Experience Spotlight

MRV as a Tool for Improving Waste Management and Driving Climate Action in West Africa and The Pacific Alliance

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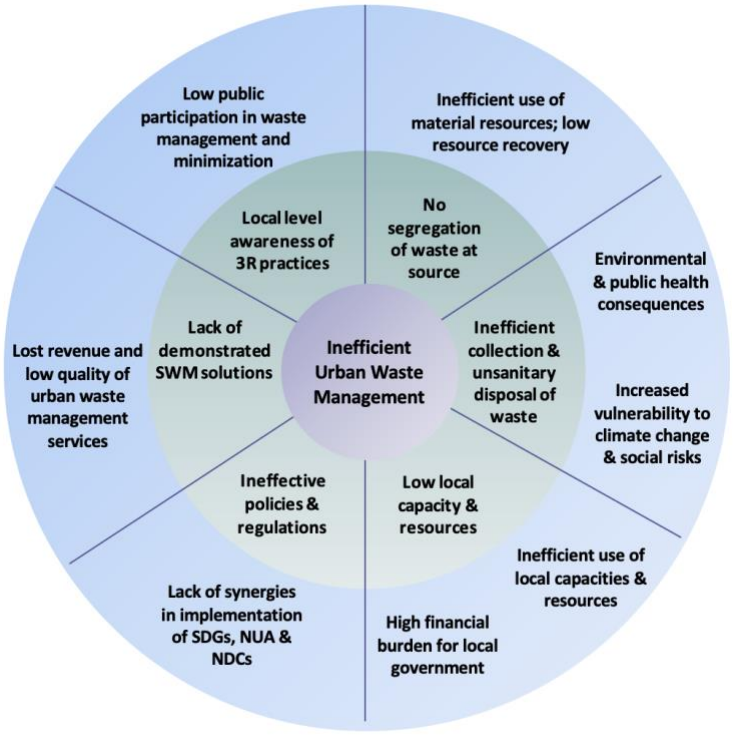
Setting the Scene

Urban waste generation is **expected to triple** by 2050 in Sub-Saharan Africa and double in many other parts of the developing world where more than half of **all waste is dumped** with little consideration for environmental impacts or health of local populations.[1] In 2018 global solid waste generation was estimated at just over two billion tons of municipal solid waste per year with more than 33% of that number not managed in environmentally compliant ways. This generation number is expected to increase to 3.4 billion tonnes by 2050.[2]

The **climate impact of waste** is relatively small compared to other emissions categories such as energy or transport, but because emissions from the waste sector are mostly SLCPs - methane and black carbon – there exists major opportunities for significant mitigation within a shorter timeframe.



'Sustainable development benefits of integrated waste management' ESCAP United Nations, 2017.

Short-lived climate pollutants (SLCPs) are powerful climate forcers that remain in the atmosphere for a much shorter period of time than carbon dioxide (CO_2), yet their potential to warm the atmosphere can be many times greater. SLCPs include: black carbon, methane, HFCS and tropospheric ozone.

Methane (CH_4) is a greenhouse gas (GHG) with a warming potential 28 times than CO_2. According to the IPPC, solid waste contributes to about 10% of world's GHG emissions and is a major cause of global warming.

Black carbon (BC) is a component of fine particulate matter (PM ≤ 2.5 µm). It is formed through the incomplete combustion of fossil fuels, biofuel, and biomass, and is one of the main types of particle. BC is more commonly present in places where waste services are not accessible leading to waste open burning.

Source CCAC

[1] 'What a waste 2.0 – A global snapshot of solid waste management to 2050' World Bank, 2018.
[2] Ibid.

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Linking climate action and waste management transitions in developing countries

Waste management in Africa and to a lesser degree in the Pacific Alliance is characterized by uncontrolled dumping and open burning of waste. In some parts of the developing world, where waste collection rates fail to account for even half of all waste generated, populations resort to alternative solutions to manage waste. These alternatives take several forms and include wild dumping, open burning and disposal into lakes and rivers.[3]

The **reoccurring presence of solid waste and SLCP linked climate actions** in developing countries' climate action planning globally reinforces this idea while simultaneously **arguing for strong monitoring, reporting and verification (MRV) to support the linkage**. A robust MRV framework is the foundation around which early NDC climate action on waste can be built, providing certainty for long-term planning by offering a path for investment in needed infrastructure as well as capacity building to support the skilled workforce required to provide good functioning of both infrastructure and services.

