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DETERMINATION OF HSW COMPOSITION AND QUANTIFICATION IN SIDS: STUDY CASE OF MORONI AND FOUMBOUNI CITIES IN COMOROS ISLAND

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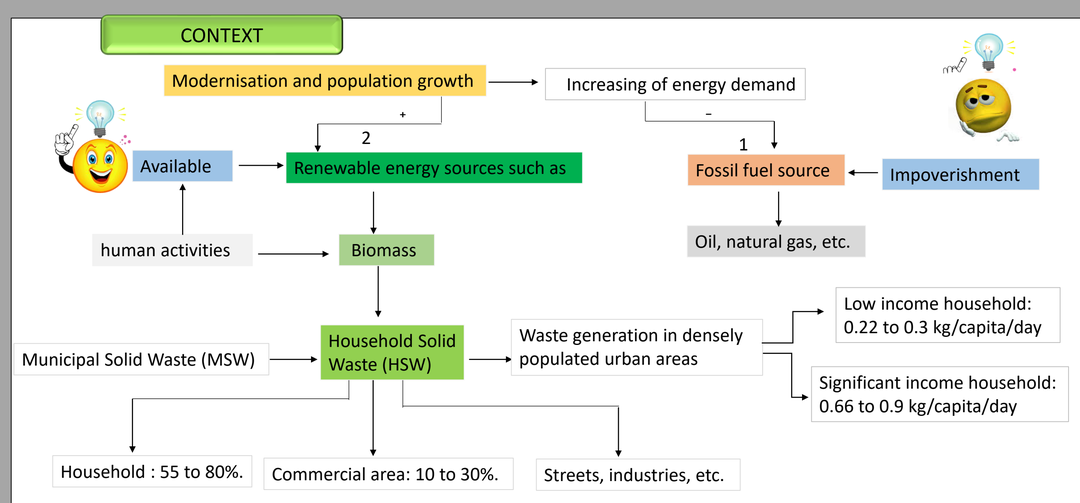
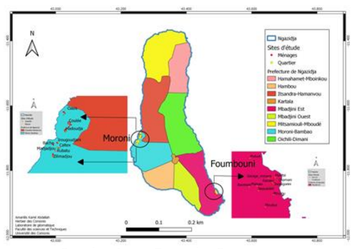
CONTEXT



Usually, waste management is neglected in many developing countries, which requires reliable and up-to-date data for planning purposes. Unfortunately, such data are non-existent in many developing countries such as Comoros[2].

Study site : Grande Comore

The study is carried out in Grande Comore (Ngazidja), the most populated island (389,445 inhabitants) of the Comoros, more specifically in Moroni and Foumbouni, which represent the urban and rural areas of our study respectively.



Study site : Grande Comore

OBJECTIVES

5 Proposal for an efficient approach to energy recovery from HSW in the Union of the Comoros

METHODOLOGY

Stratified random sampling was used to have a heterogeneous representation corresponding to the different living standards (low, middle, and high class) of the Comorian population with a confidence level of 95% as recommended by UNEP and ITEC [3]. 20 neighborhoods were selected at different geographical locations to have good representativeness of the sample. the study of the latter was based on the size of the waste-generating population and not on the weight of the sample to be analyzed. Other variables such as income, household size, and profile were studied. A survey form was distributed to collect specific data for each household. This study was conducted in 2019 and 2021, but the reference year considered is 2019.

