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Waste Generation and Composition Data Update 2022

Featuring Muse, Pyay and 415 villages

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Summary

The waste audit briefs are an effort to keep the solid waste management community up to date with the most recent data gathered by Thant Myanmar. The brief has to be seen as an addition to the **Digging Through - DT**[1] report co-published by Thant Myanmar and IGES in 2020. Therefore, only data is provided in this brief with minimal description. Context information can be accessed through the Digging Through report.

The audit brief was developed in the context of the Prevent Plastics project funded under the Switch Asia EU grant, receiving data from:

- Waste audits at disposal sites in cooperation is with Yat Yar Zar - Pyay and Twin company - Muse. (2022)
- Waste composition of special economic zones (Muse: Hotel zone, Casino zone)
- Disposal practice in 415 villages (2019 to 2022) as well as selected composition audits in the framework of a community waste program
- Waste generation data accessed through community waste projects in Yangon

Waste composition and generation is continuously changing due to evolving consumption and disposal practices by citizens as well as upgrades in collection efforts by waste collectors. Furthermore, due to limited data and analyses capacity upgrades in estimations and extrapolations also lead to a change in results.

This brief presents the outcome of audits conducted in Pyay and Muse in late 2021 and early 2022 while merging the data with existing audits and therefore refining and improving the general extrapolations. Both audits were conducted at the disposal facility and therefore do not represent the full generated waste but only the portion which arrives the final disposal site. Recyclables extracted at source as well as uncollected waste are not counted for but are added in from other data sources.

[1] https://www.thantmyanmar.com/en/documents/solid-waste-audits

Methodology

Urban waste audits in Pyay and Muse

Both audits were conducted by the local private waste collector: for Pyay (Yat Yar Zar) and Muse (Twin XX). Thant Myanmar supported the company to carry out the audit via phone. Audits were carried out for 3 (Pyay) and 4 (Muse) consecutive days at the final disposal site with 2 aims:

- Waste collected [tons/day]: counting the number of truck loads entering the dumpsite and measuring volume (width, length, hight (of waste)) of waste on each truck. Muse additionally had access to a weight bridge and was measuring the weight of the waste.
- Waste composition: From each truck a few bags of waste are taken and separated into its components. Muse also separated waste specifically for casinos and restaurants.

Audits were conducted under the objective to set up a material recovery facility which sorts waste at the final disposal site. Special attention was given to waste which still had value from the perspective of reselling it. The audit method followed the same structure as described in Digging Through 3.2.

Waste disposal in villages

A qualitative audit of disposal methods was conducted by Thant Myanmar in the period from 2019 to 2022 and is ongoing. Until now 415 villages were contacted and analysed. Questions asked were:

- Area specific: coastal, mountainous, plane, dry zone, next to river.
- Disposal method:
- Communal Dump: Yes/No
- Final treatment at dump: store, burn, leak to water
- If no dump, disposal to: burn, water, soil
- A map can be found of all the accessed places categorizing the villages depending on their geographical background (Mountain, dry zone, coastal, river and plain) as well as sorting them by colour to show the level of management (Red to green: low capacity to high capacity): https://www.google.com/maps/d/u/1/edit?mid=1PquJ3ZlWjlMIeGRmFuFbXc4_B4nQj-gu&usp=sharing

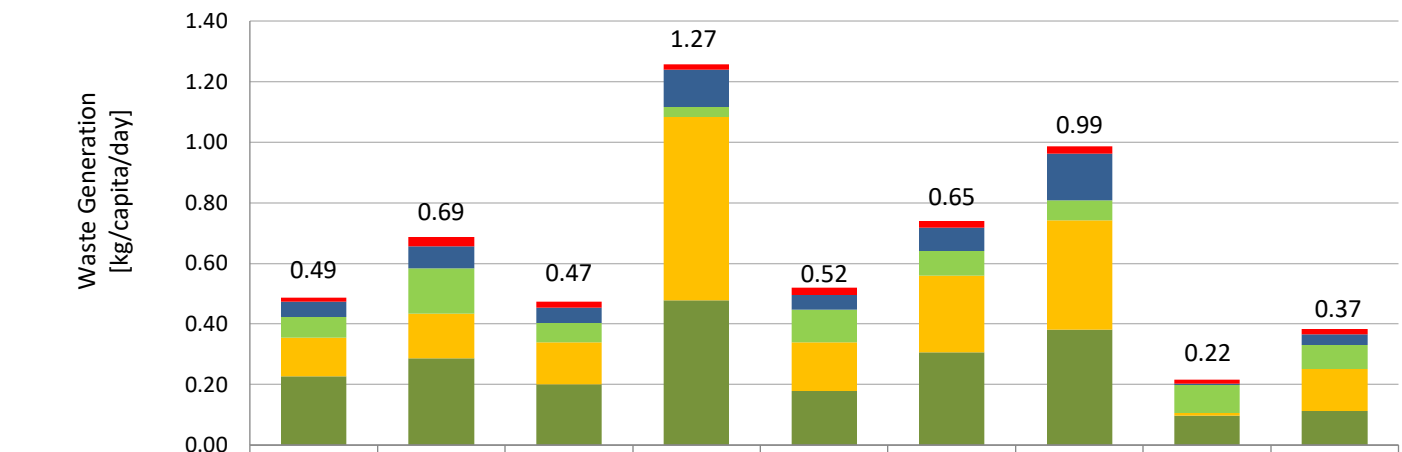
Updates in Data

All results have to be considered in the context of the *Digging Through* report. The following data provides an update considering recent audits and other data received during the last 2 years. The updates focus on two main components: **waste generation and disposal methods** and **waste composition of generated, disposed, recycled and leaked waste**.

