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ASSESSMENT OF THE CLEANLINESS SERVICE OF THE CITY OF OUM EL BOUAGHI: ANALYSIS OF THE CURRENT SITUATION AND DIAGNOSIS

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ABSTRACT

This article presents a comprehensive assessment of the cleanliness service in the city of Oum El Bouaghi, Algeria. The main objective is to analyze the current situation of waste management and identify the gaps and challenges faced by local authorities. Through a methodological approach combining field surveys, interviews with municipal officials, and the analysis of quantitative data, the study examines various aspects of the cleanliness service, including the frequency of waste collection, the efficiency of cleaning operations, and the level of citizen satisfaction. The results reveal shortcomings in the organization and management of cleanliness services, such as delays in waste collection, a lack of citizen awareness regarding waste management, and infrastructure problems. The article also proposes recommendations to improve service quality, including resource optimization, strengthening community awareness, and adopting sustainable waste management practices. In conclusion, this assessment highlights the importance of an effective cleanliness service for the quality of life of Oum El Bouaghi residents and calls for concerted action to overcome the identified challenges.

KEYWORDS

Cleaning Service, Waste Management, Waste Collection, Oum El Bouaghi, Algeria

CITATION

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I. Introduction.

Urban cleanliness is a major issue for the quality of life of citizens and the sustainable development of cities. In Oum El Bouaghi, as in many other Algerian municipalities, waste management is a growing challenge in the face of rapid urbanization and population growth. An efficient cleaning service is essential not only to maintain a healthy environment, but also to promote the image of the city and the well-being of its inhabitants.

This study aims to evaluate the cleaning service of the city of Oum El Bouaghi by analyzing the current situation and identifying the main problems encountered. Through a methodological approach combining field surveys, interviews with key stakeholders and quantitative data analysis, we will seek to understand the dynamics at play in waste management.

The objective of this research is to provide a clear diagnosis of the cleaning service, highlighting the strengths and weaknesses of the current organization. The results will help identify areas for improvement and formulate concrete recommendations to optimize waste management in the city. In short, this study aims to

contribute to the implementation of sustainable management practices that effectively meet the needs of the residents of Oum El Bouaghi.

Importance of the Research and Its Objectives.

The collection and treatment of household waste is a public service. Municipalities must ensure the disposal of household waste. They must therefore collect and treat it in compliance with environmental and health regulations. To ensure this public service, communities can choose to transfer all or part of their mission (collection + transport + treatment) to a public EPIC or a private institution.

In 2019, the wilaya of Oum El Bouaghui created a wilaya EPIC "AMUR" responsible for urban improvement operations, such as cleanliness, green space, public lighting and other missions such as sanitation, it is clear that the basic mission always remains cleanliness and to ensure the success of this company in this mission, a cleanliness plan based on a scientific approach is essential. It should be remembered that the municipality is always responsible for the service as for the EPIC is conditioned by the obligation results for this purpose a cleanliness plan must be established and validated by both parties which will present a reference for control and arbitration operations.

The evaluation of the cleaning service of the city of Oum El Bouaghi is of paramount importance for several reasons:

- This study helps identify gaps in waste management, thus contributing to improving the quality of life of residents. By analyzing citizens' awareness levels regarding waste management, the study highlights the importance of environmental education.
- This can lead to initiatives aimed at encouraging responsible behavior and reducing waste production.
- By evaluating the effectiveness of cleaning and waste collection operations, this study can help local authorities optimize the use of financial and human resources, thus improving the performance of the service.
- The results of this research will be able to inform decision-makers and policy makers on the priorities for action in waste management, thus promoting the development of appropriate and effective public policies.

II. Methodology.

This study will be split into two main parts: First comes the inventory and diagnostic part which will make it possible to identify the current service in its daily operation and to detect the anomalies which hinder it. Secondly and after taking into account the constraints and possibilities which surround it, we will propose an optimization scenario which will aim at the improvement and the upgrading of the current system.

Inventory of the cleaning service.

The objective of this part of our work is to allow in a comprehensive manner, to better know and to make known the technical, organizational and financial conditions in which the cleaning service is operated. The inventory is generally based on the collection of data necessary to understand and analyze the existing situation. We can distinguish two main types of data:

• On the one hand, data relating to the definition of spaces, the environment of the municipality where the collection takes place (housing typology, population, etc.).

• On the other hand, data relating to waste management itself: technical data (Staff, knowledge of the vehicle and container fleet, the route and length of the tour, tour time and tonnage collected, etc.). In addition to their importance in drawing up an inventory, these data are largely involved in designing an overall household waste collection plan. As a result, we conducted a survey to collect useful data to better understand the different facets of the current system. This survey took the form of:

• Interviews with the various stakeholders in the management of the collection service, regardless of their hierarchical position (director, department head, fleet manager, etc.).

• Site visits and on-site monitoring of collection teams.

