

# Solid Waste Sector Tested by Stakeholder Dynamics in Koudougou (Burkina Faso)

Zakaria Zongo\*, Issa Sory

Human and Social Sciences Research Laboratory (LABOSHS), Department of Geography, Norbert Zongo University, Koudougou, Burkina Faso

Email: \*zongozakaria21@gmail.com, soryssa@yahoo.fr

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## Abstract

Solid waste management is one of the major concerns of the authorities in the town of Koudougou. The town's dynamic is reflected in relative demographic growth and consumption patterns that are conducive to the formation of landfill sites. These landfills are the source of numerous environmental consequences and risk factors for local residents. The aim of this article is to analyze the dysfunctions in the solid waste sector caused by the interplay of actors. It draws on secondary data from the state of the art on the subject and primary data collected from 305 households and 89 actors in the sector between September 2022 and March 2023, as part of an ongoing thesis. These data show that the interplay of actors contributes to the malfunctioning of pre-collection and secondary collection, and remains a factor in the proliferation of illegal dumpsites.

## Keywords

Solid Waste, Waste Management, Stakeholder Games, Koudougou, Burkina Faso

## 1. Introduction

Sustainable urban solid waste management is one of the most pressing environmental issues facing cities in developing countries (Kouassi, 2006; Citeretsé, 2008). Indeed, demographic growth combined with uncontrolled urbanization is undermining the waste management systems set up by public authorities in these countries (Matejka et al., 2005). In these cities, poor waste management is actually the result of a lack of financial, human and technical resources, and above all the absence of land reserves to install intermediate and final landfill sites (Tshala et al.,

2017; Dandonougbo, 2013). Thus, as several authors attest, waste accumulates along the main roads and in empty public spaces in large African cities (N'guettia, 2010; Sory, 2013; Pierrat, 2014). Medium-sized African towns such as Divo in Côte d'Ivoire (Yao et al., 2021), Bangangte in Cameroon (Mbiadjeu-Lawou, 2019) and Thiès, Saint Louis, Ziguinchor in Senegal (Rouyat et al., 2006) all suffer from inadequate waste management, leading to the proliferation of illegal dumps. As a result, waste collection and disposal services in medium-sized towns and cities are rarely provided, aggravating environmental degradation and posing a risk to public health (Tini, 2003; Rouyat et al., 2006).

