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STEPS TOWARDS SUSTAINABLE SOLID WASTE MANAGEMENT (SWM) IN NAIROBI, KENYA

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1. SWM

Solid Waste Management (SWM) in developing countries has become a major global challenge due to high population growth and increasing urbanisation leading to severe health and environmental impacts. The aim is to evaluate the existing SWM system in Nairobi and propose steps towards an Integrated and Sustainable Solid Waste Management (ISSWM) system.

2. CURRENT STATUS OF SWM IN NAIROBI

Waste Picker at Dandora dumpsite

Recyclable plastics collection hub

Recycled tyres made into seating

'Fuel from Waste': Briquettes

Waste Generation: The current solid waste generated in Nairobi is 4,016 tonnes.

Waste Composition: 50.9% Organic, 16.1% Plastic, 17.5% Paper.

Waste Collection: 52% Collection Coverage, no source separation & mostly private sector collectors.

Waste Disposal: The Dandora dumpsite is the largest and presently, the only operational open dumpsite in Nairobi and 850 tonnes/day of waste is disposed here.

Recycling: Hand pickers & Local material trading. Current recycling rate stands at 35%.

3. WASTEAWARE BENCHMARK INDICATORS

No.	Category	Indicator	Results		
			City		
			Nairobi	Lusaka	Surat
		Country	Kenya	Zambia	India
	Background information on the city				
G1	Country income level	World Bank Income Category	Lower-Middle	Lower-Middle	Lower-Middle
		GNI per capita	$1,290	$1,350	$1,530
G2	Population of city	Total population of the city	4,000,000	1,500,000	4,600,000
G3	Waste generation		1,465,000	301,840	456,250
	Key Waste-related data				
W1	Waste per capita	MSW per capita (kg per year)	366	201	120
	Quantitative Indicators				
1	Public health – Waste collection	Waste collection coverage	52%	45%	85%
2	Environmental control – waste treatment and disposal	Controlled treatment and disposal	20%	41%	55%
3	3Rs – reduce, reuse and recycling	Recycling rate	35%	6%	35%

This approach was applied to obtain a profile of the physical components of Nairobi's current SWM system. A benchmark indicator, based on the methodology developed by Wilson et al (2012) is given for each physical component. Use of the Wasteaware tool allows comparisons to be made between similar developing country cities.

4. SWOT ANALYSIS

| Strengths	Weaknesses
• Available human resources for cheap labour • Existing strong policy and legislation • Existence of informal sectors • More open engagement between government and private sectors • Willingness from the government to better the SWM system	• Limited capital investments and financing power • No report information system/report ing within the local authority • Low source separation participation • Lack of skilled labour • Insufficient collection and disposal capacity
Opportunities	Threats
• Presence of a large market for the sale of recyclable materials • Biogas can be harnessed for electricity production • Fertilizer products can be produced from composting • Ready market for fuel briquettes • Creation of new businesses surrounding SWM	• Government budget allocation to SWM projects is restricted by other large scale infrastructure projects • No innovative technologies exist locally • Public awareness and participation of SWM is limited • Coordination amongst the different actors is lacking • Research and development in the SWM field is limited

5. SENSITIVITY ANALYSIS

All units in tonnes	Current SWM System										
Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Total Recycled Waste	179,463	186,641	194,107	201,871	209,946	218,344	227,077	236,160	245,607	255,431	265,648
Total Organics Recycled	53,839	55,992	58,232	60,561	62,984	65,503	68,123	70,848	73,682	76,629	79,695
Residual Organic Waste	693,311	721,044	749,885	779,881	811,076	843,519	877,260	912,350	948,844	986,798	1,026,270
Proposed SWM System											
Briquettes	0	60,000	60,000	60,000	60,000	120,000	120,000	120,000	120,000	120,000	120,000
Composting	0	300,000	300,000	300,000	300,000	400,000	400,000	400,000	400,000	500,000	500,000
Total Organics Recycled	53,839	415,992	418,232	420,561	422,984	585,503	588,123	590,848	593,682	696,629	699,695
Residual Organic Waste	693,311	361,044	389,885	419,881	451,076	323,519	357,260	392,350	428,844	366,798	406,270
Required Number of Plants over the 10 year period											
Briquette	0	2	2	2	2	4	4	4	4	4	4
Composting	0	3	3	3	3	4	4	4	4	5	5

