SDG Indicator 11.6.1, 12.4.2 and 12.5.1

Municipal solid waste collected and managed in controlled facilities with regards to total municipal solid waste generated by city

Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment.

National recycling rate, tons of material recycled

Introduction

| Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable	
Targets	**Indicator**
11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.	**Proportion of municipal solid waste collected and managed in controlled facilities with regards to the total waste generated by the city**

Goal 12: Ensure sustainable consumption and production patterns	
Targets	**Indicator**
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.	**Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment**
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	**National recycling rate, tons of material recycled**

SDG 11.6.1 MSW Collected and Managed in Controlled Facilities
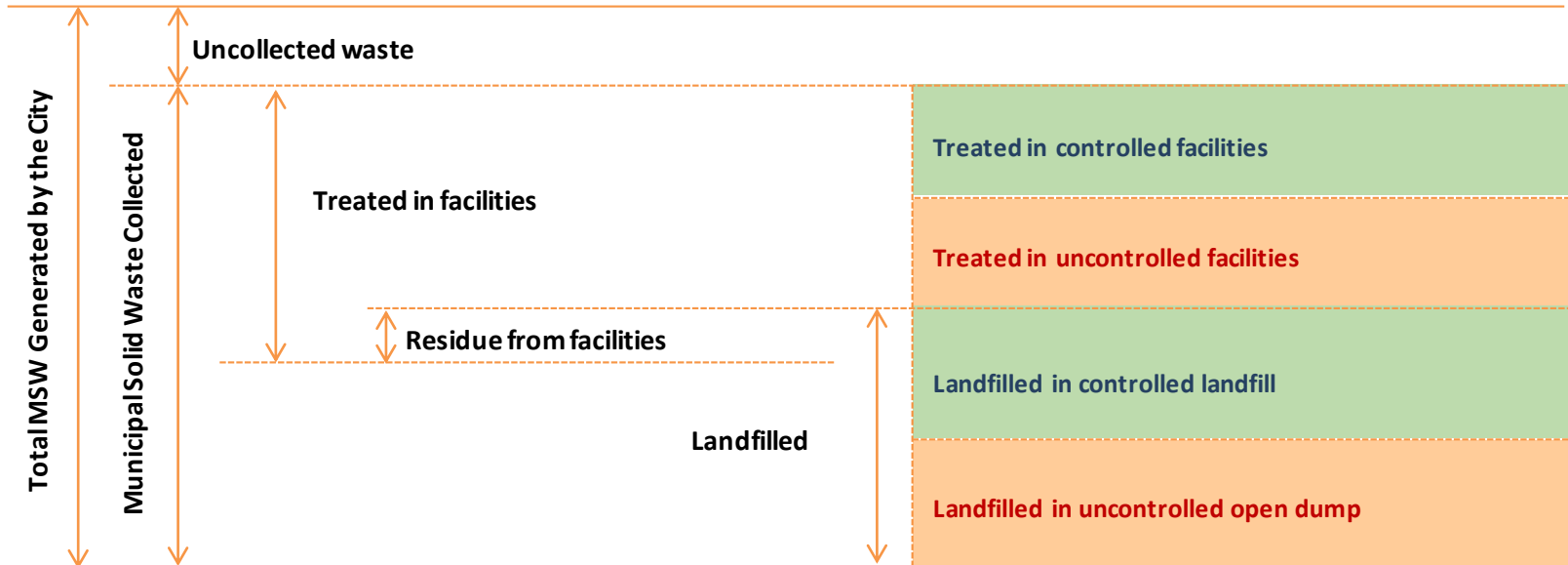
Total Municipal Solid Waste Generated by the City:
The sum of collected municipal solid waste and uncollected municipal solid waste. (Data from: Household survey and visits to commercial other institution)

