VOLUME OF SOLID WASTE ACCUMULATED BY GSC-MAIN CAMPUS: A DATA BASE FOR SOLID WASTEMANAGEMENT PROGRAM

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ABSTRACT

This study was conducted to determine the volume of solid waste accumulated by GSC Main Campus. The data gathered in the study was the actual weight of the classified waste as to non-biodegradable and biodegradable waste collected per week for five (5) consecutive months. The amount waste collected was recorded every week. Results showed that there was more biodegradable waste accumulated than the non-biodegradable wastes. Students, faculty and staff practice segregation of waste at source. Recyclable materials are recovered from the non-biodegradable waste before these dumped at the specific dumping site, and the GSC Main Campus has earned income from the recyclable materials recovered and sold at junk shops.

KEYWORDS: Solid waste, biodegradable, non-biodegradable

INTRODUCTION

Background of the Study

Nowadays, wastes are one of the major problems in our society. Anywhere you can see them, scattering along the roads, floating in the bodies of water as in the sea, in the river and the lake. It is unpleasant to the eye that they're scattered anywhere. These wastes were thrown by the residents in the community without their knowledge that these can be harmful not only to our environment but also to us as individuals. Wastes can cause pollution in air, water and the land. These problems are all caused by improper solid waste disposal. People do not practice solid waste segregation. They do not separate their garbage according to its usage.

When the solid wastes are not segregated, a large volume of garbage is handled for the collection and disposal; even an appropriate disposal system would be difficult to provide. Unsegregated solid waste in disposal sites poses environmental problems mainly air and water pollution. Segregated solid waste lessens expenditure on waste collection and disposal. Segregation enables solid waste to be more easily separated while in reusable materials out of the garden stream. The biodegradable waste can be buried or processed to become soil conditioner or fertilizers that can nourish soils in agricultural fields or gardens, the recyclables can be washed and sold to junk buyers. Segregation, composting and r cycling could dramatically reduce the volume of solid waste that is dumped in disposable sites. Only residual waste, which is the non-compostable waste need to be discarded in landfill (GTZAHT SWMLGUS - Visayas leaflet).

Guimaras State College is an institution having a population of almost 2000; there is a great accumulation of waste in the campus when there is improper solid waste segregation. Thus, this study was conducted to gather baseline data to improve the practices in waste segregation; garbage problems have set forth a call for concerted efforts to improve our impoverished environment.

Statement of the Problem

This study aimed to determine the volume of solid waste accumulated by GSC Main Campus as baseline data for the Solid Waste Management Program of the College.

Specifically, this study sought answers to the following questions:

1. What is the volume of biodegradable wastes accumulated by GSC main Campus?
2. What is the volume of non-biodegradable waste accumulated by the GSC main Campus?
3. What is the volume of recyclable waste materials collected?
4. What is the cost and return analysis of selling recyclable wastes?

METHODOLOGY

This study used descriptive quantitative research methodology. It was originally developed in the nature of sciences to study natural phenomena. Quantitative Research seeks to quantify or reflect in the number the observations on the characteristics of the population being studied (David, 2000). Specifically, this study used actual weighing or observation of solid waste at GSC that is a direct indicator to explain the problem of solid waste management in the campus.

The data gathered in the study was the actual weights of the classified waste as to non-biodegradable waste collected per week for five (5) consecutive months. The amount of waste collected was recorded every week. The following steps were undertaken:

1. Prior to the gathering of data, campus-wide information dissemination campaign was done to practice segregation of solid waste.
2. Each classroom was provided with waste can labeled degradable and non-degradable so that students will be guided where to throw their garbage. Segregation at source must be practiced. Classrooms not following instructions will be monitored for appropriate action/guidance.
3. Utility personnel were assigned to gather, weigh and record data about the biodegradable and non-biodegradable wastes. Recyclable wastes were segregated and weighed separately and were presented to the researcher in charge to be sold to the junk shops, thus income was monitored.
4. Data Gathering was done three times a week for a period of five (5) months by that time; the researcher had enough baseline data for analysis.

RESULTS AND DISCUSSIONS

Volume of biodegradable wastes accumulated by GSC main campus

The data gathered were the volume of biodegradable waste accumulated by GSC Main Campus in a period of five (5) months from August, 2011 to December, 2011. Results revealed that in August, there are 1,250 kgs. of biodegradable wastes accumulated, in September, there are 1,421.20 kgs. in October, 1,359.45 kgs, in November, 1,310.54 kgs and in December, 1,446.30 kgs of biodegradable that are collected. Results further showed that the greatest volume of biodegradable waste accumulated was in the month of December followed by September, followed by October then in November and the least, was in August.

