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EXPANSION OF JIJEL CITY AND THE PROBLEM OF URBAIN SPATIAL COHERENCE

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ABSTRACT

Through an assessment of the level of urban coherence in the city of Jijel, it was concluded that the city suffers from a lack of coherence in its urban components. Despite the existence of several laws related to urban planning and development, there are widespread urban violations and a significant prevalence of informal settlements in the city's urban environment. This is due to a lack of continuous monitoring by the relevant authorities and a lack of awareness of urban planning and construction laws among citizens. Some citizens even circumvent the laws. To achieve urban coherence in the city, citizens must adhere to legislative laws, and local authorities must impose strict penalties on anyone who violates or contravenes urban planning and construction laws. Additionally, it is recommended to propose projects that would give the city a coherence appearance, such as an urban coherence plan.

KEYWORDS

Urban Area, Urban Violations, City of Jijel, Urban Sectors, Urban Intervention, Urban Coherence

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Introduction.

The continuous and accelerating urban expansion of cities, varying in pace according to the size of the city and its socio-economic and natural characteristics, in search of a better life, coupled with the rapid population growth in the current era, has inevitably led to increased urbanization and random consumption of space in the absence of planning and order, as is the case in most Algerian cities.

The city of Jijel is one of the cities that has not been spared from this phenomenon. Since independence, it has witnessed a large influx of population due to its important location on the coastal strip and the large industrial settlement it has received in the city's development plans. This intensity increased with the recent administrative division, which granted the city some basic facilities that attracted residents, contributing to a rise in rural exodus rates and population growth due to improved living conditions, increased birth rates, and decreased mortality rates. This increase in population growth has resulted in an urban area unable to meet the needs of the population. The lack of control over construction and building has created an imbalance in the distribution of equipment and facilities, accompanied by random urbanization, which has led to the distortion of the urban fabric due to the lack of coherence in the components of the urban environment.

In order to achieve coherence and balance between the various environmental elements of the city, we will attempt through this research to address the issue of urban coherence in the city by diagnosing the current situation, analyzing it, and proposing practical alternatives aimed at achieving a coherence urban space that reflects the city's urban image. We have posed the following questions:

- What is the current status of the various characteristics of the urban environment of the city of Jijel?

- What are the solutions that would ensure the achievement of spatial coherence for the city, in which all its urban components are integrated?

We have relied on the analytical and descriptive approach in conducting this research by analyzing the urban environment of the city to obtain the most important results and come up with the best solutions to achieve the desired goal.