Municipal Solid Waste Collected:
Waste that is regularly collected from specific addresses or designated collection points. (Data from: Combination of household questionnaire and waste reception record data from waste management facilities)
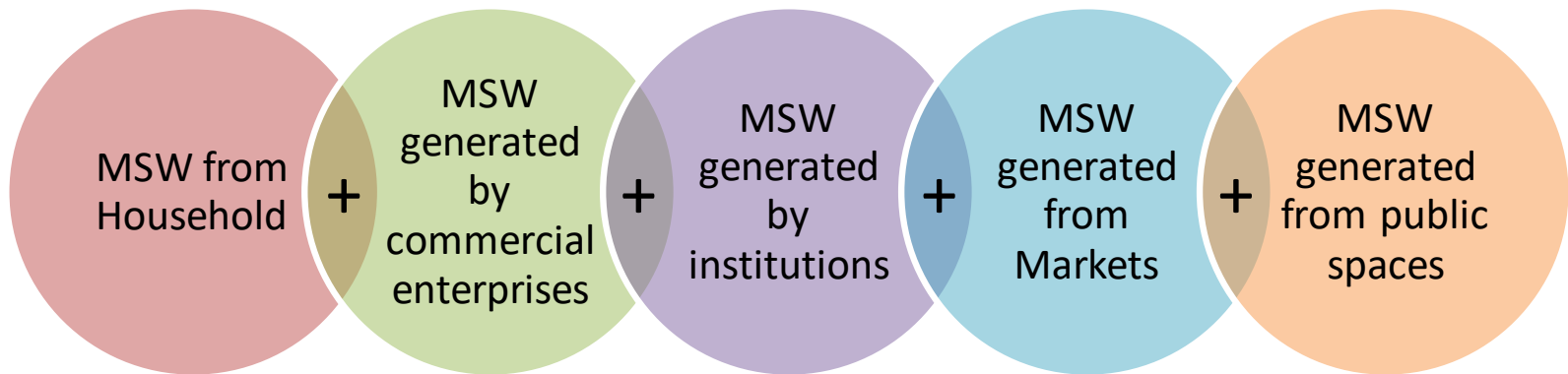
Municipal Solid Waste Managed in Controlled Facilities:
Wastes being accepted in a facility that has reached at least an intermediate level of control out of collected municipal solid waste. (Technical judgement on control level of WM facilities)
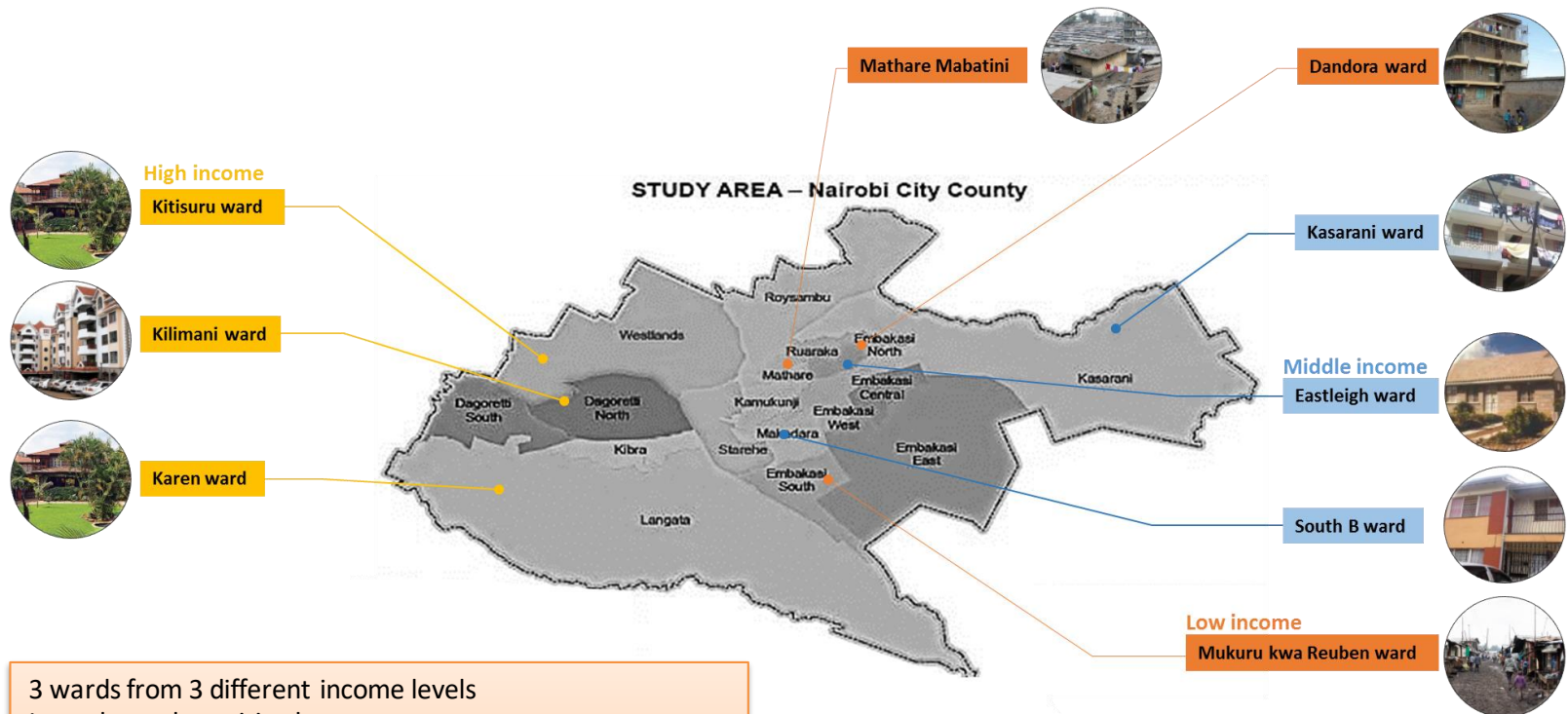
Other things to considerate:
Standardization of waste composition survey