6. PROPOSED SWM SYSTEM
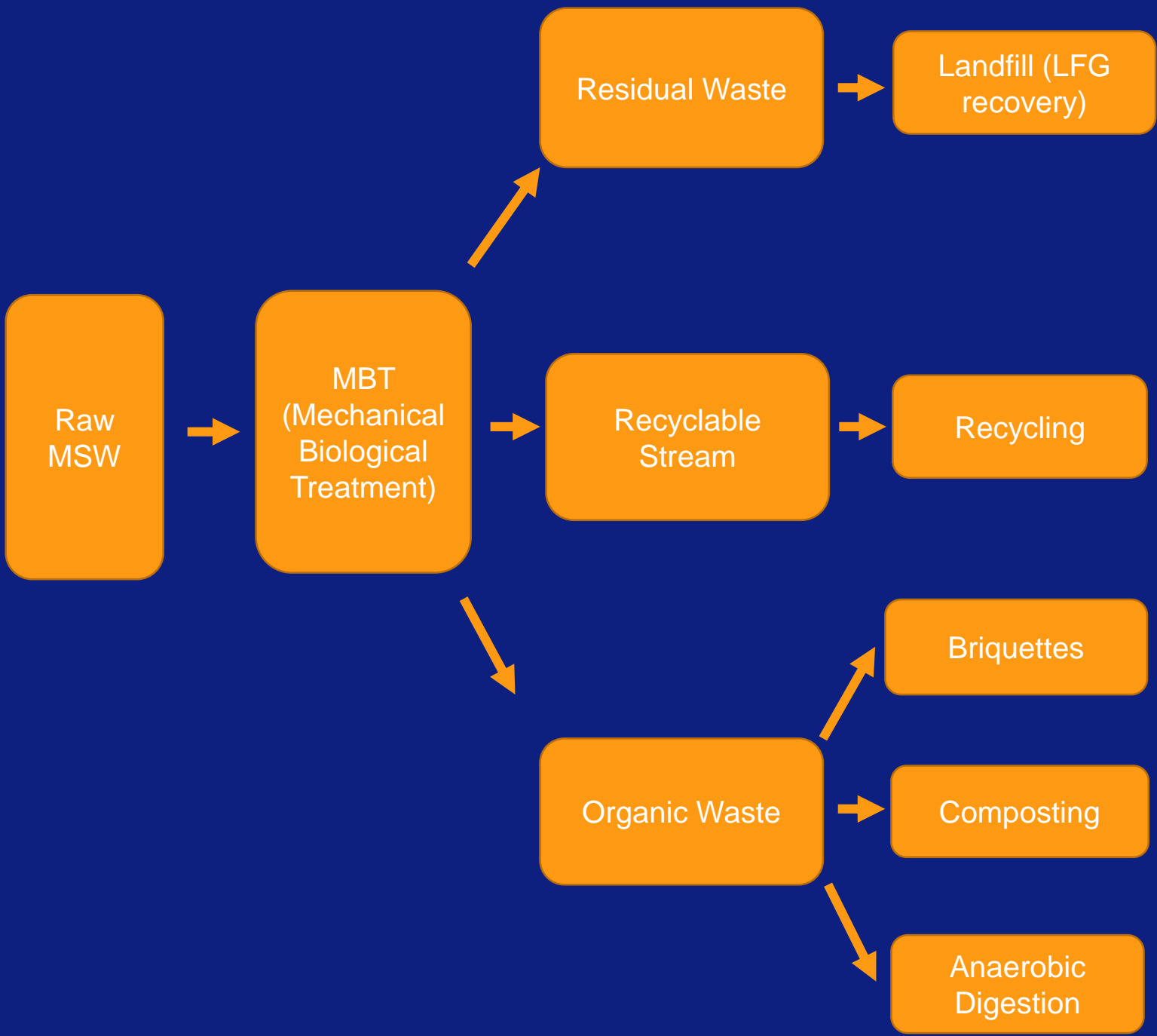
7. RECOMMENDATIONS

1. Strategic Alignment and Recognition of Actors
• Recognition of Actors in SWM
• Development of a Waste Information and Data Recording System
• Regulation and Enforcement of Private and CBO Waste Collectors

2. Source Separation and Waste Generation Reduction
• Volume-based Collection Fees
• Source Separation of Recyclable and Organic Wastes
• Levies for Problematic Wastes
• Education and Awareness Campaigns

3. Waste Collection, Transportation, Value Recovery and Disposal
• Increasing Waste Collection
• Zoning of Waste Collection
• Formalize contracts for facilitating Waste Collection Services
• Promote the Informal Sector
• Develop Material Recovery & Transfer Units

4. Resource Recovery (Energy & Materials)
• Value Recovery from Organic Wastes
• Strengthening of existing Waste Recycling Strategies

5. Residual Waste Infrastructure
• Development of New Engineered Landfill
• Rehabilitation of Dandora Dumpsite

8. CONCLUSION

A holistic study of the current MSW management sector in Nairobi, Kenya revealed many shortcomings in the existing system. In the context of SWM, it has been said that no one size fits all. Therefore, a sustainable solution must be planned to account for the available technologies, cultural and social situation as well as consideration of the local skill level and financial capacity.

ACKNOWLEDGEMENTS

REFERENCES

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