

Waste Characterization Survey Methodology Training Workshop in Lesotho

Workshop Introduction

Lancers Inn

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Trust Nhubu

Tel: +263 777 342 295

Email: tnhubut@unisa.ac.za, nhubustrust@gmail.com



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Presentation Outline



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Background



Lack of reliable and accurate MSW generation, composition data and material flows

Need for reliable and accurate data for effective waste management planning and the successful implementation of circular economy policy instruments, such as Extended Producer Responsibility (EPR)

Waste characterization surveys provide critical evidence for identifying priority waste streams, estimating recycling potential, designing financing mechanisms, and monitoring policy impacts.

Absence of reliable and accurate data in Lesotho constrain evidence-based decision-making at both national and municipal levels and limit the design of context-appropriate EPR systems and circular economy interventions.



Technical capacity strengthening in designing and implementing waste characterization surveys using standardized, practical, and cost-effective methodologies adapted to local conditions.

Recent advances in digital technologies, particularly Artificial Intelligence (AI), image recognition, and mobile-based data collection tools, offer new opportunities to enhance waste characterization processes.

AI-enabled approaches can improve the accuracy, efficiency, and scalability of waste data collection by automating classification, reducing human error, and enabling real-time data analysis.

Integrating such approaches also supports Monitoring, Reporting, and Verification (MRV) systems and strengthens evidence-based policymaking.



To address these needs, the Institute for Global Environmental Strategies – Centre Collaborating with UNEP on Environmental Technologies (IGES-CCET) proposes to design and deliver a hands-on training programme on waste characterization survey methodology in Lesotho.

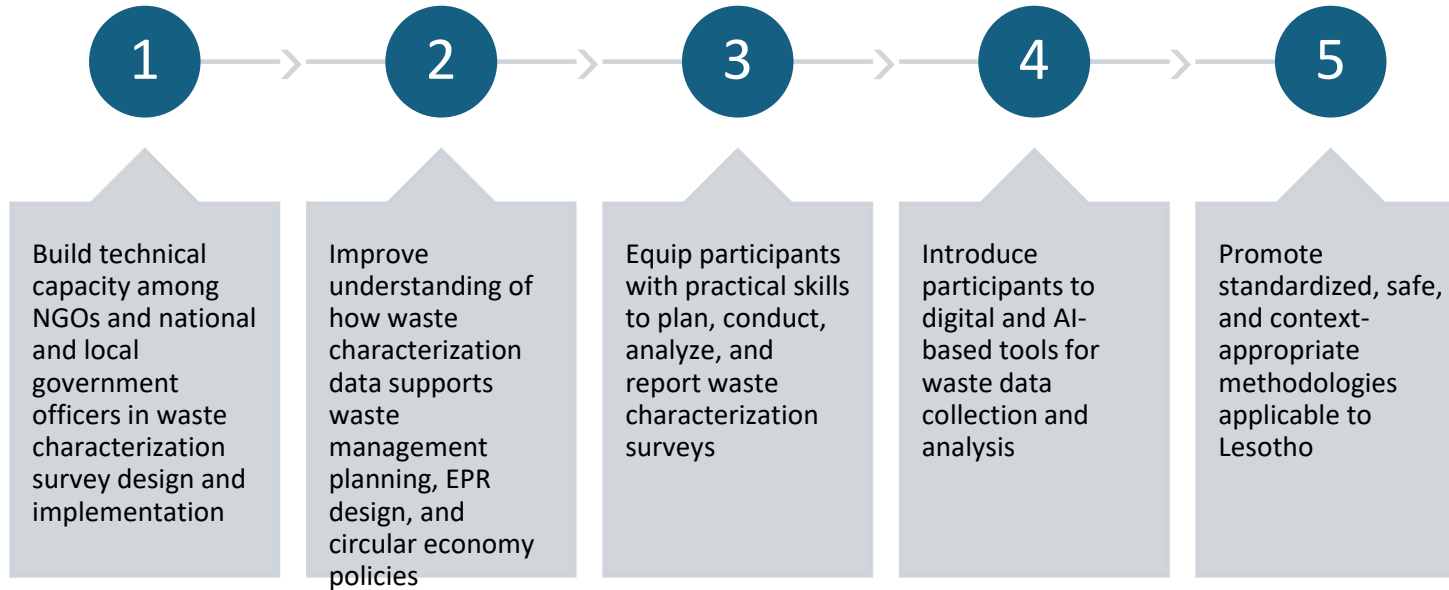
The programme will combine conventional approaches with emerging digital and AI-based tools, implemented in collaboration with the Ministry of Environment and Forestry, UNEP, UNDP, and national experts.



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Workshop Objectives



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Target Participants



National
government
officers
(environment,
waste, and
pollution units)



Municipal and
local authority staff
responsible for
waste
management



NGOs and civil
society
organizations
working on waste,
environment, and
plastics



Academic or
technical
institutions
involved in waste
research and data
collection



Waste collectors or
pickers



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Indicative Duration and Format

- **Day 1:** Classroom-based training (concepts, methodology, planning)
- **Day 2:** Field-based practical exercise and data analysis

(Exact duration may be adjusted based on participant needs and logistics.)