Materials and Methods

1. Urban Expansion of the City of Jijel:

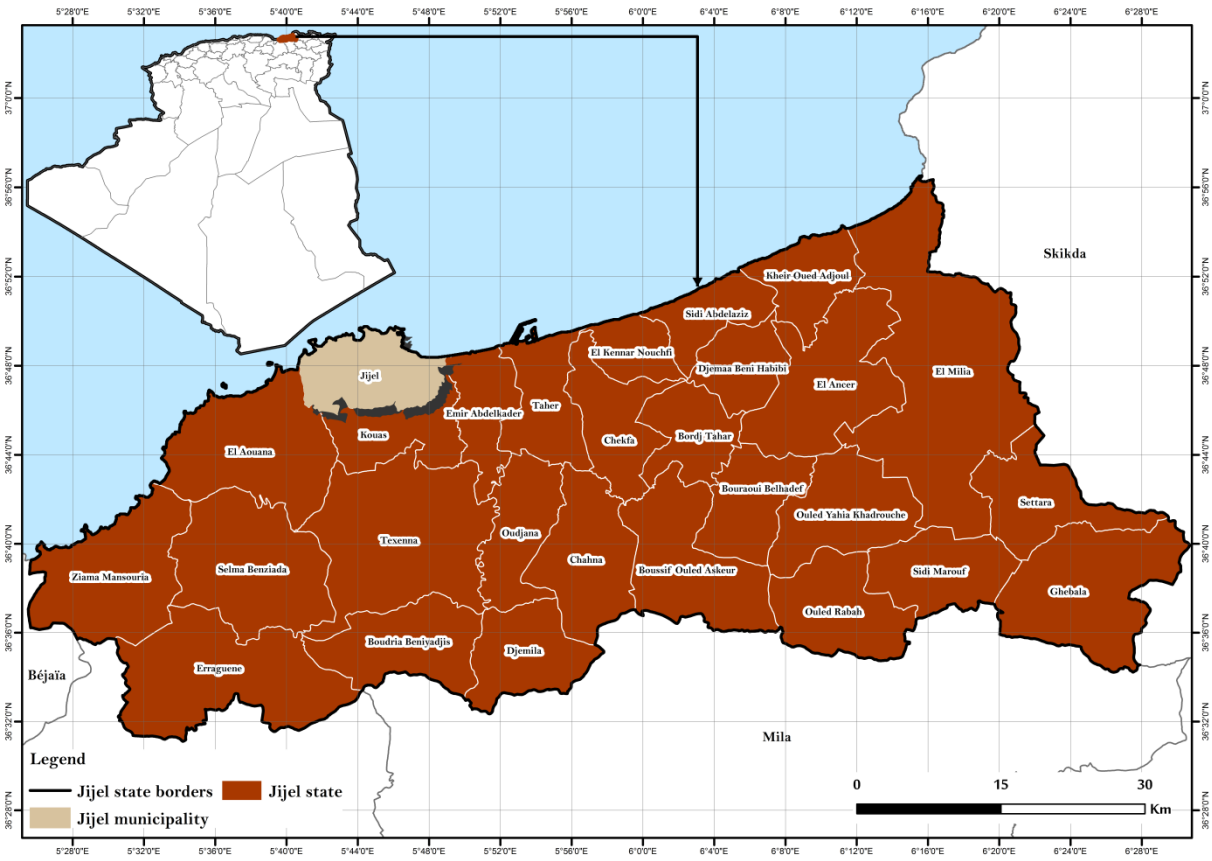
1.1. Geographic Location of the City:

The Jijel Province is located in the northeastern part of Algeria, between latitudes 36°46' and 36°50' North and longitudes 5°40' and 5°49' East. It is bordered to the north by the Mediterranean Sea, to the east by Skikda Province, to the west by Bejaia Province, and to the south by Mila Province, as shown in Map 01.

Jijel Province belongs to the coastal region that geographers have named "the hill," which corresponds in northeastern Algeria to a strip of land extending from the sea to a depth of between 50 and 800 km inland. It consists of small coastal plains, low coastal cliffs, and low hills cut into soft deposits resulting from the influence of the adjacent Mediterranean Sea: heavy rainfall, dense vegetation, and a permanent river flowing northward. The province covers an area of 2398.69 km².

The city of Jijel is located in the north of the province, with an area of approximately 6238 hectares. It is bordered by:

- The Mediterranean Sea to the north,
- Qaous municipality to the south,
- Amir Abdelkader municipality to the east, and
- El Ounane municipality. See Map 01.



It has an area of 6238 hectares, which represents 2.6% of the land area of Jijel Province, and its population is estimated at 163,055 inhabitants according to the municipal technical service census of 2019, which represents 21.13% of the total population of Jijel Province. It has a medium population density of 2140 inhabitants per km².

1.1 Evolution of Urban Growth in the City:

The urban development of the city of Jijel has gone through four stages:

- **The first stage:** The central nucleus was formed with a specific building system characterized by houses built of bricks and solid stones, distinguished by their contiguous and closely connected walls. This character formed a valuable architectural heritage that should have been preserved over time, but unfortunately, reality proves otherwise as the condition of these buildings is gradually deteriorating.
- **The second stage:** This was marked by the formation of suburban neighborhoods, including the neighborhoods of Fobour (village nègre), the nursery (la pépinière), the summit (la crête), Mustapha (madame jeanne), the clock (La vigie), and Assaous (beau marché).
- **The third stage:** This involved the restructuring of the old city by incorporating buildings for various facilities (administrations, banks, security...) and expanding towards the Ayouf plateau through new urban residential areas (ZHUN-1-2-3). This stage is characterized by adding a modern touch to the city through vertical buildings (using reinforced concrete).
- **The fourth stage:** This involved the fusion of the urban fabric with the secondary semi-urban settlements surrounding it, namely Oulad Boualenar from the west and the Harathen area from the east. A new city was also established on the Mezghitan plateau.