Sampling size formula: $n = \frac{Z_a}{2} \times \delta \sqrt{n}$

$\frac{Z_a}{2}$: coefficient ce confiance

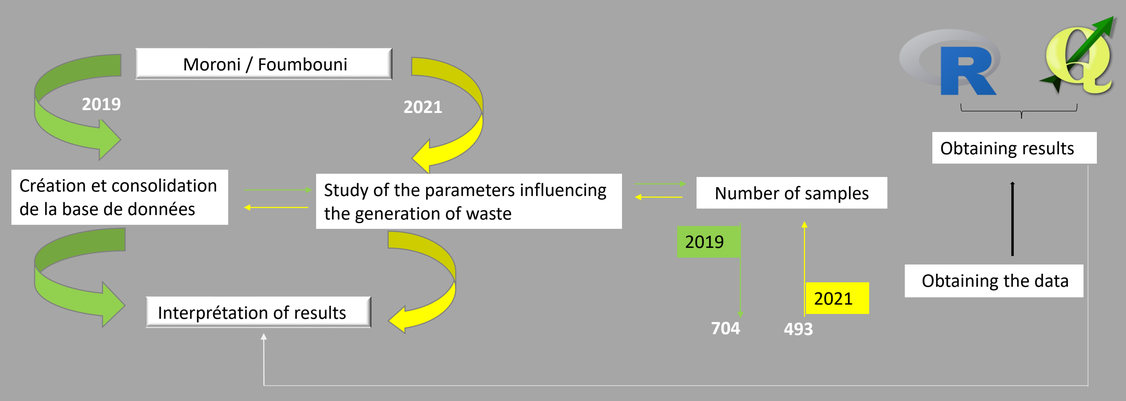
n : la taille de l'échantillon

δ = ecartype

Main activities of HSW quantification

- Investigation and deposit of refuse bags
- Collection and Selective sorting of HSW
- Quantification
- Data gathering
- Data processing

Spatio-temporal study



RESULTS

Table 1 : Household profile

Year	2019		2021	
City	MORONI	FOUMBOUNI	MORONI	FOUMBOUNI
Household size (capita/household)	5.9	4.7	6.2	5.5
Number of employees (capita/household)	2.0	1.2	1.8	1.7
Average monthly salary (capita/Month)	241.92€	185€	207.55€	151€
Average waste produced (kg/capita/day)	0.25	0.15	0.2	0.12

- The decrease in most parameters studied in 2019 and 2021 may be due to COVID 19
- With a household size > 5, waste generation between 0.22 and 0.3 per person/day and an average salary per person/month of around 250 €, **Moroni can be classified among densely populated urban areas with low-income households.**

9 Categories of HSW

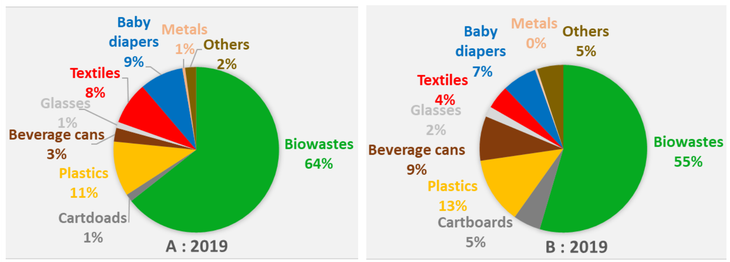


Fig.1: Composition of waste generated in Moroni (A) and Foumbouni (B) in 2019

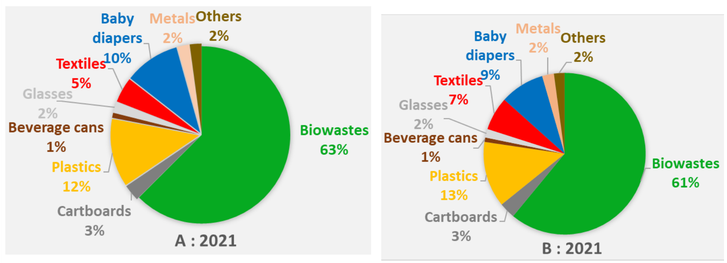


Fig.2: Composition of waste generated in Moroni (A) and Foumbouni (B) in 2021

Summary of total waste production in Comoros :

- **biodegradable** > 50%,
- **Plastics** do not exceed 13%,
- **Baby diapers** from 7 to 10%,
- **textiles** from 4 to 8%,
- **beverage cans** from 1 to 9%,
- **cartons** from 1 to 5%,
- **glasses** from 1 to 2%,
- **metal** from 0 to 2%.
- **Other from** 2 to 5%

According to these results, we find that this waste is mainly composed of non-hazardous waste, easily recoverable.

Figure 3 shows us that in a week, a household containing 7 peoples is the one that produces the most biodegradable and plastic waste. In other words, the production of waste per week of biodegradables, plastics, diapers and textiles increases with the size of the household and the other types are independent of this variable.