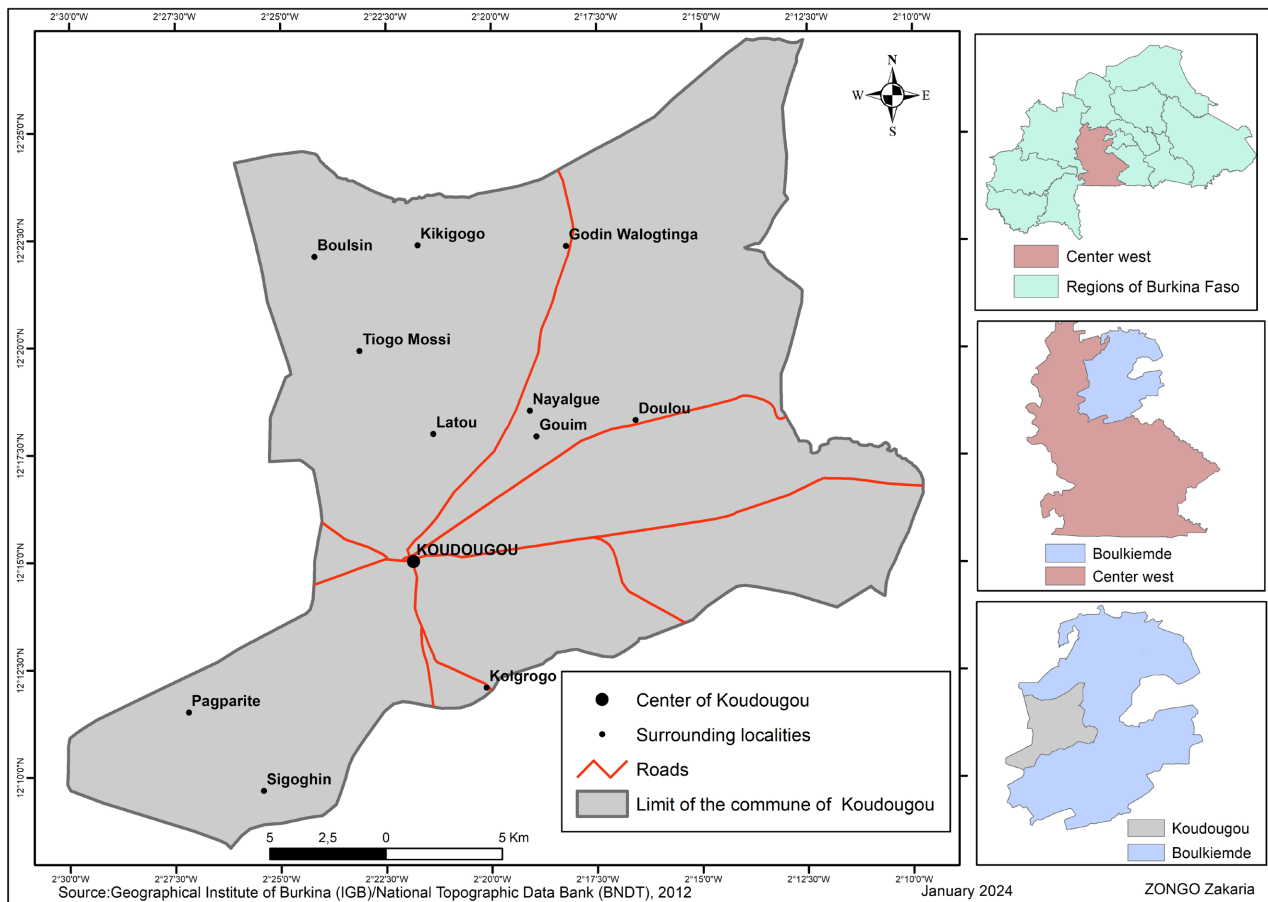
In contrast to Burkina Faso's two major cities, Ouagadougou and Bobo Dioulasso, where waste management issues have been widely addressed by a multitude of authors (Mas & Vogler, 2006; Meunier-Nikiema, 2007; Sangaré, 2012; Sory, 2013; Ilboudo, 2014), medium-sized towns are somewhat on the bangs of scientific research on this topic. Yet, these medium-sized towns are becoming development issues (INSD, 2019). To fill this gap, this research was carried out in the medium-sized town of Koudougou, which is experiencing growing insalubrity linked to dysfunctions in the solid waste sector (Zongo et al., 2022). This insalubrity is reflected in the proliferation of uncontrolled dumps, revealing inadequate waste disposal methods.

Sound and sustainable waste management cannot be achieved without the participation of citizens, who should be both consulted and made aware of this issue that concerns their daily lives (Henniche, 2010). However, in the town of Koudougou, consultation between waste stakeholders remains the least common practice. This makes the development and implementation of a sustainable management system difficult. Current waste management in Koudougou is therefore flawed, revealing socio-spatial inequalities and inequalities in exposure to risks and nuisances (Zongo et al., 2020). This article aims to analyze the dysfunctions in the waste management system caused by the interplay of actors. Specifically, the aim is first to describe the organization of the sector, and then to explain the dysfunctions of its links.

## 2. Methodology

### 2.1. Study Area

The town of Koudougou is the site of the present research. The colonial era (1910-1960) was the main source of development for the town (MHU, 2012), which very quickly became a regional capital. Koudougou is both an urban commune and the capital of the central west administrative region, Boulkiemde Province and Koudougou Department. Located between 2°21'51" West Longitude and 12°15'3" North Latitude, the urban agglomeration stretches over 15 km. Before the country was fully communalized, the city covered an area of around 272 km<sup>2</sup>. Today, this area has grown to 720 Km<sup>2</sup>, with the addition of 22 administrative villages "Map 1". Koudougou is about one hundred kilometers west central of the capital of Burkina Faso, Ouagadougou.



Map 1. Location of study area.