- **Improvements in the understanding of organic waste management at source, leading to a new disposal category named "Composted" (DT Fig. 5)** and referring to organic waste treated at source. Treatment methods are mainly: animal feeding of food waste, garden leaf composting. Adding this category generally increases waste generation predictions since a category which was before omitted is added. On the other hand, it allows a better understanding of existing sustainable practices on waste treatment at source practiced on a large scale by citizens.
- **Improvement in the category "Uncollected" which was estimated at 30% of inorganic waste disposed.** For this brief an improved method of analysis is used, looking at each inorganic waste category separately. The categories metal, paper and glass do not contribute largely to "Uncollected" as these materials are better recovered through recycling. Therefore, it is plastic which contributes mainly to the category "Uncollected".
- **Adding two towns (Pyay and Muse) leads to an improved average of waste generation rate as well as waste composition (DT Fig. 5).** Adding this data further strengthen the values of the estimate (average towns) with now 8% of the population in this category audited.
- **Adding "Rural Estimate" as an additional degree of urbanization:** The correct understanding of rural waste generation stays challenging. However, setting up waste management mechanisms in over 20 villages and analysing the disposal behaviour of over 400 villages all over the country led to following outcomes:
  - **Generation rates are lower than the standard estimate of 50% on urban was as predicted** in "What a Waste 2.0" by the World Bank and used in the prediction in "Digging through". According to surveys in the villages where Thant Myanmar is working the generation rate can be estimated better to 0.22kg/cap/day.
  - **Only 10% of the generated waste is inorganic** and consists mainly of low-grade unrecyclable plastic (8.6% of generated waste);
  - **The disposal behaviour could be extrapolated** form the analysis of 415 villages in the country.

Waste Generation and Disposal Methods

(Ref to DT 3.3.1 and 5.1.1)

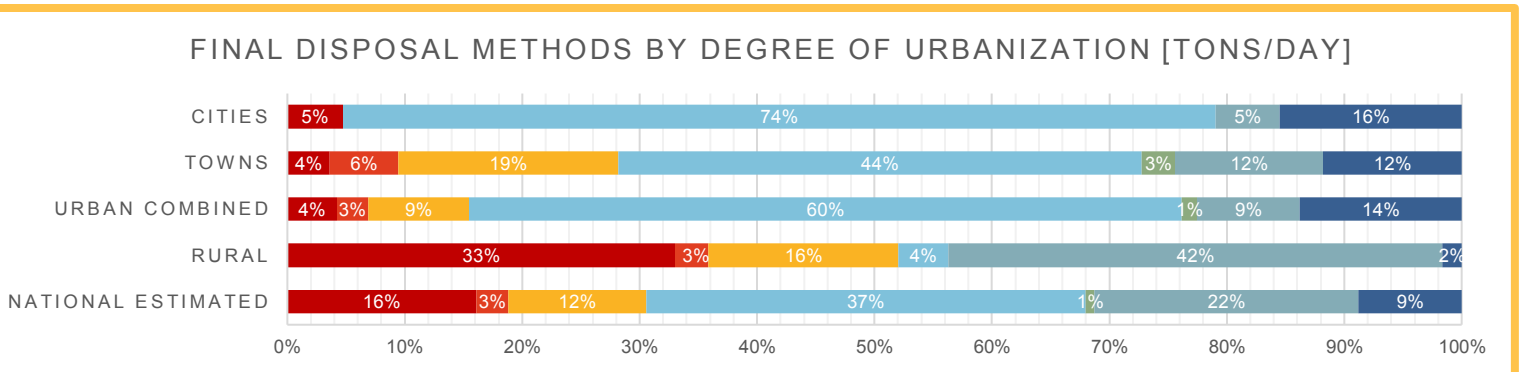


	Dawei	Pathein	Kaw thaung	Muse	Pyay	Town Average	Mandalay	Rural estimate	National Estimate
Uncollected	0.01	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02
Recycled	0.05	0.07	0.05	0.12	0.05	0.08	0.15	0.004	0.03
Composted	0.07	0.15	0.06	0.03	0.11	0.08	0.07	0.09	0.08
Collected Inorganic	0.13	0.15	0.14	0.61	0.16	0.25	0.36	0.009	0.14
Collected Organic	0.23	0.29	0.20	0.48	0.18	0.31	0.38	0.10	0.11

Figure 1 (Compare with DT Figure 5): The waste generation rate is split into 5 categories: collected waste (Organic and Inorganic) and waste not managed by the formal waste collector (Composted, Recycled, Uncollected). The "town average" waste generation rate slightly increased mainly due to the fact that the category "composted" is included into the generation rate which beforehand was neglected.

The category "Composted" was introduced newly as work on primary collection showed that a significant amount of organic waste is treated by households, either as animal feed or compost. The actual amount varies significantly between different levels of urbanization and access to land, animals, etc. Low-income urban areas living at the outskirts of cities with limited waste collection often show composting rates of 30 (for example Shwe Pyi Tar) to 45% (Informal settlement in Dala).

The generation rate "Rural Estimate" could be added as data from 415 villages provides some insight into generation and composition. The majority of this waste is either "Composted" or stays uncollected by leaking to nature in the form of air, soil and water pollution.



