

Research Article

Households' Perceptions of Waste Management by the Municipal Council of the Urban Commune of Diffa

Mahamadou Bachir Hamet Mahamane^{1,*} , **Zabeirou Koini Mahaman Salissou²**,
Rabe Kane¹ 

¹Higher Institute of Environment and Ecology, University of Diffa, Diffa, Niger

²Student at the Higher Institute, Environment and Ecology at the University of Diffa, Diffa, Niger

Abstract

This study focuses on the waste management system in Diffa's urban municipality. This involved an assessment of the current system, an in-depth analysis and, finally, a proposal of solutions aimed at improving the system. The assessment required information to be gathered on the ground. By the end of this stage, the regulatory and institutional framework governing household waste management in the urban municipality of Diffa had been mapped out. Presenting the current organization and financing of the municipality's waste management sector led to an analysis of the system. This analysis revealed that several factors are hindering the proper management of household waste in the municipality. These include shortcomings in the regulatory and institutional framework, poor organization of the sector and insufficient technical and financial resources. Added to this is the lack of importance given to the sector by local authorities, as well as the antisocial behavior of the population. These issues have had harmful consequences for the municipality, including unsanitary conditions, environmental and health risks, and the deterioration of living conditions for the population. Consequently, solutions have been proposed to improve the system based on the principle of participatory and shared management. The recommended management method is to delegate the service to the private sector, which will finance the sector through a public-private partnership. This will involve better organizing the system, setting up the necessary equipment and facilities — particularly a household waste treatment unit — and changing the behavior of all stakeholders. Waste is a pervasive issue throughout the city of Diffa, and the study aims to analyse the management system to improve it. Documentary research, surveys and field visits were conducted during the study to gain a better understanding of the mechanisms involved.

Keywords

Mechanism, Management, Waste, City Hall and Diffa

1. Introduction

Environmental degradation had begun to become increasingly apparent, the challenges more acute and the stakes higher. Because of the interdependence of the biological, geological and biogeochemical cycles fostered by

human activities for the functioning of the ecosystem, environmental protection has become a collective concern. In the quest to set up a sustainable development project, several objectives have been announced, including one that

*Corresponding author: boko.bachir@yahoo.fr (Mahamadou Bachir Hamet Mahamane)

Received: 18 July 2025; **Accepted:** 5 August 2025; **Published:** 29 August 2025



Copyright: © The Author(s), 2025. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

remains one of the most worrying environmental issues for all the world's cities.

Like other African countries, those of the Sahel in particular are now experiencing the effects of unprecedented environmental risks linked to rainwater, such as heavy rains, destructive floods, urban erosion and diseases linked to poor sanitation. It is estimated that over 80-90% of natural disasters are linked to hydro-climatic events such as droughts, heavy rains and floods [3]. On average, between 2000 and 2005, almost 300 million people were affected by natural disasters, and almost 78,000 died as a result [11]. According to the FAO, "the possibility that the recent floods in the Sahel and West Africa in general are the consequence of climate change must be taken seriously" [11].

Indeed, produced every day and in increasingly large quantities, this waste constitutes, in addition to physical, visual and olfactory pollution, a major public health problem [11]. As a result, wastewater treatment remains a poor relation in urban policies and development projects. It is unfairly considered a lower priority than drinking water distribution, with which it should nevertheless be closely associated [5].

As a country that adhered to the principles of sustainable development in the wake of the 1992 Rio de Janeiro Conference (Brazil), with the ratification of several international conventions, Niger has set about establishing national institutions that are committed to environmental protection. This has led to the development and adoption of the National Environmental Plan for Sustainable Development (PNEDD), which is the local translation of the global Agenda 21 [2].

For several years now, the Diffa region in eastern Niger has been facing humanitarian crises linked to the recurrence of natural phenomena (floods, agricultural and forage shortages), as well as the large influx of displaced persons from Nigeria following the armed conflict. The city's population exploded between 1985, when it was founded, and 2022.