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Anticipated Workshop Outcomes

Outputs	Outcomes
Trained government and NGO staff with practical waste characterization skills	Improved national and local capacity for evidence-based waste management planning
Training materials and field protocols adapted to the Lesotho context	Strengthened foundation for EPR implementation and circular economy strategies
Sample waste characterization datasets from field exercises	Enhanced application of digital and AI-supported tools for waste data systems
	Improved coordination among government agencies, municipalities, and stakeholders



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Training Structure and Approach



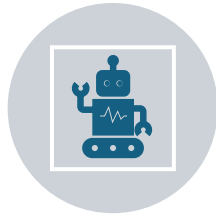
Classroom sessions:

Conceptual understanding, methodology, planning, health and safety, and digital tools



Field-based practical

training: Waste sampling, sorting, weighing, and real-time data recording



Digital application: Use of mobile tools, data visualization, and AI-based applications



Learning by doing



Group work and practical demonstrations



Adaptation of good international practices to local conditions



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Workshop Training Modules



Module	Module Title	Key Focus	Comprehensive Content
Module 1	WaCT – Importance of waste characterization (Policy Relevance, SDGs, and Decision-making)	• Purpose and importance of waste characterization • Linkages to waste management planning, EPR, and circular economy • Aligning local waste data with international reporting frameworks and national budgets.	• Introduction to SDG Indicator 11.6.1 (proportion of municipal solid waste collected and managed in controlled facilities). • The Mass Balance Concept: Verifying total waste generated vs. waste collected, recovered, and leaked. • Moving from landfill-only monitoring to source-to-disposal tracking. • Policy drivers: Securing climate finance and infrastructure investments using reliable data.
Module 2	Survey Design, Sampling & Pre-preparation	• Defining objectives and scope • Selecting waste streams and categories • Sampling locations, size, and frequency	• Income Stratification: Mapping and dividing the municipality into High, Middle, and Low-income areas. • Determining sample sizes (e.g., 90–100 households) for statistical significance. • Stakeholder engagement, municipal zoning, and choosing secure physical sorting stations. • Timelines, budgeting, and coordination between municipal departments.



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Workshop Training Modules...ctd



Module	Module Title	Key Focus	Comprehensive Content
Module 3	Household Survey Methodology	- Survey Methodology and Data collection - Capturing true domestic waste generation rates while eliminating field bias.	- Executing the 8-Day Survey Cycle at the domestic level. - Managing the "Day 1 Discard Rule" to eliminate accumulation bias. - Logistics of daily bag distribution, sample labeling, collection tracking, and household recording protocols. - Calculating per capita waste generation rates (\$kg/capita/day\$).
Module 4	Non-Household Surveys Methodology	Quantifying waste flows from the commercial, institutional, and industrial sectors.	- Identifying and sampling non-household waste generators (markets, schools, hotels, offices, hospitals). - Adjusting methodologies for seasonal or highly volatile commercial waste zones. - Tracking commercial waste collection contracts and institutional disposal paths.
Module 5	Waste Sorting and Composition Analysis	Mastering physical sorting techniques to understand exactly what a city's waste consists of.	- Hands-on implementation of the Quartering Technique to reduce large bulk samples into a manageable 50–70 kg composite sub-sample. - Categorizing waste into 12 main physical fractions (organics, paper, type-specific plastics, glass, metals, hazardous materials). - Bulk density calculations and standardizing weighing protocols.



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Workshop Training Modules...ctd



Module	Module Title	Key Focus	Comprehensive Content
Module 6	Data Management and Communication	Ensuring data integrity, validation, and error reduction during digital data entry	- Data cleaning protocols and handling missing or anomalous field records. - Cross-verifying household generation data with disposal site weighbridge records. - Aggregating regional data into municipal-wide waste profiles. - Introduction to foundational data entry spreadsheets and verification metrics.
Module 7	Environment, Health, and Safety (EHS) & Field Training Logistics	Protecting field staff and ensuring ethical, compliant operations.	- Comprehensive Personal Protective Equipment (PPE) protocols (heavy-duty gloves, puncture-resistant boots, masks). - Field risk management: Handling sharp objects, hazardous waste, and biohazards. - Training and defining roles (Team Leaders, Sorters, Interviewers). - Ethical protocols: Securing informed consent and data privacy for participating households.



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Workshop Training Modules...ctd



Module	Module Title	Key Focus	Comprehensive Content
Module 8	Survey Results communication and Way Forward	Translating raw data into actionable local laws, Master Plans, and investment strategies.	- Synthesizing survey findings into a "Municipal Waste Profile Report." - Communicating technical data effectively to mayors, policymakers, and public stakeholders. - Using composition data to design circular economy interventions (e.g., composting organic waste, optimizing recycling infrastructure) - Formulating a long-term Municipal Solid Waste Management Strategy based on findings.
Module 9	Use of AI and Digital Tools Q&A	- Introduction to AI in waste management - Leveraging modern software platforms to optimize waste flows and predict future generation. - AI-supported sorting and data capture - Digital MRV systems and dashboards	Exploring future AI applications: Computer vision for sorting automation and predictive modeling for urban waste characterisation
Module 10	Field-Based Group Work	Operationalizing theoretical knowledge through practical, field-level execution.	- Field Work: Executing household bag weighing and tracking logs - Mixing, quartering, and manually sorting an actual municipal waste sample. - Group presentations of simulated field data and troubleshooting peer challenges. - Facilitated Q&A session to address localized municipal bottlenecks and deployment challenges.



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Roles and Responsibilities



IGES-CCET

- Design the training curriculum and materials
- Deliver classroom and field training sessions
- Provide international best practices and technical guidance



Government of Lesotho (Ministry of Environment and Forestry)

- Nominate participants and technical counterparts
- Facilitate access to training venues and field sites
- Provide policy context and guidance
- Prepare necessary tools and equipment to conduct Module 10 – Field Work



Partner Organisations (UNEP, UNDP, NGOs, Municipalities)

- Support coordination, logistics, and stakeholder participation
- Contribute contextual knowledge and field support



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Thank You