	National Estimated	Rural	Urban Combined	Towns	Cities
Uncollected	3252.4	2752	500	197	303
Leaking Dumps	555.3	238	318	318	0
Open Air Burning	2368.0	1347	1021	1,021	0
Controlled Dumping	7563.3	355	7208	2,428	4,780
Sanitary Landfills	156.8	-	157	157	0
Composted	4,544	3,508	1037	686	350
Recycled	1778.2	137	1641	644	997

Figure 3 (Compare with DT Figure 13): Three major changes were introduced when looking at the final disposal/treatment methods which allows a better perception of challenges in the waste management sector:

1. *The introduction of the category "Composted" with which a significant shift into sustainable practice can be observed and which honors the capacity of source treatment of organic waste. Major policy decisions on source segregation should take this existing practice into account and build on it.*
2. *The category uncollected can be much better defined in its composition. Before it was estimated as 30% of inorganic waste generated not well taking into account that materials like Metal, Glass and Cardboard hardly leak to the environment due to its high recycling rates. This matches better with audits of leaked waste to soil or water where plastics make 90% of waste found.*
3. *The analysis of rural disposal methods allows now to calculate a "National Estimate" revealing that disposal practice can be divided into 3 nearly equal portions:*
    a. *Community managed – 32%: Composted and informal recycling*
    b. *Municipal managed– 37%: Collected and disposed in dumpsites by municipalities or private waste collectors*
    c. *Mismanaged – 31%: Waste leaking either directly from source and dumpsite or is burned for reduction purpose*

Disposal & Treatment		*Amount %*	*Category explanation*
Dump	Burn	34%	Open mixed waste burning at assigned areas, often at roadside at village entrance
	Leak	6%	Dumps build in or next to water sources with waste washing to the source during Monsoon
	Store	3%	Dumps which are neither leaking nor are burned
No Dump	Burn	17%	Households burn waste on compound
	Soil	22%	Households dispose indiscriminately
	Water	18%	Households dispose directly to water sources

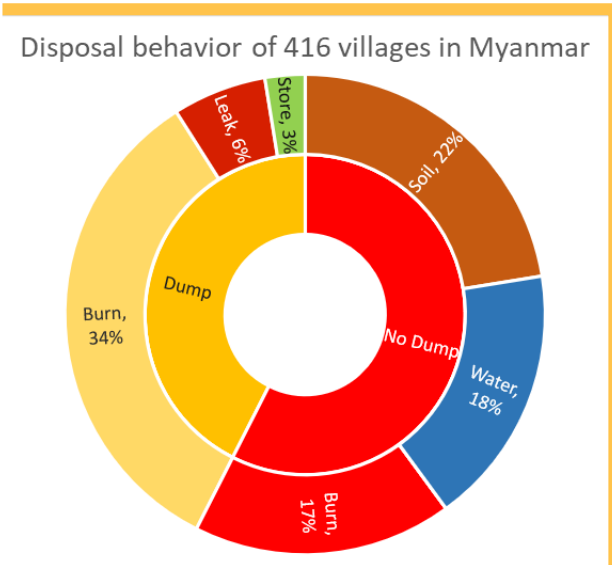
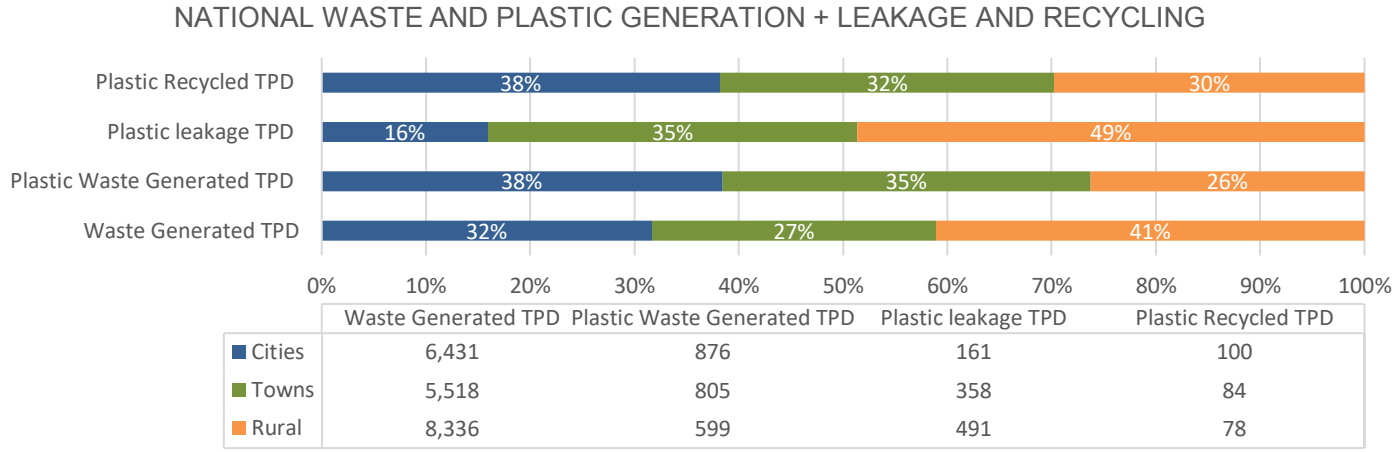
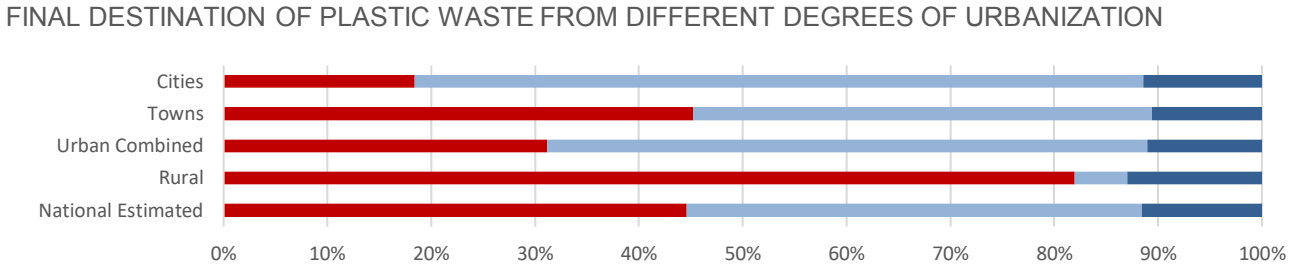


Figure 2 (Compare with DT Figure 5): Disposal behavior of "Rural Estimate" could be analyze more detailed given the large amount of data available from 415 villages. 57% of villages reported not to use any form of communal dumpsite and that they are disposing it either freely (to soil), deliberately to water or burn the waste with dry leaves on the compound. Those communities using dumps predominantly burn the waste, while the enviromental friendly practice of "store" waste is hardly practiced.