The shrinking living space that characterizes all Niger towns in general, and Diffa in particular, means that town planning has long been a necessity. Living conditions in urban areas are often difficult, as the generally poor populations who move into the city settle without means in outlying districts where infrastructure and facilities are lacking. Sanitation problems are omnipresent, and quality of life suffers considerably.

Since then, these municipalities have had to cope with strong population growth, as well as changes in consumption patterns that have led to an increase in waste volumes. This situation, the effects of which can be seen everywhere, causes major nuisance for residents and has harmful consequences for people's health, the environment and natural resources.

1.1. Research Objectives

1.1.1. General Objective

The general objective of this study is to analyze the waste

management mechanism in the Diffa Urban Health District.

1.1.2. Specific Objectives

- Identify waste treatment methods.
- Make an inventory of waste management constraints.
- Seek ways to improve the management system.

1.2. Research Hypotheses

Poor waste management is linked to poor government policy.

Waste production is linked to the city's demographic growth.

1.3. Research Questions

- What types of waste are produced?
- What types of treatment are frequently used?
- Is the population aware of the laws and regulations concerning waste?

2. Presentation of Study Area

2.1. Geographical Location

The city of Diffa is located in the far east of Niger, between 10°30' and 15°35' east longitude, 13°04' and 18°00' north latitude. It is currently the capital of three administrative districts (Region, Department and Commune) and three decentralized entities, only one of which is currently operational. It houses all the decentralized services of the Diffa Region and Diffa Department. It is the place where deconcentrated powers (Governor, Prefect and Mayor) and decentralized powers (Mayor and President of the Regional and Departmental Councils) are exercised.

2.2. Demographic Situation

The Commune's population is estimated at 67,882, including 34,661 men (51.06%) and 33,221 women (48.94%). Young girls and boys account for 24.48% of the total population, mainly from the Kanouri, Peulh, Haoussa, Arab and ZARMA ethnic groups [1].

In September 2019, an estimated 37,342 displaced people were registered in the urban commune of Diffa, including 17,285 refugees, 8,995 returnees and 10,739 IDPs living in the N'GUEL-MADOU-MA Ĩ AWARIDI and Diffa sites [1]. This situation exacerbated the vulnerability of local populations already faced with inadequate basic social services.

2.3. Materials and Methods

2.3.1. Materials

The field materials used in this study consisted of:

- 1) Household survey forms,
- 2) A digital camera for illustrative photography,
- 3) An interview sheet,
- 4) Sphinx and Excel 2016 software.

2.3.2. Methodology

The study was carried out in three (3) stages:

- 1) Documentary research on previous work in the field of urban waste management;
- 2) Data collection through field observations, surveys and interviews;
- 3) Data processing.

