of several waste hauling bins conveniently located near the residence halls. GCSU Grounds Crew manually remove the bags of waste from these dumpsters and transport them by hand to a nearby pickup truck, where they are deposited in large hauling bins leased from our waste hauling company. The amount of time and labor involved in this process may seem minimal to the person who

actually creates the waste stream by discarding an old newspaper, but there is still a considerable effort required to remove that item from our campus.

As needed during the work week, Sinclair Disposal Service (SDS) removes the hauling bins and to their transfer station in north Milledgeville, where the waste is reloaded for transportation to one of three privately operated landfills, each about a one-hour drive away in Macon, Jackson, or Winder.

Our expense for this service is a $15/ton tipping fee plus the cost of transportation and a bin rental fee. The present arrangement is not threatened by any impending landfill closures. The costs of landfilling waste products using SDS services is expected to be maintained at a consistently low price. The SDS landfills are not near to capacity (John Witherspoon, personal communication). In fact, the low cost of landfilling is an important reason that recycling is considered by many to be inefficient from a cost basis.

Incidentally, the City of Milledgeville also uses SDS to collect and dispose of its waste. Baldwin County, however, contracts with Attaway Waste Services, which has an option to dispose of waste in the Baldwin County landfill, but is not obligated to do so. In fact, the Baldwin County landfill is at risk of being closed because it does not accept enough waste to pay the costs of keeping it open (Marion Nelson, personal communication).

Across the country, the costs of landfilling have grown exceedingly high in response to restrictions designed to reduce off-site pollution from landfilling. The 1976 Resource Conservation and Recovery Act (RCRA), and its 1984 amendments, requires municipal landfills to have protection such as liners, leachate collection systems, methane collection and monitoring, groundwater monitoring, and closure/post-closure plans (Kundell and Inman 1994). Almost every state has programs in place to help local governments cope with strict landfill requirements. The costs of landfilling have increased dramatically, even in the Southeast, where land is still relatively abundant. The average tipping fee for municipal solid waste in Georgia in 2005 was $35.38/ton (DCA 2005).

In 1990, Georgia enacted the Comprehensive Solid Waste Management Act, which brought the state laws into compliance with the 1984 RCRA Section D requirements for landfills, and also empowered a variety of criteria designed to reduce the amount of waste disposal. The emphasis has been on mulching organic waste, source reduction, and material reuse. The act also laid out many specific requirements related to solid waste management, and charged the Georgia Environmental Facilities Authority <http://gefa.org/> with developing a loan system to help municipalities develop recycling facilities (Kundell and Inman 1994). In

addition, the Georgia Department of Community Affairs <http://www.dca.state.ga.us/> operates many programs to encourage solid waste management education and planning.

The generation of waste at GCSU must be evaluated in light of the national and state programs to reduce waste and create sustainable solid waste management programs. As an institution of higher education, GCSU should be at the forefront of adaptation to new, higher standards, and we should be on the cutting edge of new solutions to managing our common environmental resources.

Present Costs of Waste Disposal on GCSU Campus

The cost of trash disposal for GCSU is based on several variables, including landfill tipping fees, bin rental fees, and a transportation fee which covers truck fuel and maintenance. For FY06, the total cost of disposal for main campus and the University Housing LLC (which covers Bobcat Village housing) was $82,560. This figure has been increasing since FY04, however, as the we have increased the amount of garbage that is being thrown away (Josefina Endere, personal communication).

In 2003, GCSU re-negotiated the disposal contract with SDS. At that time, we changed the type of service from using several 6-yard containers all over campus to having only one 20-yard container which was located initially at the Depot and then later in the Centennial parking lot. This arrangement created more work for the Grounds Crew driving around collecting and depositing bags of trash, but on the other hand, it reduced our costs with SDS. The disposal costs decreased, but went up again in FY06, as the new residence halls on main campus and at Bobcat Village were opened.

In FY05, the total tons disposed was 492.52. In FY06, we generated an additional 233.40 tons over the previous year. This increase was due to the opening of Bobcat Village buildings 400, 500, and 600, and the addition of a second 20-yard compactor at that site.

GCSU Waste Disposal History (2002-2007)
Sinclair Disposal Service Charges

FY	GCSU Totals	%Change	LLC Totals	%Change	Grand Total	%Change
2002	$ 55,819		-		$ 55,819	
2003	$ 53,758	-3.7	-		$ 53,758	-3.7
2004	$ 35,298	-34.3	-		$ 35,298	-34.3
2005	$ 37,980	7.6	-		$ 37,980	7.6
2006	$ 46,063	21.3	36,497.17		$ 82,560	117.4

In FY06, 725.92 tons were disposed through SDS, at a cost of about $114/ton. SDS charges a landfill tipping fee when they collect each waste transfer bin; this fee is based on the weight of the garbage in the bin. It ranges from $31 to $36/ton. An additional $50-75 in other fees are charged to cover the fuel and environmental cost of driving the trash truck and the maintenance of the truck over time. In addition, we pay $75.00 a month to rent each container.

