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Original Research

Towards Sustainable Waste Management: Profiling the School Waste in Eastern Potia National High School

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ABSTRACT

The management of solid waste at rural schools is relatively overlooked, given its potential for environmental sustainability. In this study, Eastern Potia National High School, Alfonso Lista, Ifugao, Philippines, was monitored daily for 20 days. Using the Waste Analysis and Characterization Study (WACS) protocol, the study assessed the volume, composition, generation rate, and density of waste from the waste sources within the school. Analyses showed that biodegradable waste with a predominantly food waste component was on top at 71.82%, with the school canteen providing the greatest proportion. Recyclable and residual waste made up 16.73% and 11.45%, respectively, with no special waste generated. Volumes of waste particularly increased on special events such as exam day, Valentine's Day, and parent-teacher conferences, displaying the influence of school events on waste generation. Given the study, school-based interventions such as the implementation of composting, waste segregation, and integrating environmental education within school curricula are recommended. This research supports UN SDG 12 (Responsible Consumption and Production) by providing actionable information regarding context-based and activity-driven waste management in rural educational institutions.

INTRODUCTION

Solid waste, comprising trash, sludge, and refuse from various sources (Golwala et al. 2021), has now become an important international issue due to its serious environmental, health, and economic impacts (Mahajan 2023). An estimated amount of 2.01 billion tons of municipal solid waste (MSW) is generated globally yearly, with about 33% of this amount not managed suitably (Kaza et al. 2018). This is alarming and is expected to nearly

double by 2050 to 3.8 billion tons (United Nations Environment Programme 2025), highlighting the seriousness of the need for sustainable and context-specific waste management systems.

The problem is especially noticeable in emerging economies such as the Philippines. From 2012 to 2016, the generation of solid waste grew from 37,427.46 to 40,087.45 tons on average daily (Mawis 2019). The problem is compounded by limited infrastructure, lack of public awareness, and poor implementation of environmental policies. Valenzuela et al. (2018) found that existing deficits in chemical waste management among learners and non-teaching personnel underscore the importance of more effective integration of environmental education into curricular programs.

Schools are microcosms of general waste management problems. Studies have recorded typical waste items in schools, such as food waste, plastics, paper, and organic waste, which are mainly handled improperly due to poor segregation and poor waste disposal facility systems (Chatira-Muchopa et al. 2019). Such poor management raises the risk of diseases and environmental deterioration (Ampofo 2020). The problem is typically aggravated by the lack of fundamental facilities such as waste bins and functional Material Recovery Facilities (MRFs) (Ugwu et al. 2020). Researchers recommend holistic waste management systems—like composting, recycling, and curriculum-based awareness programs—to effectively deal with these problems (Debrah et al. 2021).

Nonetheless, several educational organizations, particularly those in rural and under-resourced settings, still adhere to wasteful and inefficient waste disposal practices. Paper waste is still the bane of educational settings (Goa & Sota 2017); hence, the importance of student-driven initiatives such as paper recycling (Noer & Wistara 2024). In addition, poor waste profiling and characterization hinder the formulation of effective waste management programs, frequently leading to the improper treatment of toxic wastes and increased environmental risk (Justin et al. 2018). As Niska & Serkkola (2018) pointed out, precise waste profiling is key to maximizing the efficiency of collections and recycling and to devising cost-efficient, sustainable systems.

Schools, more than any other sector, are important platforms to foster environmental awareness by engaging children in experiential learning processes such as recycling and composting (Camarillo & Bellotindos 2021). Rural schools, however, are underrepresented in research, and many of them still work with limited infrastructure, poor monitoring, and few waste education programs (Khandelwal & Choudhary 2024; Utami et al. 2024).