• Contact with the various municipal services for the collection of cartographic data, demographic and urban planning statistics and financial data, etc…

III. Results

1. Description of the Study area.

The Wilaya of Oum El Bouaghi, located in the north-east of Algeria, is the result of the administrative division of 1974 and remodeled during the division of 1984 and is composed of 12 dairates and 29 communes. It is located in the area of the Constantine highlands in the center of the wilayas of eastern Algeria and extends over an area of 7638.13 km2 at an average distance of between 90km and 100 km from the main wilaya capitals.

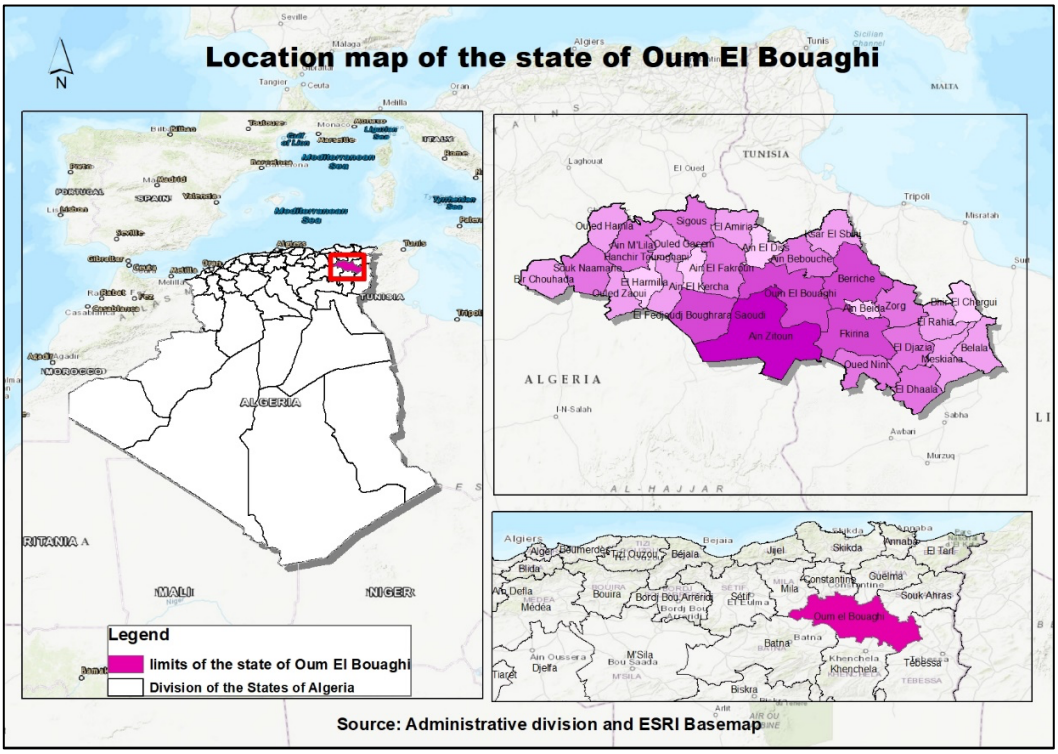

Fig. 1. Situation of the state of Oum El Bouaghi

The city of Oum El Bouaghi, the capital of the wilaya, is a medium-sized city with a heterogeneous urban fabric characterized by a detached, discontinuous set, which implies a discontinuous structure in the built environment related to the conditions and history of the city.