MSW Generated

MSW from Household **+** MSW generated by commercial enterprises **+** MSW generated by institutions **+** MSW generated from Markets **+** MSW generated from public spaces

= Total MSW Generated by the City

MSW Generated – Pilot in Nairobi

STUDY AREA – Nairobi City County

Mathare Mabatini

Dandora ward

High income
Kitisuru ward

Kasarani ward

Kilimani ward

Middle income
Eastleigh ward

Karen ward

South B ward

Low income
Mukuru kwa Reuben ward

3 wards from 3 different income levels
In each ward we visited:
- 10 households
- 2 schools
- 2 markets
- 2 super markets
- 1-2 hospitals
- 2 restaurants and hotels
- 2 offices

MSW Generated – Pilot in Nairobi

= Household MSW Generation Per capita x Population in Nairobi

→ How to estimate household MSW generation per capita? -> Sampling!

- Distribute 8 liner bags for 50 sample households from high, middle and low income areas respectively and get average daily MSW generation for 7 days. Discard the first liner bag because it is not representative
- Record number of residents in the household
- Divide daily MSW generation by the number of residents in the household
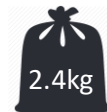
Kamau Family
4 members

Discard!
Because ppl put accumulated waste in the bag making the sample not representative

$$\frac{2.4kg + 3.2kg \quad 2.5kg \quad 1.8kg \quad 1.5kg \quad 2.1kg \quad 2.7kg}{7 \times 4} = 0.57kg/day/person$$

MSW Generated – Pilot in Nairobi

MSW Generated – Pilot in Nairobi

Nairobi Low income HHs

Name of Ward: Dandora
Date: ~~09/05~~ 09/05/2019
Time: 8·00 am

House No.	Family size	Waste amount (Kg)							Total (kg)
		Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	
5233 1	5	0.35	1 kg	1 kg	0·3kg	0.3kg	0·5	0·7	4·15
4819 / 4130 2	3	0·4	0·2	0·4kg	0·6kg	0·6kg	0·7	0·4	3.3
5228 3	4	0·5	0.9	0·8kg	0·8kg	1·1kg	1Kg	0·9	6
56308 4113 4	4	0·5	0·3	0·8kg	0·5kg	0·8kg	0·6	0·9	4·4
5148/5338 5	5	0·6	0·1	0·9kg	0·4kg	0·3kg	0·6	0·7	3·5
5417 6	3	0·6	0·5	0·6kg	1·1kg	0·7kg	0·8	1Kg	5·3
4315 21027	5	0·7	0·2	1·5kg	0·8kg	0·5kg	1·2	0·6	5·5
25025 8	3	2	1·6	0·5kg	0·7kg	0·3kg	0·4	0·9	6·4
5631/5948 9	3	0·6	0·3	0·4kg	0·4kg	0·6kg	0·4	0·5	3·2
5387/5332 10	4	0·5	0·4	0·4kg	0·2kg	0·7kg	0·3	0·7	3·2
Total waste (kg)									44·95
Total people	39								
Per capita generation rate (kg/cap/day)									

MSW Generated – Pilot in Nairobi

MSW Generation Per sqm, #of employee, chairs, beds, etc of premise type x total sqm, # of employee, chairs, beds, etc of the premises in Nairobi

→ How to estimate unit MSW generated by other premises?

- Check what data is available for each premises for the purpose of aggregation, such as total m^2 of hotels, restaurants, schools, institutions and markets. If this is not available, check what other data is available such as total tourist number for hotels, total number of students for schools, total number of beds for hospitals, etc. Any indication for the scale of the premises is good.

- Visit 2 hotels, 3 restaurants, 2 schools, 1 institution, 1 market and 1 hospital per ward. If a ward has large shopping malls, these should be visited separately too.

- Interview, measure and record how much waste is generated per day and find out with which collection company they have a service contract.

- Interview the collection companies about the amount of waste being generated from the interviewed premises, if necessary.