Result further implies that more biodegradable wastes were accumulated in December due to the more activities conducted in this month like holding of Christmas Party. In September, the volume of biodegradable waste is due to the conduct of the Intramural Meet.

Table 1. Volume of biodegradable waste accumulated by the GSC Main Campus

Course	Aug	Sept	Oct	Nov	Dec	Total
BIT	105.5	84	88	83	298.3	658.8
HRM	44.75	63.7	83.95	101.54	128.5	422.44
Admin/ CANTEEN	262	284	295	237	198	1276
BSBA	51.5	57	68.5	44	47.5	268.50
BED	391	483	461	446	333	2114.0
CRIM	51	23.5	35	40	77	226.50
InfoTech	55	55	91	218	212	631
EDUC	290	371	237	141	152	1191
TOTAL	1250.75	1421.20	1359.45	1310.54	1446.30	6788.24

Volume of non-biodegradable waste accumulated by the GSC main campus

Table 2 shows the volume of non-biodegradable waste accumulated by the GSC Main Campus in the period of August, 2011 to December, 2011. The greatest volume of non-biodegradable waste accumulated by the GSC Main Campus in August is 1, 112.83 kgs, in September, 1, 257.00 kgs, in October, 1, 010.15 kgs, in the month of November it is 909.25 kgs and in December the volume of non-biodegradable accumulated is 940.78 kgs. The data further revealed that the greatest volume of non-biodegradable waste accumulated at the GSC Main Campus is in September. This is followed by August; next is in October, then in December, and the least accumulation of non-biodegradable waste is in November, 2011.

The result implies that more non-biodegradable wastes were accumulated in September due to the holding of Intramural meet. It further implies that waste minimization especially the non-biodegradable waste is practiced by students, faculty and staff as shown in the decreasing accumulation of non-biodegradable waste in the later month of the survey.

Table 3 presents the volume of recyclable waste materials collected in a period of five (5) months from August, 2011 to December, 2011. The results show that in August, there are 28.50 kgs. of recyclable waste materials collected, in September 38.50 kgs., for October, 26.00 kgs., in November 13.00 kgs. and in December, 13.50 kgs. Result further revealed that the greatest collection of recyclable waste materials was in September and the least was in November.

This implies that more recyclable waste materials were used in September due to more activities conducted in this month like the intramural Meet. As there are more activities, there is more accumulation of wastes in which one is recyclable materials.

This further implies that there is a practice of segregation of wastes in GSC Main Campus as reflected in the data gathered where recyclable materials have been separated from the biodegradable and non-biodegradable wastes. Usage of recyclable materials has been minimized as shown in the decrease in the volume of recyclable waste collected in the later months of survey.

Table 2. Volume of non - biodegradable waste accumulated by the GSC main campus

Course	Aug	Sept	Oct	Nov	Dec	Total
BIT	56	69	48	31	184.28	388.28
HRM	28.25	41	54.65	36.75	26.5	187.15
Admin/ CANTEEN	233.5	236	239	233	185	1126.50
BSBA	39.5	61.5	61.5	29.5	14	206.00
BED	397	470	379	350	227	1823.00
CRIM	3	2.5	3.5	7	22	38.00
InfoTech	101	101	71	102	156	531.00
EDUC	254.58	276	153.5	120	126	930.08
TOTAL	1112.83	1257	1010.15	909.25	940.78	5300.01

Table 3. Volume of recyclable waste materials collected in period of five months

Course	Aug	Sept	Oct	Nov	Dec	Total
BIT	0	0	0	0	0	0.00
HRM	1	0	0	0	0	1.00
Admin/ CANTEEN	6.5	9	11	5	6	37.5
BSBA	0	2	0	0	0	2.00
BED	21	27.5	15	8	7.5	79.00
CRIM	0	0	0	0	0	0.00
InfoTech	0	0	0	0	0	0.00
EDUC	0	0	0	0	0	0.0
TOTAL	28.5	38.5	26	13	13.5	119.5

Table 4 shows the value of sold recyclable waste materials collected at GSC Main Campus. Data shows that in period of five (5) months, from August, 2011 to December, 2011 the total cost of recyclable waste materials sold in junk shops amounted to one thousand four hundred thirty-four pesos (Php. 1,434), from the total volume of 119.50 kgs. Of recyclable waste materials sold at Php. 12.00 per kilogram in junk shops. Data revealed that in August, the cost is three hundred forty-two pesos (Php. 342.00). In September it amounted to four hundred sixty-two pesos (Php. 462.00), for October, it is three hundred twelve pesos (Php. 312.00), November it is one hundred fifty-six pesos (Php. 156.00) and in December the cost of recyclable waste materials amounted to one hundred sixty-two pesos (Php. 162.00). The results further reveal that the highest cost of sold recyclable waste materials in September due to more recyclable waste materials collected and the least is in November having the least collected recyclable waste materials. This further implies that the more recyclable waste materials collected, the greater is the amount collected from the sale of recyclable materials. In recovering recyclable materials from other wastes, really "may pera sa basura" and at the same time reducing the bulk of wastes dump at specific site.