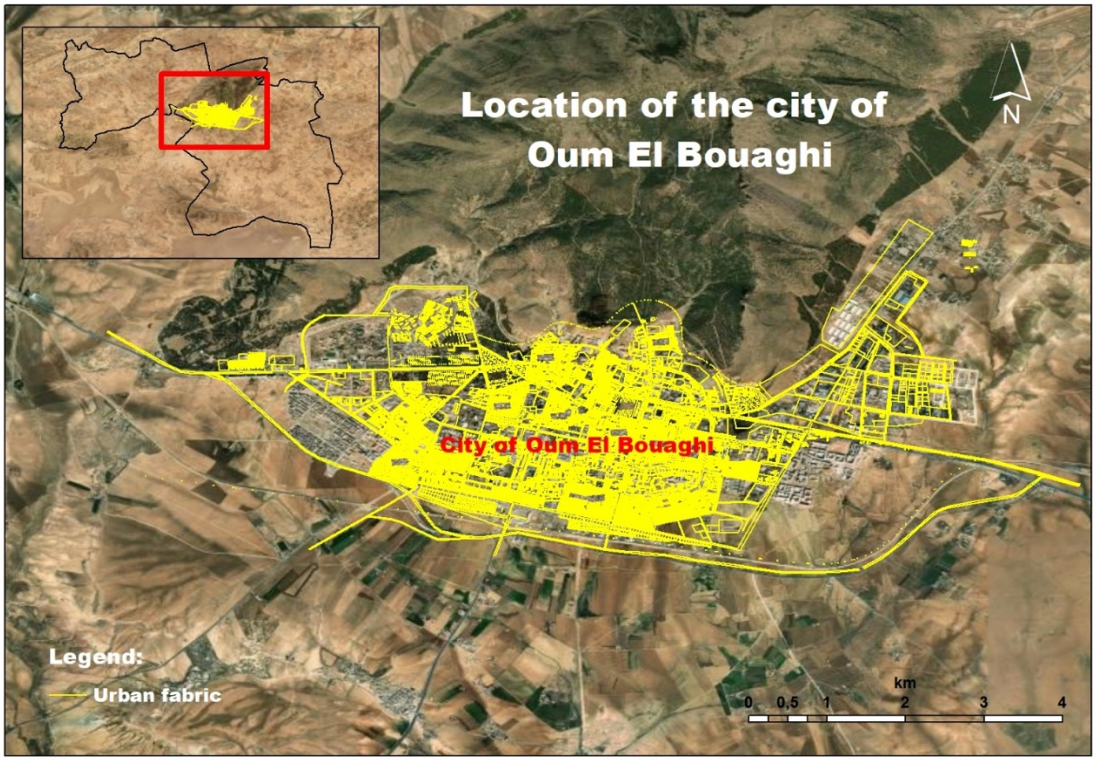

Fig. 2: Location of the city of Oum El Bouaghi

This housing structure in the city of Oum El Bouaghi generally presents three types of aspects:

- Individual housing.
- Colonial-style housing with load-bearing walls usually made of stone and double-pitched roofs with tiles, and the presence of an inner courtyard.
- Collective housing, which is the type generally concentrated in the same area and often referred to as "ZHUN" (new urban housing zone). Morphologically, we find vertical housing and horizontal housing without integration between the two. Regarding the physical condition of vertical or collective housing, it is mostly in good condition. In vertical housing, we also find medium and poor conditions. The poor condition of the dwellings is related to a lack of maintenance, the type of materials used, and the aging of the houses.

