Recyclables in UCR waste containers

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Abstract

The purpose of this study is to understand what kinds of wastes enter our trash receptacles and determine how much of the waste is recyclable at the University of California, Riverside (UCR) campus. A significant amount of UCR's trash is composed of recyclable materials varying from plastic bottles, aluminum cans, and various forms of paper wastes. The goal of this experiment is to estimate how much recyclable materials end up in landfills from the UCR campus. Since there are hundreds of trash receptacles on campus, this study will focus in on the hallway trash receptacles of Bourns Hall of Engineering B-Building. In this study, fifteen waste bins of B-Building were monitored for one week for its non-biodegradable contents. Two recycling bins were added and all seventeen bins were monitored for their non-biodegradable contents. Their contents were grouped according to their composition into generalized categories.

Introduction

The University of California, Riverside (UCR) is one of the many universities leading the way in environmental research. It is quite ironic, however, that the University of California, Riverside has fallen very far behind in many basic environmental programs such as recycling. The campus lacks a strong recycling program. It is not enough to make recycling available; a message should be presented and possibly add "financial incentives, which could make recycling more than just an environmentally friendly action".[i] Many factors prevent recyclables from entering recycling bins. The size of the recycling containers may even have an effect on recycling because "[w]hen space is an issue, overflow immediately ends up in the trash".[ii]

Increasing the rate of trash diversion from landfills to recycling plants will be just another way UCR continues its struggle to become a "greener" campus. In 1993, "40% of U.S. municipal solid waste was recyclable paper".[iii] Since then, there have been many leaps forward in getting more people involved in recycling. One such act was the creation of "bottle bills"[vi], which takes a “deposit on most aluminum cans and PET bottles”[v] which creates a higher demand to recycle them to reclaim the deposit. Before an accurate statement about recycling at the UCR campus can be made, data about the actual waste bins must collected. The purpose of this experiment is to determine how much of the public waste on campus is comprised of recyclable materials and to test if the addition of recycling bins will prevent recyclables from entering the waste bins.

Materials and Methods

Since the University of California, Riverside (UCR) is a large campus (and has hundreds of trash receptacles) we monitored the non-biodegradable wastes of only one of the buildings. Bourns B-Building was chosen to represent the UCR campus for the following reasons: (1) it is not located near the commons, so it should not receive a disproportional amount of discarded food containers; (2) it is very accessible and receives a wide variety of students and professors; and (3) it does not have recycling containers already in place.

The only waste bins monitored were the hallway waste bins. This is due to the fact that the waste bins inside the rooms may have contained dangerous materials and materials that may be unique to an engineering building. The hallway waste bins were monitored daily between 12 p.m. and 4 p.m. In this time interval, the waste bins contain most of their daily contents since it is after lunch but it is before the waste bins are emptied after 6 p.m. For the first week, fifteen waste bins were monitored. For the second week, fifteen waste bins and two recycling bins were monitored. The recycling bins were clearly labeled and were covered in a light green paper to help distinguish them. To monitor the waste and recycling bins, all their non-biodegradable contents were emptied out and logged into a notebook.

The non-biodegradable wastes were marked into different categories based on their composition. For example, newspapers and notebook paper were both placed under the same category, “Printing and Writing (PW) Paper”. Other categories are more generalized such as “Plastic Containers” which were any type of plastic varying from prescription medicine bottles to sushi trays. The size of the wastes were not taken into account, therefore large cardboard boxes still only counted as *one* “Cardboard” item.

Non-biodegradable waste	Description and/or examples
Printing and Writing (PW) Paper	Newspapers, computer paper, notebook paper.
Paper Hand-towels	Napkins, paper towels, hand wipes
Plastic Containers	Soap Bottles, medicine bottles, plastic trays
Paper Containers	Sturdy paper with walls thinner than 1 mm, French fry cartons, paper plates
Soft Drink Cups	Commercially used paper cups and coffee cups
Polystyrene Containers	Noodle cups, take-out boxes
Plastic Cups	Clear plastic drink containers, large fountain drink cups
Aluminum Cans	Drink containers made of aluminum
Polyethylene Terephthalate[vi] (PET) Bottles	Bottles containers used to hold soda and water
Low Density Polyethylene Bags (LDPB)	Bags such as grocery-store bags and sandwich bags
Paper Bags	Bags made from thin paper
Wax paper	Paper used to wrap and cover fast food items.
Glass Bottles	Drink containers made from glass
Gloves	Nylon gloves, rubber gloves, latex gloves
Potato Chips and Candy (PCC) Wrappers	Potato chip bags and candy wrappers
Condiment Containers	Ketchup packets, hot sauce packets, coffee cream cups
Cardboard	Container or scraps of cardboard paper
Utensils	Utensils made from wood, plastic, and metal