Eastern Potia National High School in Ifugao's Alfonso Lista is one such example of these systemic problems. The institution is facing haphazard waste disposal, poor segregation techniques, and underuse of its MRF due to the unavailability of proper equipment. Though programs like the "Recycled Parol" project have been undertaken, such programs have not been consistent and have not had lasting impacts. Unresolved concerns regarding waste segregation and dumping still pose threats to the environment in the school. While some studies

have examined waste generation and waste management in urban and well-resourced schools, there is a lack of information about daily trends in waste generation in rural public high schools, particularly during seasons when activity intensity varies. Knowing how examination days, holidays, or meeting days influence waste generation would inform more context-dependent waste interventions. In addition, the research is in support of Republic Act 9003 (Ecological Solid Waste Management Act of 2000) and the United Nations' Sustainable Development Goal 12, which promotes a culture of responsible consumption and production in institutions.

This research contributes to the literature on school-based SWM in the context of rural areas and potentially acts as a model for other institutions looking to develop evidence-based, locally appropriate waste management. More broadly, this study evaluated the 20-day trend in daily waste generation in Eastern Potia National High School and determined the generation rate, percent composition, volume of generated waste, and bulk density.

2. MATERIALS AND METHODS

The study followed a descriptive research design, using waste analysis and characterization (WACS) approach as utilized in the study of Ngohayon & Tulagan (2022a).

Data collection was conducted in Eastern Potia National High School, where the campus areas have been categorized based on EcoGov (2011) (as cited by Ngohayon & Tulagan 2022b) waste generator categories. These categories have been modified based on the context of the school and include: (1) Institutional waste sources comprising classrooms, office spaces, laboratories, and meeting rooms—areas of teaching, administration and amenities for minor food consumption; and (2) Commercial waste sources implying food service areas including canteens where one prepares food, eats, and also does cleaning as presented in Table 1.

Table 1: Category of waste generators.

Waste Generators	Category	Daily People*
Grade 7 Classroom	Institutional	68
Grade 8 Classroom	Institutional	63
Grade 9 Classroom	Institutional	71
Grade 10 Classroom	Institutional	71
Administration Building	Institutional	6
Faculty Room	Institutional	23
Canteen	Commercial	7
Total		**309**

*Population based on the school population by the Department of Education (2025).

Fig. 1 presents the area of the generators on the school campus. Each building was provided with different trash bins for all types of waste.

Fig. 1: Location of the different waste generators.

A standard procedure for waste collection, modified from Diaz & Warith (2006), was applied for one month, excluding weekends and holidays, thus a total of twenty (20) days. Waste bins were labeled biodegradable, recyclables, residual, and special wastes, and were provided in strategic campus locations, including classrooms, office spaces, the cafeteria, and common areas. Waste was weighed daily using an electronic balance to calculate generation rates on an average daily basis. Waste composition was analyzed by segregating waste into biodegradable, recyclables, residual, and special categories by weight and percentage. Bulk density was determined by compacting each type of waste into a container of a known volume and weighing its content.

The generation rate was calculated using the formula provided by Kawai & Tasaki (2016):

$$\text{Generation Rate} = (\text{Total Mass of SW})/(\text{Number of Units per sample}) \quad \ldots (1)$$

The gravimetric composition of each waste type was calculated using the formula provided by Miguel et al. (2016):

$$\%\ \text{type of mass} = (\text{Mass of Type of Waste})/(\text{Total Mass of SW}) \times 100 \quad \ldots (2)$$

The bulk density was calculated using the formula provided by Palanivel & Sulaiman (2014):

$$\text{Bulk Density} = (\text{Total Mass of SW})/(\text{Bulk Volume of SW}) \quad \ldots (3)$$

The data were collected throughout twenty (20) days, ensuring that variations in school activities (such as exams, school fairs, or extracurricular events) that might have influenced waste generation were factored into

the measurement. The one-month waste quantification sampling spanned different parts of the grading period to capture variations in daily routines.