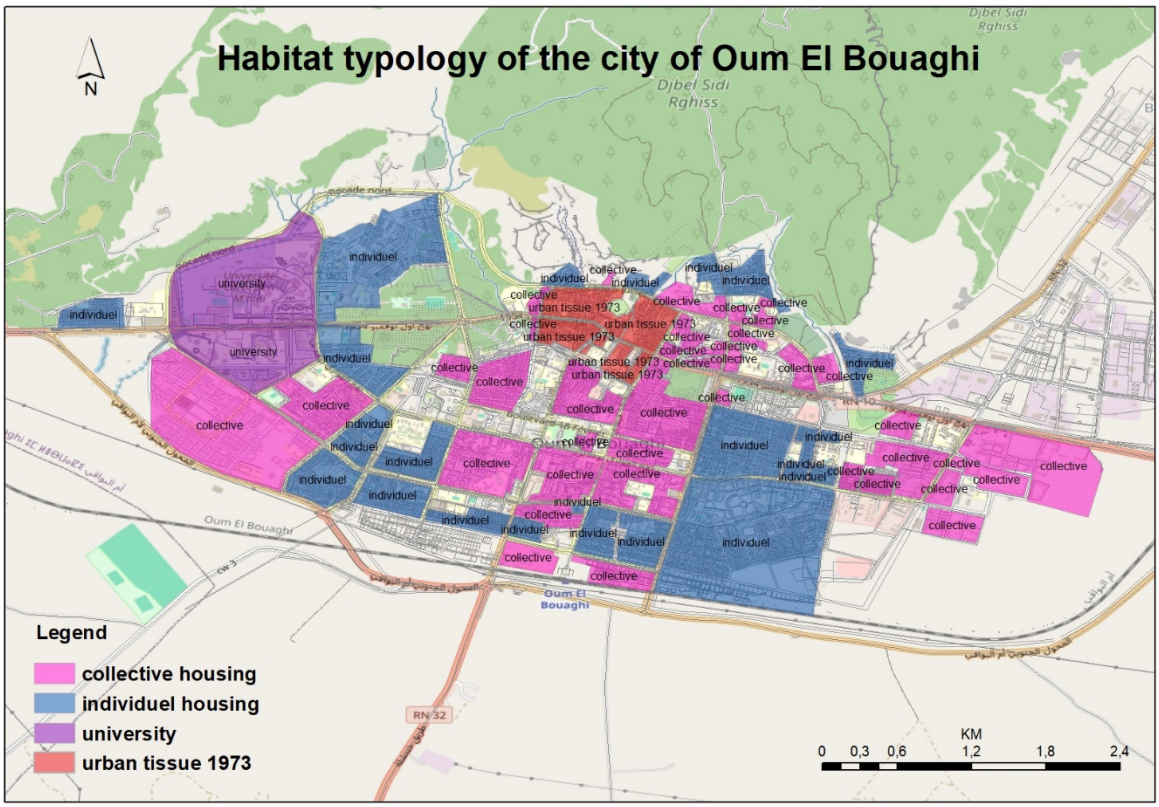

Fig. 3: Habitat typology of the city of Oum el bouaghi

The city of Oum El Bouaghi has benefited from the creation of a large number of facilities and the establishment of new services. The creation of a university center is an element that allows for the elevation of the education level in the region on one hand and the strengthening of the city in terms of cultural and educational facilities on the other hand. The industrial zone, on the other hand, is there to limit the flow to other cities, thus maintaining the population in the city by providing job creation opportunities.

As for the road network, in general, the roads in Oum El Bouaghi allow for smooth traffic, except for the section of RN 10 that crosses the city center, where a slight traffic jam with double parking is observed during the morning phase. All neighborhoods are characterized by paved roads, which facilitate truck accessibility; however, some small plots in Bir Terch and El Djehfa, as well as the Lekmine neighborhood, require surfacing. The width of the roads in Oum El Bouaghi represents an opportunity to improve yields.

The following numerical data comes from the latest General Census of Population and Housing (2008). This allows for a comprehensive demographic analysis (population, households, housing, etc.) across the entire territory of the wilaya of Oum El Bouaghi. In 2008, the population of the wilaya was 80,113, with an average annual growth rate of 1.9%.

2. Producers of household and similar waste:

Before delving deeper into the analysis, it is essential to identify the main producers of waste:

– Households: Waste generated by households is of a food and non-food nature, consisting mainly of organic matter (kitchen and gardening waste) and other recyclable components (paper, cardboard, glass, metals, etc.)

– Traders The packaging fraction presents a real constraint for the collection service in Oum El Bouaghi and in particular the pre-collection system, the absence of a specific device for this type of waste caused the bins to overflow knowing that the Supermarkets, shops and cafes as well as bakeries generate industrial quantities every day.

– The road sweeping product: EPIC AMUR has created a sweeping service, the removal of residues is ensured by a dump truck.

The quantity of household waste produced in the study area "Commune of Oum El Bouaghui" reaches 63.8 tons per day, equivalent to 0.63 kg per inhabitant. It should be noted that this quantity is divided into three sources of generation:

- Quantities collected by the compactor trucks that ensure collection from the designated sectors.
- Quantities collected by the poly-arms and bins placed in the municipality.
- Quantities collected by the tipping and tractor trailers, which are primarily composed of sweeping products and leveling operations. It is observed that there is a significant dispersion of results with a standard deviation reaching 23 tons. In reality, this fluctuation depends on the frequency and especially the rest days of the collection teams; April 26, as well as May 1 and 3, are Fridays. A collection delay is estimated at 10% (sweeping products, hotspots, and areas around the bins, population ratio).