MSW Collected – Pilot in Nairobi

	Definition	Data Source
Amount of MSW Collected	MSW removed from generator and reached to disposal sites and other waste management facilities	• Officially designated disposal sites • Not officially designated disposal site but recognized by authority and used daily as major waste disposal site • Other waste recycling and treatment facilities (registered or non registered)
Population with access to basic waste collection services	UN-Habitat and partners are now developing *service ladder* for **no, limited, basic and improved** waste collection service	Questionnaire to household about the level of waste collection services (e.g. census)

Key definitions:

Disposal sites includes 1) officially designated disposal sites and 2) not officially designated disposal site but recognized by authority and used daily as major waste disposal site

Waste management facilities are biological and material recovery, recycling and thermal treatment facilities dealing with waste …. (work in progress)

MSW Collected – Pilot in Nairobi

MSW Managed in Controlled Facilities – Pilot in Nairobi

Level of Control	Land disposal	Thermal treatment	Biological and materials recovery/recycling
Low (uncontrolled) facility	☐ No compaction ☐ No cover soil ☐ No fencing ☐ Fire/smoke existence ☐ No leachate control ☐ No equipment / limited equipment	☐ Uncontrolled burning ☐ No air / water pollution control functions	☐ Unregistered locations with no distinguishable boundaries ☐ No provisions made for worker health and safety ☐ No air / water pollution control
Limited (semi-controlled) facility	☐ Some compaction ☐ No cover soil ☐ Some fire/smoke existence ☐ Site staffed ☐ Some level of access control / fencing ☐ No leachate control ☐ Some equipment for compaction	N/A	☐ Unregistered facilities with distinguishable boundaries ☐ No provisions made for worker health and safety ☐ No air / water pollution control
Basic (controlled) facility	☐ Waste compacted ☐ Covered with soil ☐ Site staffed ☐ Site fenced and control of access ☐ No fire/smoke existence ☐ Sufficient equipment for compaction and soil cover	☐ Emission controls to capture particulates ☐ Trained staff follow set operating procedures ☐ Equipment maintained ☐ Ash management carried out	☐ Registered facilities with marked boundaries. ☐ Provisions made for worker health and safety. ☐ Necessary air / water pollution control
Improved facility	☐ Waste compacted ☐ Covered with soil ☐ Site staffed ☐ Site fenced and control of access ☐ Leachate containment and treatment (depending on the local climate) ☐ Collection of landfill gas (depending on landfill technology)	N/A	☐ Engineered facilities with effective process control. ☐ Evidence of materials extracted being delivered into recycling or recovery markets. ☐ Pollution control compliant to environmental standards
State-of-the-art facility	☐ Waste compacted ☐ Covered with soil ☐ Site staffed ☐ Site fenced and full control of access ☐ Properly sited and designed functional sanitary landfill site ☐ Leachate containment (naturally consolidated clay on the site or constructed liner) ☐ Leachate treatment ☐ Gas collection and flaring and/or utilization ☐ Post closure plan	☐ Built to and operating in compliance with international best practice including e.g. EU or other similarly stringent stack and GHG emission criteria ☐ Emission controls is conducted compliant to environmental standards ☐ Fly ash managed as a hazardous waste using best appropriate technology. ☐ High energy conversion efficiency meeting European 'R1' or similar standard.	☐ Built to and in compliance with international best practice. ☐ Nutrient value of biologically treated materials utilised (e.g. in agriculture/horticulture). ☐ Materials extracted with high purity and delivered into recycling markets.

MSW Managed in Controlled Facilities – Pilot in Nairobi (Dandora Dumpsite)