Plastic Waste Generation and Disposal Methods



	Waste Generated TPD	Plastic Waste Generated TPD	Plastic leakage TPD	Plastic Recycled TPD
Cities	6,431	876	161	100
Towns	5,518	805	358	84
Rural	8,336	599	491	78



	National Estimated	Rural	Urban Combined	Towns	Cities
Plastic leakage TPD	1,010	491	519	358	161
Plastic Disposed TPD	995	30	964	349	615
Plastic Recycled TPD	262	78	184	84	100

Figure 4 (Compare with DT Figure 6, 13): The understanding of generation rates (Figure 1, final destination (Figure 2) and Waste Composition (Figure 5) allows to better understand the most challenging portion of waste: plastic. The figures show the total TPD and therefore have to be understand in the context that the rural population is around 70% of the total while cities and towns share the remaining 30% roughly equally.

- *Above: The contribution of different levels of Urbanization (Cities, Towns, Rural) to waste and plastic generation but also Enviromental leakage and Recycling. Rural areas significantly contribute to leakage of plastic, although generating the smallest amount.*
- *Below: The final destination of plastic shows the status of the plastic crisis with roughly 50% of non-recycled plastic leaking to the environment and a recycling rate of only 13%. Urban and rural areas equally contribute to the crisis with around 500TPD each leaking to water, air or soil.*

Waste Composition of Generated Waste

(Ref to DT 3.3.2 and 5.1)