Example of SDS Billing

Cost of Emptying MSU Compactor One Time

Date	Description	Qty.	Rate	Total	Comment
9/1/2006	Landfill Muni Solid Waste	5.88	$ 31.50	$ 185.22	5.88 tons charged at $31.50/ton
9/1/2006	20 YD Comp Pull & Return			$ 115.00	Cost to remove and return bin
9/1/2006	Fuel/Environmental Fee	1		$ 19.53	Fuel charge
	Total			$ 319.75	

GCSU has eight dumpsters spread across campus: four at Centennial Center, two at Bobcat Village, one at Bell Hall, and one at Maxwell Student Union. The two large compactors at Bobcat Village are paid for separately by the University Housing LLC.

GCSU Waste Transfer Bins

- Centennial Transfer Site
  - Three 30 cubic yard
  - One 40 cubic yard
- Bell Hall
  - One 8 cubic yard
- Maxwell Student Union
  - One 20 cubic yard compactor
- Bobcat Village
  - Two 20 cubic yard compactors

According to SDS, the school could save money by reducing the number of pick-ups, however it would take about a 40% volume reduction for the school to see a significant reduction in cost without a renegotiation of our services (John Witherspoon, personal communication). It costs SDS $78.80/pick-up for each of the 20 cubic yard open top containers, and the additional hauling fees add up to a significant expense. If the dumpsters are tipped less often, we would pay less money for tipping, as well as for fuel and maintenance. In our contract there is no price break for disposing of more trash, so there could be a significant incentive to reduce our costs by reducing the total amount of waste being disposed.

Since much of our charge is a volume based cost, lowering volume will lower cost. If we estimate just a reduction of 30% due to recycling, we could dispose of only 507 tons/year instead of 725. With the cost averaging $114 per ton, the estimated cost of disposal with a recycling rate of 30% would only be $57,000 per year. That level of involvement could create a $25,000 savings, which might be enough to justify a recycling program. The key to reducing the cost of disposal is reducing the volume of garbage generated, and reducing the number of bins rented and the number of trips made to the landfill.

Volume has increased over the past few years, though, as our school is growing. And another consideration is that garbage needs to be disposed of quickly, especially during the

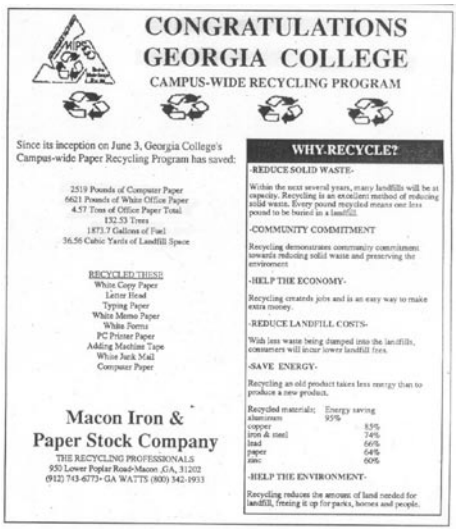
hotter months and during periods of greater generation, in order to minimize problems from odors and overflow.

Another option for waste disposal would be for the university to deliver the trash directly to the county landfill, however, at this time, the university does not have the equipment or staff necessary to handle this.

Recent History of Waste Reduction on GCSU Campus

We can assume that the difficult years of the Great Depression and World War II must have brought stringent materials recovery and recycling programs to Milledgeville and the GCSU campus, but for the purpose of this briefing, we can only document the history of recycling efforts in the last 20 years.

Sometime in the late 1980's, then President Ed Speir attempted to create a white paper recycling program. Dr. Speir was aware of 'Green Campus' movements at Antioch, Oberlin and other Midwestern colleges that promoted sustainable university practices, and he wanted Georgia College to participate in such a program. Admittedly a 'top-down' initiative, the school secured funding for blue collection bins and push carts. Once a week custodial staff would collect paper and take it to the old train depot to be stored. A recycling company from 35 miles away, Macon Iron & Paper Stock <http://thescrapmarket.com/>, would come pick up the paper once a week or whenever it needed to be emptied (Ed Speir, personal communication).


