

Characterization and quantification campaign of household waste from Cap-Haitien (Haiti), in order to size management channels

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Introduction

In Haiti, an island nation of about 10 million inhabitants, no city has a satisfactory household waste management system. The collection rate is very low, with most waste being thrown into the environment and burned. The national company in charge of waste collection and disposal (SMCRS) has too few means to meet the needs. There are few initiatives to improve the situation because of the many other priorities facing the country, a lack of skills and political will.

This mismanagement causes many nuisances, both within the country and abroad, as waste often ends up being carried by the water to the ocean. Faced with this situation, some international donors have chosen to tackle the problem in the region of Cap-Haitien (more than 500 000 inhabitants in this city alone), in order to find a solution for both urban waste and those of an important industrial park nearby (Industrial Park of Caracol concentrated on the textile industry).

In order to choose management methods adapted to the context, in particular to the nature of the waste and the quantity produced, and in view of the weakness of the existing data, it was decided to organize a characterization and quantification campaign of the household waste from the city of Cap-Haitien.

Material and methods

The method we proposed should allow us to answer several questions:

- 1 / What is the average amount of waste produced per inhabitant in the area?
- 2 / What is the composition of this waste?
- 3 / Are there differences in terms of per capita quantity and quality at different socio-economic levels?
- 4 / What is the capacity of residents to sort at source?
- 5 / How much would they be willing to pay for regular pre-collection of their waste?

This type of study can only be carried out from the most representative samples of what we want to characterize, population samples and waste samples. The methods implemented are generally dictated by compromises between an acceptable level of precision and the available means.

In order to carry out quantification and characterization in parallel, we chose to collect, twice a week, door-to-door, from voluntary households, the waste produced during 2 weeks. Two bags, in order to separate the wet biodegradable waste from the dry waste, were given to them at the start and during each passage.

It has been proposed to distinguish 3 socio-economic levels based on the type of habitat: precarious habitat, average habitat, mixed habitat (high, medium and precarious). For each level, two geographic areas were chosen to determine the heterogeneity within the same level. In each zone, 2 sub-sectors have been delimited. We decided to take 600 households in total, 200 per level, 100 per neighborhood, 50 per sub-sector. We will thus have a fairly good representation of the results by level in terms of quantity per inhabitant (confidence level 95%, risk of error of 7%), a little less good per neighborhood (risk of error of 10%). Twelve animators went through the different sectors to search each 50 households willing to participate in the study. Individual meetings and together meetings were held before the campaign to ensure that households understood what was expected of them.

We decided to characterize each day samples of the same level but separately by neighborhood, that is to say samples from 100 households. We had 4 samples to sort per day (two per sub-sector corresponding the two

bags per household). When the mass exceeded 200 kg, we reduced the sample by quartering to a mass close to 200 kg. In total, we characterized 2 x 24 samples (2 x 8 per level) which makes it possible to guarantee a relatively good representativity of the results obtained. Each sample was sorted according to 16 categories of materials. At the end of the campaign, some of the households were interviewed by the animators to discuss the progress of the campaign, their willingness to join a pre-paid collection system, their ability to pay for this service and their ability to sort the waste produced in two streams.

More than 50 people were employed for the two weeks of the campaign (6 weeks for the 12 animators). The necessary equipment was bought or rented on site or in the Dominican Republic. The characterization site was made available by the Cap Haitien City Hall.

Results and discussion

Overall, the study covered 600 households, a little over 3,000 inhabitants. 12750 kg of waste were weighed, 300 to 1500 depending on the neighborhood. The results show that the average amount of waste produced per capita and per day in Cap Haitien is between 0.3 and 0.5 kg. If the proportion of the population according to the 3 types of habitat retained here was the same (not known), the average quantity produced per day and per inhabitant would be of the order of 0.4 kg, 33% lower than the data that was considered up to now (0.6 kg / hab.j, never reached during our measurements). This result is not trivial in terms of sizing management tools.

Looking at the sector averages over the two weeks of collection, we find that:

- the putrescible matter content is between 47 and 64%, the general average is 57% (between 52 and 63% depending on the levels),
- the plastic content is between 10 and 16%, the overall average is 13% (between 10 and 16% also depending on the levels),
- the textile content is between 5 and 14%, the overall average is 8% (between 6 and 10% depending on the level),
- the diaper content is between 2 and 5%, the overall average is 3% (between 3 and 4% depending on the levels).

These 4 categories represent 81% of the mass of waste. The amount of paper + cardboard slightly exceeds 3%. Other waste of mainly organic nature (bags, shoes, hair, ropes, ...) represent nearly 4% on average. The other materials are at relatively low percentages. Even the fine elements, which often account for a large share in developing countries (sometimes mainly because of the presence of sand) are very little present (3 to 4%).

It is noted that the quality of sorting by the households is overall far from perfect but there is still a clear difference between the two types of bags. This is quite encouraging because even if the households were here volunteering to participate in this study, it was enough to raise awareness to obtain a sorting effort.

The results of the survey revealed the will to set up a regular collection system, to pay for the service and to sort at source in order to facilitate recovery operations.

Conclusion

This campaign provided up-to-date and reliable data on the quantity produced and the composition of household waste in Cap Haitien. These results are now used to size the best possible pre-collection, collection, transport, recovery and waste disposal of waste devices. This was the first campaign of this magnitude conducted in Haiti with such rigorous sampling protocols.

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