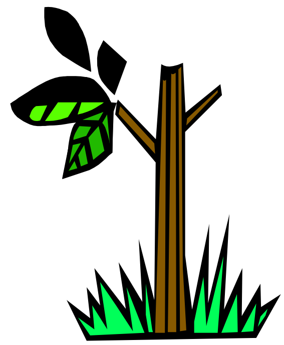
Composting at Towson University: A Feasibility Study



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I. Purpose Statement

To prepare for entry into the environmental workforce, the students of the Environmental Science and Studies senior seminar course chose to focus on alternative methods for solid waste disposal on the Towson University Campus. We were able to incorporate elements from each of our courses (i.e. biology, economics and public policy) into the solving of the solid waste problems that were encountered.

In order for the organisms to decompose the material, certain conditions must exist within the compost pile. They need an ideal temperature, a sufficient energy source (carbon), a protein source (nitrogen), oxygen, and moisture. The temperature inside the compost pile should be between 50-60°C (120-150°F). Also, the carbon to nitrogen ratio must be between 25:1-30:1. Ventilation, turning of the pile, and preserved air spaces around the wood chips will provide enough oxygen for aerobic decomposition. The moisture content of the pile must be maintained at a level between 40 to 60%. If these

-4 weeks, without any odor. When the decomposition process is complete, the final product is nutrient rich compost that can be used in landscaping, gardening, etc.

III. Composting Benefits

Composting waste is an effective, less expensive way to manage organic waste. It recycles valuable natural resources and produces a high quality, inexpensive soil conditions due to low oxygen levels. As the material in the lanfill decomposes, it produces methane and acidic leachate, which can cause many environmental problems. Building a composting facility and additional recycling at Towson University would reduce the amount of waste the university sends to the landfill by 80%.

There are many benefits of mixing compost with existing soil. These include improving soil structure, texture, aeration, and water retention. It can also provide problem solver. Towson University would become a role model for the surrounding schools and community.

Many students, faculty, staff, and the public are unfamiliar with composting. Towson University could use the composting program to educate their students as well as other people in the surrounding communities. Cornell University, which currently has approximately the same size student population as Towson University, instituted a composting program. The program has been used as a resource for research projects at the undergraduate and graduate levels, as well as for outreach programs with other local businesses (Cornell University Website 1998).

A composting project at Towson University could also bring positive attention to the campus and attract potential students. Washington State used its composting program to boost student enrollment. At the 1992 Palouse composting symposium, high school students, whom had participated in these educational outreach programs, gave presentations on composting. Of these students, fifty enrolled at WSU within the next two years (Washington State University Website 2001). A composting program at Towson could be a possible selling point for the university. Waste disposal is a major problem, not only in Maryland, but also in the entire country and this project would enable Towson to be an environmental leader in the community.

IV. Regulations Pertaining to University Composting

Composting in Maryland is regulated by the Maryland Department of the Environment Solid Waste Division. The regulations governing composting within the university are rather simple. The university is permit exempt if it only composts material that is generated on campus. Should the university decide to accept waste from other sources (such as the surrounding community or Towson High) possibly as an outreach gesture, then there is a specific permitting procedure that requires the employment of a certified operator (COMAR 26.04.07.23.). We would need to refer to the Code of Maryland Annotated Regulations (COMAR 26.04.07.23.) to determine which regulations apply. In contrast, accepting organic waste, such as woodchips, from an outside source

understanding current regulations, we were able to proceed in developing a composting program that would be feasible at Towson University.

V. Characteristics of Composting Systems

Several different composting methods were evaluated before coming to a final decision of which would be the most effective for our campus. Our class consulted Mr. James Marion, the Resource Management Director of the New York Correctional Services, to assess the possibility of composting on the University campus. Mr. Marion has built over 30 composting facilities since 1990 and is an expert in composting at large facilities. He introduced us to a number of different composting methods along with their advantages and disadvantages, and he described the procedure for construction and maintenance of a large scale composting facility.