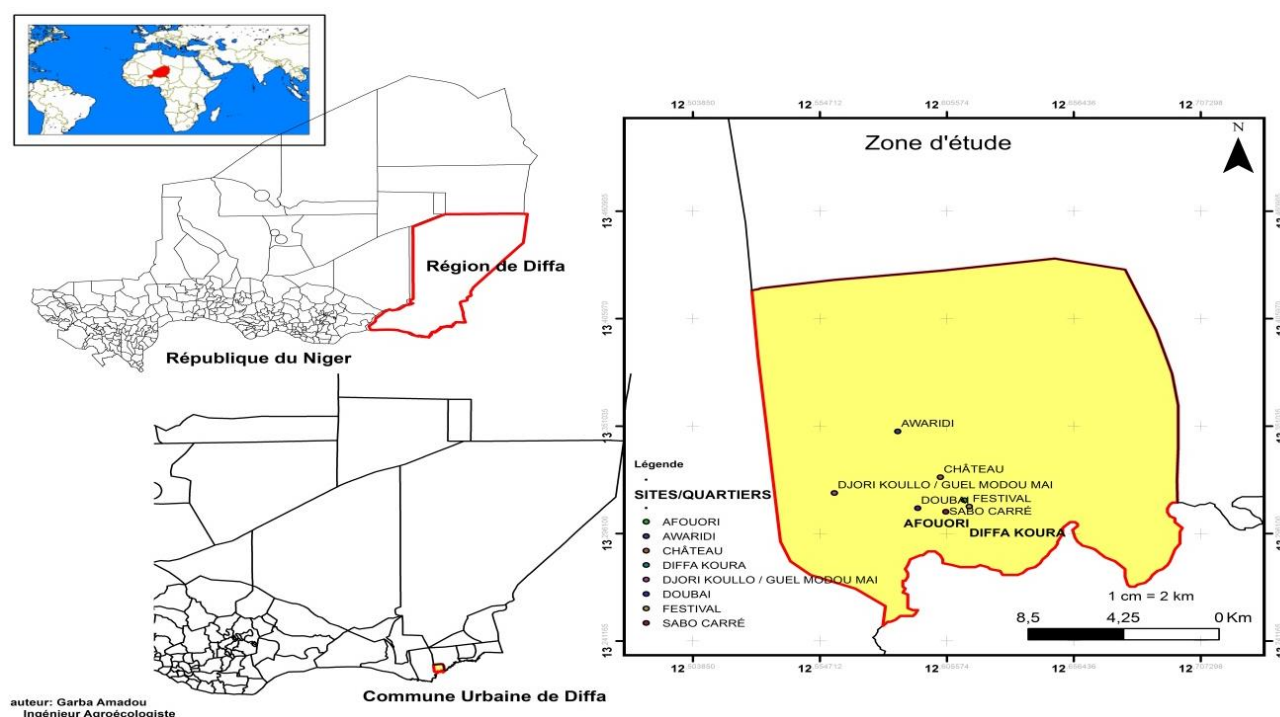


Figure 1. Commune Urbaine de Diffa (Source PDC-2022).

2.4. Field Investigations

They consist of observing, at a given moment, the behaviors and habits of populations that are conducive to the proliferation of waste, failures in the sanitation system, water sources, and hygiene in general in the CUDAs, as well as infrastructure developments. These various observations have helped to supplement the information gathered in our research.

Surveys were conducted on the basis of a questionnaire comprising closed and open-ended questions, depending on the information sought.

2.4.1. Household Surveys

For this study, 150 households were sampled in 10 districts of Diffa, distributed as follows according to district density.

Table 1. Identification of climate risks and potential impacts.

Neighborhood name	Number of households
Maloumdi	20
Dubai 2	15
Quartier administratif	20
Festival	20
Nouveau carre	20
Diffa koura	25
Chateau	15
Dubai 1	15
Total	150

2.4.2. Surveys of Reclaimers/Cleaners and Retailers

The survey covered 10 people and aimed to find out more about their status and working methods, to assess and quantify as accurately as possible the various waste recycling channels, and to highlight the difficulties encountered by these actors. As we did not have the exact number of these actors in the health center.

2.5. Interviews

At the village and neighborhood level, five (5) interviews and two (2) focus groups were conducted, one with men and the other with women. The average number of people per focus group was ten (10). This study is therefore based on a sample of 250 farmers in various agroecological zones of the urban commune of Diffa. This allowed us to collect the opinions of local stakeholders, with the minimum age of respondents and interviewees being approximately ≥ 30 years old.

2.6. Data Processing

The data collected during observations and household surveys, as well as the results of analyses, are processed and entered using software. This software is Microsoft Word. Excel enabled us to process the data collected in the field in order to present the results in table form, which then generated histograms. The map enabled us to locate the study area. Finally, the digital camera enabled us to take images in real time.

the borough, the survey was carried out on the basis of their availability and cooperation in providing information.

Surveys of Pre-collectors

We surveyed 15 pre-collectors in the 8 districts covered by the survey, with the aim of understanding their working methods, their role in the waste management process and the difficulties they encounter.