CONGRATULATIONS
GEORGIA COLLEGE
CAMPUS-WIDE RECYCLING PROGRAM

Since its inception on June 3, Georgia College's Campus-wide Paper Recycling Program has saved:

2519 Pounds of Computer Paper
6621 Pounds of White Office Paper
4.57 Tons of Office Paper Total
132.53 Trees
1873.7 Gallons of Fuel
36.56 Cubic Yards of Landfill Space

RECYCLED THESE
White Copy Paper
Letter Head
Typing Paper
White Memo Paper
White Forms
PC Printer Paper
Adding Machine Tape
White Junk Mail
Computer Paper

Macon Iron & Paper Stock Company
THE RECYCLING PROFESSIONALS
930 Lower Poplar Road-Macon, GA, 31202
(912) 743-6773 • GA WATTS (800) 342-1933

WHY RECYCLE?

-REDUCE SOLID WASTE-
Within the next several years, many landfills will be at capacity. Recycling is an excellent method of reducing solid waste. Every pound recycled means one less pound to be buried in a landfill.

-COMMUNITY COMMITMENT
Recycling demonstrates community commitment towards reducing solid waste and preserving the environment

-HELP THE ECONOMY-
Recycling creates jobs and is an easy way to make extra money.

-REDUCE LANDFILL COSTS-
With less waste being dumped into the landfills, consumers will incur lower landfill fees.

-SAVE ENERGY-
Recycling an old product takes less energy than to produce a new product.

Recycled materials:	Energy saving
aluminum	95%
copper	85%
iron & steel	74%
lead	66%
paper	64%
zinc	60%

-HELP THE ENVIRONMENT-
Recycling reduces the amount of land needed for landfill, freeing it up for parks, homes and people.

A news article from September, 1991 highlights the Georgia College recycling program (The Union Recorder 1991), and an advertisement from Macon Iron & Paper Stock congratulated the school on collecting over 2500 pounds of computer paper and 6600 pounds of white office paper. The program seemed to be very promising and to be making a great impact, however the effort eventually fizzled and died out.

One of the main reasons for the failure of the recycling program was the storage issue, as the depot building leaked and was not well suited for storage and transfer of waste paper. When Georgia College was granted money to fix up the depot, it was no longer available to store the paper. In addition, there were budget cuts and a loss of employees who contributed to the program (Dave Groseclose, personal communication). The program had little student or staff volunteer participation, and little effort was solicited other than placement of recycling containers by staff. The general maintenance staff considered it an extraneous bit of work for them, decreed from above, and little or no follow up was given to reinforcing the need

for their use or servicing of the containers. The project faded away over a two to three year period (Ed Speir, personal communication).

Later on, there was a second push for recycling, which was motivated by a student organization, but again the program failed due to the storage problem and limited staff support. GCSU also recycled cardboard at one time but does not anymore.

Most recycling efforts on campus now are voluntary:

- Beta Beta Beta, the biology honor society has several aluminum can recycling bins in Herty Hall and at other locations. The proceeds from the cans support Habitat for Humanity.
- The Environmental Science Club collects newspaper and white office paper from eight offices across campus. The newspaper is dropped off at the Baldwin County collection facility, and the office paper is taken to Macon.
- The CATS program in Smith House maintains an internal collection of aluminum, plastic, paper and printer cartridges.
- The Arts & Sciences building has aluminum can collection boxes near the vending machines.
- Lanier Hall also has aluminum can collection boxes to benefit Habitat for Humanity.
- Certain employees in the Russell Library manage to reuse white paper by having the Print Shop cut it up and make it into notepads.
- The Outdoor Education program at Lake Laurel recycles aluminum cans.
- The GIVE Center accepts aluminum and printer cartridges.

What Are Other Schools Doing?

Primary and secondary schools generate waste at a rate of about 1600 pounds/employee/year. The typical school waste stream includes recyclable paper and cardboard (30.7%), food (20.3%), leaves and grass (23.0%), plastic (9.8%), and metal (5.1%) (KAB 2007). Many schools across the country have tapped the potential of a campus recycling program. Recycling plastics, aluminum, glass, paper, cardboard, scrap metal, and organics prevents millions of tons of material from going to a landfill. Campuses save money by not paying tipping fees to the waste haulers, and those expenses increase annually as landfill rates and transportation costs go up. In most cases the money saved from not landfilling waste can fund a recycling program , even before revenues from recycling returns are considered. The Grass Roots Recycling Network maintains a web site that highlights many successful campus programs <http://www.grrn.org/campus/campus_recycling.html>. On campuses that recycle, students feel good about recycling, the school saves money, and the university teaches a valuable lesson about conserving resources.

What do other schools do to recycle?