Some compaction
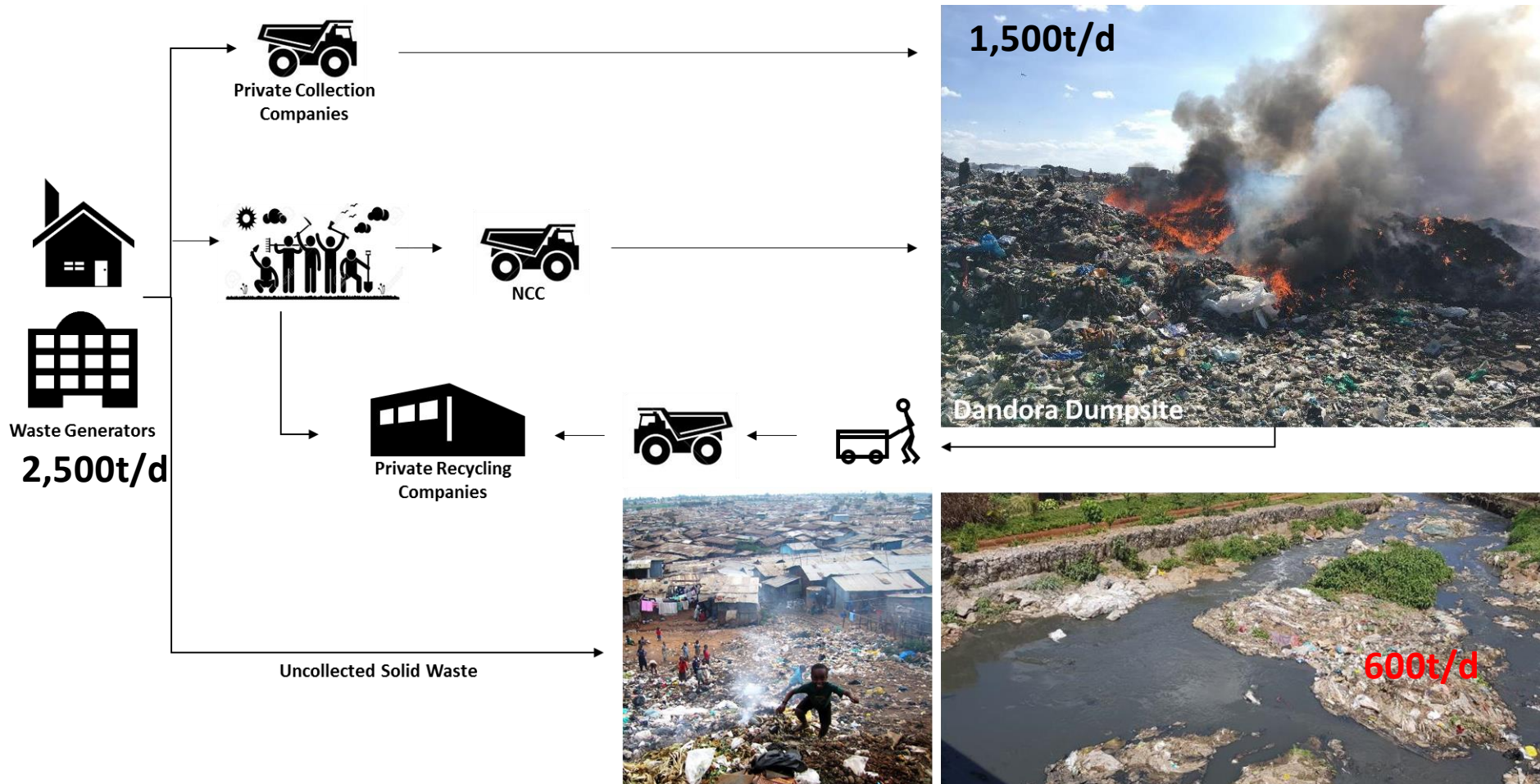

Fire existence

Weighing bridge

LIMITED CONTROL

-> The amount of waste reaching to Dandora Dumpsite cannot be counted as numerator