3. RESULTS AND DISCUSSIONS

3.1. Percent Composition of the Generated Waste

Table 2 depicts that the predominant waste in Eastern Potia National High School (EPNHS) is composed of biodegradable waste (71.82%). Food waste is the most dominant at 48.87%, and the source thereof is pinpointed as the canteen because of everyday food preparation and food service. Used paper and paper containers are also included in the same category, which are found in classrooms and offices due to regular academic and administrative practices. Recyclables account for 16.73%, plastic bottles (13.07%), and plastic wrappers (11.45%) are the largest subcategories. Residual waste accounts for 11.45%, consisting of non-recyclable packaging material. No special waste was collected during the study period.

Table 2: Percentage of generated waste in Eastern Potia National High School.

	Biodegradable Waste (%)				**Recyclable Waste (%)**			**Residual Waste (%)**	**Special Waste (%)**
	Used Papers	*Paper Containers*	*Food Waste*	*Soiled Paper*	*Plastic Cups*	*Plastic Bottles*	*Plastic Cutleries*	*Plastic Wrappers*	
Canteen	0.00	9.96	44.74	0.11	0.67	1.11	0.30	5.15	0.00
Administration Building	0.67	0.08	0.00	0.24	0.00	0.24	0.00	0.13	0.00
Faculty Room	0.49	0.54	0.34	0.36	0.50	0.58	0.01	0.96	0.00
Grade 7 Classroom	0.09	1.28	1.32	1.55	0.83	1.90	0.00	1.52	0.00
Grade 8 Classroom	0.02	1.13	1.23	1.56	0.58	1.86	0.00	1.45	0.00
Grade 9 Classroom	0.04	1.06	0.72	1.62	0.57	2.37	0.03	1.01	0.00
Grade 10 Classroom	0.12	0.86	0.52	1.17	0.16	5.01	0.02	1.24	0.00
Total	1.43	14.91	48.87	6.61	3.31	13.07	0.36	11.45	0.00
Grand Total				**71.82**			**16.73**	**11.45**	**0.00**

This dominance of biodegradable waste, especially food waste, corresponds to that observed in rural Philippine schools, where packaged meals and catering service predominate breakfast through dinner consumption (Latugan et al. 2024; Sağlam & Aydın 2024). However, this level of food wastage here (48.87%) exceeds that of several urban public high schools, which usually vary from 35% to 45% (Kasavan et al. 2020), indicative of structural inefficiencies within meal service and insufficient food recovery practices. This is due to the observed oversupply and large serving portions that do not reflect the variability of students' appetites, lack of food redistribution programs, and use of perishable meal types without corresponding storage. Hence, this problem requires careful canteen planning guidelines for meals, variable portions, and collaborations toward food recovery.

The composition of waste also identifies behavioral impacts. Increased recyclable waste from Grade 9 and Grade 10 study spaces implies consumption of commercially packaged foods that was higher among mature students, driven by more purchasing freedom and preference for convenience foods. This is consistent with Alfitri et al. (2020), who state that consumption patterns according to age coincide with high single-use plastic consumption. Inclusion of special awareness programs for high-grade students, in addition to prohibitions of specific types of packaging within campus facilities, can help prevent these amounts.

Residual waste, although proportionally smaller (11.45%), is mostly non-recyclable snack food packaging from both canteen sales and surrounding shops. As residuals need to be disposed of in a landfill, moderate quantities create environmental and logistical problems. From bulk density figures computed during this study, residuals are relatively high-density, involving less bin volume but long-term landfill storage, compared to organics. From a strategic perspective, this would mean that sending low-density, high biodegradable waste fractions to composting would lessen the bin capacity and reduce collection frequency, and taking a procurement policy that minimizes product that generates residuals.

The absence of special waste, while positive from a health and safety standpoint, also reflects the limited scope of laboratory activities and hazardous material use in this rural school setting. This contrasts with urban science-focused institutions, where laboratory chemicals and e-waste constitute a measurable fraction of total waste (Valenzuela et al. 2018).