In embodiment of the objectives set forth in the review of the directive plan for planning and development for the municipality of Jijel, 19 land use plans were maintained, in addition to 4 plans in the secondary settlements, with the addition of new plans in Mezghitan and the eastern entrance. Other plans are also intended for future expansion, and the southern region (Tawalbia) was designated for long-term future expansion.

As a result, the city of Jijel has become an urban fabric that combines housing in its various forms and different land uses. We have chosen to distribute these uses across urban sectors in order to achieve a more accurate and comprehensive analysis.

From this, it is clear to us that two factors have had a significant impact on the city's plan and urban expansion:

- **Topographic factor:** The topography has been an obstacle to the expansion process, especially on the southern side of the city, unlike the center, which has a good foundation for construction and a gentle slope that facilitated its planned and organized establishment.
- **Road axes:** Expansion often follows the same direction of the road on one or both sides:
  - National Road No. 43 extends along an east-west axis passing through Jijel from Skikda to Souk El Athnin (Bejaia) and crosses the municipality of Jijel in its northern part for a length of 16.25 km. This road ensures the regional connectivity of the city.
  - National Road No. 77 extends along a north-south axis passing through Jijel, Setif, and Mila, and crosses Jijel for a length of 2 km, contributing to connectivity with the municipalities of Qaous, Taksenna, and Jimla.
  - Provincial roads: There is one provincial road that crosses the municipality of Jijel, which is provincial road No. 150, as it crosses Jijel to Qaous for a length of about 3.25 km.

The reasons for urban expansion can be summarized in three main factors:

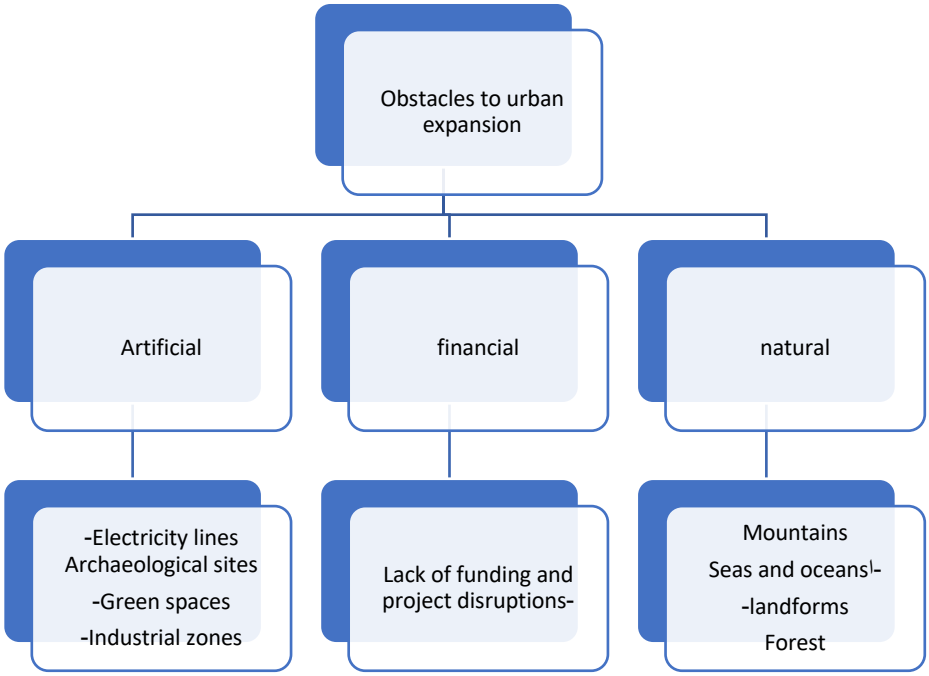
Demographic factor: This results in a greater consumption of space.

Political and administrative motivations: Once any population cluster is classified as an urban center (municipality, district, province), it receives a strong push in the growth movement, leading to significant consumption of space.