Cote d'Ivoire - SLCP measures in waste sector

- Reduce open burning
- Implement sanitary landfills
- Boost material recovery
- Recover methane from landfills
- Improve management of wastewater

Source: CACC SNAP Finance Webinar

As is the case globally, in least developing countries (LDCs) **responsibility for waste management** and collection falls to municipalities, while regulation related to the definitions of waste and its proper disposal rests with national authorities.[4] This is the case in the countries of West Africa and to a lesser extent in the Pacific Alliance. While resources for managing waste are extremely scarce in **LDCs where the bulk of focus is placed on collection**, in West

The 'Reciclo Orgánicos' Program

The Governments of Canada and Chile share more than 20 years of collaboration for sustainability within the framework of an Environmental Cooperation Agreement. As a result of this cooperation the Reciclo Orgánicos Program was born, with the purpose of supporting Chile's NDC implementation through the reduction of GHG emissions (in particular methane) from existing landfill sites and measures to divert organic matter from landfilling, and the development of robust sectoral MRV. This initiative is part of the Government of Canada's $2.65 billion climate finance commitment under the Paris Agreement to help developing countries address the challenges of climate change and their transition to low-carbon economies.

From the projects supported by Reciclo Orgánicos, it is expected to reduce around 7 million tonnes of CO2e. For this reason, this Program becomes important to combating climate change and reaching Chile's NDC goals. Additionally, the program developed the MRV protocols for quantifying GHGs from landfills, composting plants, and anaerobic digestion plants so that the Chilean government can adequately quantify the impacts of the projects that generate reductions in GHG emissions in the waste sector. Currently, the Program is investing in testing state-of-the-art technology for MRV, such as Blockchain, which allows quantifying and recording in real-time the reduction of GHG emissions from the project, with greater precision, transparency and lower costs.

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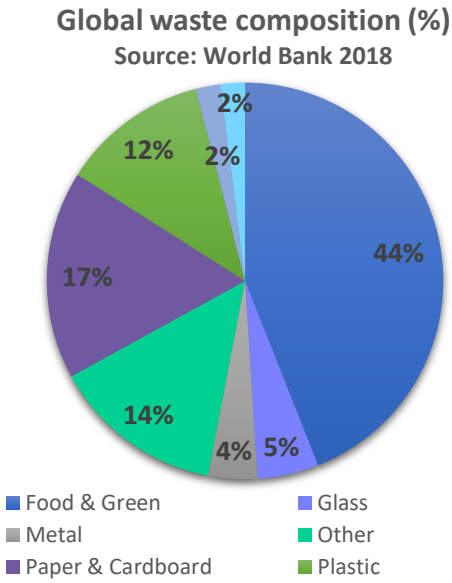
[3] 'Global waste management outlook' International Solid Waste Association (ISWA) / UN Environment Programme (UNEP) 2015.
[4] Ibid.



Africa common collection practices from households and businesses include use of donkey-carts and tricycles while pick-ups and larger trucks serve to transport waste to transfer points and treatment facilities. **Middle income countries like Mexico or Chile have higher rates of collection** and have integrated provisions for final disposal often in the form of controlled landfills, sites that often lack a liner or leachate collection system, but with other mechanisms in place to limit environmental impacts.[5]

Waste characteristics are another important consideration both in relation to waste management and climate opportunities. Typically, **organic matter** is the largest component of municipal waste globally and the one responsible for the generation of **methane**, a potent greenhouse gas (GHG). The organic waste component is estimated at about 32% in developed countries and as high as 56% in LDCs. **Recyclable materials** such as paper, cardboard, plastics, and metal come next, representing 15% of total waste in low income and about 25% in middle income countries.[6]

In addition to climate considerations, these insights into waste composition have important implications related to **opportunities for recovering value from waste** as well as the impacts of disposed waste on climate and environment. Informal workers play an important and often unseen role in waste management in the developing world, seeking to recover value from materials found in waste. The presence of these same materials also holds hope for the uptake of concepts like **Circular Economy**, one where materials are reused through recovery loops thus avoiding the need to tap raw materials and avoiding the emissions associated with that process.[7] Finally, the predominant presence of **organics in waste is perhaps the most relevant to the discussion of climate** and environment. Methane produced by decaying organic material is a highly potent GHG, 28 times more potent than CO_2. And in addition to the climate mitigation opportunities presented by uptake of a focused organics strategy other benefits can be derived from such a strategy such as energy production, nutrient recovery, protection of water resources, soil conservation and job creation.[8]

In order to effectively realize the benefits offered by the prospect of investments in the waste sector, it is **important to have a roadmap** for this journey. Equally important to ensuring a successful arrival at the destination is the need for a compass that orients along the way. In this instance waste focused NDCs are the map guiding the way while the **MRV methodology serves as the compass**. In practice **MRV offers the tools needed to ensure that infrastructure and systems are preforming as planned**, offering measurable outputs to ensure necessary climate progress is achieved. Cote d'Ivoire's SLCP action plan offers an example of this in practice as Ivoirian officials seek to link air quality and climate objectives through the development of an integrated MRV system that includes waste sector actions.[9]