Table 4. Cost of sold recyclable waste materials collected at GSC Main Campus in pesos

Course	Aug	Sept	Oct	Nov	Dec	Total
BIT	0	0	0	0	0	0
HRM	12.0	0	0	0	0	12.0
Admin/ CANTEEN	78.0	108.0	132	60.0	72.0	450.0
BSBA	0	24	0	0	0	24.0
BED	252.0	330.0	180.0	96.0	90.0	948.0
CRIM	0	0	0	0	0	0
InfoTech	0	0	0	0	0	0
EDUC	0	0	0	0	0	0
TOTAL	342.0	462.0	312.0	156.0	162.0	1,434.0

Table 5 shows the summary of volume of waste (biodegradable, non-biodegradable and recyclable) accumulated at the GSC Main Campus in the period of five (5) months from August 2011 to December 2011. Results revealed that as a whole at GSC Main Campus there were 1,250.75 kgs. of biodegradable collected, 1,421.20 kgs in September, 1,359.45 kgs. in October, 1,310.54 kgs. in November and 1,446.30 kgs in December. It is shown that it is December where there was the greatest accumulation of biodegradable wastes and least in August. Data further revealed that for non-biodegradable, the greatest accumulation was in September and least in November. For recyclable wastes, the greatest accumulation was in the month of September and least in November.

This implies that when the non-biodegradable wastes are in great volume more recyclable materials are collected. The use of non-biodegradable materials has been minimized which shows that in the campus, there is a practice of reducing the use of non-biodegradable wastes.

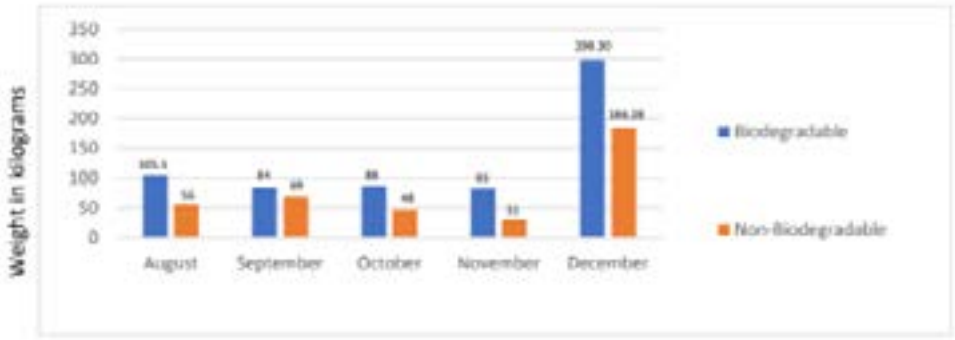
Table 5. Summary of volume of wastes accumulated at the GSC Main Campus in kilogram

Course	Aug	Sept	Oct	Nov	Dec	Total
Biodegradable	1,250.75	1,421.2	1,359.54	1,310.54	1,446.3	6,788.24
Non-Biodegradable	1,112.83	1,257.0	1,010.15	909.25	940.78	5,230.50
Recyclable	28.50	38.50	26.00	13.00	13.50	119.50

Volume of wastes accumulated per school

Fig. 1 shows the volume of biodegradable and non-biodegradable wastes accumulated in the School of Industrial Technology for five (5) months from August 2011 to December 2011. It shows that for the month of August, the students, faculty and staff in the School of Industrial Technology have accumulated 105.50 kgs. of biodegradable and 56 kgs. of non-biodegradable wastes. In September, the wastes they have accumulated is 84 kgs. of biodegradable and 69 kgs. of non-biodegradable wastes. For the month of October, they have accumulated 88 kgs. of biodegradable and 48 kgs. of non-biodegradable and 31 kgs. and in December, 298.30 kgs. of biodegradable and 184.28 kgs. of non-biodegradable wastes were accumulated. It is further shown that in the school of Industrial technology, the greatest volume of wastes (biodegradable and non-biodegradable) accumulated was in December and least in November.