Economic motivations: The economic development of a city makes it a center of attraction, leading to rural exodus and migration, which in turn leads to the consumption of urban space and the expansion of the city.

Social motivations: The social improvement of some cities makes them a center of attraction for the population, leading to an increase in their population and consequently an increase in the demand for housing and facilities, leading to encroachment on neighboring areas, which is a factor in rapid urban expansion.

4-1-Constraints on Expansion: We have represented these constraints in the following diagram:



In order to gain a comprehensive understanding of the city's urban realm and conduct a thorough and accurate analysis, we have divided the city of Jijel into urban sectors. This division is aimed at analyzing and diagnosing the degree of coherence of its urban area. In this analysis, we have relied on the following criteria:

- Stages of urban development
- Residential settlements and their patterns
- Boundaries of land use plans
- Main and secondary road axes
- Watercourses

Through this, we have obtained 7 urban sectors as shown in the following

Urban Sectors	**Neighborhoods it includes**
Sector 1	Beach neighborhood, Boumarché, Fobour, Mustafa and Belhaine neighborhoods, Al Al Maqasib, Moussa neighborhood
Sector 2	40 hectares, Ouled Aissa, University, 1000-housing unit neighborhood, Ben Achour
Sector 3	Moussa neighborhood, Al Maqasib
Sector 4	Al Aqabi, Al Shamaim
Sector 5	Harrathen, Eastern entrance to the city, The third kilometer
Sector 6	Al Hadada, Bouarmel, Al Bargouqa
Sector 7	Oulad bounar