## 2.2. Data Collection

A number of techniques and tools were used to collect the data. These included questionnaire surveys, interviews, and direct observations in the field. This research was based on the city’s territorial organization, taking into account all ten (10) districts in order to report on the current solid waste management situation. The research methodology is based on the collection, processing, analysis and interpretation of secondary and primary data. The state of the art on the topic consisted in analyzing information on solid waste management in scientific publications. Primary data included qualitative and quantitative data. Semi-structured interviews were conducted, using an interview guide, with eighty-nine (89) actors in the sector (municipal technical services, partners and NGOs, associations, decentralized services, informal collectors). Quantitative data were collected by means of a questionnaire from three hundred and five (305) households selected from the city’s ten (10) districts and distributed according to household size by sector. The sample size was determined using the method of Schwartz (1995) based on the formula:  $N = Z\alpha^2 \cdot PQ/d^2$ , where:  $N$ = sample size per sector;  $Z\alpha$  = deviation set at 1.96 corresponding to a confidence level of 95%;  $P$  = number of households in the sector;  $Q = 1 - P$ ;  $d$  = margin of error which is equal to 5%.

This method offers the advantage of making a reasoned choice of the number of households to be surveyed per districts. Calculations are based on data from the localities file of the fifth General Census of Population and Housing (INSD, 2019). Applying the SCHWARTZ formula, the number of households surveyed per sector is shown in “Table 1”. Within each sector, the households surveyed were selected at random. In each household, one person, in this case, the head of household or his or her respondent, was surveyed. This made it possible to ascertain households’ perceptions of solid waste management in the city, as well as to gather their suggestions for improving the management of the system.

**Table 1.** Number of households surveyed per districts.

<i>Sectors</i>	Number of Households in 2019	Number of Respondents
1.	4535	33
2.	3530	29
3.	3074	26
4.	4219	31
5.	5321	36
6.	1825	20
7.	3656	29
8.	6345	40
9.	4660	33
10.	3523	28
Total	40,688	305

Source: INSD, RGP, 2019, field survey, September 2022-March 2023 (INSD, 2019).

This sample (305) was used to capture household perceptions of linear solid waste management. GPS and the camera were used to take the geographical coordinates of the dumps and the images.

### 2.3. Data Processing

All the data collected was processed and analyzed using appropriate software. For the qualitative data, interviews were recorded using a dictaphone, coded and then transcribed literally. Word 2016 was used for text input. These data were analyzed using the content analysis technique. In order to guarantee anonymity, pseudonyms were used to identify respondents. In relation to the quantitative data, the analysis used descriptive statistics via the Excel 2020 spreadsheet. This was used to produce tables and graphs. Maps were produced using QGIS 3.34 software. GPS data are transferred and processed by this software to show the spatial distribution of landfills in the communal area.

## 3. Results and Discussion

### 3.1. A Lack of Dialogue between Waste Sector Stakeholders

The main actors in charge of sanitation in the town of Koudougou can be summed

up as public agents (State and local authorities), private agents (associations, NGOs, MSEs and partners) and informal players. The central state, or the designer of policies and strategies, plays a facilitating role in coordinating the sector's activities, even though waste management in particular and sanitation in general are services transferred to local authorities (GRAAD, 2017). In fact, the central government is the interface between local authorities and decentralized cooperation agencies working in the sanitation sector. As such, it is the project owner and ensures compliance with environmental protection legislation. At local level, the roles and responsibilities of waste management stakeholders are defined by the municipal decree no. 2009/019/SG of August 6, 2009. These actors include the municipality, the local population, associations and development partners.