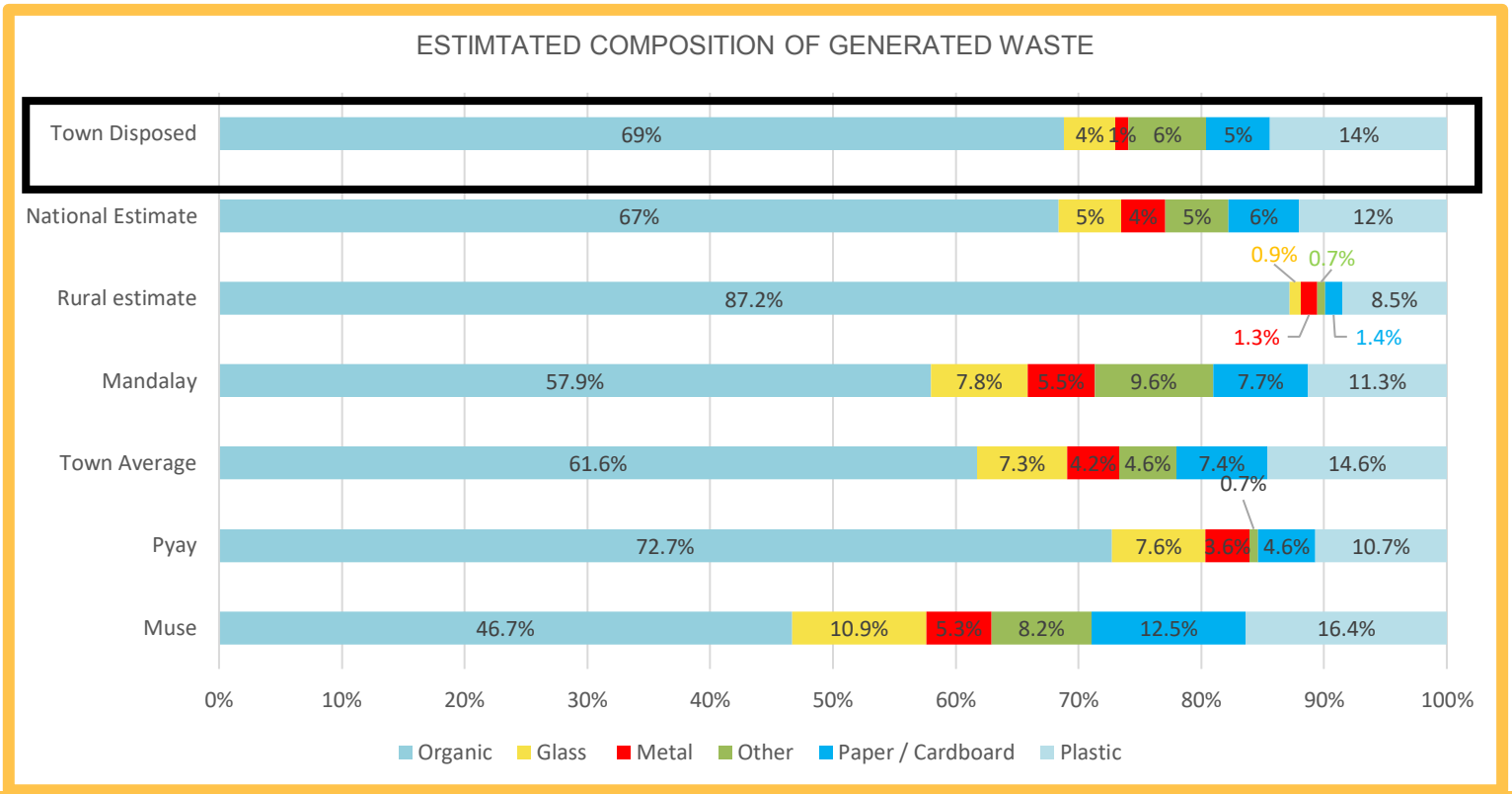


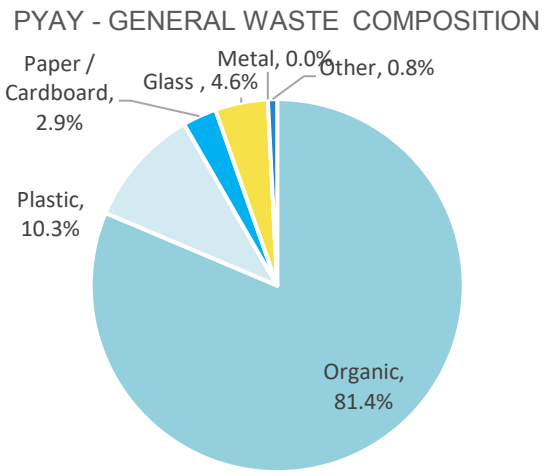
Figure 5 (Compare with DT Figure 16): This is the first time that waste composition data can be shown including all the waste categories (Disposed, Recycled, Uncollected). Data is shown for the 2 towns Pyay and Muse, as well as the summarized levels of urbanization, Cities, Towns and Rural. From these data a national estimate can be drawn. For comparison the composition data of disposed waste "Town Disposed" (not including, Uncollected, Composted and Recycled) is displayed: Metal, Glass and Paper are underrepresented in "Town Disposed" due to high level of recycling.

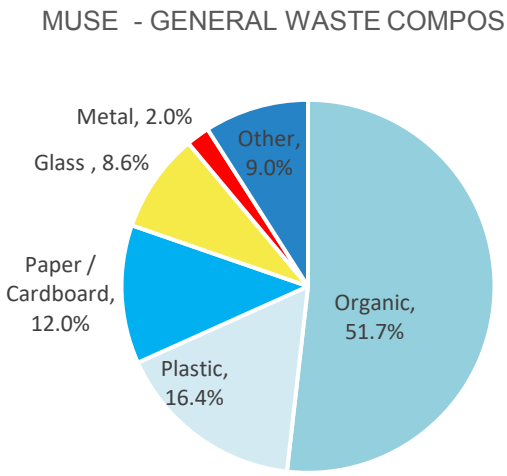
Data certainty is still rough as recycling data were cross estimated from data received by junk shops, recyclers and a few households' generation audits. The only well confirmed data comes from aluminum as a complete lifecycle assessment was conducted in cooperation with the largest can producer Ball.

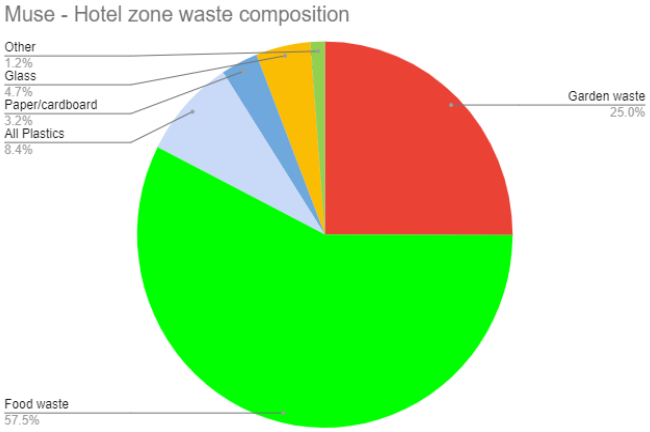
Composition form uncollected waste is even harder to well assess and past generation audits were never able to fully cover the complex disposal methods of commercial activities as they happen mostly informally. Therefore, the analysis relies on qualitative feedback from municipalities regarding their coverage of the area and are mostly around 30% leakage.

Waste Composition of Disposed Waste

(Ref to DT 3.3.2)







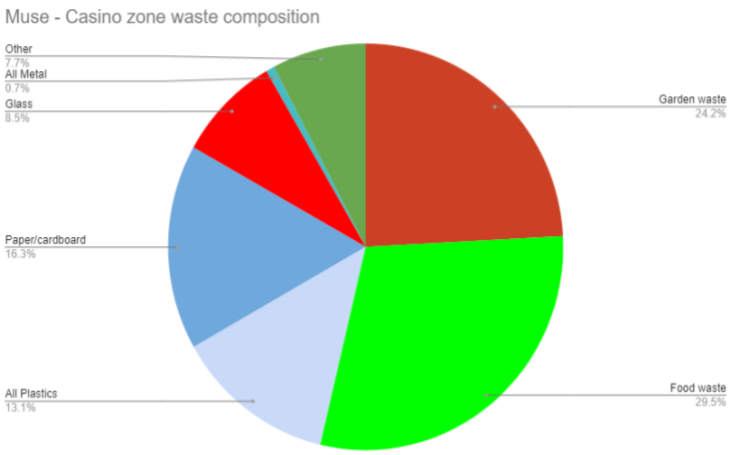


Figure 6 (Compare with DT Figure 9): The waste composition of the two towns roughly presents the extremes in Myanmar. Pyay has a very high content of organic waste as businesses and consumption are linked to the largely agricultural surrounding generating mainly organic waste. Muse on the other hand is the main trading hub of the nation between Myanmar and China. Muse also has the highest waste generation rate in Myanmar being the only town with over 1kg/cap/day.

Muse was also able to analyse hotel and casino generation data separately making it the first audit specifically for a certain industry. The results are as expected showing high amount of food waste from the hotel zones.