What SDG 11.6.1 reveal – investment gap in waste management in the city

1,500t/d

Dandora Dumpsite

600t/d

Private Collection Companies

NCC

Private Recycling Companies

Waste Generators
2,500t/d

Uncollected Solid Waste

What SDG 11.6.1 reveal – investment gap in waste management in the city

Landfill management improvement

Collection improvement

Recycling improvement

Waste Generators

Private Collection Companies

NCC

Private Recycling Companies

Uncollected Solid Waste

Dandora Dumpsite
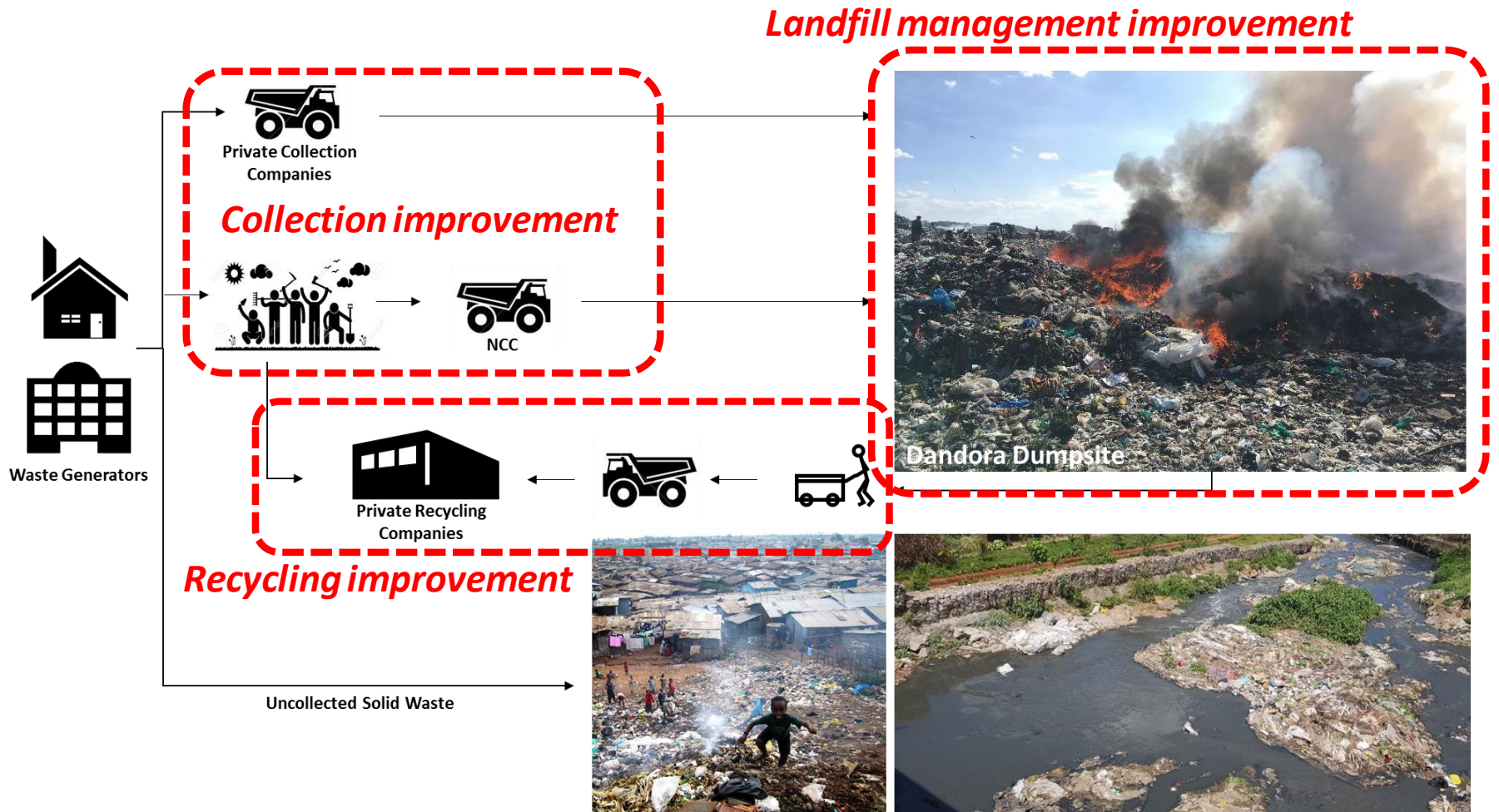
Way Forward

May 2019   :   Pilot in Nairobi (still going on)
June 2019   :   Revision of monitoring methodology
July 2019   :   Pilot in Mombasa and Seychelles
August 2019 :   Methodology role out

- Methodology and definitions will be shared with UNSD once it was established after pilot testing
- More efforts in capacity development on the ground is necessary

Hazardous waste data

Challenges related to waste management data:

- Lack of internationally agreed and harmonized definitions and methodologies, leading to poor comparability of data among countries
- Difficulty in capturing household-level waste management practices, informal or semi-formal activities, as well as illegal waste related activities
- Hazardous waste is a multi-sector, multi-level and multi-stakeholder subject
- Different life-cycle depending on type and source of hazardous waste
- Data and information demonstrating the linkages and identifying trends to inform policy action are essential, but often non-existent or scattered among different institutions
- Often lack of transparent institutional cooperation between national, regional and local authorities for the production and use of national environment statistics
- Difficulty in linking the use of chemicals with hazardous waste (example: solvent-based paint)

Concepts and definitions - I

Hazardous waste - waste with properties that make it hazardous or capable of having a harmful effect on human health or the environment, as per Basel Convention.

Hazardous waste generated - quantity of hazardous waste that is generated within the country during the reported year, prior to any activity such as collection, preparation for reuse, treatment, recovery, including recycling, or export, no matter the destination of this waste.

Environmentally sound treatment of hazardous waste – Waste treated according to technical guidelines adopted by the Conference of Parties to the Basel Convention, or according to nationally defined standards.

Concepts and definitions - II

Treatment of hazardous waste – 'Disposal' (D1-D15) and 'Recovery' (R1-R13) operations included in Annex IV of the Basel Convention.