Several players were interviewed throughout the course of the study. The aim of these interviews was to find out the viewpoints of the various institutional players on the issue of waste, whether municipal officials or representatives of min-

isterial departments. These interviews enabled us to understand the various constraints linked to waste management in the municipality, but above all the strategic axes for improving the system. After drawing up a list of the personalities in charge of the town and waste issues, a schedule of meetings was drawn up to gather information. These interviews included specific questions to these people according to their job and responsibilities. We spoke to

- Hygiene and Sanitation Manager CSI Diffa,
- The Deputy Head of Hygiene and Sanitation DRSP Diffa,
- Diffa Regional Director of the Environment,
- Director of Technical and Municipal Services for the City of Diffa.

The questionnaires (household survey) were entered using Excel, and the results were analyzed using figures showing the various responses as percentages.

3. Results

The following results emerged from this study.

With regard to the socio-demographic aspects of the respondents, the following histogram reflects the educational levels of the people surveyed.

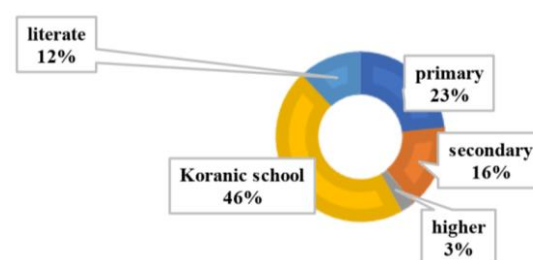


Figure 2. Level of education.

Figure 2 shows that 58% of respondents had received non-formal education, broken down by level, including 46% Koranic school and 12% literacy training, and 42% formal education, including 23% primary, 16% secondary and 3% higher education.

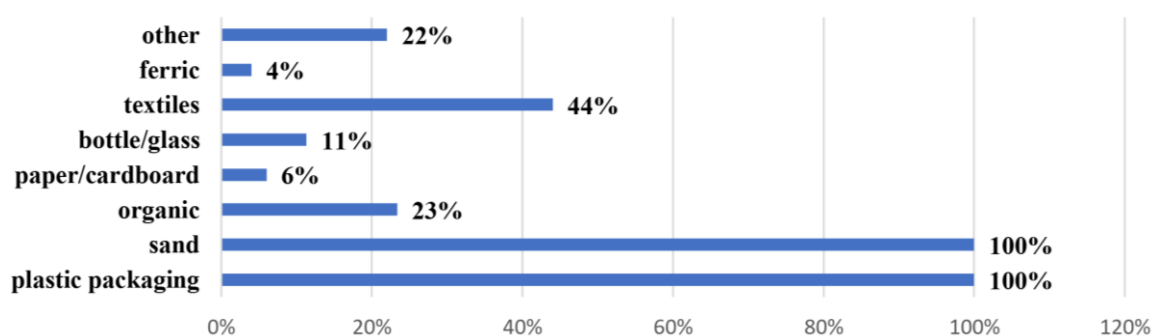


Figure 3. Waste typology.

According to the field survey, **Figure 3** shows that 100% produce sand and plastic, 44% textiles, 23% organic waste, 11% glass, 6% cardboard, 4% iron and 22% other types.

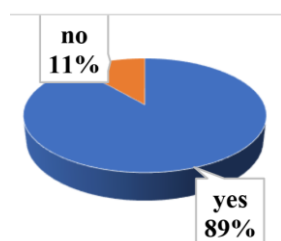


Figure 4. Ownership of waste garbage cans.

The results of **Figure 4**, show that 89% of households surveyed have and use small garbage cans of various types to store their garbage; 11%, on the other hand, have no such bins, disposing of it directly in the street after sweeping.



Figure 5. Perception of recycling.

With regard to waste sorting, **Figure 6** shows that 5% of households surveyed with a garbage can sort their waste, while 95% keep it mixed.

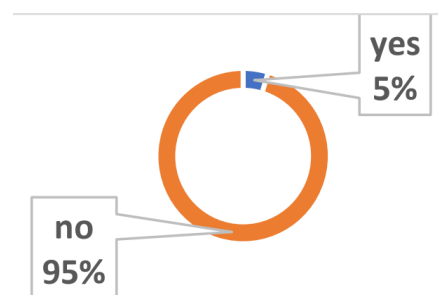


Figure 6. Sorting.