This implies that the accumulation of non-biodegradable wastes is minimal which shows that the students, faculty and staff in the School of Industrial Technology practice wastes minimization specifically the non-biodegradable wastes.



Months

Fig. 1 Garbage accumulated in the School of Industrial Management

Fig. 2 presents the volume of wastes (biodegradable and non-biodegradable) in the School of Hotel and Restaurant Management for the period of five months from August 2011 to December 2011. The graph shows that in August, in the School of HRM, 44.75 kgs. of biodegradable and 28.25 kgs. of non-biodegradable wastes were accumulated. In the month of September, 63.70 kgs. of biodegradable and 41 kgs. of non-biodegradable were accumulated. For the month of October, the students, faculty and staff in the School of HRM have accumulated 83.95 kgs. of biodegradable and 54.65 kgs. of non-biodegradable wastes. In November, 101.54 kgs. of biodegradable and 36.75 kgs. of non-biodegradable wastes were accumulated and in December, 128.50 kgs. of biodegradable and 26.50 kgs. of non-biodegradable were accumulated. It is further shown that it is in December where the greatest volume of biodegradable waste was accumulated and in October is the greatest accumulation of non-biodegradable wastes in the School of HRM.

It implies that in the accumulation of wastes, the non-biodegradable wastes are minimal as compared to the biodegradable wastes which show that the students, faculty and staff are knowledgeable of the proper ways of protecting the environment.

Figure 3 shows the wastes (biodegradable, non-biodegradable and recyclable) accumulated at the Administration Building and the Canteen. It shows that in August, the biodegradable wastes accumulated at the administration building and canteen is 262 kgs; non-biodegradable is 233.50 kgs. and the recyclable is 6.5 kgs. In September, 284 kgs. of biodegradable, 236 kgs of non-biodegradable and 9 kgs. of recyclable materials. For the month of October, 295 kgs. of biodegradable, 239 kgs. of non-biodegradable and 11 kgs. of recyclable were collected. In November, 237 kgs. of biodegradable, 233 kgs. of non-biodegradable and 5 kgs. of recyclable were accumulated while in December, 198 kgs. of biodegradable, 185 kgs. of non-biodegradable and 6 kgs. of recyclable waste materials. It is further shown that the accumulation of non-biodegradable is as much as that of the biodegradable and the increase in wastes, increase the recyclable materials recovered. This implies that the operation of the canteen still uses more non-biodegradable materials which shows the reduction of wastes is not fully practiced.

Months

Fig. 2 Garbage accumulated in the School of Hotel and Restaurant Management

Months

Fig. 3 Garbage Accumulated in the Administration Building & College Canteen

Figure 4 illustrates the volume of biodegradable, non-biodegradable and recyclable wastes accumulated at the School of Business Administration in the period of five (5) months from August 2011 to December 2011. It shown that in August at the School of Business Administration, 51.5 kgs. biodegradable, 39.5 kgs. of non-biodegradable and no recyclable wastes were accumulated. For the month of September, 57 kgs of biodegradable, 61.5 kgs of non-biodegradable and 2 kgs. of recyclable were collected. In October 68.5 kgs biodegradable, 61.5 kgs of non-biodegradable and no recyclable waste were gathered. In November there were 44 kgs of biodegradable, 29.5 kgs. of non-biodegradable and no recyclable materials accumulated and in December, 47.5 kgs. of biodegradable, 14 kgs. of non-biodegradable with no recyclable wastes were accumulated.

It further shows that in the School of Business Administration, the greatest accumulation of biodegradable wastes was in October while it was in September where there was the greatest accumulation of non-biodegradable wastes. The least accumulation of biodegradable was in November while it is in December where the accumulation of on-biodegradable is least. There were recyclable materials, recovered only in September in the month where the non-biodegradable wastes are more.

Months

Fig. 4 Garbage Accumulated in the School of Business Canteen Administration

Figure 5 presents the wastes (biodegradable, non-biodegradable and recyclable) at the Basic Education department for a period of five (5) months from August 2011 to December 2011. It shows that in the month of august, there were 391 kgs. of biodegradable, 397 kgs of non-biodegradable and 21 kgs. of recyclable materials collected. For September, 483 kgs. of biodegradable collected, 470 kgs. of non-biodegradable and 27.50 kgs. of recyclable materials. In October, 461 kgs. of biodegradable, 379 kgs. of non-biodegradable and 15 kgs. of recyclable that were collected. In the month of November, there were 446 kgs. of biodegradable, 350 kgs. of non-biodegradable and 8 kgs. of recyclable wastes accumulated and in December, 333 kgs. of biodegradable, 227 kgs. non-biodegradable and 7.5 kgs. recyclable wastes were collected. Results further revealed that there was a decreasing use of non-biodegradable wastes in the later months at the Basic Education Department, which also resulted to a decrease in the recovered recyclable materials.