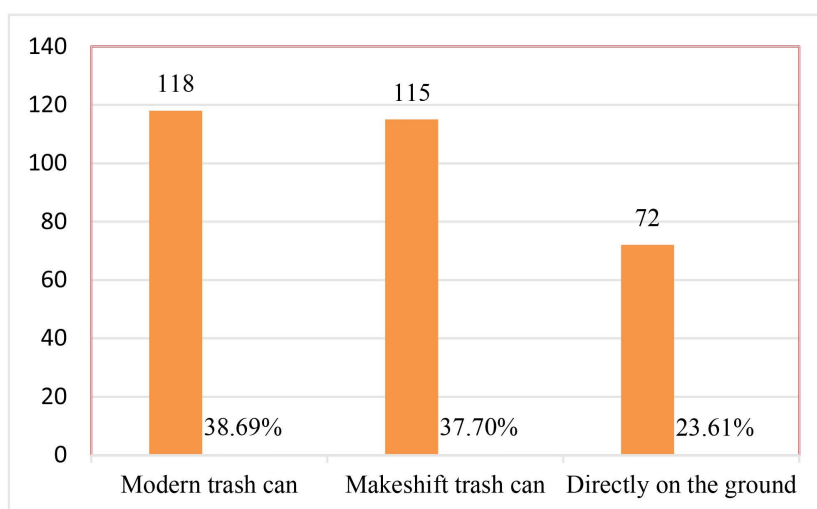
The Koudougou local authority is in charge of setting up and maintaining the waste collection infrastructure. Its technical departments (roads and sanitation) ensure compliance with the terms of reference signed between the waste pre-collection associations and the municipality. They also issue approvals and ensure that pre-collection associations are integrated into the city's six (06) collection zones. Ten (10) autonomous associations are mobilized to evacuate solid waste from households to transit centers. They play a key role in the pre-collection of household waste, public and private administration waste, and infrastructure waste merchants. Some are members of the Green Brigade, which sweeps the city's main thoroughfares. Households, which are among the biggest producers of waste in urban centers, should play a major role in the sector by applying the "polluter pays" principle. In Koudougou, the vast majority of the population has no access to the pre-collection service due to the insufficient number of pre-collection associations. These associations are unable to cover a large part of the town due to insufficient logistical equipment (tricycles). As a result, large quantities of household waste are disposed of anarchically by burning and dumping in the city's public spaces. This further complicates the sector's management.

Boosting the waste sector would not be possible without the substantial support of technical and financial partners, grouped into NGOs and international organizations. These partners, such as the Group of Research and Analysis Applied for Development (GRAAD), the French Development Agency (FDA), the German Technical Cooperation (GTZ) and the Swiss Cooperation, are involved in Koudougou in the framework of decentralized cooperation, supporting community sanitation initiatives. Their role is limited to advisory support, training and technical, financial and material assistance for sanitation associations and actors. In any case, solid waste management in Koudougou sometimes mobilizes a multitude of actors with conflicting interests. No framework for dialogue exists to federate the actions of the various actors. Indeed, the absence of a waste management master plan leads to confusion regarding the actors' responsibilities in the field. This is what hampers efficient waste management in several medium-sized African towns (Kondho et al., 2019). Moreover, the absence of a framework for stakeholders' consultation exacerbates the interplay between them, who circumvent the

law in order to protect their own interests. As a result, the search for sustainable solutions for rational waste management remains the least shared concern of all stakeholders. Management of the sector thus becomes competitive and disputed (Sory, 2013). Moreover, the waste chain in Koudougou comprises several levels, from waste packaging to landfill, via primary and secondary collection.

### 3.2. Packaging and Pre-Collection, the First Links in the Chain

Unlike the city of Lomé, where men (93%) are the main players in the waste chain (Kondho et al., 2019), in the city of Koudougou women are responsible for sanitation tasks. They account for 98% of pre-collection operators. This could be explained by sociological considerations, because in Koudougou the question of the responsibility for sanitation and cleanliness falls more on women than on men. Pre-collectors therefore collect waste from households to authorized landfill sites. Pre-collection is organized door-to-door in the city's six (06) collection zones by ten (10) community-based organizations, whose means of waste disposal are tri-cycles and donkey-drawn carts. In Koudougou, the pre-collection of waste only concerns the cadastral area of the town, and the choice of customers creates a certain segregation between solvent customers and those who are not. Indeed, for one waste collection per week, the customer pays 1000 FCFA per month. Paying this fee to dispose of waste is a luxury that many households, particularly low-income ones, cannot afford. Waste packaging material is a function of the socio-economic characteristics of households. While wealthy households (86% of subscribers surveyed) use conventional garbage cans, low-income households make do with makeshift equipment (buckets, cut-up cans, dishes, bags, etc.) to dispose of their waste. Waste is sometimes deposited on the ground, which complicates the work of the pre-collectors, sometimes leading to tense relations between households and pre-collectors. **Figure 1** shows conventional garbage cans in households subscribing to the waste pre-collection service.