We initially looked at the least expensive method, the windrow system. This method consists of a series of connected piles of organic waste that are turned successively every other day. The piles sit in long row, in the open with only minimal site preparation necessary. It takes approximately 3-4 weeks for the first pile to be sufficiently decomposed. This system is very inexpensive, requiring only a concrete pad and a vehicle that is used to turn the pile. However, the pile may be considered unattractive and excess water from rainfall could cause saturation to the piles. Saturation could interrupt the process and cause an unpleasant odor.

In contrast to the open windrow method, we also looked at fully enclosed systems. These structures take up a relatively small area (10 x 35 x 10 feet) and keep the entire process covered, so that risks of odor and visual obtrusiveness are minimized. However, this system can be expensive with costs ranging from $200,000 - $400,000.

There are also additional installation costs and employee training costs for the filtering and computer systems.

The best alternative, we felt, was to create an enclosed aerated static bay system. This involves building a barn-like structure that is on a cement floor with open compost that is available at this site, so there will be room for expansion if needed in the future. The site is located just west of the Towson Center (Appendix 2) and is isolated from students and surrounding traffic. The Towson University practice fields nearby would not be affected by the composting facility. George Krause, the facilities planner, has assured us that there are no expected uses for this area in the university master plan for the next ten years. Water, sewer, and electric connections are available from the nearby grounds facility, and connecting to the preexisting lines is far less expensive than running new lines to the location. In addition, it is possible that somebody from the grounds building could be assigned the responsibilities of overseeing the composting facility.

There are also preexisting bays located next to the grounds building on the corner of the parking lot. The bays could be used for storage of wood chips or supplies for the facility, when they are not being utilized for other reasons. Some of these bays are currently filled with mulch and small equipment (i.e., skid-steer loader). The mulch could be kept there, and the small equipment could be stored inside the composting facility. The companies supplying the wood chips also can easily reach this area. Upon reviewing time. Finally, water, sewer, and electric would have to be run to this site, which ultimately would increase costs. We feel this site is not as appropriate as the Grounds Building Site.

The final site visited was the Auburn Road Site (Site C) located on the corner of Auburn Drive and Osler Drive. This site is located directly next to a major route through campus. There may not be enough space is available at this site to accommodate the proposed facility. This property is also surrounded by neighbors who might oppose such a structure, in which case some type of barrier would have to be constructed. Water, sewer, and electric would have to be connected to the site, which adds to the costs. We think it should only be considered as a last alternative. Given all these considerations, the Grounds Building Site is the best location for the Aerated Static Bay Composting System.

VII. Operating an Aerated Static Bay Composting

The proposed aerated static bay system would

generated, it is then allowed to sit for 3-4 weeks. After this decomposing period, the pile would be run through a screener to remove any contamination, such as plastic or metal. Once screened, the composted material would remain in a finishing pile for 30-60 days, in order for it to fully cure.

VIII. Glen Dining Facility Audit

In order to further assess the feasibility of composting on campus, we needed to determine the composition and the quantity of the waste being produced at the dining facilities. Mr. Dave Tosi allowed us to conduct an audit of the waste being produced on an average day. All the waste produced during the preparation of the food was separated into food scraps, plastics, tin, cardboard, and non-recyclable materials. These items were then weighed to determine the amount of each that accumulated in a single day. The waste from the dining area is composed of food scraps and paper napkins, which are both compostable. This waste was processed through a pulper and weighed. Our audit produced an approximate quantity of waste produced at the Glen Dining Facility in an average day.

In order to assess the amount of waste produced in a single day at the Newell Dining Facility, we compared the amount of meals served at each location. The Glen served 1,175 meals to students on the day of the audit compared to 592 at Newell. We then used the proportion of meals served at Newell compared to the Glen to calculate the approximate amount of waste produced per day at the Newell Dining Facility (Table 1). The total waste per year was then calculated by multiplying the total waste per day for each facility by the amount of days that the facility is open per year. The audit is important because it shows the relative proportions of all the different types of waste that are generated at the two dining facilities.