- Dedicate staff to running the program; volunteers are always needed, but there is someone responsible for keeping the effort going

- Place recycling collection bins in classrooms, hallways, offices, break rooms, and residence halls; make the collection sites convenient, safe, and easy to use
- Have comprehensive user friendly websites that instruct the campus community where, what, and how to recycle
- Generate positive attention and higher responses by offering promotions, contests, gimmicks, and events
- Educate through action by informing people at events, correcting poor recycling behavior, operating demonstration projects, and using students to spread the word
- Include compost projects (including school cafeterias)
- Reducing waste and reusing unwanted items; provide exchange programs for anything from office supplies to furniture to bikes
- Complete the circle by buying recycled products

The University of Georgia saves up to $9000/month by recycling office paper and removing compost from the waste stream. Over 150 tons are kept out of the landfill each month. The major savings are from diverting waste that used to go to the dump. Their physical plant runs the system using their own trucks and labor. The paper is donated to the Georgia Building Authority, which then supplies the university with needed supplies (Roberts 2002).

Success stories from successful campus recycling programs abound:

- At Warren Wilson College, near Asheville, NC, a crew of 15-20 students is responsible for collecting and managing over 25 recyclable materials, operating a FreeStore and WoodShop, composting campus food waste, disposing of solid waste, researching and implementing new waste reduction programs, and educating the campus about waste-related issues <http://www.warren-wilson.edu/~recycle/>.

- At Prescott College in northern Arizona, a campus policy requests that employees, faculty, and students use the recycling bins provided <http://www.prescott.edu/administration/policies/policy_903.html>
- At the University of Oregon, Campus Recycling employs a Recycling Program Manager and four full time Recycling Coordinators who direct all program operations and manage a crew of approximately 40 student workers. There are over 2500 recycling collection sites for paper, bottles and cans, cardboard and kitchen recyclables <http://darkwing.uoregon.edu/~recycle/main.htm>.
- Oberlin College in Ohio uses a single-stream collection system to take in and recycle cans (tin, aluminum, etc), glass bottles, newspapers, envelopes, mixed paper (glossy, colored, office), and plastics #1 and #2 <http://www.oberlin.edu/recycle/oncampus.html>.

As a member of the Council of Public Liberal Arts Colleges (COPLAC), GCSU is committed to providing a superior education to its students, which includes providing

opportunities for healthier living like as in the private colleges mentioned above. Several COPLAC schools support recycling efforts, including:

- Eastern Connecticut State University has developed an Institute for Sustainable Energy that has a 12 step program toward achieving sustainability. The plan calls for an aggressive solid waste reduction and recycling program. <http://www.easternct.edu/depts/sustainenergy/>
- The Evergreen State College has an extensive system of waste reduction and recycling that includes information on how to avoid or recycle dozens of common campus products <http://www.evergreen.edu/facilities/Recycle/recyclehome.htm>
- The University of Minnesota at Morris has had a recycling facility in place for over 20 years. The facility employs 2-4 students and processed almost 160 tons of materials in 2005 <http://www.morris.umn.edu/services/recycling/>
- As part of the Sustainable Universities Initiative, the College of Charleston has reduced its waste stream substantially in the last seven years, employing two full-time physical plant workers and part-time graduate students to organize and operate an extensive program. The recycling committee issued a 56-page handbook that outlines his history, progress, and operation <http://www.cofc.edu/~recycling/about.html>.

Nationwide, composting and recycling prevented 64 million tons of refuse from going into landfills. Today the U. S. recycles 32% of its waste. This includes:

- 50% of paper
- 34% of plastic soft drink bottles
- 45% of aluminum cans
- 67% of appliances

Is GCSU Behind the Times?

Georgia College & State University is lagging behind other universities around the country by not having a large scale recycling program. In the U. S. as a whole, we recycle 32% of all our waste. In 1999, citizens prevented 64 million tons of waste from going into our landfills by composting and recycling. Because the only directed efforts on GCSU campus are volunteer, we cannot obtain an accurate estimate of recycled materials, but it is safe to say that it is significantly less than 32%.

We think we can do better than that, and there is a groundswell of support for that contention. The Environmental Science Club circulated a petition to President Dorothy Leland which asked her to promote

campus recycling. Over 1500 people signed the petition and pledged to recycle materials if appropriate collection facilities were made available. A Facebook group was created called "Rally for Recycling at GCSU" currently has over 700 members.

It appears that a primary reason that our campus is not recycling is simply that we do not have a system in place. The support and citizen participation appear to be in place, but the mechanism and delivery is missing.

There is a concern that recycling programs cost money, and there is an additional cost of providing collection bins, storage, and transportation. But there are also tremendous savings from not landfilling. At the moment, the tipping fees are cheap, and so the price we pay for garbage removal is rather inexpensive. This does not mean that we cannot save money by redirecting landfill costs (with no financial gain) toward recycling expenses (which generate income). And a large portion of our campus community believes that recycling is the right thing to do.