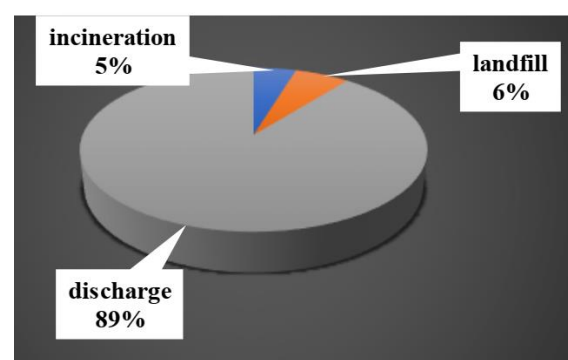


Figure 7. Perception of waste treatment.

Figures 7 and 8 show that 5% of respondents say they incinerate their waste, 6% bury it inside the house and 89% throw it away. This practice, i.e. the incineration and storage of waste in unofficial places, is most often the source of respiratory and diarrheal diseases, as this waste, through its various microbes, contaminates food and drinking water sources. The town hall is absent from many neighborhoods, and the associations that do exist are not encouraged by the authorities in charge.

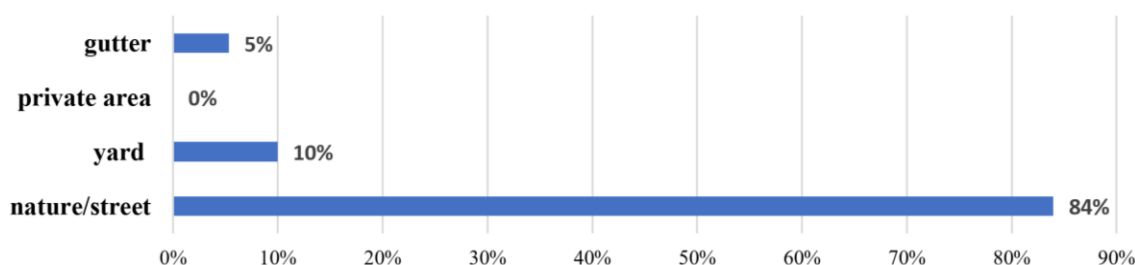


Figure 8. Disposal of liquid waste.

In terms of liquid waste disposal, the histogram above shows that 84% pour their wastewater into the streets, 5% into the gutters, 10% into the yard and 0% dispose of it privately.

Figure 9 shows that 97% of households are aware of the

harmful effects of garbage, while 3% are unaware of them. Among the harms mentioned, they relate to human health, which confirms that the mismanagement of household waste is linked to the mentality of the population.

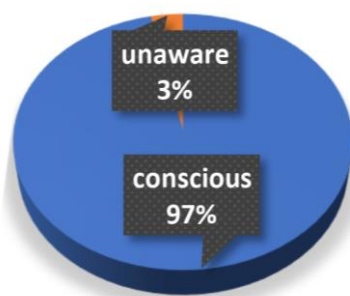


Figure 9. Awareness of the harmful effects of garbage.

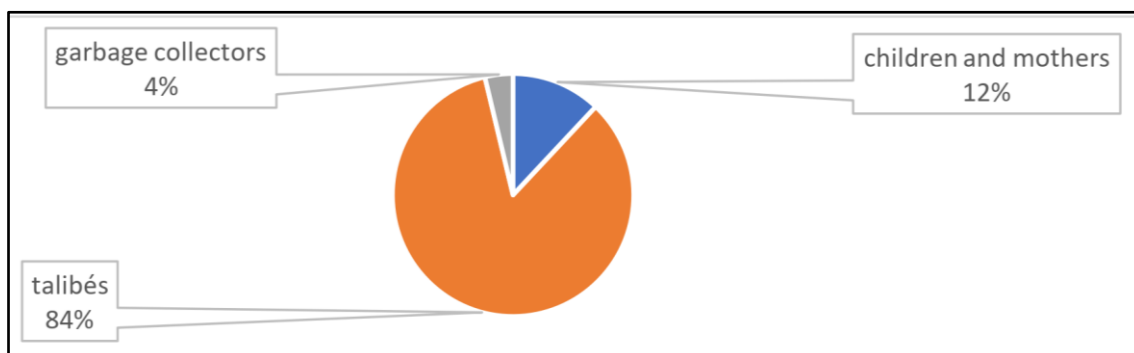


Figure 10. Means of waste disposal.