Recycling - Any reprocessing of waste material that diverts it from the waste stream, except reuse as fuel. Reprocessing is included. Recycling within industrial plants i.e. at the place of generation should be excluded.

Incineration - the controlled combustion of waste, with or without energy recovery.

Landfilling - final placement of waste into or onto the land in a controlled or uncontrolled way.

> Controlled landfill - waste disposal site that is authorized and operates under applicable national or international legal requirements

Proposed sub-indicator levels

Indicator 12.4.2 – Hazardous Waste

Level 1 – global dataset which includes modelling of data gaps but is based on national official statistics

Level 2 - reporting of national data and meaningful sub-indicators, such as:

A. *Country capacity for sound treatment of own hazardous waste within the country.*

B. *Country capacity for treatment of hazardous waste from other countries*

C. *Hazardous waste exported in order to be soundly treated*

D. *Hazardous waste intensity of production*

Disaggregation

Indicators could be further disaggregated depending on the country's policy information needs:

- By generating sector / by ISIC codes;

- By type of landfilling: controlled vs. uncontrolled, specialized hazardous waste

  landfills, etc.

- By type of treatment per each generating sector;

- By type of recycling operation;

- By territorial division;

- Etc.

Data sources and collection process

Data sources:

- Hazardous waste generators;

- Hazardous waste collectors/operators;

- Hazardous waste treatment facilities;

- Environmental protection authorities;

- Basel Convention focal points;

- Statistics office.

Data collection process:

- Official reports at national/entity/generator level;

- Questionnaires

- Sample studies extrapolated at sector/national level.

Data Sources – data reporting flow pyramid

Data reporting

UN/BRS Focal Point

Data verification, aggregation

Line Ministries

National Statistics

Data providers

Municipal Waste Management Dept.

Chamber of Commerce/ Customs office

City Sanitation Departments

Waste Collection, Waste Treatment Facility Managers

Industrial Waste Producers

Private Waste Management Companies

Waste Water Treatment Facilities

Environmental Enforcement Officers

Introduction

Goal 12:	Ensure sustainable consumption and production patterns
Target 12.5:	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse
Indicator 12.5.1	National recycling rate, tons of material recycled

Concepts and definitions - I

Recycling - Any reprocessing of waste material that diverts it from the waste stream, except reuse as fuel. Reprocessing is included. Recycling within industrial plants i.e. at the place of generation should be excluded. – includes composting, excludes non-metallic minerals

Composting - biological process that submits biodegradable waste to anaerobic or aerobic decomposition, and that results in a product that is recovered and can be used to increase soil fertility

Material Flow Accounting (MFA) – monitoring system for national economies based on methodically organised accounts and denoting the total amounts of materials used in the economy.

Concepts and definitions - II

Extended Producer Responsibility (EPR)- an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle.

Domestic Material Consumption (DMC) - a standard MFA indicator and reports the apparent consumption of materials in a national economy.

Material Footprint (MF) – the attribution of global material extraction to domestic final demand of a country. The total MF is the sum of the material footprint for biomass, fossil fuels, metal ores and non-metal ores.

Total waste generated - the total amount of waste (both hazardous and non-hazardous) generated in the country during the year

Concepts and definitions - III

Municipal Solid Waste (MSW) - waste originating from households, commerce and trade, small businesses, office buildings and institutions. It also includes bulky waste and waste from selected municipal services, however excludes waste from municipal sewage network and treatment, municipal construction and demolition waste.

Non-metallic minerals – includes industrial minerals and construction minerals.

Hazardous waste - waste with properties that make it hazardous or capable of having a harmful effect on human health or the environment, as per Basel Convention.

Proposed Sub-indicator levels

Indicator 12.5.1 – Recycling Rate

Level 1 – global dataset which includes modelling of data gaps but is based on national official statistics

Level 2 - reporting of national data and meaningful sub-indicators, such as:

A. *Recycling rate by material flow for metals using DMC*

B. *Packaging waste recycling rate*

C. *WEEE recycling rate*

Disaggregation

Data for this indicator can be disaggregated at various levels for this indicator in accordance with the country's policy information needs. For instance:

- In country recycling and materials exported destined for recycling

- By recyclable material.