Another important concern is that there is no local recycling company that can step in and immediately create and operate a recycling facility for our campus. The GCSU campus is not in a major metropolitan area where there would be several recycling services enabled to handle such a project. If we elect to create a campus recycling program, it will have to be studied and examined in more detail because there are no readily implemented solutions. Without a significant volume, the transportation costs of moving our recyclables to a market can erode much of the gains earned by pulling recyclables out of the waste stream.

There are several reasons why GCSU does not have a full-scale recycle program. And there are also many questions that need to be answered before we can create such a program. Some of these questions will be addressed later in this document. One important question that has already been answered is 'what is in our waste?'

Campus Waste Audit

Purpose

On October 4th 2006, the Environmental Audit class (ENSC 4950) conducted a waste audit on the front campus of GCSU, with the help of the school's Environmental Science Club. The purpose of the waste audit was to determine the composition of the material in the campus waste stream for a given day, such that we could extrapolate that information across an entire year. With the help of the Physical Plant, students gathered one-third of all the trash that was collected on that day. The students then sorted the trash based on different types of materials, including newspaper, white paper, cardboard, metal, plastics, etc. The amounts of each category were weighed, and the proportions were used to estimate the total amount of recyclable materials that GCSU disposes of each year.

Methods

A waste audit provides a snapshot and stream analysis of waste composition on a university campus. Knowing the composition of waste on campus is useful for the designing and implementation of a waste management plan to encourage recycling and reduction of waste material. Our idea for conducting a waste audit came from the University of Oregon Campus Recycling Program <http://darkwing.uoregon.edu/~recycle/waste_audit.htm>. Their website offers suggestions and guidelines to ensure an effective and successful waste stream analysis.

We chose to have the audit on a Wednesday to ensure high participation, and because midweek was ideal for the volunteer schedule. The audit was held on the front lawn of campus, to invite participation and encourage public awareness. Trash was gathered from the following buildings on campus throughout the day:

- Adams (residence hall)
- Terrell (residence hall)
- Wells (residence hall)
- Arts and Sciences (classroom/office)
- Ceramics (art studio)
- Chappell (administration)
- Kilpatrick (classroom/office)
- Mayfair (art studio/classroom/office)
- Parks (administration)
- Public Safety (administration)

as well as dozens of waste receptacles spread across the grounds. We excluded working with potentially hazardous materials such as chemical waste from Herty Science building, because we were not prepared to deal with such waste.

The collected bags of trash were weighed as they came to the site and recorded by their origin. Then each bag was sorted through individually on tables. Recyclable and compostable materials were removed and sorted into appropriate containers, while the remaining non-recyclable material was placed in separate trash bags for disposal. Recyclable items collected were sorted into large plastic and cardboard containers labeled as aluminum, glass, cardboard, magazine paper, newspaper, white paper, mixed paper, plastic 1&2, and other plastics. As the bins filled, their contents were bagged, sealed, and separated into designated piles containing the same recyclable material.

After the material was sorted, the different piles of recyclable material were weighed and tabulated. Bags were weighed on an elongated piece of plywood placed over two balanced bathroom scales. Material that could not be recycled was discarded in waste receptacles. Many bags contained liquids (e.g., unconsumed drink cups), which was spilled onto the ground and washed away. There were some odd items (e.g., television set, pencil sharpeners, full cans of food and beverage, clothing) that was either kept by volunteers or donated to charity.

Results

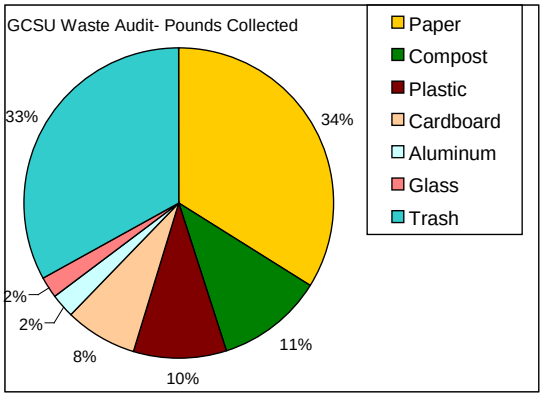
We found that most of the waste produced on campus is paper products such as newspaper, cardboard, magazines, mixed, and white paper, with white paper maintaining the highest percentage. Around fifty percent of the waste collected was non-recyclable, including compost and other miscellaneous trash. While sorting through the trash, we found items such as pencil sharpeners, cardboard, and even a television set among the plethora of recyclable material gathered. There was a difference in total pounds of trash collected and the amounts left after sorting; we attribute much of this to the weight of the liquids which spilled out during the sorting process. Surprisingly, there was a small amount of aluminum recovered, which may indicate that many aluminum beverage containers.