Table 1. Waste Audit

	Glen	**Newell**	**Both Facilities**
Meals Served	1175	592	
Facility Schedule (days/year)	357	165	
Food Waste (lbs./day)	711.0	355.0	
Food Waste (lbs./year)	253,827.0	58,575.0	
Food Waste (tons/year)	127.0	29.0	
Food Waste - Total Tons			156.0
Plastic (lbs./day)	36.2	*9.1	
Plastic (lbs./year)	12,916.0	1,493.0	
Plastic (tons/year)	6.5	0.7	
Plastic - Total Tons			7.21
Tin (lbs./day)	40.0	10.0	
Tin (lbs./year)	14,280.0	1650.0	
Tin (tons/year)	7.1	0.8	

Tin - Total Tons1P /MCID 52>BDC 84.384 466.M(1P 0.48001 ref*84.864 395.11 (1P /M8001 ref*232.01 39

waste management, including waste minimization and waste recovery, such as composting.

Other grants are also available to non-profit organizations from a variety of sources as listed in the Catalog of Federal Domestic Assistance put out by the Environmental Protection Agency, Office of Solid Waste. The awards will not cover the construction of the building but will cover the purchase of equipment such as the screener, a new bobcat and other supplies such as fans and piping. The awards could also pay for training and educational materials. The awards range from $5,000 to $250,000.

Mary Louise Healy, Director of the University Research Services, supplied additional funding possibilities such as the National Fish and Wildlife Federation Challenge Grants and the Chesapeake Bay Small Watershed Grants Program. She stressed the need to "emphasize the watershed protection element" of the composting project. Other possible funding sources are the Maryland Department of Natural Resources Governor's Watershed Revitalization Partnership Program for Stream Restoration, and the Ittleson Foundation, which focuses on environmental education.

XI. Conclusions

Currently, the University spends a large amount of money on waste removal, and we wanted to try to develop a mechanism to lower these costs. We chose to focus on composting based on the fact that a considerable amount of the waste being generated is food waste and food is readily compostable. We took into consideration potential costs (construction costs, supplies and training) and potential savings (additional recycled materials, tipping and hauling fees) and according to our waste audit calculations, we anticipate substantial savings, which could cover the start up costs within a year. In addition to the economic benefits, composting at Towson University could provide many other benefits such as community and educational outreach programs.

There are very few regulations governing composting within the university, and funding is available from outside sources making the program easier to initiate. After considering all of these factors we determined that composting is not only feasible but also advantageous.

VIII. Appendix 1--Economic Analysis

*Two estimates of the amount of waste that the University generates annually were used to estimate the economic benefit of implementing a composting facility on campus. The first estimate was based strictly on the tons of waste that were generated as a

From that estimate we calculated the proportions of food waste, metal, plastic and miscellaneous waste on an annual basis and at Newell Hall. The second estimate is based on the assumption that the compactors that are located behind the dining facilities are always full when they are dumped. Using this assumption, the university would generate 520 tons of waste annually. The proportions of waste types from the waste audit were then applied to the 520 tons. Any calculations based on these estimates are referred to as

Tons of Waste Generated Yearly

	Yearly Tons (Percent of Total) Based on Audit	Yearly Tons (Percent of Total) Based on Extrapolation*
Food Waste	156 (73%)	379.6 (73%)
Metal (Tin)	7.96 (4%)	20.8 (4%)
Plastic	7.21 (3%)	15.6 (3%)
Miscellaneous Waste	41.08 (20%)	104 (20%)
Total Waste	212.25 (100%)	520 (100%)

Recycling and The Money Gained Through Increased Recycling

# of Tons Generated ($ Gained/ Year) Based

Totals	15.17 ($1329.87-$1730.10)	36.4 ($3021-$4067)

Potential Savings

	Based on Audit	Based on Extrapolation
Potential $ Saved in Waste Removal	$19,430	$37,600
Potential $ Gained Through Recycling	$1,329.87-$1,730.10	$3,021- $ 4,067
$ Not Spent on Purchasing Compost	$2,000	$2,000
Total Saved	$22,759.87-$23,160.10	