

Development of a pilot study for waste characterization in the municipality of Puerto López, Ecuador

Summary for Decision Makers

Methane is a greenhouse gas that is more than 80 times more potent than carbon dioxide in driving climate change, and accounts for nearly half a degree Celsius of warming to date (IPCC, 2021). Significant cuts in methane emissions will result in a slowing of global warming and could prevent 0.3 degrees Celsius of warming along with numerous public health and ecological benefits (UNEP and CCAC, 2021). The waste sector is the third largest source of human-driven methane emissions and presents one of the best opportunities for mitigation today (UNEP and CCAC, 2021). Barriers to implementation include, among others, a lack of information and data identifying sources of methane from landfills and dumpsites and access to best practices and evidence-based methane mitigation measures. This document provides a brief description of efforts undertaken to address gaps in data on solid waste generation in Puerto López, Ecuador.

RMI and Clean Air Task Force (CATF), with funding from the Global Methane Hub launched the **Waste Methane Assessment Platform (Waste MAP)** to provide an accessible online tool that highlights emissions, mitigation opportunities, and best practices to reduce solid waste methane emissions, providing a clear pathway for achieving the Global Methane Pledge and other national and subnational greenhouse gas reduction targets. As part of the Waste MAP project in Ecuador, CATF assisted the Ministry of Environment, Water and Ecological Transition of Ecuador (MAATE by its acronym in Spanish) in conducting solid waste characterization studies in alignment with the forthcoming Solid Waste Characterization Guide intended for use by the Municipal Decentralized Autonomous Communities (GADM by its acronym in Spanish). This work was implemented locally by Ambire Global and Consultora Residuos y Ambiente REYAM SAS.

The waste characterization was conducted in the urban, rural, and commercial sectors of Puerto López Canton from July 31 to August 9, 2023. The Puerto López canton is located in the southwest part of the Province of Manabí and includes the urban parish of Puerto López, and rural parishes of Machalilla and Salango. It is a tourist canton with a population of approximately 25,621 inhabitants as of 2023 according to the census carried out by the National Institute of Statistics and Censuses (INEC). It is estimated that there is a floating population of 717 per day.

The project piloted the methodology developed by the “Solid Waste Management and Inclusive Circular Economy Project (GRECI by its acronym in Spanish)” of the MAATE. The characterization was conducted by six recyclers and five GADM staff who were responsible for collection, weighing, dividing and classification of waste and

two transporters responsible for mobilizing personnel and complying with collection routes. The training of the waste characterization team was done by GRECI. The CATF team provided all the sample collection and personal protection equipment (e.g., bins, brooms, rakes, gloves, weighing scale, N95 masks).

Solid waste surveys were conducted to determine the generation, composition, management, and final disposal of solid waste in the community. These surveys addressed demographic information on waste generators (e.g., gender, address, household size, educational level, household income and expenses), the type of waste management services (e.g., waste collection frequency, waste segregation and storage, street sweeping), and communication to waste generators (e.g., receptiveness and preferred means).

A total of 131 households were sampled, of which 70 were urban and 61 rural. An additional 60 samples were taken from non-household generators, which included one market, three educational institutions and three samples of the street sweeping system. It was estimated that the canton **generates 20.30 tons/day of which 54% is organic waste and 46% is inorganic waste** with a total density of 161.66 kg/m³. The per capita generation of waste was estimated by MAATE at 0.78 kg/day with 0.61 kg/day by urban households and 0.51 kg/day by rural areas. Non-household generators were divided into “associated generators” (a category which includes a number of large and commercial generators such as shops, restaurants, hotels, and public and private institutions); and others, which include educational institutions, markets, and street sweeping. Non-household establishments generated substantially higher amounts of waste than household generators. For instance, shops generated 2.97 kg/day, markets at 2.63/stall, hotels generated 4.90 kg/day, and restaurants, 10.62 kg/day.

The detailed results of the waste characterization are shown in the table below:

Table 1: Waste Characterization Puerto López, Ecuador

Type of solid waste	Composition % - Urban household generators	Composition % - Rural household generators	Composition % - Associated generators	Composition % - Educational institutions	Composition % - Los Frailes ¹	Composition % average cantonal
Organic Waste						
Food and yard waste	41.2%	42.4%	78.6%	24.1%	18.2%	54.1%
Inorganic Waste²						
Paper	2.1%	1.4%	0.5%	4.6%		1.3%
Cardboard	3.8%	2.7%	2.9%	1.3%	2.1%	3.1%
Plastic						
Polyethylene terephthalate - PET	1.4%	1.9%	0.8%	5.5%	10.1%	1.4%
High Density Polyethylene - HDPE	1.6%	1.5%	0.6%	1.5%	0.4%	1.2%
Polychloride vinyl – PVC	0.1%	0.4%	0.1%		0.4%	0.2%
Low Density Polyethylene - LDPE	4.9%	5.1%	2.1%	2.4%	6.3%	4.0%

¹ Los Frailes, a protected beach area, is part of the Machalilla parish. During the study, park rangers collected all the waste and provided it to the study team to assess the waste characteristics.

² In Ecuador, paper and cardboard are often defined as inorganic waste.

(table continued)

Type of solid waste	Composition % - Urban household generators	Composition % - Rural household generators	Composition % - Associated generators	Composition % - Educational institutions	Composition % - Los Frailes ¹	Composition % average cantonal
Polypropylene - PP	3.2%	1.3%	0.4%	3.8%	3.8%	1.6%
Polystyrene - PS	1.5%	2.2%	1.3%	5.5%	8.0%	1.7%
Tetra Pak (multilayer packaging)	1.4%	0.8%	0.5%	11.7%	1.7%	0.9%
Glass						
Clear	2.1%	6.3%	2.2%	1.1%	24.5%	3.5%
Colored (e.g., brown, green)		1.0%				0.3%
Flat (e.g., window glass)	0.3%			4.9%		0.1%
Metals						
Ferrous						
Non-ferrous	1.4%	1.4%	0.5%		2.5%	1.1%
Rubber	1.9%	0.5%	0.1%		0.8%	0.8%
Wood	0.7%	0.7%	1.4%	2.0%	0.4%	0.9%
Textiles	4.4%	1.9%	0.3%	0.2%	1.1%	2.2%
Electrical and electronic	0.5%	0.5%	0.2%			0.4%
Sanitary	14.7%	18.1%	3.7%	2.9%	12.7%	12.2%
Inert	0.7%	0.7%	0.1%			0.5%
Hazardous	0.5%	0.5%	0.0%			0.4%
Others, not categorized	11.5%	8.6%	3.8%	28.5%	6.8%	8.0%

Lessons learned highlight the importance of suitable equipment usage, streamlined documentation processes, active community participation, and efficient time management. The report stresses the significance of community engagement and effective planning in ensuring successful waste management initiatives and serves as a vital guide for future projects in similar contexts.

References

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