Results

The experiment revealed many patterns in the wastes of the Bourns Hall B-Building. Despite the addition of recycling bins, the waste bins still contained many recyclables. The most abundant non-biodegradable waste by numbers was the paper hand towers (see **Figure 1** and **Figure 2**). This is attributed to the fact that the bathrooms dispensed paper hand-towels and most people continued to dry their hands even after they had left the bathroom and disposed of these hand towels in the hallway trash bins instead of the bathroom waste bins.

There were a few distinct waste patterns that were unique to Bourns B-building. In Bourns B-Building, there were ample amounts of PET bottles and PCC wrappers in the trash cans because five out of the fifteen trash cans were located in close proximity to vending machines. Another unique waste pattern was the unusually high amount of gloves in the trash bins. Due to the fact that many experiments and laboratories are located in Bourns B-Building, there are a disproportional amount of Gloves in the trash bins in Bourns B-Building compared to non-science related buildings (see **Figure 1** and **Figure 2**).

Data from February 26th 2008 show a dramatic increase in the number of sheets of PW paper in the waste bins as seen in **Figure 2**. This is due to an unusual amount of whole newspapers that were found the waste bins. Data from March 6th 2008 are drastically different in a few ways because of an unexpected luncheon provided to the faculty and staff in Bourns B-Building. At this event, free food and drinks were provided on polystyrene plates and plastic cups. This event added an abnormal amount of Polystyrene and plastic cups to the waste bins and is reflected in **Figure 2**.

The totals for all the materials collected from the recycling bins are shown in **Figure 3.** The recycling bins did their projected goal by decreasing in the average number of PET bottles in the waste bins as seen in **Figure 4.** There was a decrease in the number of sheets of PW paper overall for the two weeks as well. Based upon the numbers collected, 21% of items put into waste bins are recyclable material (waste paper, aluminum cans, and plastic bottles). In addition, the average waste bin contains one plastic bottle, two sheets of paper, and a fourth of an aluminum can per day.

Table 1: Week 1 Contents of Waste Bins of Bourns B- Building				
	25-Feb-08	26-Feb-08	28-Feb-08	29-Feb-08
	12:51 PM	3:43 PM	1:38 PM	2:05 PM
PW Paper	4	68	16	33
Paper Hand Towels	36	32	21	31
Plastic Containers	5	11	6	2
Paper Containers	10	14	5	9
Soft Drink Cups	26	18	9	23
Polystyrene Containers	6	3	3	1
Plastic Cups	1	0	4	2
Aluminum Can	1	0	5	5
PET Bottles	12	9	4	12
LDPB	5	3	5	9
Paper Bags	11	8	7	5
Wax Paper	8	5	2	4
Glass Bottles	2	2	2	3
Gloves	9	7	6	8
PCC	17	17	11	13
Condiment Containers	3	6	0	3
Cardboard Containers	6	0	0	8
Utensils	2	8	0	0

Table 2: Week 2 Contents of Waste Bins of Bourns B-building				
	3-Mar-08	4-Mar-08	6-Mar-08	7-Mar-08
Contents of Waste Bin	1:36 PM	12:17 PM	2:14 PM	3:38 PM
PW Paper	16	22	19	18
Paper Hand Towels	34	27	50	26
Plastic Containers	9	4	3	4
Paper Containers	8	6	12	7
Soft Drink Cups	13	9	11	11
Polystyrene Containers	1	10	35	5
Plastic Cups	1	1	21	2
Aluminum Can	9	1	2	3
PET Bottles	15	6	1	6
LDBP	7	7	7	16
Paper Bags	6	5	10	10
Wax Paper	0	4	4	4
Glass Bottles	3	1	1	1
Gloves	7	2	1	0
PCC	20	7	17	13
Condiment Containers	3	2	6	0
Cardboard Containers	0	0	0	4
Utensils	0	0	19	2