The collected data and configurations were as follows:

GCSU Campus Waste Audit

October 4, 2006

Material	Pounds	Percent
Paper	309	33.9%
Compost	101	11.1%
Plastic	88	9.7%
Cardboard	70	7.7%
Aluminum	22	2.4%
Glass	21	2.3%
Trash	300	32.9%
Total	911	100.0%



From the data shown, it can be inferred that up to 65% of the typical waste stream at GCSU is potentially recyclable. The single exception is the compostable material, which we allowed to include brown paper towels from restroom trash; there are many health reasons to exclude such waste from material removed from the landfill stream.

Making assumptions for the amount of trash and recyclables generated over the course of the year, we created a table to display the potential savings and earnings of a campus recycling program operating at maximum efficiency:

Material	Audit Day Pounds	Percent	Annual Pounds	Market Price	Potential Earnings	Potential Savings
Aluminum	22	2.3%	33,237	$0.46	15,288.89	1,894.51
Compost	151	15.7%	228,125			13,003.13
Glass	21	2.2%	31,726	$0.01	237.94	1,808.38
Paper, Cardboard	70	7.3%	105,753	$0.02	2,115.06	6,027.92
Paper, Magazines	77	8.0%	116,328			6,630.70
Paper, Mixed	75	7.8%	113,307	$0.04	4,249.01	6,458.50
Paper, Newspaper	69	7.2%	104,242	$0.02	1,824.24	5,941.79
Paper, White	88	9.2%	132,947	$0.06	7,976.81	7,577.98
Plastic, 1 & 2	67	7.0%	101,221	$0.10	10,122.09	5,769.60
Plastic, Other	21	2.2%	31,726			1,808.38
Trash	300	31.2%	453,228			
Total	961	100.00%	1,451,840		$41,814	$56,921

The table shows that if the recovery of October 4th 2006 were extrapolated out across an entire year, and the percentages were multiplied by the total amount of waste currently generated at GCSU (1,451,840 pounds), we could estimate the annual production of recyclables and remaining trash. Given a current market value, the potential earnings of selling all the recyclable material was estimated at $41,814. Re-negotiating the costs of waste hauling could generate another $56,921 each year in savings. Granted, this estimate is based on 100% recovery of recyclables, which would be unlikely in the beginning of any collection system requiring users to sort their waste.

A Waste Management Plan for GCSU

A Comprehensive Waste Management Strategy

The three major components of a comprehensive waste management strategy are to: 1) reduce wastes, 2) recycle and reuse, and 3) dispose of remaining waste. In many schools, the only working component of this strategy is the disposal. Historically, disposal was (and may still be) inexpensive, and there was little incentive to develop the other two strategies. Unfortunately, disposal costs and the related environmental costs of landfilling are growing, and the first two strategies are untenable once the material is sent to a dump.

According to the U. S. Environmental Protection Agency, institutions may want to develop a solid waste management system for handing their waste stream (EPA 2008). This system would:

- Define current waste management practices
- Identify problems and deficiencies with the current system
- Identify opportunities for improvement in the current system
- Set priorities for action to address problems and affect improvement
- Measure progress toward implementing actions
- Identify the resources needed and develop budgets and schedules
- Support proposals for solid waste management grants

The steps outlined in this program allow an institution to achieve its waste management goals. The priorities and the resources of the system are set by the institution's members and leaders, based on their own values and expectations.

So long as waste removal is the dominant goal of Georgia College's waste management system, recycling may not be able to develop to its fullest potential. A re-examination, however, of the "priorities for action to address problems and affect improvement" might lend legitimate credibility to establishing a recycling program in spite of perceived economic costs. The opportunities to reduce, reuse, and recycle materials, at any rate, should precede the option of disposal <http://www.epa.gov/osw/>

Recycling Opportunities in Middle Georgia

Recycling is not uncommon in Middle Georgia. There are dozens of recycling facilities in the area, many with very long histories <http://thescrapmarket.com/anniv.php>. In Milledgeville alone, the following recovery centers are listed:

- Buddy's Recycling, 531 N Wayne St

- H B & Sons, 2811 Irwinton Rd
- Thomas Alloy, 61 W Hwy 22

The City of Milledgeville maintains a recycling service for newspapers, magazines, plastics, aluminum, steel, and cardboard through Sinclair Disposal Services. In addition, Baldwin County operates eleven different drop off locations for sorted newspaper, cardboard, plastic, steel, aluminum, glass, white goods, and brown goods <http://www2.gcsu.edu/orgs/student/esc/baldwin_recycling_guide.html>.