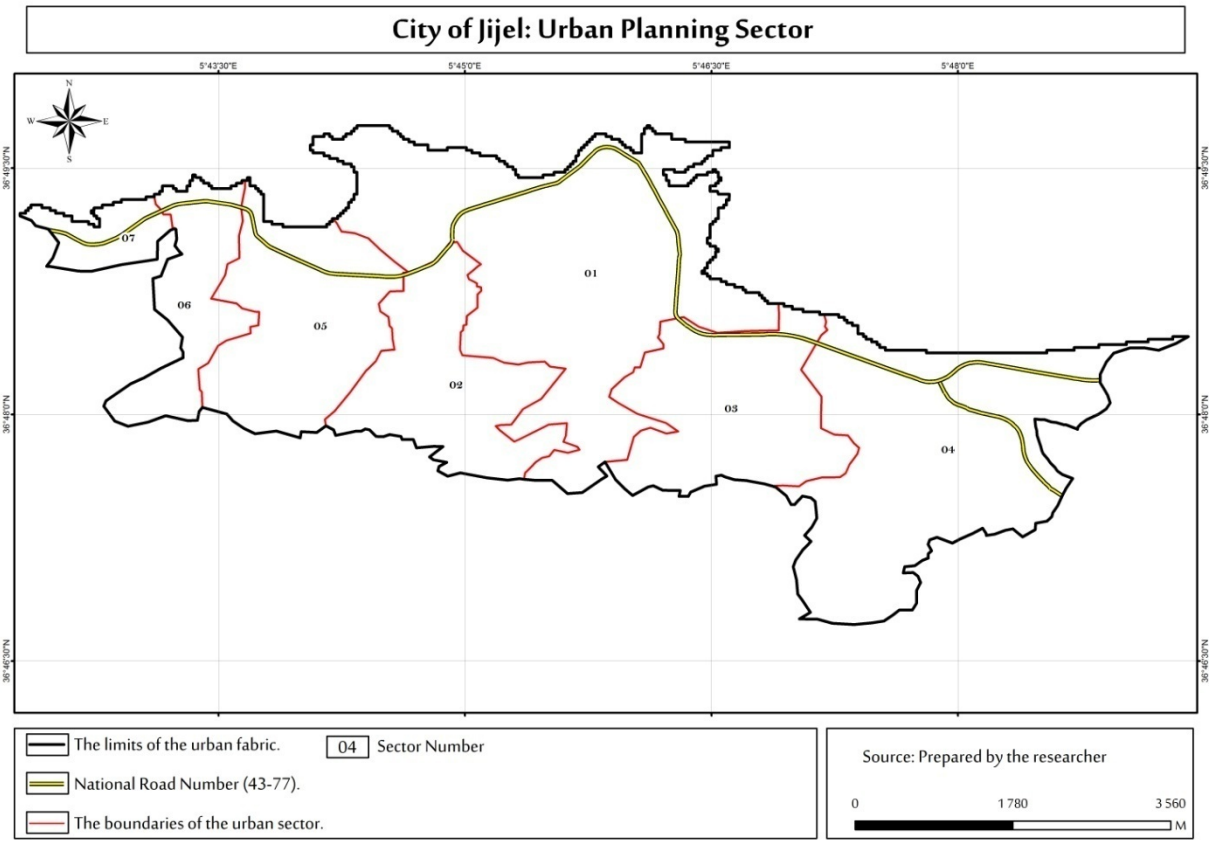


Table 1: Spatial Distribution of Population and Housing in Jijel's Urban Areas

Urban Sectors	Population **(hab)**	Population density	Number of dwellings	Housing density (dwelling units per hectare)	Number of households	Area (hectares)
Sector 1	49866	80.27	16587	26.69	13231	621.39
Sector 2	31992	110.51	8412	29.05	7387	289.48
Sector 3	14952	39.23	4001	10.49	2971	381.08
Sector 4	18868	43.11	6456	14.75	4070	437.61
Sector 5	19300	67.81	5188	18.22	3951	284.6
Sector 6	5235	33.82	3284	21.21	585	154.79
Sector 7	945	15.14	762	12.21	386	62.38