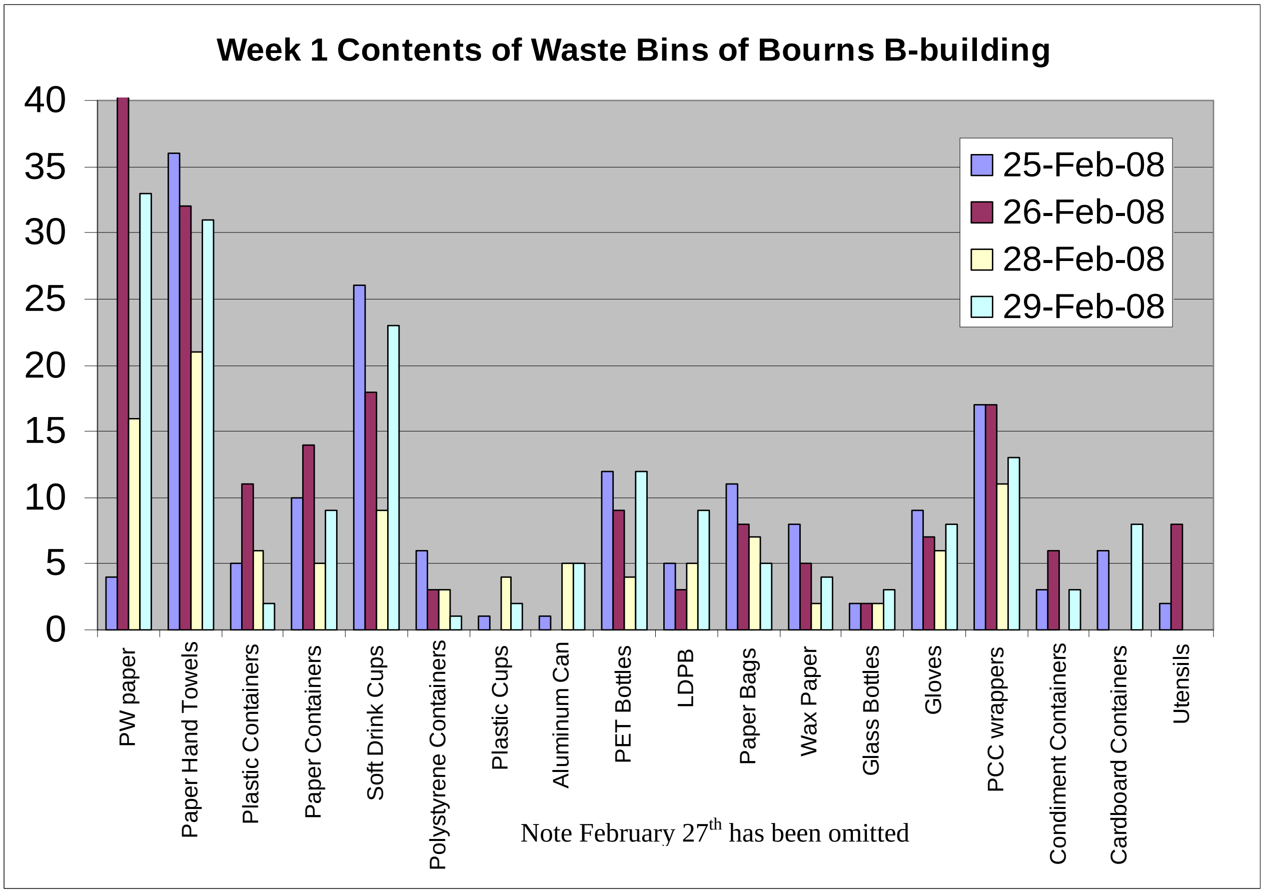

***Figure 1**. Contents of 15 Trash Bins of Bourns B-Building between from February 25th- February 29th, 2008. February 27th has been omitted due to waste from the previous day not being removed.*