This figure shows that 4% of households surveyed use garbage collectors to evacuate waste, 12% use mama's children and 84% use talib és (Coranique students). This implies that household waste management.



Figure 11. Place of disposal and waste management.

4. Discussions

The current management system in the urban commune of Diffa undoubtedly suffers from a number of shortcomings. In fact, you only have to visit the commune's neighborhoods to see the children and mothers 12% talib és 84% garbage collectors 4% conscious 97% unaware 3% inadequacy and failure of the system in place. From the ever-increasing number of illegal dumps to official dumps that are not sufficiently

evacuated, not to mention the scattering of waste, particularly plastic, on roads, trees and near homes, it is clear that the commune suffers from poor waste management [4]. Nearly 90% of the population surveyed agreed that the current waste management system needs improvement. While some feel that this is an individual responsibility, others put the blame on the municipalities, which must have the means (technical and financial) to manage waste properly.

So, in this section, we'll be taking an in-depth look at the current system, to reveal the points that are hampering the

proper management of solid household waste in the district.

In the city of Diffa, there are no garbage bins for household waste in the districts. Waste is piled up here and there in the middle of public roads [9]. There are not enough sanitation committees to cover the entire Commune. These committees are totally absent in certain neighborhoods (Duba i1 and 2, for example); there is also a total absence of any notion of waste recovery. Our findings are in line with those of other authors [11]. Through these studies and the reality on the ground, we can say that there is no real political will on the part of the authorities in charge, because the potential exists and the opportunities are there too. On the one hand, the pre-collection of household waste is now handled by several stakeholders, including the town council, NGOs and associations (chara).

On the other hand, we note that there are not enough human and material resources for pre-collection and collection. The success of this aspect necessarily depends on genuine cooperation between the various players involved in this field. Our findings are in line with those of the author [3].

The results from Wari in 2012, in the city of N'Djamena, are consistent with our findings, particularly in the 8th arrondissement, where we note that there are no trash bins for household waste [10]. Waste is piled up here and there in the middle of public roads. The existing sanitation committees are not sufficient in number to serve the entire municipality. These committees are completely absent in certain neighborhoods, for example (Amgobo, Ryat). It should also be noted that there is a total lack of awareness of the concept of waste recovery. Our results are consistent with those of the authors [11].

Several studies have shown that the poor management of household waste and wastewater harms groundwater and surface water through the infiltration of chemical and bacteriological substances. These polluted waters could subsequently be used by humans or animals for a variety of purposes. There is also a lack of legislation governing the management of urban household waste. Compost and excreta from human and animal sources are not well managed, given the agronomic importance of this waste for soil fertilization. There is no policy for recycling them. Waste plays a vital role in the economy and in job creation through sorting at source. But these potentials are not exploited by municipal authorities. Waste sorting at source reduces the volume of waste in the municipality [7]. This system can be used to cover the operating and monitoring costs of transit dumps and sorting and recovery centers. The authorities in charge of this sector must take account of its importance, as it creates added value both financially and in terms of employment.

Some experiences from developed and developing countries Like the Maghreb countries, Tunisia suffers from the phenomenon of rapid production of household and industrial waste, which is of very varied types and carries serious risks for the environment (pollution of water resources, air and soil), on economic development (tourism, for example, is the most

important sector in Tunisia, given the damage that waste causes to landscapes and tourist sites), and on public health (damage to cleanliness and hygiene), thus presenting a complicated set of noxiousness, biodegradability and reusability [6].