- Disaggregation of Recycling Rate by material flow for metal is possible by disaggregated data for ferrous and non-ferrous recycled materials and material flows.
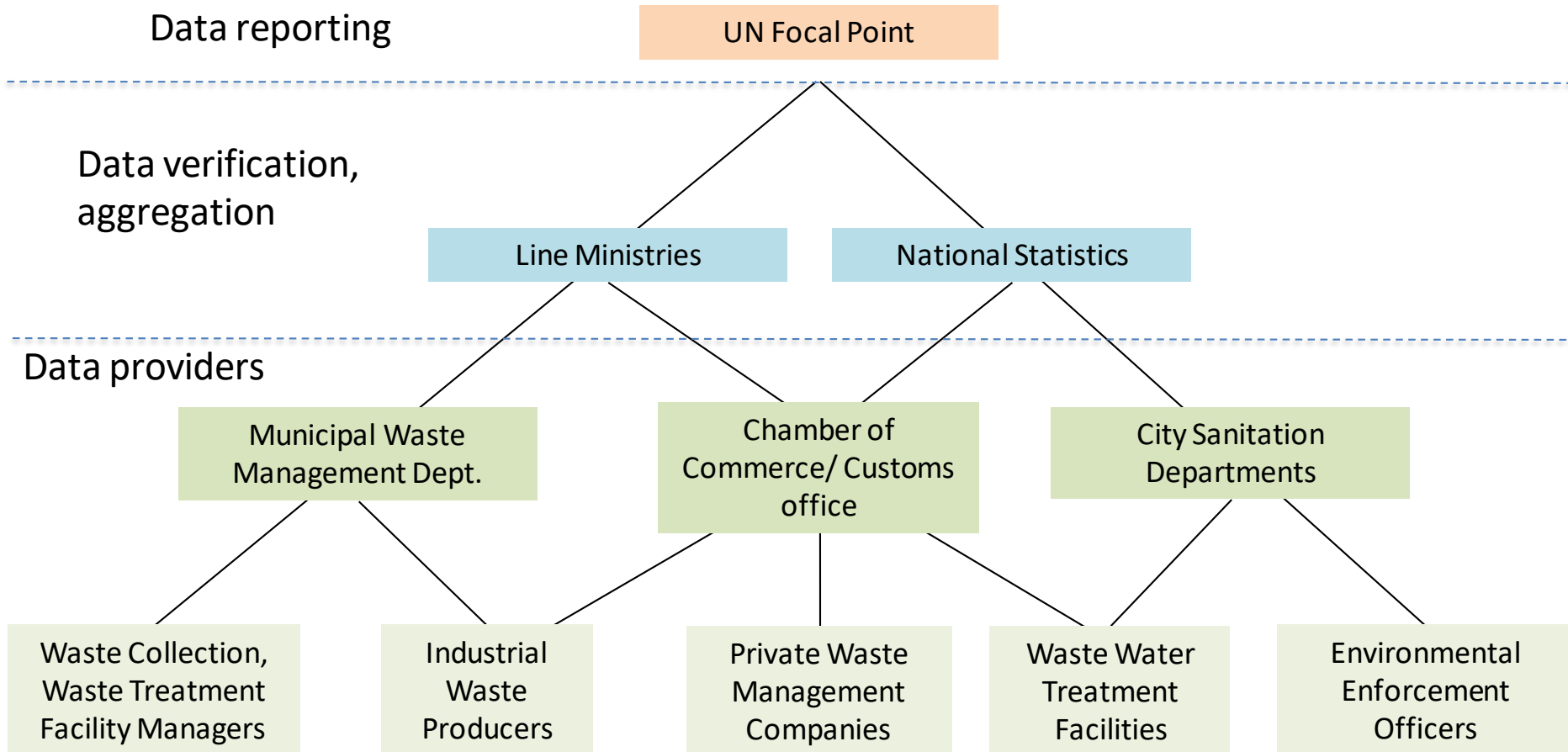
Data sources and collection process

Data sources:

- Municipal bodies;

- Private contractors;

- NGOs/community organizations;

- Permitted end of recycling chain entities;

- Processing units;

- Customs offices.

Data collection process:

- Official reports at national/entity/generator level;

- Questionnaires

- Sample studies extrapolated at sector/national level.

Data Sources – Data reporting flow pyramid

Data reporting

UN Focal Point

Data verification, aggregation

Line Ministries   National Statistics

Data providers

Municipal Waste Management Dept.   Chamber of Commerce/ Customs office   City Sanitation Departments

Waste Collection, Waste Treatment Facility Managers   Industrial Waste Producers   Private Waste Management Companies   Waste Water Treatment Facilities   Environmental Enforcement Officers

Next steps

- Finalizing definitions and sub-indicators
- Global modelling of recycling
- Working with UNSD to ensure information collected in the UNSD/UNEP Questionnaire is standardized to allow comparability across countries

Thank you

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