**Figure 1.** Methods of waste disposal in households.

Given that good waste management begins at the source of production (Ntain, 2010), it would be ideal for households to sort their waste at the source to facilitate pre-collection. However, surveys reveal that only 15.41% of households surveyed practise this eco gesture, compared with 84.59% of households who mix all kinds of waste in the garbage cans. A woman precollector state:

“Let me tell you that in the garbage cans we find everything: babies’ diapers, faeces, food scraps, and diapers with women’s menstrual periods. However, imagine if this waste were to remain in households for a long time. The nuisance would be accentuated, leading risks of disease”.

These comments reveal the pre-collectors perception of household behavior, reflecting a notorious lack of civic-mindedness that does not facilitate pre-collection work. Unlike Ouagadougou (Sory & Tallet, 2015), Dakar (Diawara, 2010) and Yaoundé (Ngambi, 2015), where sorting centers exist to facilitate waste disposal, in Koudougou no sorting center has been built by the municipality with a view to waste recovery and recycling. Yet the absence of organized sorting and selective collection of recyclable waste at household level is a major obstacle to the emergence of a genuine waste market (Zahrani et al., 2006; Diawara, 2010).

### 3.3. Informal Waste Pre-Collection: A Response to System Failures

In the town of Koudougou, a number of actors are involved independently in waste pre-collection. These actors are neither recognized by the municipality nor attached to a pre-collection association. They therefore constitute a group of informal pre-collectors who play an active role in household waste management. There are two types of informal waste collectors: permanent and occasional. Permanent informal collectors are well equipped with vehicles and operate clandestinely in the sector. Organized into a network, they have contacts and customers. Garbage collection is carried out for a derisory sum. They evade the municipal police and care little for the destination of waste pre-collected from households and commercial facilities. They impose a kind of unfair competition on formal pre-collectors and also contribute to the formation of illegal dumps. As for occasional informal collectors, waste pre-collection is just an alternative way of generating financial resources. Vacationing students usually set out with carts in search of salvaged materials. They generally collect used batteries, plastic waste and scrap metal. In search of these types of waste, some households offer to empty their garbage cans for a derisory sum (100 FCFA or 200 FCFA) or even payment in kind (food). Not all the waste collected reaches the sites authorized by the municipality. This result is in line with those of (Ngambi, 2015; Yao et al., 2021), who noted the presence of informals in waste pre-collection in Yaoundé, Cameroon, and Divo, Côte d’Ivoire, respectively. These authors maintain that informal workers, known as “AGALO poubelle” in Divo and “vider-poubelle” in Yaoundé, have received no training whatsoever. They collect household waste for a fee of 100 FCFA to 300 FCFA, depending on the quantity of garbage and the distance to be covered. (Sory, 2013) has also demonstrated this situation in Ouagadougou, where the implementation of the 2007 waste management master plan has led to the

marginalization of informal waste collectors, who are disrupting the operation of the sector. The waste collected by informals ends up in unauthorized dumps, increasing the burden on the municipality, which has to dispose of it through secondary collection.