Source: Master Plan for Urban Planning and Development + Data Processing

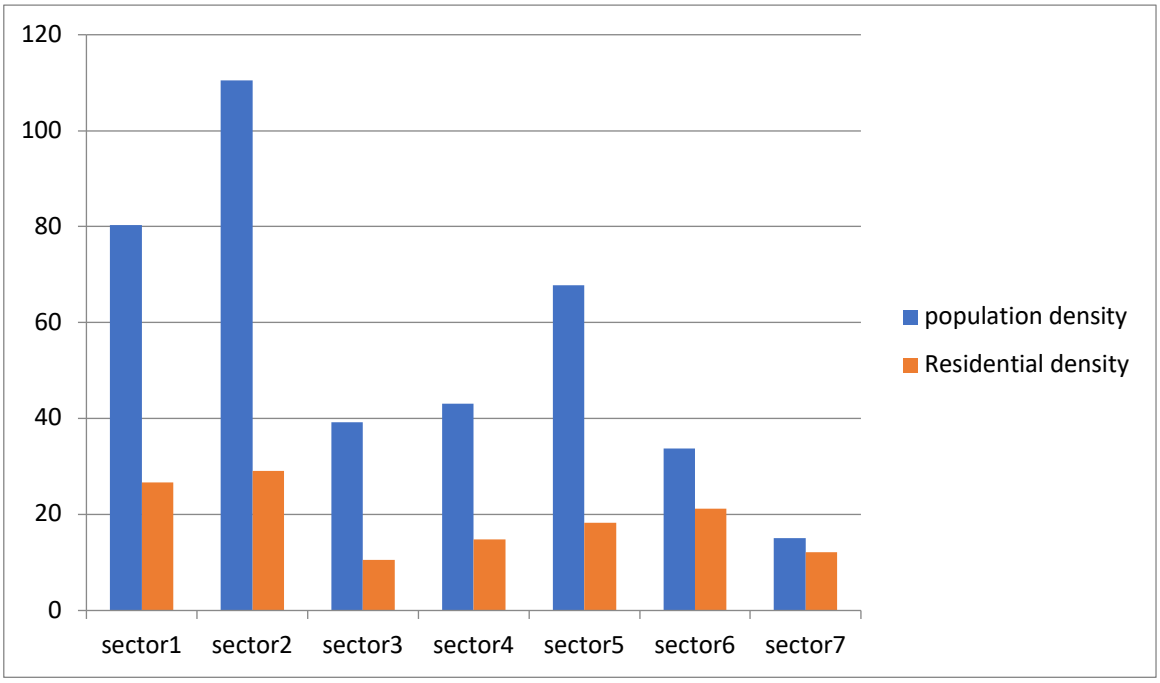
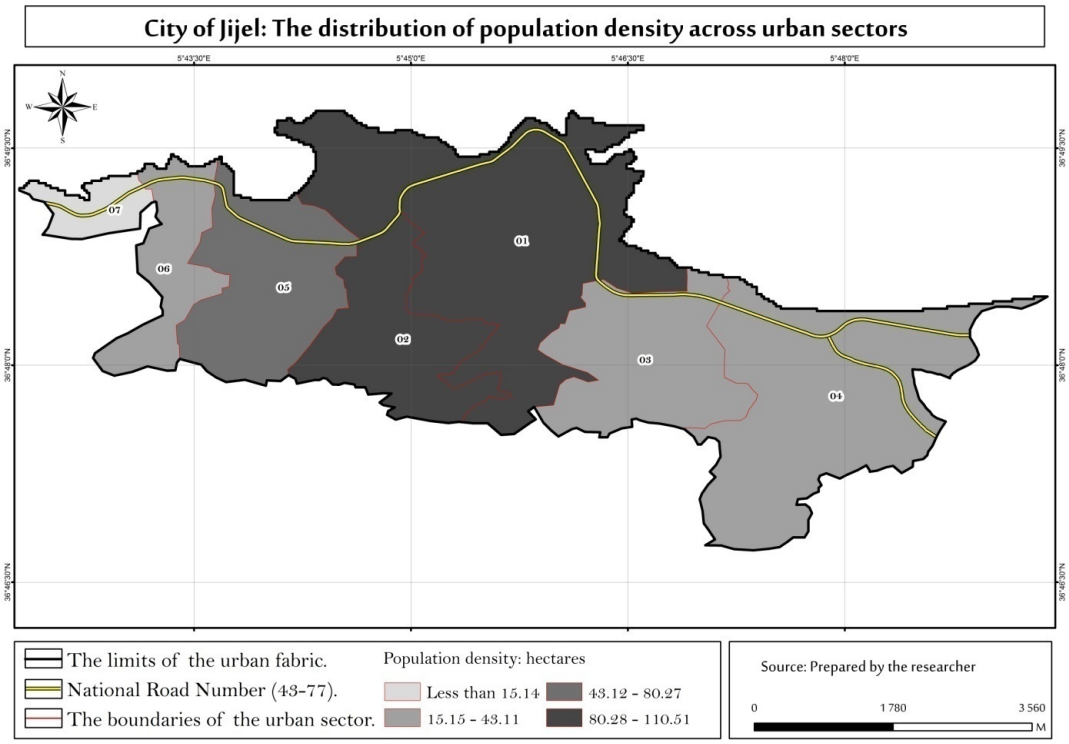


Fig. 1:Population density and Residential density of urban sectors.