3.2. Volume of Generated Wastes

The volume of waste generated at Eastern Potia National High School was grouped into biodegradable, recyclable, residual, and special wastes as shown in Table 3. Most of the biodegradable waste was generated by the canteen with a quantity of 0.70 m³, followed by Grade 7 (0.35 m³) and Grade 8 (0.27 m³). For recyclable wastes, the canteen generated a quantity of 0.79 m³, followed by Grade 10 (0.42 m³) and Grade 9 (0.39 m³). The overall quantity of residual waste for all areas amounted to 1.10 m³, with the majority being generated by the canteen, with 0.37 m³. Special wastes were not generated by any of the locations assessed (0.00 m³). Overall, a volume of 1.97 m³ of biodegradable wastes, 2.25 m³ of recyclable wastes, and 1.10 m³ of residual wastes were generated by the school.

Table 3: Volume of generated waste of Eastern Potia National High School.

	Biodegradable Waste (m^3)	Recyclable Waste (m^3)	Residual Waste (m^3)	Special Waste (m^3)

Canteen	0.70	0.79	0.37	0.00
Administration Building	0.07	0.02	0.01	0.00
Faculty Room	0.12	0.08	0.09	0.00
Grade 7 Classroom	0.35	0.31	0.10	0.00
Grade 8 Classroom	0.27	0.25	0.33	0.00
Grade 9 Classroom	0.25	0.39	0.11	0.00
Grade 10 Classroom	0.21	0.42	0.10	0.00
Total	1.97	2.25	1.10	0.00

Recyclables were the highest total volumetric quantity at 2.25 m^3, comprised primarily of light but large packaging like PET bottles, cartons, and snack pouches. These were abundant across academic and food service zones, indicative of broad single-use packaging dependency. The highest levels of recyclables were observed from higher-grade classrooms (Grades 9–10), where likely purchasing decisions are greater, packaged beverage and snack consumption is higher, and activities involving print media modules or project works are integrated within curricula (Cosma et al. 2021). Canteen sales also constituted a high amount, with most beverages and snack foods being packaged types sold in recyclable packaging. High volumetric representation was observed for recyclables against their comparatively low weights, a typical property of packaging materials like PET bottles and snack pouches. Volumetric difference indicates a need for high-capacity bins to contain this material despite its relatively low mass. Studies parallel in nature within schools in Malaysia report similar observations, such that Kasavan et al. (2020) reported PET bottles and cartons were highly visible in volumetric terms and contributed negligibly to total mass, and point to the need for special collection and compaction arrangements.

Biodegradable waste, 1.97 m^3, was the second-highest volume category and created different management issues. Its higher water content, odor, and quick decomposition nature mean that it needs to be collected more frequently, especially from food preparation zones. This category was mainly generated from the canteen, with supplementary inputs from kitchen food scraps, fruit rinds, and classroom compostable papers. This echoes studies by García-Herrero et al. (2021), who report that institutional food preparation facilities commonly have organic refuse as being central to collection schedules. Evidence from Antón-Peset et al. (2021) indicates that specific didactic measures, in this case, student-initiated monitoring of food wastage, can be decreased by 30% and boost pro-environmental behaviors.

Residual waste, though the smallest fraction by volume (1.10 m^3), still represents a persistent issue, consisting mainly of multi-layer snack packaging that is neither recyclable nor compostable. These materials, destined for landfill disposal, highlight the limitations of current segregation practices and the need for procurement policies that favor alternative packaging. The absence of special waste is consistent with the school's limited

use of hazardous materials, aligning with national observations that such waste streams are negligible in non-laboratory-intensive public secondary schools (DENR 2021).