It implies that students, faculty and staff in the department are aware of the need of limiting the use of non-biodegradable wastes.

Months

Fig. 5 Garbage Accumulated in the School of Basic Education

Figure 6 shows the biodegradable, non-biodegradable and recyclable wastes accumulated at the School of Criminology in the period of five (5) months from August 2011 to December 2011. It is shown that in the month of august 51 kgs. of biodegradable wastes that were collected and 3 kgs. of non-biodegradable. For September, 23.5 kgs biodegradable and 2.5 kgs. of non-biodegradable were accumulated; in October, 35 kgs. biodegradable and 3.5 kgs non-biodegradable. in November 40 kgs. of biodegradable and 7 kgs. of non-biodegradable while in December, 77 kgs. of biodegradable and 22 kgs. non-biodegradable wastes. It is further shown that no recyclable materials were recovered from the non-biodegradable wastes collected and the non-biodegradable wastes accumulated was minimal.

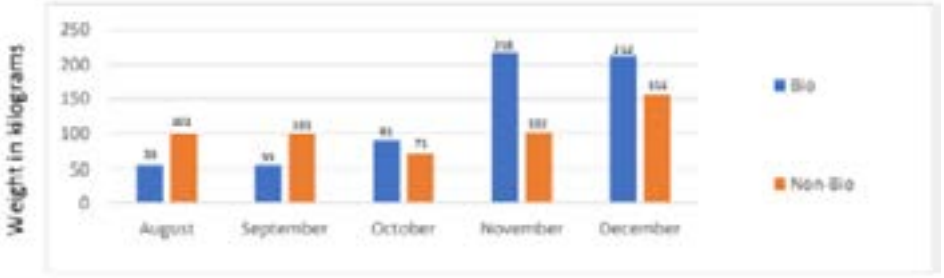
This implies that students, faculty and staff at the School of Criminology are not great generators of non-biodegradable wastes.

Months

Fig. 6 Garbage Accumulated in the School of Criminology

Figure 7 shows that the volume of wastes (biodegradable , non - biodegradable and recyclable) accumulated in the School of Information Technology in five (5) months from August 2011 to December 2011 . It is shown that from August and September , the same amount of biodegradable wastes accumulated , 55 kgs . and also , the non - biodegradable wastes , 101 kgs . In October , there were 91 kgs . of biodegradable and 71 kgs . of non - biodegradable wastes . For November , 218 kgs . of biodegradable and 102 kgs of non - biodegradable wastes and in December , 212 kgs . of biodegradable and 156 kgs . of non - biodegradable with no recyclable materials recovered from the wastes . There are more non - biodegradable wastes generated at the School of Information Technology .

This implies that students and personnel in the Information Technology are generators of non - biodegradable wastes due to the nature of the course offered which uses materials that cannot be decomposed .



Months

Fig. 7 Garbage Accumulated in the School of Information Technology

Figure 8 presents the volume of biodegradable, non-biodegradable only collected in the School of Education in five (5) months from August 2011 to December 2011. It shows that the greatest volume of accumulated biodegradable wastes is in September and least in November. For the non-biodegradable, greatest accumulation is in September and least in November. It is further shown that in a month where the biodegradable wastes are great the non-biodegradable were in great volume also the same with the non-biodegradable wastes. It implies that waste accumulation in the School of Education has been minimized as shown in the decreasing volume of wastes especially the non-biodegradable.

Months

Fig. 8 Garbage Accumulated in the School of Education

CONCLUSIONS

Based on the findings revealed in the study, the following conclusions were drawn:

1. In the GSC main campus, more biodegradable wastes are accumulated than the non-biodegradable wastes.
2. Segregation of wastes at source is practiced by students, faculty and staff.
3. Recyclable materials are recovered from the non-biodegradable wastes before these are dumped at the specific dumping site.
4. GSC Main Campus has earned income from the recyclable materials recovered and sold at junk shops.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are suggested:

1. Students, faculty and staff at GSC Main Campus must continue the waste segregation practices.
2. Improvement of the waste minimization activity especially the reduction in usage of non-biodegrad able wastes.
3. Improvement of the recovery mechanism to recover all recyclable materials before dumping the non-biodegradable wastes at the specified site.
4. Development of an institutional production program that would utilize recyclable materials in produc ing valuable products.
5. Development of IGP from waste.
6. GSC Main Campus to develop a comprehensive solid waste management program.

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