### 3.4. A Waste Chain with Disjointed Links

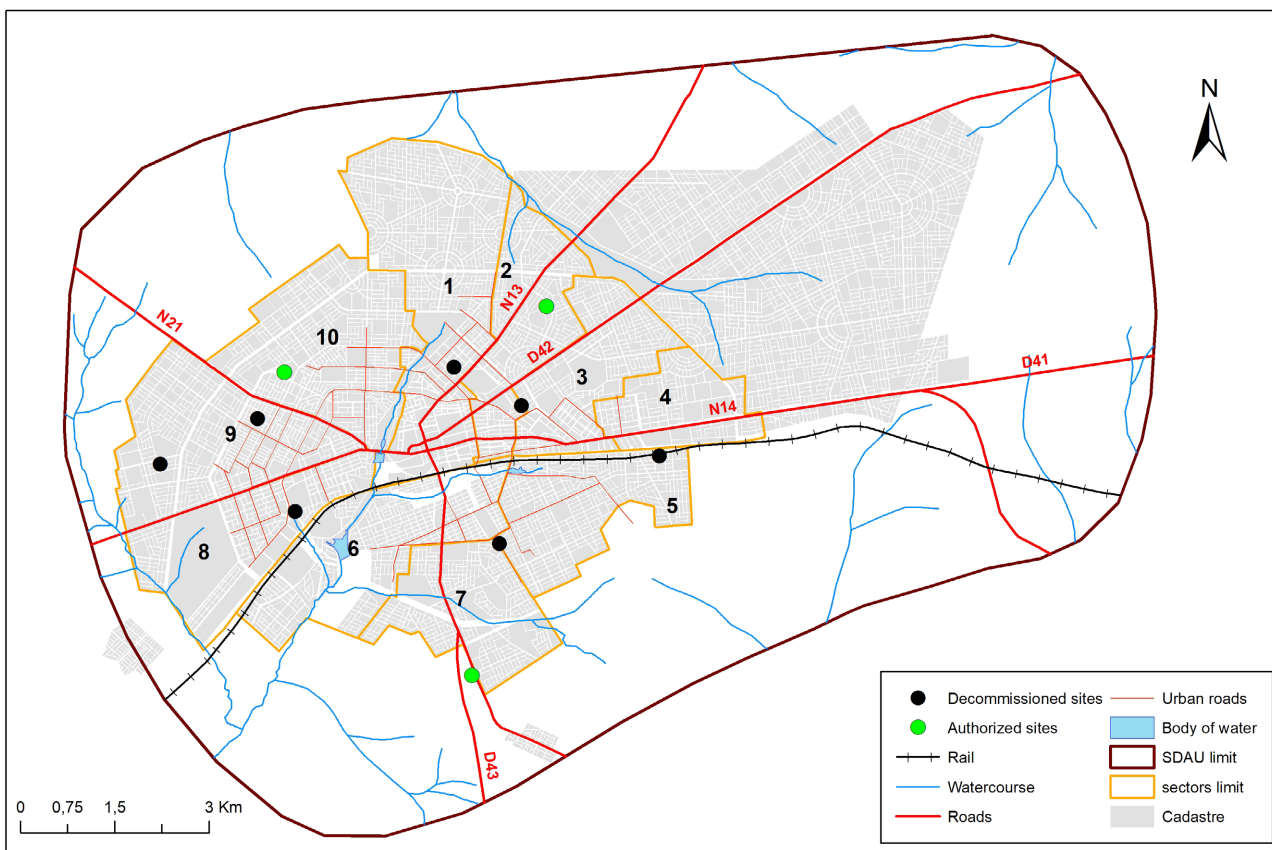
Pre-collection and secondary collection of solid waste show mixed results in most sub-Saharan cities (Tabet, 2001; Meunier-Nikiema, 2012). In Koudougou, in addition to the lack of land for landfill sites, secondary collection, estimated at 15% (GRAAD, 2017) is virtually absent from the system. As a result, the low coverage rate of the collection service results in an unhealthy and degraded urban environment, characterized by the pollution of environmental components (Nyassogbo, 2005; Gbinlo, 2010). In Koudougou, the public waste collection circuit, which constitutes the secondary waste collection service provided by the municipality, is not systematic. Occasionally, young people are recruited to clean up transit sites, garbage bins, rainwater drainage channels, and illegal dumps. The breakdown of the secondary collection link can be explained by defective logistical equipment for transporting waste (one functional dump truck and two underdecks) and the non-existence of a budget dedicated to the solid waste sector. In fact, the municipality hardly allocates any substantial financial resources to the department in charge of secondary collection.