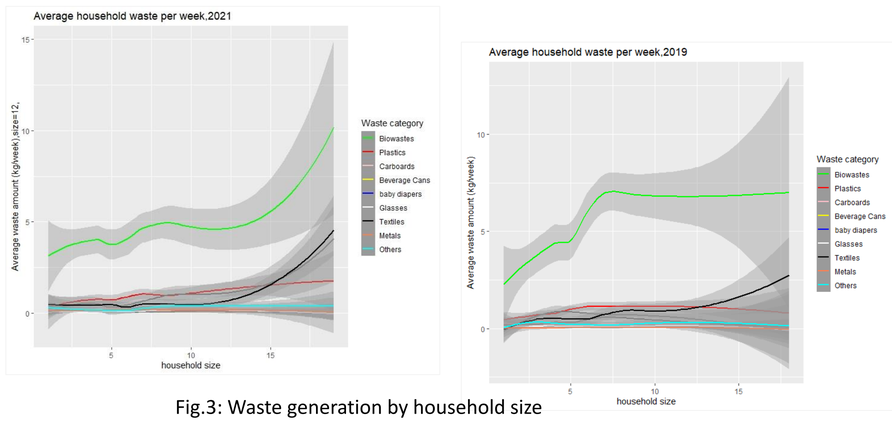


Fig.3: Waste generation by household size

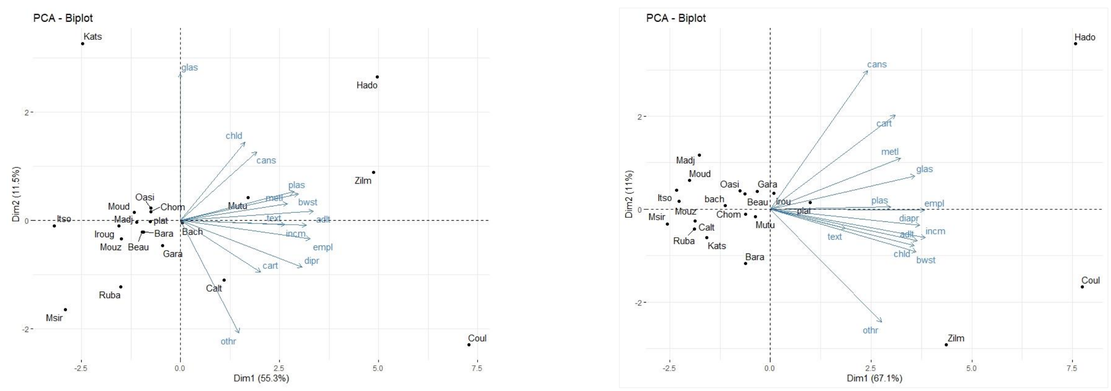


Fig.4: Projection of individuals on dimensions 1 et 2 (2019 and 2021)

As shown in Figure 4, Coulée, Hadoudja and Zilimadjou are the neighborhoods that produce the most HSW and whose financial conditions are quite satisfactory since these variables are positively correlated with the Dim 1 . These 3 districts of Moroni are characterized by satisfactory market conditions, a high number of adults and children. In 2019, the Zilimadjou district has more similarities with the Hadoudja district. On the other hand, in 2021, its characteristics were similar to those of the Coulée.

Moreover, in Foumbouni, the neighborhoods that produce the most HSW are Mutuel, Plateau, Barakani, Chomoni and Garage Mzizeni. The production of bio-waste, plastics, baby diapers and cans is strongly correlated with the monthly salary, the number of employees, the number of children and the number of adults.

Conclusion

The spatio-temporal study revealed that the household solid waste generated in Moroni and Foumbouni are of the same nature, but may vary from one region to another. However, 2019 represents the reference year since the study took place before the arrival of COVID19. The monthly salary, the number of adults, and the number of employees are positively correlated with the production of HSW.

With a production of more than 50% of bio-waste and about 40% of fuel, two ways of energy recovery are the most suitable in Comoros: methanation and gasification.

However, to choose the best valorization technique, other studies deserve to be carried out.

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