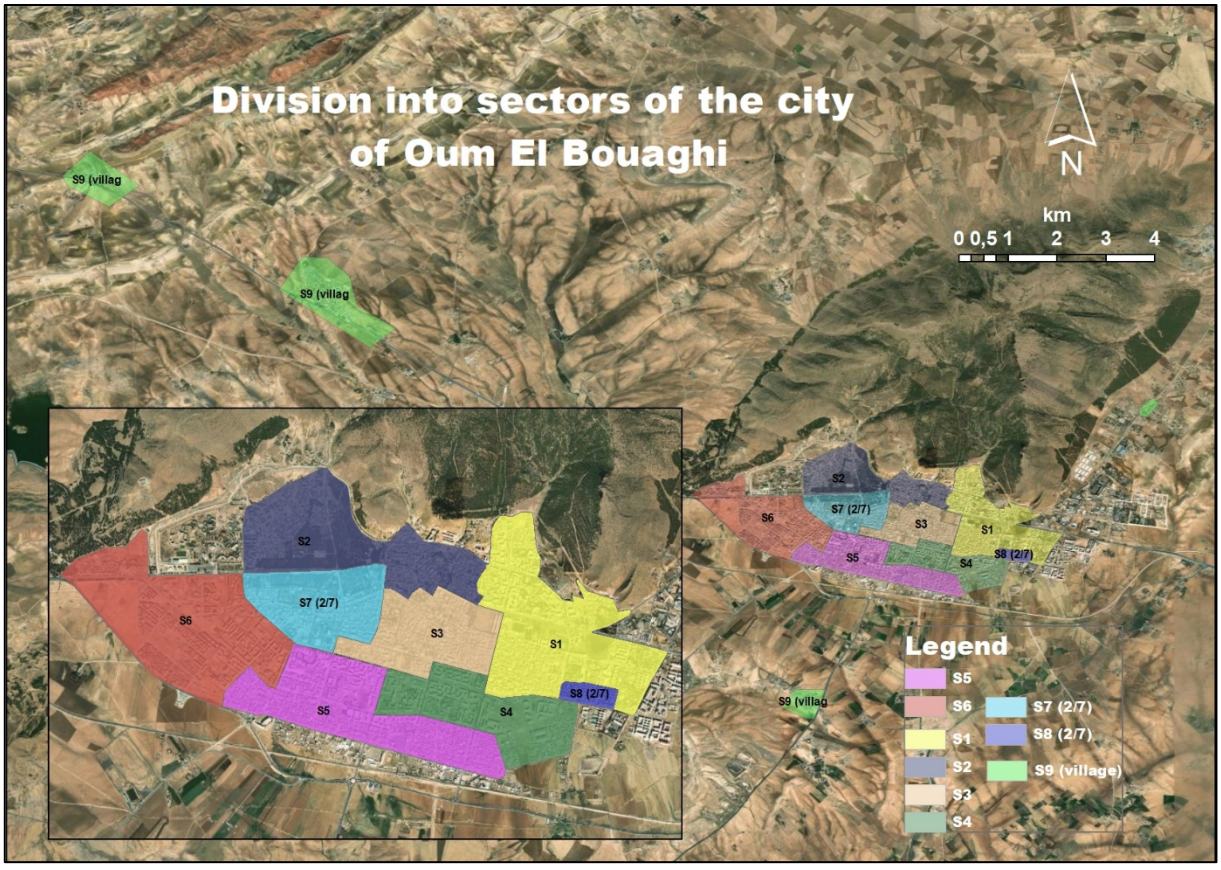

Fig. 4. Division into sectors of the city of Oum El Bouaghi

3. Status of waste collection service:

a) Collection times

Household waste collection in Oum El Bouaghi is organized according to specific schedules in order to ensure efficient waste management. In the Tagouft and Nouvelle Ville sectors, collection takes place between 3:00 a.m. and 10:00 a.m., allowing waste to be processed early in the morning. For the City Nasr and

SONATIBA sectors, waste is collected from 4:00 p.m. to 10:00 p.m., thus providing a time slot after working hours. Collection in the Touzline sector takes place from 7:00 p.m. to midnight, while the city center and Bouaaziz Said benefit from a night service, with collection operations from 10:00 p.m. to 3:00 a.m. This schedule aims to minimize nuisances for residents while ensuring optimal urban cleanliness.

b) Collection frequency:

The collection frequency is relatively high: from 6 times a week to every day, depending on the housing type. The city center and the new city as well as the BOUAAZIZ SAID city are collected 7 times a week while the villages are collected between 3 and 6 times a week. Field monitoring carried out by our investigation teams has highlighted possibilities for optimizing the collection frequency.