Within 30-90 mile radius, there are sufficient recyclers to generate relatively rewarding prices for cleaned and sorted recyclables, as this table shows:

Post-Consumer Recyclable Material	Price per unit
Ferrous Metal (Used steel cans)	$70 per ton[a]
Ferrous Metal (No. 2 bundles)	$70 per ton[b]
Aluminum UBCs (used beverage containers)	$0.46 per pound[b]
Plastic- (Baled) Type 1 Clear PET	$0.12 per pound[b]
Plastic- (Baled) Type 1 Green PET	$0.10 per pound[b]
Plastic- (Baled) Type 2 Natural HDPE	$0.9 per pound[b]
Plastic- (Baled) Type 2 Mixed HDPE	$0.5 per pound[b]
Plastic- (Baled) Type 1 Mixed PET	$0.6-7 per pound[a]
Plastic- (Baled) Types 1 & 2 HDPE & PET	$0.1-2 per pound[b]
Paper- Corrugated	$40 per ton[b]
Paper- Newspaper #6	$30-35 per ton[b]
Paper- Newspaper #8	$60-65 per ton[b]
Paper- High-grade office	$180-185 per ton[b]
Paper- Colored ledger	$75-80 per ton[b]
Paper- White ledger	$120-130 per ton[b]
Paper- Computer laser	$126-136 per ton[b]
Paper- Computer laser-free	$135-145 per ton[b]
Glass- Clear	$29 per ton[b]
Glass- Green	$11 per ton[b]
Glass- Brown	$15 per ton[b]

(a) - Broker buying prices for materials shipped out of local market area.
(b) - Loaded free-on-board cars in local market.

The prices paid for mixed or intermingled recyclables is substantially less. Some operations will pay for mixed goods, while others will remove them without a charge.

Building a Campus Recycling Program

The Georgia Department of Community Affairs recommends developing recycling programs to reduce waste generation <http://www.dca.state.ga.us/development/EnvironmentalManagement/programs/recycling.asp>. The following steps have been suggested to launch an office recycling operation:

1. Select a Recycling Coordinator and/or Committee
    - The person or people you choose should have good organizational and communication skills and enthusiasm for recycling. During the start-up phase of your program the coordinator will need a reasonable amount of time to make sure all the necessary parts of the program are in place. Once the system is in place, it should require only a few hours a month to monitor the program. If you select a committee, you should try to have members from all the various departments of your company to monitor the program and stay aware of any special needs or problems as they arise.

2. Keep Track of What you Currently Throw Away
    - The easiest and most reliable way to track your trash is to have a trash flow evaluation done by a recycling service, consultant, or your current trash service (see Step 3 below for selecting a service.) They will review what you currently throw away and determine what is recoverable. They will also be able to help you determine the best way to remove, and identify where to take, your recyclables. There is often a fee for this type of evaluation, but many recycling businesses will waive this fee if you select them as your recycling vendor.
    - Another option for evaluating what you throw away is to develop a recycling worksheet and monitor your own trash disposal habits. This will help you determine the type of recycling you should be doing and the recycling system that will be necessary to handle it.

3. Choose a Hauler
    - Most large communities have recycling services available. A good place to start looking is by checking with your current trash service provider, contacting your city or county solid waste department, or by contacting other businesses in your area that are recycling and ask them for a referral. You should also check the telephone directories under Waste Paper or Recycling for other options. Local Keep America Beautiful affiliates are a great resource, as is Earth's 911 <www.earth911.org>

4. Choose Containers to set up your recycling system
    - Your collection system will require various products and equipment ranging from personal recycling collection containers to be used at an individual's desk to large mobile collection containers to pick up and transport your recyclables to your dock or drop-off area. Most office supply stores carry simple recycling containers marked with the chasing arrows symbol, and there are many online sources for containers. Your recycling service provider will also be able to help you identify the most appropriate container system for your program.

5. Educate and Inform Employees
    - Education of employees is key to the success of any office recycling program. Most people are excited about taking part in the program and are very receptive to learning about it. Try a three-step approach:

1. Build Awareness. Let people know about the goals and benefits of the program
2. Conduct employee meetings to discuss the recycling process. Tell people what is recyclable and what is not, and how they can participate in the program.
3. Follow up on the program. Keep people aware of the progress of the program through meetings, memos and newsletters.

6. Review Your Recycling Program
    - Review your program every three to six months and compare results to the disposal evaluation you performed before starting your program (Step 2.) If your program is not meeting your expectations, look at your system and see where you can make changes to make your program more successful, such as increasing educational efforts, moving recycling containers or expanding the program to include more materials.

7. Promote Ideas for Reusing Materials and Reducing Waste
    - There are many ways you can reduce the amount of waste materials generated in your office. Have paper that's been used on one side cut up and made into note pads; reuse old envelopes as file folders; and use ceramic coffee mugs instead of Styrofoam cups. The possibilities are endless.