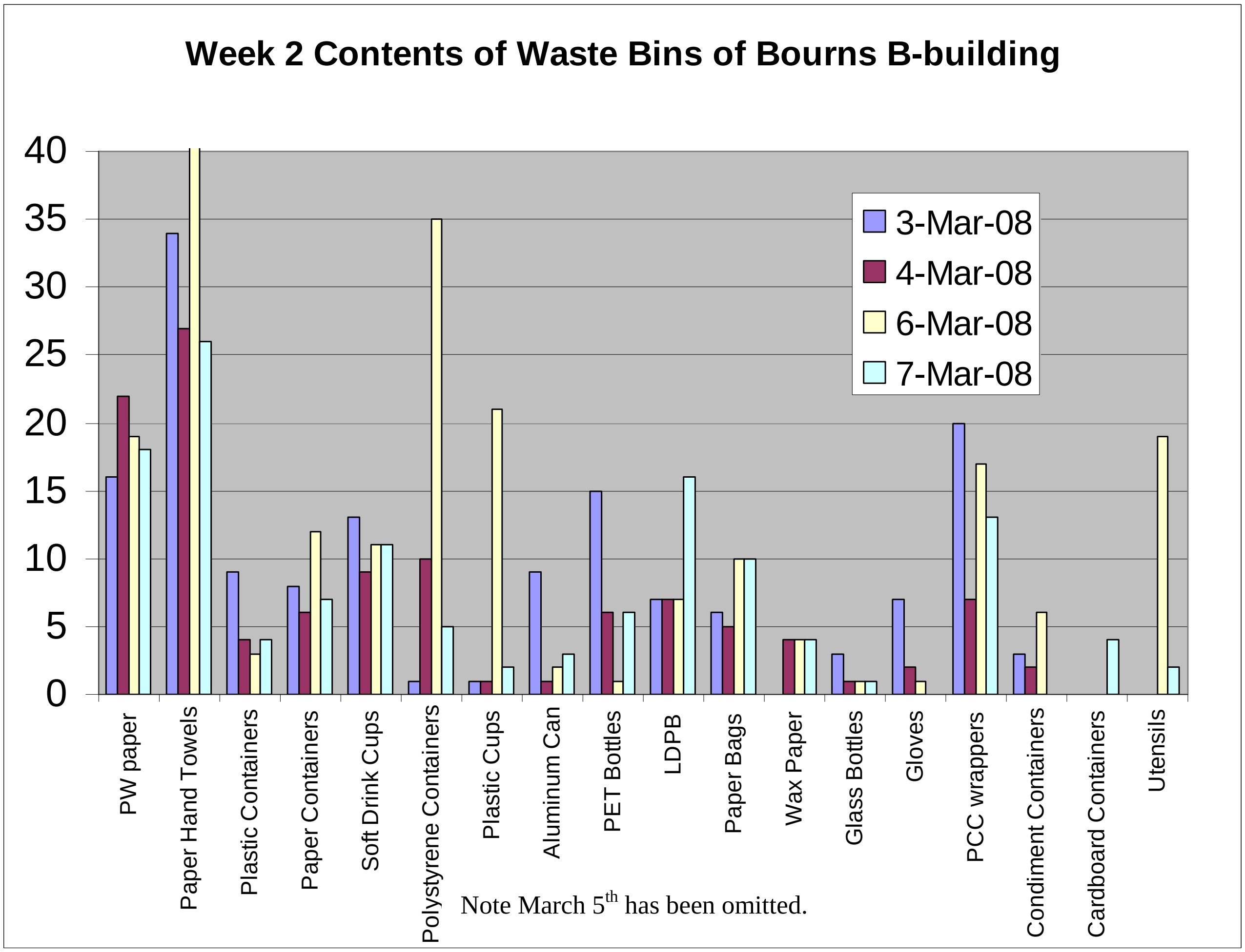

Figure 2*. Contents of 15 Trash Bins of Bourns B-Building between from March 3rd-March 7th, 2008. March 5th has been omitted because the waste from the previous day was not removed.*