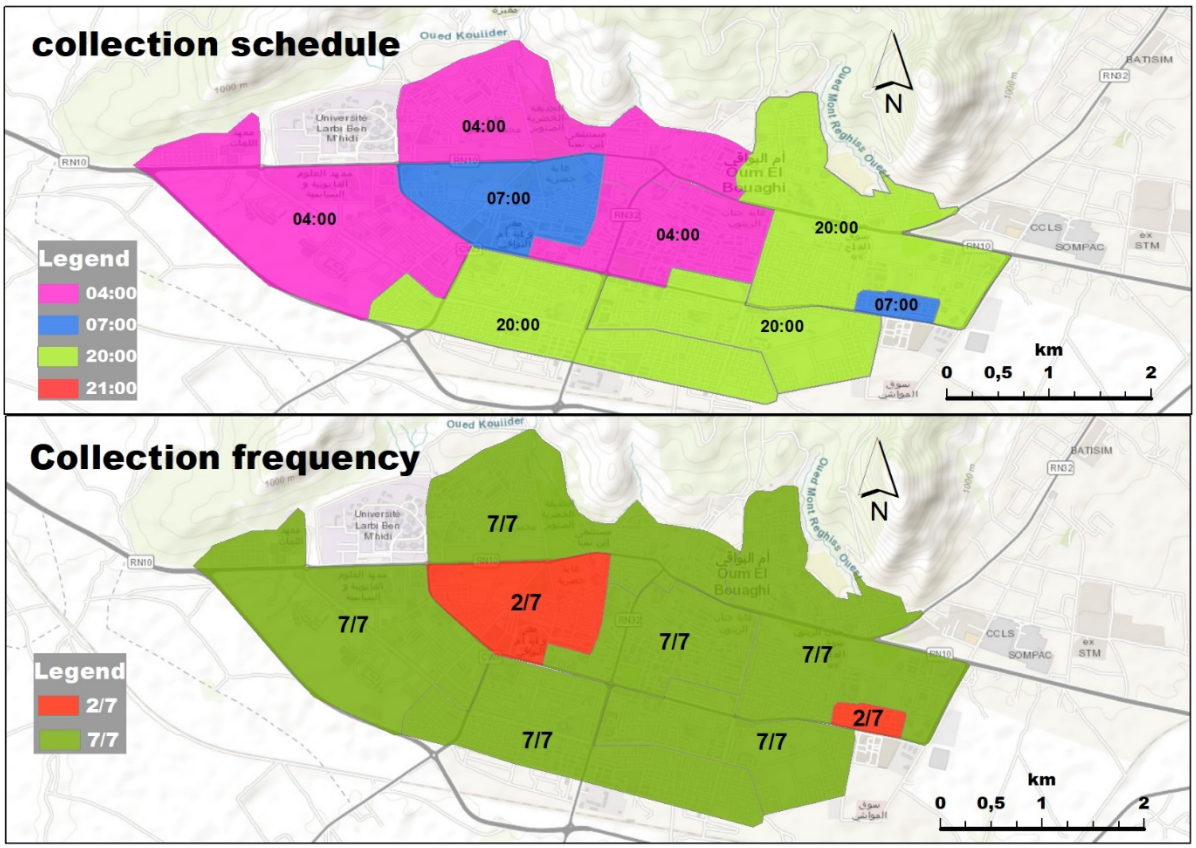

Fig. 5. Collection schedule and frequency of household waste of the city of Oum El Bouaghi

c) Collection method

Depending on the type of housing, there are two types of collection: door-to-door and group collection; collection by voluntary contribution is more effective than door-to-door collection in terms of yield.

1. Containerized collection points: with the containerization process initiated by the municipality, a significant portion of household waste production is received by the installed bins, which represent the common method throughout the urban area of the territory. For certain routes and due to the lack of assignment of an unsuitable truck, collection does not occur mechanically. All the bins are without wheels, which presents a hindrance to collection; the idea behind this consideration is to minimize the risk of vandalism according to the municipal authorities.
2. Bulk collection points: it has been observed that most of these collection points are voluntary drop-off sites created by citizens along the routes of the collection trucks.

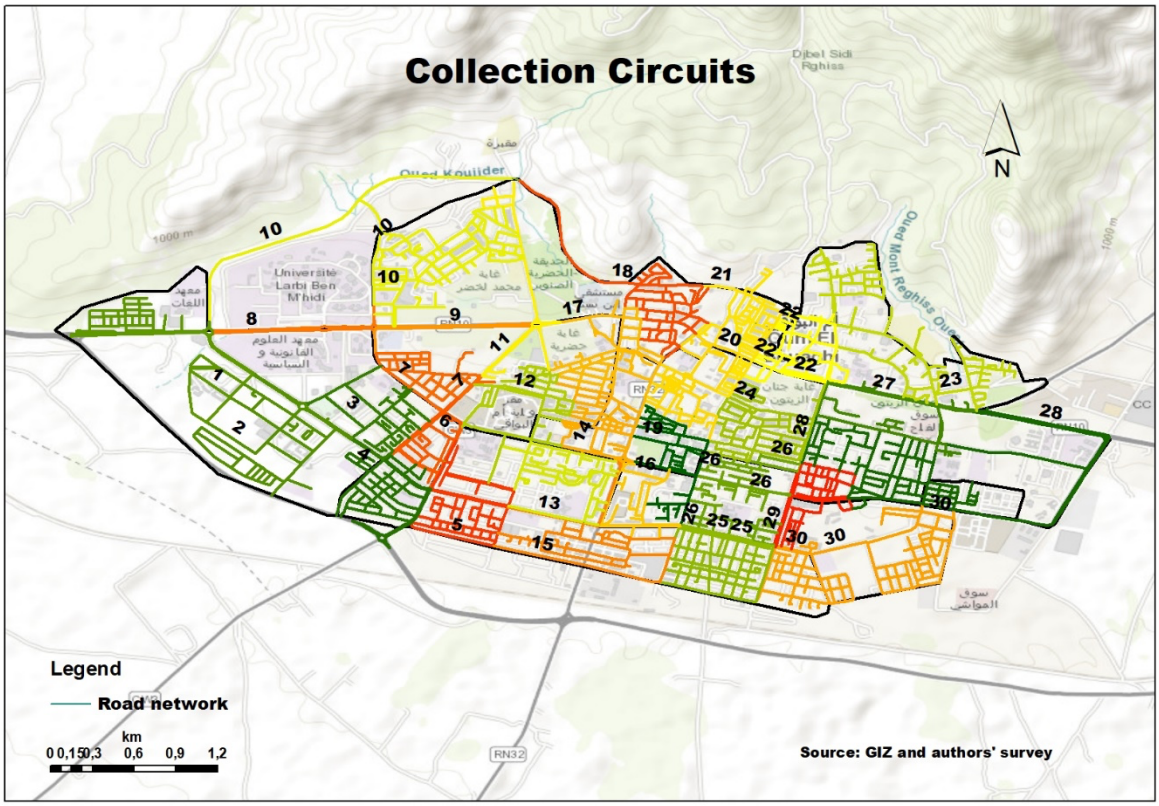

Fig. 6. Collection circuits of the city of Oum El Bouaghi

d) **Door-to-door** Citizens do not accept collection points next to their homes; for this reason, it is difficult to containerize individual housing areas. The following plan illustrates the location of waste grouping points in the capital locality.