3.3. Generation Rate of the Generated Wastes

Table 4 shows the daily waste generation rate in Eastern Potia National High School, classified into biodegradable, recyclable, residual, and special waste in different buildings at the school. The data shows that most of the school's waste output consists of biodegradable waste, weighing 31.99 kg per day. The canteen stands out as the source of biodegradable waste with the highest generation rate of 30.47 kg per day. This is because of the food preparation waste, kitchen trash, and leftovers, making the canteen the highest contributor to the waste generation profile of the school. Also, even though the canteen only has seven staff, most of the consumers were the students, faculty, and staff who generate the waste in the canteen area. This is supported by Supangkat & Herdiansyah (2020) in who population directly affects waste generation, thus more consumers generate more waste. Moreover, the other buildings, like the admin office, faculty room, and classrooms, contribute relatively small volumes to the biodegradable waste stream.

Table 4: Generation rate of waste in Eastern Potia National High School.

	Biodegradable Waste (kg/day/building)	Recyclable Waste (kg/day/building)	Residual Waste (kg/day/building)	Special Waste (kg/day/building)
Canteen	30.47	1.37	2.23	0.00
Administration Building	0.55	0.14	0.07	0.00
Faculty Room	0.25	0.18	0.13	0.00
Grade 7 Class-room	0.21	0.14	0.06	0.00
Grade 8 Class-room	0.21	0.12	0.06	0.00
Grade 9 Classroom	0.17	0.14	0.04	0.00
Grade 10 Classroom	0.13	0.25	0.04	0.00
Total	31.99	2.32	2.63	0.00

Recyclable waste production stands at 2.32 kg per day from the whole school. Between classrooms, the highest recyclable waste is recorded by the Grade 10 class with a student population of 71, and stands at 0.25 kg per day. This is interesting considering that the Grade 9 class also has a student count of 71 but has slightly less recyclable waste generation (0.14 kg per day), indicative of differences in classroom materials used in the activities. This is attributed to the projects given to the grade 10 students, thus producing more recyclable waste such as plastics. The high student populations in Grades 7 to 10 (63 to 71 students per day) account for the consistent production of recyclables from paper and plastic consumption. The combined student population of

the faculty room and the administration building, of six and 23 individuals per day, respectively, accounts for lower but proportional levels of recyclable waste.

Residual waste in the school totals 2.63 kg per day. The canteen is again the main source, with a yield of 2.23 kg per day, because of packaging material and disposable, and non-recyclable waste related to food services. The comparatively low waste generated in classrooms and offices is consistent with their functional purpose and the size of the populations.

Further, the data shows zero generation of special waste in all buildings. The nonexistence of special waste is a result of the very minimal utilization of hazardous chemicals or materials that would generate special waste; hence, no such waste was generated during the 20-day profiling period. Moreover, damaged electronics were reported to the property custodian for proper government clearance; thus, it is not disposed of at the school level.

3.4. Bulk Density of the Generated Wastes

Table 5 shows bulk densities of waste collected at Eastern Potia National High School in terms of kilograms per cubic meter (kg/m³). The bulk density shows the compactness or volume occupied by waste and how often waste is collected, the storage space it will require, and the costs in disposing of it.

Table 5: Bulk densities of the waste generated by Eastern Potia National High School

	Biodegradable Waste (kg/m^3)	Recyclable Waste (kg/m^3)	Residual Waste (kg/m^3)	Special Waste (kg/m^3)
Canteen	30.47	38.24	62.82	0.00
Administration Building	290.65	9.57	5.81	0.00
Faculty Room	45.52	40.33	30.03	0.00
Grade 7 Classroom	74.55	31.84	56.28	0.00
Grade 8 Classroom	73.99	33.1	37.18	0.00
Grade 9 Classroom	55.25	34.35	26.03	0.00
Grade 10 Classroom	49.89	47.17	39.58	0.00
Total	637.33	234.6	257.73	0.00

The canteen, though responsible for the greatest weight of generated waste, has the lowest bulk densities of biodegradables (30.47 kg/m³) and recyclables (38.24 kg/m³), and a relatively intermediate bulk density for residual waste (62.82 kg/m³). This is characteristic of waste generated by food products, which are voluminous but light because they are organic and full of water, and have air trapped in the food waste. This is supported by Zhu et al. (2020), wherein food waste has a low bulk density when compared to other types of waste. However, the low bulk density means that regardless of the canteen generating a high weight of waste, it takes up much space and would have to be collected often to avoid spilling and toxic gases (Zhang et al. 2020).