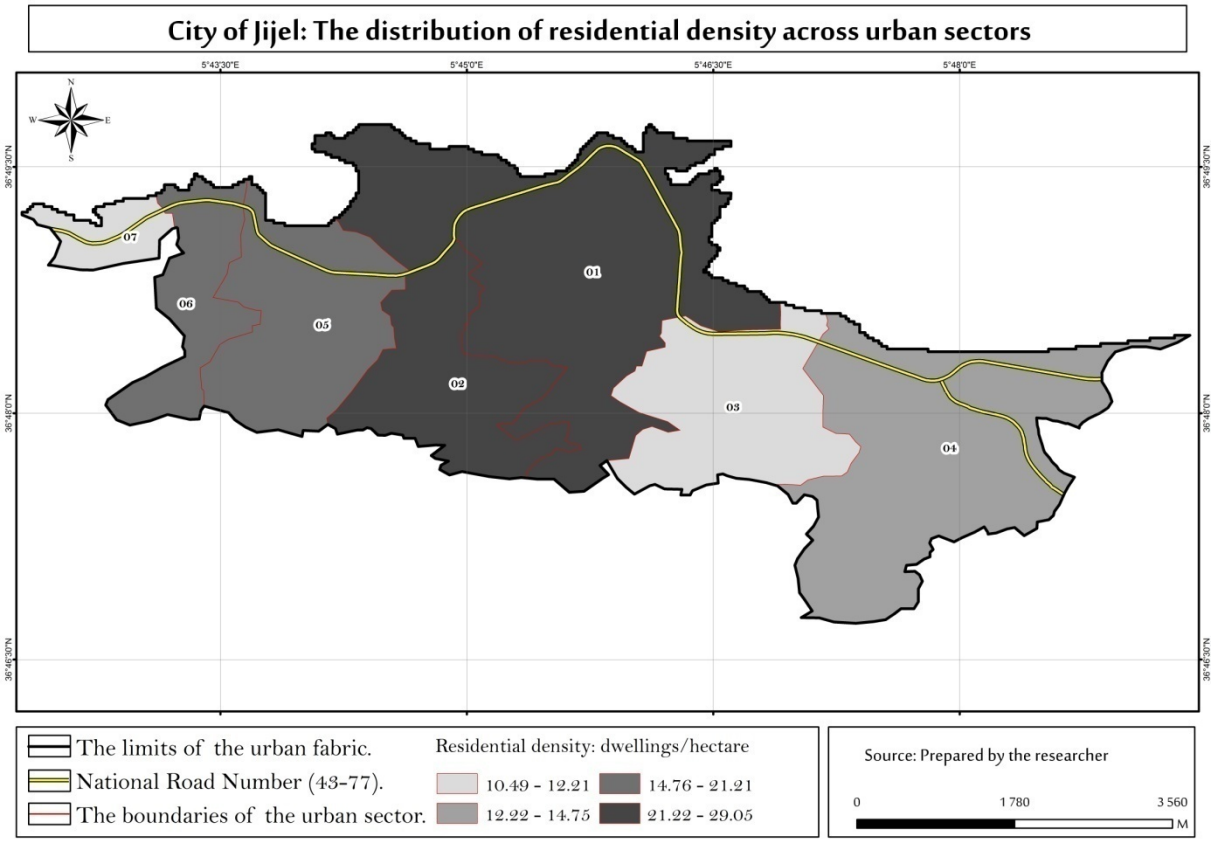
Population Density:

The average population density in the city is approximately 55.69 people per hectare. The highest density is found in Sector 2, reaching 110.51 people per hectare, with an estimated population of 31,992. This is due to its dense urban fabric and being the city's primary expansion area. Following this is the first urban sector with a population of 49,866 and a density of 80.27 people per hectare. This is attributed to multiple families residing in a single dwelling. Sector 5 comes next with a population of 19,300 and a density of 67.81 people per hectare, owing to its medium-density fabric. Sector 4 follows with a population of 18,868 and a density of 43.11 people per hectare, and Sector 3 with 14,952 inhabitants and a density of 39.23 people per hectare, as both sectors cover a large area. Sector 6 has a population of 5,235 and a density of 33.82 people per.



Residential Density:

The average housing density in the city is approximately 18.94 dwellings per hectare. The highest density is found in Sectors 1 and 2, with a total of 16,587 and 8,412 dwellings, respectively, resulting in a housing density of 26.69 and 29.05 dwellings per hectare. This is due to the large number of dwellings and their strategic location, which is equipped with various essential facilities and services. Following these are Sectors 5 and 6, with 5,188 and 3,284 dwellings, respectively, and a housing density of 18.22 and 21.21 dwellings per hectare. Sector 5 is characterized by a predominance of dwellings over facilities, while Sector 6 is considered a new city designed to relieve the population pressure on the main city and is expected to experience continuous growth in housing density. Sector 4 comes next with 6,456 dwellings and a density of 14.75 dwellings per hectare. This sector contains collective dwellings, although at a lower rate than Sector 6. The lowest housing density, below the average, is found in Sectors 3 and 7, with densities of 10.49 and 12.21 dwellings per hectare, respectively. This is due to their small size and the prevalence of areas unsuitable for development.



Result and Discussion

2- Evaluation of the level of urban coherence in the city of Jijel:

2-1- At the Legal and Regulatory Level: This will be achieved through:

An analysis of the types of urban violations present in the city: Like other Algerian cities, Jijel is not exempt from urban violations that mar the urban and aesthetic appearance of the city. Through this element, we will study the urban violations in each urban sector of Jijel in order to assess the degree of urban coherence and the extent to which.