e) **Containerization** The container system in the city of Oum el Bouaghi is mainly composed of 1100 L and 770 L bins in Galva. Based on our field surveys and interviews with sector heads, we have inventoried the following quantities by volume and by collection area:

Table 1. Distribution of bins by sector

Collection area	Container volume		
	1100L	770L	Shelters
Downtown Circuit	22	1	
Circuit Merisou	18	2	
Circuit Nouvelle Ville	56		7
Circuit Pitance Chichan	44		
Circuit LEKMINE	25	6	
Circuit E250	25	11	
Circuit SAADA	24	3	
Circuit Tagouft	2		
Circuit El Hilal	9	1	1
Circuit Touzline	5	1	1
Circuit Nassim	23		4
Circuit Bir Khachba	6	4	1
Circuit EPLF2	13	2	1
TOTA L	**272**	**31**	**15**

Source: GIZ and authors' survey 2024

4. Sectorization: EPIC AMUR ensures the collection of the entire town of Oum El Bouaghui by assigning teams to the 13 collection sectors, and to ensure coverage of the entire city, the service operates a daily fleet consisting of: 10 compactor skips (including 02 from rental and 1 from landfill site), 2 tipping skips, and 1 tractor.

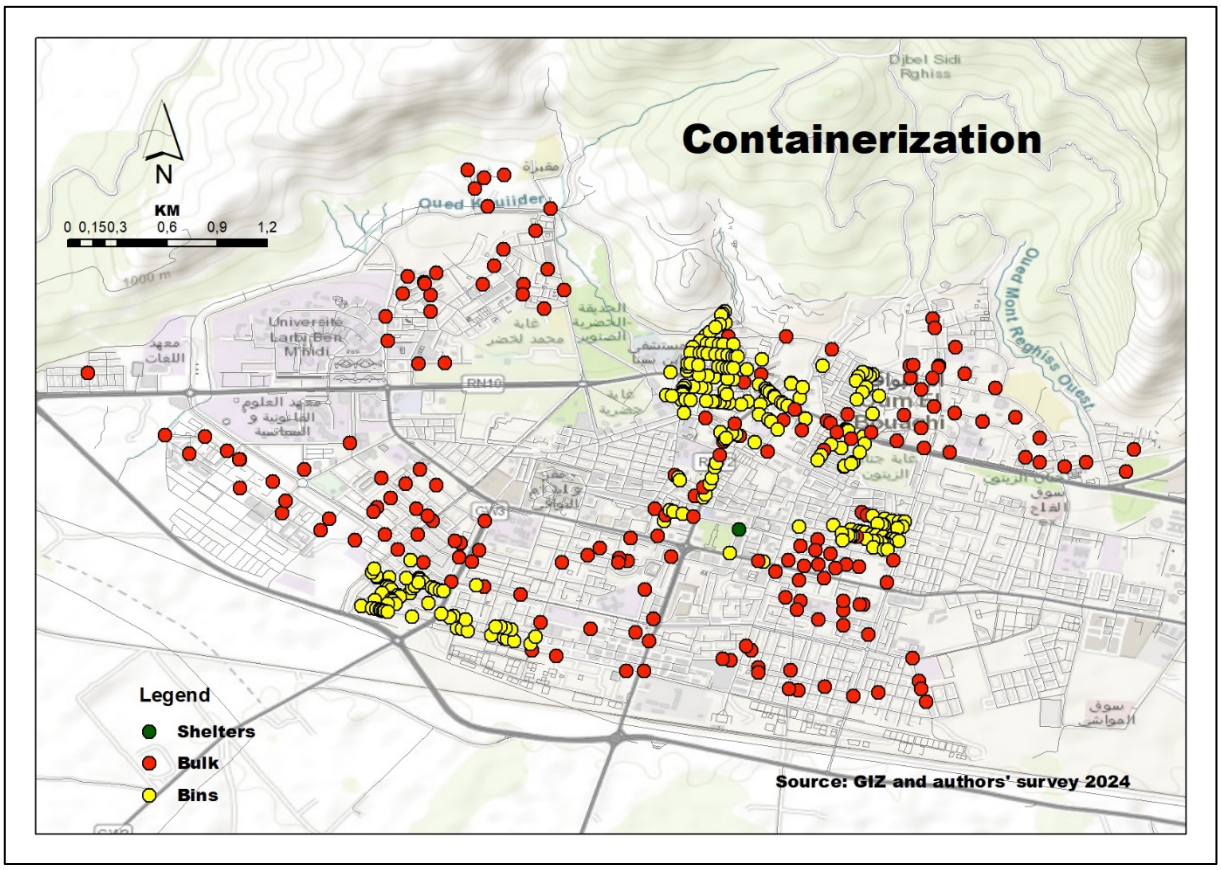

Fig. 7. Containerization of the city of Oum El Bouaghi

5.Truck capacity: 79M3 is the total capacity of all trucks to complete a single round equivalent to 40 tons. Theoretically, the current fleet is more than sufficient to cover the entire city; however, the dilapidated state of the trucks and the lack of maintenance limit their capacity. Additionally, the significant amounts of cardboard collected by the compacting bins affect this capacity. The same applies to the bins, where the capacity of trucks equipped with a container lifter is 49M3, equivalent to 196 bins. Therefore, to cover all the bins, at least two rotations must be planned to avoid assigning trucks without a container lifter for the bins.

6. Personnel: It is difficult to determine the number of operational municipal agents due to the lack of a tracking and attendance control system. It was also noted during the diagnostic phase that some agents returned to the municipality, especially those responsible for prophylactic activities. According to the secretary general of the municipality, 68 agents were transferred to the EPIC, including 1 operations manager, 2 team leaders, 1 park manager, and 2 maintenance and cleaning agents.

IV. Discussion.

1) Strengths

- The management of the EPIC is strengthened by engineers.
- Clear sectorization and absence of overlap at the circuit level.
- An average of 2 unloadings per team per day.
- The monitoring team is provided with a means of transport.
- Efforts already made to optimize resources and circuits.
- Creation of a team for the elimination of black spots.
- Stable truck routes.

- Specific collection of sweeping product.

2) Areas for Improvement

a) Organization:

- The organizational chart requires a revision with the development of job descriptions.
- Intervening in three municipalities simultaneously during the startup phase hinders the proper functioning of the company and weakens control and management (company in the development phase).
- Absence of a hygiene and safety system in the company.

b) Resources

- The current fleet is in poor condition, which poses a problem for the daily availability of collection vehicles, particularly regarding punctuality and regularity of collection.
- The number of agents is largely sufficient; however, their status presents a barrier for the EPIC (municipal agents), especially for integrating them into the new organization.