Conversely, the admin building has an unusually high bulk density for biodegradable waste at a level of 290.65 kg/m³, even though it has a minimal daily waste generation by weight. This implies that the waste generated here consists of denser and more compact waste, possibly consisting of paper waste, craft trimmings, or heavier organic waste instead of normal food waste. Although paper waste is common in schools, it can be an opportunity for the circular economy (Adeniyi et al. 2023). The low bulk density of the recyclable (9.57 kg/m³) and residual waste (5.81 kg/m³) in the admin building also implies that they are generated in minimal amounts and are possibly light materials such as shredded paper or soft plastics.

Classrooms have different bulk densities, with Grade 7 and 8 having higher biodegradable densities of 74.55 and 73.99 kg/m³, respectively, and the highest recyclable waste density of 47.17 kg/m³ by Grade 10. The comparatively high bulk densities in classrooms imply waste materials such as used paper, containers, and packaging waste are packed more tightly and have less volume and hence are easier to keep in storage before disposal. Residual waste densities in classrooms vary from 26.03 to 56.28 kg/m³, as their composition may vary depending on different activities, classes, or segregation practices. The total bulk densities across the school reveal that biodegradable waste has the highest density (637.33 kg/m³), followed by residual waste (257.73 kg/m³) and recyclables (234.6 kg/m³). This pattern emphasizes that, while biodegradable waste dominates in volume and weight, residual and recyclable wastes are also significant and relatively dense, thus requiring proper storage and management. Similarly, Dahlawi & Sharkawy (2021) find that higher educational institutions in Saudi Arabia have more recyclable waste, such as paper and plastics, that needs proper management.

3.5. Daily Volume and Generation Rate

Fig. 2 and Fig. 3 show the profiled volume and rate of waste generation over twenty days, indicating the trends in waste build-up within various sectors in schools. Figure 2 indicates the volume of generated waste, the peaks of which occur on Days 4, 8–11, and 18, whereas Figure 3 indicates the rate at which waste is generated daily and how rapidly waste builds up during activities or occasions.