[5] 'International guidelines for landfill evaluation' International Solid Waste Association (ISWA) September 2011.
[6] World Bank 2018.
[7] 'What is circular economy?' Ellen MacArthur Foundation, 2020. Retrieved from: https://www.ellenmacarthurfoundation.org/circular-economy/concept
[8] 'Global food waste management: an implementation guide for cities' World Biogas Association & C40 Cities, 2018.
[9] Climate and Clean Air Coalition (CACC) SNAP Finance Webinar: Sustainable Waste Management and Household Energy, Nov. 2020.

Côte d'Ivoire – Canada Waste Programme

In 2018, the Government of Canada allocated a grant to the United Nations Environment Program to assist Côte d'Ivoire in the implementation of their NDCs in the waste sector. Although the waste sector in Côte d'Ivoire emits fewer GHGs compared to other sectors, it offers enormous opportunities for emission reductions and job creation. The Programme was vital to the development of National Compost and Biogas strategies for 2020 – 2030 and the implementation of a pilot biodigester plant installed at 'Société Ivoirienne d'Abattage et de Charcuterie (SIVAC)' in the industrial zone of Yopougon (Abidjan). The Programme also supported training of stakeholders on composting and biogas techniques: from theory to practice, and financing development and trained experts on GHG and black carbon emissions inventory and on how to set up, implement and monitor an MRV system for the waste sector.

Mr. Tiangoua KONE, formally Deputy Director of Climate Change Department, Ministry of Environment, Urban Health and Development, Côte d'Ivoire

While the elements of an MRV plan will remain consistent, the application of MRV to a sector requires specific and distinct components that permit the MRV methodology to be applied in a rigorous way. For example, **MRV in support of waste focused Nationally Appropriate Mitigation Action (NAMAs) include critical elements**: waste generation, composition, amount of waste collected, percent of waste treated and by what treatment, prevalent weather conditions and where relevant gas generation and energy is produced. This same MRV approach can be applied to a discussion of impacts or benefits as well as how they are distributed across a population[10]

The obvious **MRV challenge for developing countries is the absence of data**, and insufficient systems to monitor and properly track quantities of waste generated. Lacking this information, it is difficult to develop accountability or transparency mechanisms or to design rational strategies to target action and needed investment. Therefore, to facilitate the development of effective MRV in the waste sector, better data must be a priority focus.

Whether a mitigation action into the waste sector involves infrastructure such as a landfill with gas collection, a composting facility, or an improvement in waste collection, the ability to connect investments to impacts will revolve around an actor's ability to measure inputs such as waste quantity, waste composition, and treatment. At the **most basic level this implies a need for data on waste characteristics, collection and disposal data,** as well as a measuring of the efficacy of treatment.

Measuring impacts

Defining a methodology for the measurement of impacts should include a focus on:

- The geographical scope
- The impact boundaries of the activity on GHG emissions, and the sustainable development benefits
- The baselines for key development benefits and GHG emissions
- The indicators to measure the impacts
- The data required to measure/estimate the indicators
- A data collection system including clear delegation of data collection responsibilities between the different involved stakeholders
- Establishing procedures to ensure reliability of data collected and estimates (Q&A)

Source: UNEP DTU Partnership, 2015.

[10] 'NAMAs on Waste Management: Designing a MRV methodology for the NAMA' UNEP DTU Partnership, NAMA training, Maputo, Mozambique, 2015.

The natural progression from this aspect of MRV leads to a **look at how an accounting of benefits can be integrated within this MRV approach**. A discussion of the impacts or benefits that accrue from investments targeting waste and climate action can quickly become complex given the myriad ways that waste issues cut across environmental media, public health, and individual livelihoods. In order to sort out the multiple connections implicit in this discussion it is possible to again refer to the MRV framework for help in establishing a clear picture of the tradeoffs and possible benefits.

Senegal – Canada NDC Waste Project

As part of the Government of Canada's climate finance commitment under the Paris Agreement to help developing countries address the challenges of climate change Environment and Climate Change Canada (ECCC) supported the **NDC Waste Project** in Senegal. Launched in 2018 and implemented by UN Environment, the project had many successes including enabling Senegal to finalize its very **first Orientation Law** for the solid waste sector since 1960. This legal framework lays the foundations for integrated and sustainable management of solid waste and contributes to the implementation of a circular economy; which is a foundation of the mitigation options in the **NDC**. The project also enabled the development of two strategic documents for the development of organic waste treatment through composting and methanization and it helped to strengthen the MRV system for the solid waste sector.