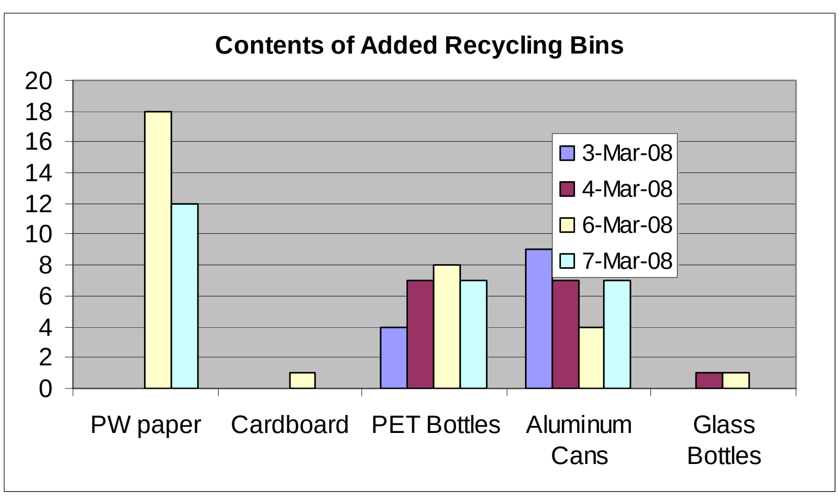

Figure 3*. Contents of 2 Recycling Bins added to Bourns B-Building between from March 3rd-March 7th, 2008. March 5th has been omitted because some of the wastes from the previous day were not removed.*

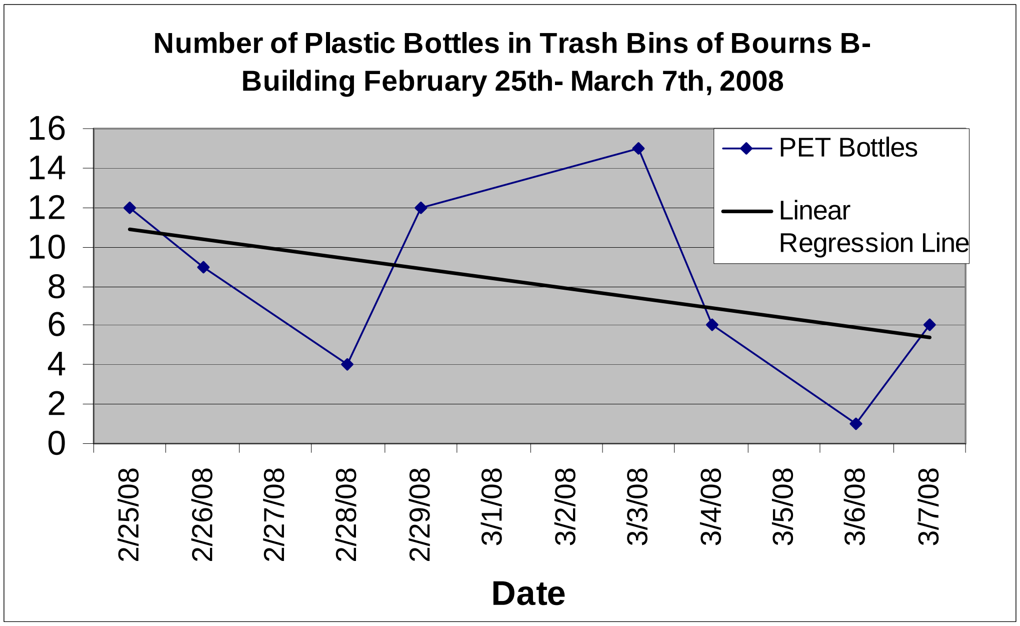

Figure 4. *Decline in average number of plastic bottles in waste containers shown by linear regression line.*

Table 3: Contents of Added Recycling Bins in Bourns B-Building				
	3-Mar-08	4-Mar-08	6-Mar-08	7-Mar-08
PW Paper	0	0	18	12
Cardboard	0	0	1	0
PET Bottles	4	7	8	7
Aluminum Cans	9	7	4	7
Glass Bottles	0	1	1	0

References

1. Cichonski, Thomas J., and Karen Hill. Recycling Source Book. 1st ed. Detroit: Gale Research Inc., 1993. 40-45.
2. **"**Environmental works**."** Encyclopædia Britannica. Deluxe Edition. Chicago: Encyclopædia Britannica, 2008.
3. Gast, Justin. "The Plastic Age." Resource Recycling (2008).
4. Yepsen, Rhodes. "Encouraging Sustainable Recycling Behavior through Financial Incentives." BioCycle 48 (2007): 35-37.

Endnotes

[i] Yepsen (2007)
[ii] Ibid
[iii](Cichonski)
[iv] Ibid
[v] Ibid
[vi] Gast(2008)