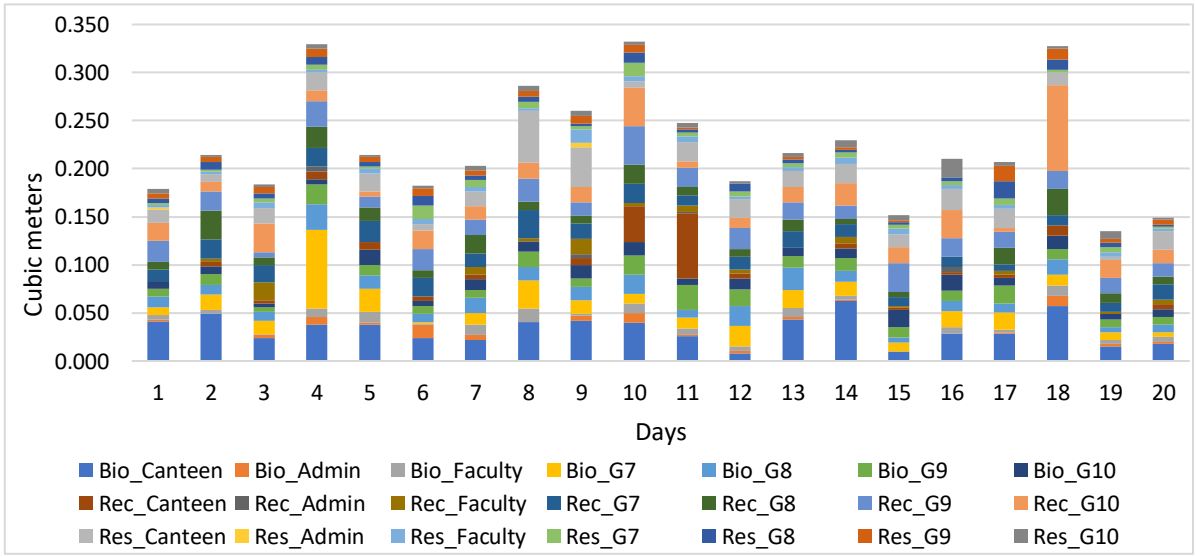

Fig. 2: Profiled volume of generated waste for twenty days.

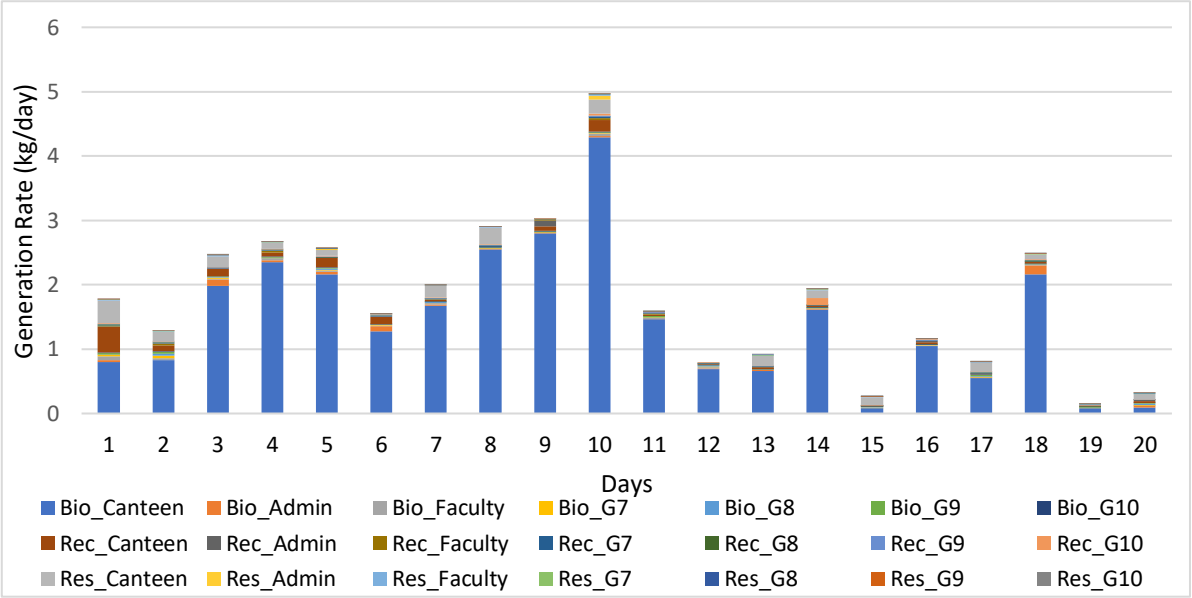

Fig. 3: Profiled waste generation rate for twenty days.

In the initial five days, volume and rate of generation are moderately high, probably a consequence of teachers' preparation of administrative papers, including the filing of SALN (Statement of Assets, Liabilities, and Net Worth), exam printing, and other papers. These five days are peak office activity, and consequently, more papers are consumed, with administrative offices such as Bio_Admin and Rec_Admin leading in paper usage. But on Days 5 and 6, which are examination days, the rate of generation goes down, as collected from Figure 3. The decreased rate indicates less movement by students and minimal canteen usage during examination days, which are usually characterized by silence and discipline, reducing consumption and socializing.