- For management, human resources are available, but logistics other than transportation means are necessary to ensure proper monitoring.
- Absence of attendance traceability.
- Absence of gathering points, changing rooms, and sanitary facilities.
- From an ergonomic standpoint, the installation of galvanized bins without wheels can severely impact the health of the agents as well as the aesthetic aspect of the collection points.
- An unarranged park.
- Insufficient maintenance and storage facilities.
- Absence of washing for trucks and containers.
- Absence of monitoring sheets and maintenance sheets.
- Trucks with very low cubic capacity while the roads are wide, as well as the type of bins installed.

c) Skills

- Newly recruited engineers have profiles that exactly meet the needs, but in order for them to perfectly accomplish their tasks, specific training programs must be scheduled.
- No training program has been established by the human resources department.
- The EPIC requires support for: planning, monitoring, and control.
- Members of the communication unit require training on the development of educational tools as well as the elaboration of communication plans.

d) Communication and Awareness

- Absence of an internal and external communication system or plan.
- No specific budget for communication and awareness campaigns.
- Lack of internal communication tools such as procedures, programs, and even a clear assignment of agents.

e) Operational Planning and Control

- The established collection program needs improvement in terms of time, distance, and quantity collected.
- Absence of a pre-collection plan and bins are not identified.
- The assignment of collection agents is not clear.
- Assignment of trucks without container lifters for containerized areas.
- No monitoring measures through weighing.
- The entire fleet is mobilized and no truck is in reserve.
- Assignment of trucks without container lifters in containerized sectors.
- Absence of daily reports and feedback on collection.

V. Conclusions

The evaluation of the cleanliness service in the city of Oum El Bouaghi has revealed crucial issues that require immediate attention. Through the analysis of the current situation, it has become apparent that despite notable efforts in waste collection and management, gaps persist, particularly in terms of infrastructure, citizen awareness, and coordination among the various stakeholders involved.

The results of this study highlight the importance of an integrated and participatory approach to improve urban cleanliness. It is essential to implement tailored strategies that include not only the enhancement of waste collection and treatment services but also awareness campaigns aimed at encouraging responsible behaviors among citizens.

Furthermore, collaboration between local authorities, private actors, and the community is crucial to creating a clean and sustainable environment. The recommendations made in this study aim to guide decision-makers toward pragmatic and effective interventions. By investing in sustainable solutions and strengthening community engagement, Oum El Bouaghi can aspire to become a model city in waste management, thereby contributing to the quality of life of its residents and the preservation of its environment.

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