Recommendations

1. **Waste Generation Rate:** The waste generation rate of 0.37Kg/cap/day is lower than the Worldbank (What a Waste 2.0) prediction of around 0.5kg/cap/day when classifying Myanmar as a lower-middle income country. This shows that circularity loops are very active and well established like repair, resell or other forms of reuse. Until now there is very little focus on these loops and even less active support for them. Research on these loops would be essential to better understand their needs and support requests.

2. **Waste Composition:** Waste consists mainly of two mutually destructive components: Organics and plastics. Without plastic waste organic waste would easily decompose no matter how it would be disposed. Plastics would have at least a higher chance to be recycled when not strongly contaminated by organics. The mix of these two components results in an explosion of waste generation since plastics mixed with organics becomes waste, while organics itself would be just returning back to nature. Therefore, segregation efforts for organic material at every step of the value chain should lie at the center of any SWM improvement activity. Source segregation and treatment of organics can result in waste reduction of 50 to 80%. Efforts should focus on the exiting source management activities like:

a. **Animal feeding:** local authorities should again look into reversing livestock banning form urban centers and instead focus on improving livestock management in urban areas to absorb food waste;

b. **Composting:** Local cold composting for garden waste and kitchen waste should become mandatory.

c. **EPR:** Switch away from Single Use plastic by encouraging existing practices of BYO or organic packaging. A real polluter pay system where producers have to take responsibility for the full lifecycle management of their products is key to resolve the plastic crisis.

3. **Waste Disposal:** 45% of generated plastic is mismanaged either by being burned or leaking to soil and water. This number shows the dramatic difference between an ideal condition (100% managed) and the reality where waste (and specifically plastic) is a threat to community health and natural resource availability (clean water, healthy soil, animal health, clean air) is degrading. Managing this crisis through waste collection would require 200mil USD/Anum assuming the Worldbank standard of 30USD/ton of waste. Currently urban areas spend below 10USD/ton and recover these funds through fees only by 17%[2]. This does not even include rural Myanmar. Financial sustainable waste management focusing on collection and landfilling using the current mode of funding is not realistic. Effective SWM in Myanmar has to shift away from the common approach of use / dispose and household fees while focusing on:

a. **Recovering fees from producers:** This is easier to manage and also fair for consumers as those who use more unsustainable products have to pay a higher price for these products.

b. **Make source segregation the center of any SWM initiative:** Focus should shift away from waste collection as the primary objective of waste management to source segregation and source treatment.

c. **Restrict the use of unnecessary material:** Single Use Plastics and other short living items with low circularity have to be restricted to reduce the burden on the waste collection system;

d. **Allow and encourage community participation for urban waste:** Communities, recyclers, livestock managers, compost facilities, repair shops and informal collectors should at least receive no restrictions when improving waste management efforts on the primary collection level. Ideally, they should be supported and encouraged at all levels possible, opposite to the current restrictive measures.

e. **SWM law for rural areas:** develop a law system which require rural authorities to set up simple SWM systems including waste collection for inorganic waste, fees for management and landfill supported by authorities.

[2] Situation analysis SWM Mon state UNDP: https://drive.google.com/open?id=18oaZ43VV_pz_w5pL_oS_fJQdnxmAF4g_&authuser=thantmyanmarmovement%40gmail.com&usp=drive_fs

1. Composition and disposal data of generated waste

Item	Unit	Dawei	Pathein	Kaw thaung	Muse	Pyay	Town Average	Mandalay	Rural estimate	National Estimate
Audit date		**2019**	**2019**	**2019**	**2022**	**2022**				
Location of audit		Final Dump	Final Dump	Final Dump	Final Dump	Final Dump		Final Dump		
Population	capita	125,000	237,089	49,301	53,596	125,011	8,514,215	1,580,907	37,994,367	54,410,000
Waste Generation	kg/cap/d	0.49	0.69	0.47	1.27	0.52	0.65	0.99	0.22	0.37
Uncollected	**kg/cap/d**	0.01	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02
Composted	**kg/cap/d**	0.07	0.15	0.06	0.03	0.11	0.08	0.07	0.09	0.08
Recycled	**kg/cap/d**	0.05	0.07	0.05	0.12	0.05	0.08	0.15	0.004	0.03
Waste Disposed	**kg/cap/d**	0.36	0.43	0.34	1.08	0.34	0.57	0.74	0.11	0.25
Collected Inorganic	**kg/cap/d**	0.13	0.15	0.14	0.61	0.16	0.25	0.36	0.009	0.14
Collected Organic	**kg/cap/d**	0.23	0.29	0.20	0.48	0.18	0.31	0.38	0.10	0.11
Leakage to Environment	**%**	2.4%	4.7%	4.5%	1.5%	4.7%	3.5%	2.5%	6%	5%
Recycling	**%**	11%	11%	11%	10%	10%	12%	16%	2%	9%
Inorganic Waste Disposed	**%**	27%	18%	25%	45%	13%	26%	28%	5%	20%
Recycling on Inorganic	**%**	27%	32%	26%	17%	36%	30%	55%	12%	47%
Waste Generation	**[t/day]**	60.76	162.72	23.37	68.10	65.14		1,562.18	8,130.11	20,285
Waste Disposed	**[t/day]**	44.5	102.8	16.8	58.1	42.5		1,174.3		
Density	**[ton/m3]**	**0.200**	**0.200**	**0.209**	**0.200**	**0.200**		**0.215**		
Truckloads/ day			**55**	**11**	**0**	**0**		**1000**		
Organic		**64.4%**	**67.3%**	**60.0%**	**46.7%**	**72.7%**	**61.6%**	**57.9%**	87.2%	66%
Plastic		**9.4%**	**12.2%**	**15.1%**	**16.4%**	**10.7%**	**14.6%**	**11.3%**	8.5%	13%
Paper / Cardboard		**12.3%**	**10.4%**	**7.1%**	**12.5%**	**4.6%**	**7.4%**	**7.7%**	1.4%	5%
Glass		**5.7%**	**4.0%**	**12.4%**	**10.9%**	**7.6%**	**7.3%**	**7.8%**	0.9%	5%
Metal		**4.2%**	**4.4%**	**4.1%**	**5.3%**	**3.6%**	**4.2%**	**5.5%**	1.3%	4%
Other		**4.0%**	**1.8%**	**1.2%**	**8.2%**	**0.7%**	**4.6%**	**9.6%**	0.7%	5%