In comparison, Days 8 and 9 give observable peaks in both volume and waste generation rate, probably caused by pre-Valentine's Day shopping. Student activities, including gift purchases, class decoration, parties, or sharing of food, are all prevalent during this period, resulting in a peak in packaging material, plastics, and food waste. Such a buildup reflects intensity in activities even before the formal Valentine's Day celebration on Day 10 (February 14, 2025). Significantly, although Day 10 registers a peak in rate, it is slightly less in volume than Days 8 and 9. Perhaps this indicates that although the volume of total waste was not at a peak, it was produced intensively in a short time frame, and perhaps from confined events or class parties.

Between Days 1 and 14, the school community is involved in the preparation of athletes for the provincial meet, and this is contributing towards a consistent stream of waste from areas around the canteen, since there is heightened consumption of food. Figures on Day 13 also rise, arguably for a culmination event or a period of intensified training. Day 18 also registers a tall figure for waste, coinciding with the PTA meeting, with guests included, materials such as printed programs or handouts, and catering services, which result in greater waste

output and rate. Both volume and rate of generation typically fall off by Day 14, suggesting a return to normal scholarly activity with reduced participation in extracurricular or outside activities.

These results indicate strong event or occasion dependency on the generation of waste. Administrative work, sports training, celebrations by students, and institutional gatherings have a strong bearing on the volume and rapidity of waste generation. These imply the need for pre-planning waste management, where resources like bins, waste segregation facilities, and staff are pre-adjusted according to the school calendar. Promoting digital processes, waste-free celebrations, and eco-friendly event culture may also reduce peak waste generation, particularly in identified peak activity days.

The students' behavior, volume, bulk density, and composition of waste manifest a relationship through observed patterns within EPNHS. Large volumes of lightweight recyclables, such as PET bottles and snack packs, mirror a culture of convenience-oriented consumption, especially from upper-grade students who buy ready-to-consume beverages and packaged snacks. This consumption inflates volumetric shares of recyclables without contributing correspondingly to overall waste mass, as validated by their low bulk density values. Conversely, the canteen's dominance in biodegradable waste is a function of both the high moisture content and the food service model, where generous portions, limited leftovers management, and the absence of food-sharing policies lead to heavy, odorous organic waste streams. Bulk density data further show that select categories of waste need collection more frequently to avoid odor and pest problems, while voluminous, lightweight recyclables necessitate larger-capacity storage bins or compaction units despite their relatively low mass. Through correlating these observations with school calendar schedules and observed peaks of behavior, in event-driven consumption peaks, for example, the school can better optimize bin size, bin locations, and collection frequency, minimizing eventual overflow incidents and enhancing waste diversion effectiveness.

4. CONCLUSIONS

This study demonstrates that while Eastern Potia National High School has a relatively effective segregation practice, the present waste management system is disproportionately troubled by canteen-generated biodegradable waste and the volumetric dominance of lightweight recyclables. These patterns are closely tied to behavioral factors such as consumption of packaged snacks and beverages among upper-grade students, and the absence of food waste reduction strategies in food service areas, and to structural factors like inadequate storage for bulky recyclables and insufficient collection frequency for dense, odorous organics.

To address these challenges, the school may implement targeted waste reduction and diversion measures that go beyond basic segregation. For biodegradable waste, portion control policies, leftover redistribution, and composting initiatives could substantially reduce daily organic loads while providing educational value. For recyclables, investing in compaction equipment or expanding bin capacity could improve storage efficiency,

especially during high-activity periods identified in the school calendar. Residual waste reduction will require procurement policies that favor recyclable or compostable packaging and discourage multi-layer plastics.

Even more generally, behavior change communications would be strengthened through integration with operational planning, e.g., matching collection schedules with peak, event-driven waste. Collaborations with recycling businesses or local government units would further diversify off-site disposal alternatives. Through intermingling data-driven operational changes with community outreach, EPNHS can develop toward a model of waste handling that is both environmentally responsive as well as enhances the learning environment.

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