In most cases, waste is disposed of outside cities, in order to further avoid not only the alteration of air quality (foul odors...), and visual pollution (Deposition of waste offering a cumbersome and unsightly appearance to the city), but also the proliferation of insects, mosquitoes, rodents and all other disease and epidemic vectors. In principle, Niger should have followed the example of countries that have set up a waste management system, in particular the city of Diffa [8].

Other West African countries such as Burkina Faso, Mali, Benin and Senegal, compared with Niger, have made progress in the field of sanitation in general and solid waste management in particular.

In the meantime, the training and valorization center that worked in the commune made progress in waste collection and treatment in the commune before it was closed down by the mayor's office for lack of funding. It was able to put waste to good use by recycling and manufacturing certain objects (slabs, plastic asphalt, cobblestones, platforms).

In the absence of control over materials and means, people incinerate (burn) waste in the open air, with all the consequences that this entails, as the waste contains special waste such as batteries and other explosive devices. These are high-risk elements that cause damage. This leads to respiratory illnesses, environmental pollution and so on. These factors can create major problems for the sustainable management of urban household waste in the city of Diffa.

5. Conclusion

The study was undertaken with a view to contributing to the improvement of the Diffa town council's waste management mechanism. Population growth and accelerated urbanization have made urban sanitation a real threat to the environment. The general aim of this study is to analyze this mechanism. To achieve this, a number of methods were applied: literature review, surveys (of households, reclaimers/recyclers/environmental vendors, neighborhood chiefs, authorities, pre-collectors and public refuse collectors), interviews and field observation. Analysis of the data collected shows that several parameters are lacking in the current waste management system.

Abbreviations

PNEDD	National Environmental Plan for Sustainable Development
MDP/PDC	Municipal Development Plan
IDP	Internally Displaced Person
DREC/CRO	Civil Registry Office

CUDA/UMD Urban Municipality of Diffa
 CSI/IHCC Integrated Health Care Center
 DRSP/RPHD Regional Public Health Directorate
 NGOs Non-Governmental Organization

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] PDC Diffa. Diffa Municipal Development Plan, 2020.
- [2] Marie Rose Bangoura. 2017. Household solid waste management and socio-spatial segregation in the city of Conakry. Geography. University of Toulouse le Mirail - Toulouse II, 2017. French..
- [3] Saleh A. Wari 2012. Issues in urban household waste management in the city of N'Djamena: the case of the 8th arrondissement. Dissertation for the master's degree in water and environmental engineering Option: Urban Environment. International Institute for Water and Environmental Engineering (2iE).55P.
- [4] PENDA O. 2015. Diagnosis of the household solid waste management system of Arrondissement Communal IV of the City of Niamey (Niger) and proposed solutions for improvement. Thesis for the master's degree in water and environmental engineering, option water & sanitation. 2iE. 99P.
- [5] CHRISTOPHE L. J. and CLAUDE B. 2000. Sustainable waste management and urban sanitation, Pseau. 45P.
- [6] BOUSNANE S. 2018. The management and impact of urban solid waste on the environment case study: city of Constantine. Master's thesis Field: urban technical management Specialization: city and urban projects. UNIVERSITY OF LARBI BEN M'HIDI OUM EL BOUAGHI. 134P.
- [7] CIFAL. 2010. Waste management in African cities, International workshop for young professionals on waste management in medium-sized cities in West Africa - Ouagadougou, July 2010.5P.
- [8] LAWAL G. A and ABDOU B. 2021. Issues in solid waste management and prospects for recovery in the city of Diffa" University of Diffa. 35P.
- [9] SANOUSI G. 2021. The role of the municipality in solid household waste management: the case of the urban commune of Diffa. University of Diffa. 35P.
- [10] MOUSSA S., 2011. End-of-internship report on professional integration, issues surrounding household waste management in the city of N'Djamena.
- [11] United Nations Office for Disaster Risk Reduction, 2025. Global Assessment Report on Disaster Risk Reduction 2025: Resilience Pays: Financing and Investing for our Future. Geneva. 253Pages.