According to data collected from the mayor's finance department, the annual amount allocated to the city's hygiene-sanitation department is constant at just sixteen million (16,000,000 FCFA), including fifteen million (15,000,000 FCFA) for the annual salaries of the women of the green brigade and one million (1,000,000 FCFA) for vehicle fuel. Sanitation is therefore the poor relation of urban policies in Africa, and this is reflected above all in the low level of funding allocated to the sector (Matejka et al., 2005). Consequently, without a real will and a strong commitment from the Koudougou municipal authorities in terms of the sector's operating budget, hopes of boosting the sector are dwindling. Another major difficulty facing the sector is the land tenure issue, which is particularly acute in the town of Koudougou. The city's various development projects have been carried out without any provision for landfill sites. This situation further complicates the work of the pre-collectors, and their cry for help can be heard in the words of one of the association's leaders: "Once my pre-collectors came back to park the tricycles with the garbage in front of my yard. I asked them to park in front of the town hall so that the municipal authority could take the issue of the sites seriously. The town hall has sold our sites without replacing them". These comments reveal the difficulties encountered by the pre-collectors in the field of waste collection, given that the issue of landfill sites has become marginal in the town of Koudougou.

### 3.5. The Question of Landfills Sidelined by Municipal Officials

At municipal level, the absence of a framework for concerted action by the various

actors means that each one develops strategies for circumventing legislation in order to make the most of the sector, which explains the malfunctioning of primary and secondary collection. In fact, field surveys reveal a political agenda in the management of the city’s waste. Sanitation has become an instrument of political clientelism, given the behavior of the commune’s top officials. Political rewards have led to the downgrading and sale of certain authorized landfill sites “Map 2”, and even to the sale of certain equipment acquired through decentralized cooperation. All the indications are that the waste issue is not yet a priority in Koudougou. Some of the former sites planned for waste disposal since 1995 by the town council have been decommissioned and allocated to NGOs and private individuals today. Other decommissioned sites, such as the “village laafi” (health village) in district 8 and the youth listening center in district 9, are used for public utility infrastructures.



Source: IGB (BNDT 2012), Cadastre Koudougou and field data

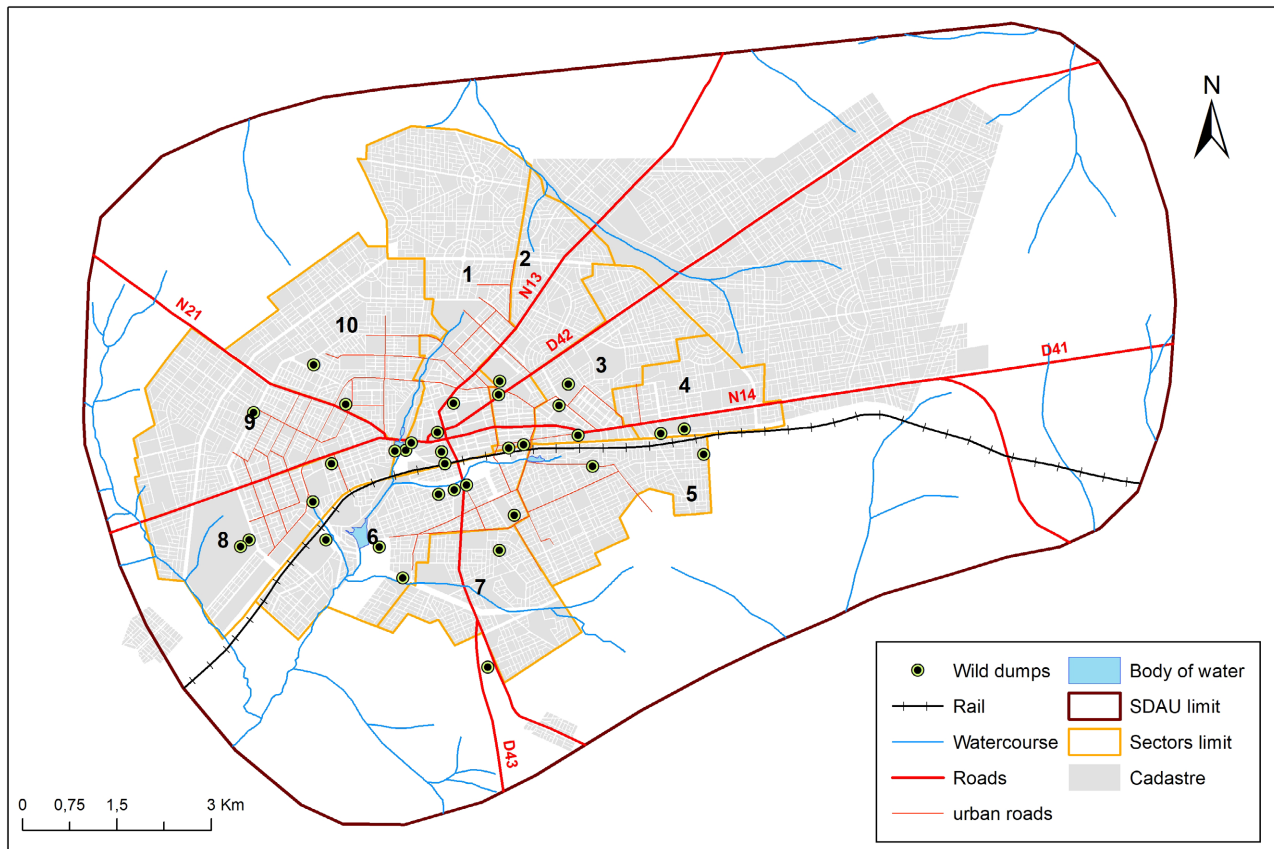
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**Map 2.** Decommissioned and authorized waste disposal sites.