A pilot composting unit was also supported with the participation of the University and the Senegalese Bureau of Standards (ASN) in order to design standards that will frame the production of quality compost and biofertilizers while reducing GHG emissions. Ultimately, the results of the project will help create approximately ten industrial composting plants across the country and create hundreds of jobs for young people.

Mr. Idrissa DIATTA, Head of the Project Monitoring, Technological Innovation and Cooperation Department at the Waste Management Coordination Unit (UCG), Senegal

Placement and quantification of benefits within an MRV framework

Investments in the waste sector have important multiplier effects, resulting in a variety of benefits ranging from the purely environmental to the economic. To take the MRV approach to a logical conclusion it is important to also consider ways to link the accrual of benefits to the initial investments in waste and climate infrastructure. Though challenging, the understanding developed through this process can help to bolster the case for climate focused investment in sectors such as waste, ones that also have important developmental components.

Some of the ways that this **MRV approach might be extended to an analysis of climate investment** linked benefits include:

GREEN JOB CREATION Job creation centers around the opportunity to create value from the materials recovered from waste, but it is important to consider that a part of the population already subsists on income derived from this waste. Job creation considerations should thus be linked to the investment in waste and the extent to which new jobs are created by this investment, while remaining cognizant of the impact this investment has on existing jobs. **Measurement considerations**: estimation of added value of new jobs, measurement of improved livelihood, multiplier effects of newly generated income.	**PUBLIC HEALTH IMPROVEMENTS** Improving waste management can mitigate many health impacts, this includes reductions in the spread of disease linked to viruses present in waste in addition to parasitic, lung and skins infections, as well as reductions in incidence of respiratory diseases tied to waste handling and proximity to open burning of waste. **Measurement considerations**: reduced incidence of infectious disease and respiratory ailments, reduction in waterborne ailments in close proximity to waste installations.
ENVIRONMENTAL PROTECTION The impact of poor waste management on the environment includes pollution of surface and ground water, localized air pollution in the form of odor and dangerous concentrations of methane, and more generalized releases of black carbon and other toxic pollutants released when specific wastes are combusted. **Measurement considerations:** reductions in water pollutant concentrations near dumpsites, reduced incidence of waste in the landscape, and reduced concentrations of air pollutants associated with open burning.	**CIRCULAR ECONOMY UPTAKE** A concept based on the principal of reuse of previously utilized materials in newly manufactured products, avoiding the need to tap raw materials as an input for new products reducing the associated climate and environmental impacts. **Measurement considerations:** reductions over time of the quantity of resource inputs - water, energy, materials – required per unit produced
RESOURCE RECOVERY Resource recovery focuses on a variety of techniques to recover value from discarded waste material, this includes the recovery of biogas from a landfill for use in energy production, or the processing of organic waste to produce compost, a valuable output that when applied to crops can boost production while substituting for chemical alternatives. **Measurement considerations**: volume of biogas or final compost produced from a given quantity of waste material.	**ADAPTATION MEASURES IMPLEMENTED** An additional aspect related to waste sector investment looks at the opportunities to mitigate the impacts of climate change which has linkages to many benefits described above, and includes the protection of soils, reforestation of fragile landscapes, and protection of water resources. **Measurement considerations**: soil fertility, water retention and levels of biodiversity; land reforestation linked to waste sourced compost and pollution as measured in water bodies impacted by waste.

The way forward on MRV in West Africa and Pacific Alliance countries

Developing countries **have many opportunities to leverage waste and climate investments** but to effectively optimize these investments they must be done in parallel with strong MRV mechanisms. The integration of a strong MRV component into these activities offers an additional level of assurance to both investors and other primary stakeholders, further **bolstering justification for investments** in waste sector transformation.

With global waste generation on an upward trend combined with the need for urgent action on sustainability and climate, a strong MRV systems offers a sound foundation for addressing both. Additionally, the waste sector offers the opportunity to further extend the application of MRV by permitting better tracking of the development of waste system infrastructure and the benefits it delivers, thereby building constituency for increased MRV driven climate action in other sectors.

The development of a robust waste focused MRV framework will offer a strong model that can be adapted by national, sub-national, international and non-state actors and applied to other areas of climate focus in West African and Pacific Alliance countries, presenting a point of departure for a regional exchange centered around strategies for bolstering mitigation outcomes and contributing further to efficiently reducing greenhouse gas emissions from the solid waste and other sectors.

For more information on this Spotlight Paper, please contact the principal investigators – Dr. Tiga Neya and Mr. Chris Godlove or for more information on any other Spotlight Papers in the Series please contact the SGT-MRV Coordinator – Mr. Francisco Pinto.