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Waste Disposal Method of Urban Waste (Ref to DG ANNEX II 8.1)

City	Population	Waste per Capita	Waste Generated TPD	Composted		Recycled		Sanitary Landfills			Controlled Dumping			Open Air Burning			Leaking Dumps			Uncollected	
National Estimated	54410000	0.37	20,285	22%	4,544	9%	1778.2		1%	156.8		37%	7563.3		12%	2368.0		3%	555.3	16%	3252.4
Rural	37,994,367	0.22	8,336	42%	3,508	2%	137		0%	-		4%	355	16%	16%	1347	3%	3%	238	33%	2752
Urban Combined	16415633	0.73	11,949	9%	1037	14%	1641	1	1%	157	1	60%	7208	59	9%	1021	46	3%	318	4%	500
Towns	8,514,215	0.64	5,518	12%	686	12%	644	1	3%	157	36	44%	2,428	59	19%	1,021	46	6%	318	4%	197
Cities	7,901,419	0.81	6,431	5%	350	16%	997	33%	0%	0	100%	74%	4,780	0%	0%	0	0%	0%	0	5%	303
Yangon	5,160,512	0.74	3800.00		190.0	16%	589.3	no		-	yes	100%	2811.4	no	0%	0.00	no		0.00	6%	209.3
Mandalay	1,580,907	0.96	1517.49		104.7	16%	235.3	yes	0%	-	yes	100%	1139.5	no	0%	0.00	no		0.00	2%	37.9
NPT	1,160,000	0.96	1113.47		55.7	16%	172.7	no		-	yes	100%	829.4	no	0%	0.00	no	0%	0.00	5%	55.7
Bago	**254000**	**0.53**	**134.62**		**20.5**	**12%**	**15.9**	**no**		-	**yes**	**100%**	93.4	**no**	**0%**	0.00	**no**	**0%**	0.00	4%	4.8
Myitkina	243,031	0.65	158.24		19.6	12%	18.7	no		-	no	0%	0.0	yes	100%	114.28	no	0%	0.00	4%	5.6
Sittwe	100,748	0.65	65.60		8.1	12%	7.8	no		-	no	0%	0.0	yes	100%	47.37	no	0%	0.00	4%	2.3
Hpa an	75,141	0.65	48.93		6.1	12%	5.8	no		-	yes	100%	35.3	no	0%	0.00	no	0%	0.00	4%	1.7
Loikaw	**60,000**	**0.60**	36.00		**4.9**	**12%**	**4.3**	**no**		-	**yes**	**100%**	25.6	**no**	**0%**	0.00	**no**	**0%**	0.00	4%	1.3
Hakha	24,926	0.65	16.23		2.0	12%	1.9	no		-	no	0%	0.0	yes	60%	7.03	yes	40%	4.69	4%	0.6
Thaunggyi	264,804	0.65	172.42		21.4	12%	20.4	no		-	yes	100%	124.5	no	0%	0.00	no	0%	0.00	4%	6.1
Dawei	80,117	0.65	52.17		6.5	12%	6.2	no		-	yes	100%	37.7	no	0%	0.00	no	0%	0.00	4%	1.9
Magwe	90,038	0.65	58.63		7.3	12%	6.9	no		-	no	60%	25.4	yes	40%	16.93	no	0%	0.00	4%	2.1
Pathein	237,089	0.65	154.37		19.2	12%	18.2	no		-	Yes	100%	111.5	No	0%	0.00	no	0%	0.00	4%	5.5
Mawlamyine	400,000	0.65	260.45		32.3	12%	30.8	no		-	yes	100%	188.1	no	0%	0.00	no	0%	0.00	4%	9.2
Sagaing	81,432	0.65	53.02		6.6	12%	6.3	no		-	Yes	100%	38.3	no	0%	0.00	no	0%	0.00	4%	1.9
Madaya	24,234	0.65	15.78		2.0	12%	1.9	no		-	no	0%	0.0	Yes	60%	6.84	yes	40%	4.56	4%	0.6
Pwin Oo Lin	158,783	0.65	103.39		12.8	12%	12.2	yes	100%	75	yes	0%	0.0	no	0%	0.00	no	0%	0.00	4%	3.7
Miketila	111,522	0.65	72.61		9.0	12%	8.6	no			no	60%	31.5	No	0%	0.00	yes	40%	20.98	4%	2.6
Taungoo	108,589	0.65	70.70		8.8	12%	8.4	no			no	60%	30.6	Yes	40%	20.42	no	0%	0.00	4%	2.5