The benefits of such a program may never be known until the entire program has been fully operational for some time. So much of the perceived benefits are buried in reduced expenses that it is difficult to realize monetary gains immediately. Until the system is operating, it remains to be seen what can be accomplished (Gloria Hartigrew, personal communication).

On the other hand, the costs of building and operating a recycling system may be more readily apparent. The system requires six specific but interrelated components (Kundell & Inman 1994):

- Identification and marketing of materials
- Collection
- Processing
- Transportation
- Manufacture of materials into new products
- Sale of new products to consumers

Often the focus is on the anticipated added costs, because they are seen to be separate and additional to the already existing disposal costs. As the recycling program develops, however, there is ample evidence to expect that the startup costs can be recovered from avoided waste disposal charges if an aggressive waste reduction strategy is implemented (EPA 1995).

Recommendations for Action

An important component of a waste management strategy for Georgia College & State University is an institutional recycling program. We recommend that the university take these steps to design and implement such a program:

- Designate a staff person to act as recycling coordinator
- Identify and publicize existing recycling efforts
- Encourage additional volunteer recycling ventures on campus
- Designate a facility for recycling collection and transfer
- Investigate institutional options for a comprehensive recycling program, which may include arrangements with a private recycling firm
- Develop and implement an action plan for recycling that is inclusive, obtainable, and inexpensive
- Inform and engage the campus on why and how to recycle using many different educational methods and outreach tools
- Follow up on the implementation of the program, and fix the things that need fixing
- Reduce the generation of garbage and recyclables by eliminating waste at the source
- Realize that a successful program takes time to develop

Already there are hundreds of people recycling on our campus. They do not appear to be doing it to make money; they are engaged in the activity because it makes sense from an environmental and ethical viewpoint. Our first task should be to encourage and enable these activities while we explore options for an institutional solution.

A critical concern is to make recycling the job of someone who works for the university. Waste management already has many employees, so all we have to do is realize that waste reduction and recycling are already components of someone's position, and write that into their job description. This employee can save the campus money and time by identifying ways to reduce material waste and transform garbage into recycling. A student work program could be created to aid the recycling coordinator with collection and processing of materials. Many of the successful programs have students perform the bulk of the collection and processing, and some even have students complete academic assignments involving the operation and planning of the facility.

Every successful program we studied started with a plan. The University of Missouri <http://extension.missouri.edu/owm/greencampus/index.htm> encourages campuses to start with attainable goals, such as:

- Achieve 40% reduction of solid waste by diverting recyclables from the waste stream.
- Establish 150 bins in classrooms, dorms, food service areas, arenas, computer labs, and offices throughout the campus for the collection of recyclables.
- Hire one full-time campus recycling coordinator to oversee the program.
- Establish a central collection and processing center on campus to consolidate paper, cardboard, plastic, glass, aluminum, steel and other materials.

Designating a location to store and process recyclables is of paramount importance. This location should be convenient, secure, and protected from the weather, since rainwater can ruin a paper recycling operation very quickly. It should include a drop-off facility where volunteers can bring their waste, as well as a central processing facility for the campus operation. It should have sufficient space to allow for a variety of collection and processing bins, including the large containers that will be hauled to industrial recyclers. We have an operation similar to this at the Baldwin County facility, and there may be an opportunity to duplicate or piggyback on that and other existing facilities. Obviously, this effort will require some startup costs, such as forklift and storage bins. There are grants from agencies such as the Georgia Department of Community Affairs for these expenses (Laurie Sikora, personal communication).

One of the most important recommendations is to take advantage of the level of commitment already evident on campus. Thousands of students, faculty, and staff have demonstrated a concern for recycling, and these people deserve an opportunity to do what they already want to do. Additional thousands of active participants can be cultivated through education and marketing strategies, including:

- Posters describing the process
- Brochures explaining how to recycle at GCSU
- Teach-ins and educational forums
- Movies
- Demonstrations and special events
- Incentive programs to recognize and reward recycling efforts
- Contests to reward participation

Recycling on GCSU campus can be a great opportunity for contractors such as Starbucks, Chick-Fil-A, and Sodexho to join the efforts to create a more sustainable campus, by contributing funds or materials toward recycling efforts. All of the members of our campus community should be invited to partner with the GCSU Green Initiative task force <http://info.gcsu.edu/intranet/green/> to promote recycling and other methods of sustainable living, as we promote the mission of Georgia College to maintain "a commitment to public service, continuing education, technical assistance, and economic development activities that address the needs, improve the quality of life, and raise the educational level within the university's scope of influence <http://www.gcsu.edu/about/index.htm>."

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