Analysis of this map shows a regressive trend in the number of landfills authorized by the municipality. From 1995 to 2005, the city had seven (07) authorized landfills. From 2006 to 2012, all seven sites were decommissioned, broken up and allocated to private individuals for commercial and housing purposes. Today, pre-collectors have only three (03) authorized sites for waste disposal. This political maneuvering partly explains the proliferation of illegal dumps “Map 3”. Indeed,

the municipality is accused by association leaders of not having played its full part in setting up waste collection infrastructures. In reality, the available collection centers are far from the pre-collection areas and are emptied irregularly. This explains the formation of dumps in open spaces.



Source: IGB (BNDT 2012), Cadastre Koudougou and field data

January 2023

ZONGO Zakaria

**Map 3.** Spatial distribution of illegal dumps.

The spatial distribution of rubbish dumps highlights their concentration in the city center and along major roads. Analysis of this spatial distribution shows that these heaps of rubbish are formed by poorly collected waste from commercial infrastructures. As laxity is the golden rule in solid waste management (Sory, 2013), these dumps are then filled with household waste collected by associations, because authorized landfill sites are overflowing due to a lack of regular waste removal. Pre-collectors thus contribute to the proliferation of illegal dumps, with catastrophic consequences for the environment and human beings.

#### 4. Conclusion

This article highlights the structure and operation of the solid waste sector in Koudougou and reveals the role of the different actors in managing the sector. The lack of waste sorting in households, the absence of systematic collection, the scarcity of place for landfill sites, and the absence of a final landfill, above all, the non-existence of a framework for stakeholder consultation are all bottlenecks in the

sector. The results of waste collection activities show a very low collection rate of around 15%. The waste collected remains for a long time at intermediate disposal sites, creating risks and nuisances for local residents. This untreated waste is sometimes disposed of by burning. For a rational and sustainable waste management in the town of Koudougou, the public authorities need to set up a final land-fill, increase the number of intermediate waste disposal sites and provide pre-collection associations with logistical resources, not forgetting large-scale awareness raising among the population. Households will also have to sort their own waste to lighten the burden on pre-collectors.

However, this research has not shed any light on the power struggles and conflicts of interest of the stakeholders in the waste sector. This is justified by the fact that in the town of Koudougou, the issue of waste is still marginal for local authorities, which explains the low level of funding for activities in the sector. Future research could focus on the political issues surrounding waste management, as well as the environmental and ecological inequalities caused by waste. In addition, waste recovery through recycling and composting represents an opportunity to reduce piles of rubbish and the rate of urban unemployment, in order to move towards an ecological and sustainable city.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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