Pyay	**134,861**	**0.52**	**70.27**		**13.3**	**12%**	**8.3**	**no**			**yes**	**100%**	**45.4**	**no**	**0%**	0.00	**no**	**0%**	0.00	**5%**	**3.3**
Ba Maw	58,696	0.65	38.22		4.7	12%	4.5	no			no	0%	0.0	no	100%	27.60	No	0%	0.00	4%	1.4
Nanmon	8,000	0.65	5.21		0.6	12%	0.6	no			no	0%	0.0	yes	100%	3.76	no	0%	0.00	4%	0.2
Putaro	15,978	0.65	10.40		1.3	12%	1.2	no			no	0%	0.0	yes	60%	4.51	yes	40%	3.01	4%	0.4
Kyauk Phyu	20,866	0.65	13.59		1.7	12%	1.6	no			no	0%	0.0	yes	100%	9.81	no	0%	0.00	4%	0.5
Mrauk Oo	36,139	0.65	23.53		2.9	12%	2.8	no			no	0%	0.0	yes	60%	10.20	yes	40%	6.80	4%	0.8
Maungdaw	11,742	0.65	7.65		0.9	12%	0.9	no			no	0%	0.0	yes	60%	3.31	yes	40%	2.21	4%	0.3
Pon Na Kyun	5,000	0.65	3.26		0.4	12%	0.4	no			no	0%	0.0	yes	60%	1.41	yes	40%	0.94	4%	0.1
Myebon	11,566	0.65	7.53		0.9	12%	0.9	no			no	0%	0.0	yes	60%	3.26	yes	40%	2.18	4%	0.3
Taungup	28,652	0.65	18.66		2.3	12%	2.2	no			no	0%	0.0	yes	60%	8.08	yes	40%	5.39	4%	0.7
Baw	5,000	0.65	3.26		0.4	12%	0.4	no			no	0%	0.0	yes	100%	2.35	no	0%	0.00	4%	0.1
Thandwe	14,327	0.65	9.33		1.2	12%	1.1	no			yes	60%	4.0	no	0%	0.00	yes	40%	2.69	4%	0.3
Ngapali beach	10,000	0.65	6.51		0.8	12%	0.8	no			no	0%	0.0	yes	60%	2.82	yes	40%	1.88	4%	0.2
Mann Aung	5,246	0.65	3.42		0.4	12%	0.4	no			no	0%	0.0	yes	60%	1.48	no	40%	0.99	4%	0.1
Myawady	113,155	0.65	73.68		9.1	12%	8.7	no			yes	100%	53.2	no	0%	0.00	no	0%	0.00	4%	2.6
Thandaung Gyi	16,056	0.65	10.45		1.3	12%	1.2	no			no	0%	0.0	Yes	60%	4.53	yes	40%	3.02	4%	0.4
Aung Ba + Kalaw	57,797	0.65	37.63		4.7	12%	4.4	no			no	0%	0.0	yes	100%	27.18	no	0%	0.00	4%	1.3
Hsipaw	20,897	0.65	13.61		1.7	12%	1.6	no			no	60%	5.9	no	0%	0.00	yes	40%	3.93	4%	0.5
Muse	53,596	1.27	68.10		4.3	12%	8.0	no			no	20%	10.7	yes	60%	31.98	yes	20%	10.66	4%	2.4
Lashoe	174,335	0.65	113.51		14.1	12%	13.4	no			no	0%	0.0	yes	60%	49.19	yes	40%	32.79	4%	4.0
Tar Chi late	51,553	0.65	33.57		4.2	12%	4.0	no			no	0%	0.0	yes	60%	14.54	yes	40%	9.70	4%	1.2
Naung Shwe	16,208	0.65	10.55		1.3	12%	1.2	no			yes	100%	7.6	no	0%	0.00	no	0%	0.00	4%	0.4
Ye	34,430	0.65	22.42		2.8	12%	2.6	no			no	0%	0.0	yes	100%	16.19	no	0%	0.00	4%	0.8
Kaw Thaung	57,949	0.65	37.73		4.7	12%	4.5	no			yes	100%	27.2	no	0%	0.00	no	0%	0.00	4%	1.3
Myeik	115,141	0.65	74.97		9.3	12%	8.9	no			no	100%	54.1	no	0%	0.00	no	0%	0.00	4%	2.7
Nyaung U	48,528	0.65	31.60		3.9	12%	3.7	no			no	0%	0.0	Yes	100%	22.82	no	0%	0.00	4%	1.1
Pakokku	110,842	0.65	72.17		9.0	12%	8.5	no			yes	100%	52.1	no	0%	0.00	no	0%	0.00	4%	2.6

Ngwe Saung	14,489	0.65	9.43		1.2	12%	1.1	no			no	0%	0.0	Yes	60%	4.09	yes	40%	2.73	4%	0.3
Pyapon	49,128	0.65	31.99		4.0	12%	3.8	no			no	60%	13.9	No	0%	0.00	yes	40%	9.24	4%	1.1
Kim pon Camp	10,000	0.65	6.51		0.8	12%	0.8	no			no	0%	0.0	yes	60%	2.82	yes	40%	1.88	4%	0.2
Kyaik Hto	35,224	0.65	22.94		2.8	12%	2.7	no			no	60%	9.9	no	0%	0.00	yes	40%	6.63	4%	0.8
Thaton	55,047	0.65	35.84		4.5	12%	4.2	no			no	0%	0.0	Yes	60%	15.53	yes	40%	10.35	4%	1.3
Shwe Bo	69,036	0.65	44.95		5.6	12%	5.3	no			yes	100%	32.5	NO	0%	0.00	no	0%	0.00	4%	1.6
Kawlinn	21,431	0.65	13.95		1.7	12%	1.6	no			no	0%	0.0	yes	60%	6.05	yes	40%	4.03	4%	0.5
Monywa	207,489	0.65	135.10		16.8	12%	16.0	no			yes	100%	97.6	No	0%	0.00	No	0%	0.00	4%	4.8
Demoso	2,197	0.82	1.8																	4%	0.1
Phruso	4000	0.80	3.2																	4%	0.1
Shartaw	7776	0.76	5.9																	4%	0.2
Masae	2000	0.80	1.6																	4%	0.1
Phasaung	25557	0.80	20.4																	4%	0.7

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