Table 2: Distribution of Urban Violations Rates in Jijel by Urban Sector

	CES Exceeding	Exceeding COS	Non compliance with building alignment	Facade renovation of a residential building	Building repurposing	Unauthorized construction	Dumping construction waste on the road
Sector 1	3%	5%	2%	19%	11.6%	5%	8.48%
Sector 2	23%	27%	13%	13%	45%	7%	6%
Sector 3	71%	62%	81%	23%	17%	33%	12%
Sector 4	10%	20.2%	63%	19%	12.6%	41%	46%
Sector 5	45%	30%	60%	65%	13%	48%	30%
Sector 6	5%	4%	5.3%	45%	50%	4%	16%
Sector 7	81%	85%	95%	55%	12%	70%	50%

Source: Based on 2024 field survey data.

- CES: Ground floor coverage ratio: This ratio represents the proportion of the total land plot area occupied by the ground floor of a specific building

$$GFC = \frac{Built\ up\ area}{plot\ area}$$

This indicator is estimated at 0.60 to 0.65 (60% to 65%) in Algeria.

- COS: The Coefficient of Surface (COS) varies depending on the building type and height. This index can be used to identify the building type, whether it`s individual or collective

$$COS = \frac{total\ floor\ area}{plot\ area}$$

COS = Total Gross external area /Total plot area

Gross external area (GEA): This is the sum of the areas of all floors (excluding balconies, stairs, and networks). The surface area is calculated if it exceeds the built-up area.

Individual building COS > 1.8

Apartment building < 2

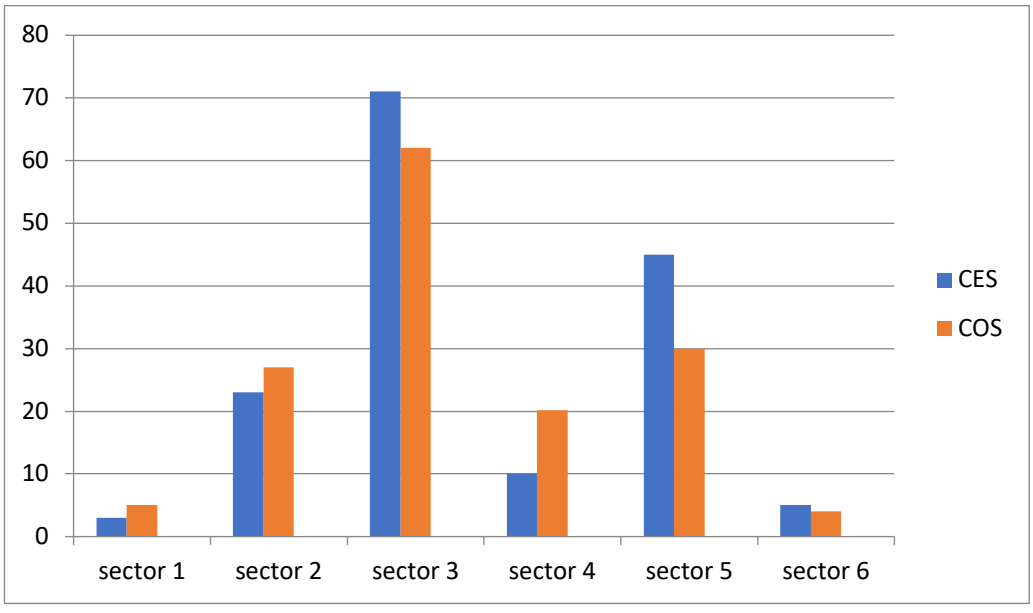


Fig. 2 :Bar chart showing CES and COS in different sectors .

The city of Jijel faces several urban violations, including excesses in the CES and COS ratios. These violations are found at a low rate in buildings in Sector 1, ranging between 3% and 5%, which is considered the city center. This is due to the lack of real estate pockets, and most ground floors are used for commerce. These violations are more prevalent in Sector 7, specifically in the Oulad Boualenar neighborhood, ranging between 81% and 85%. This is primarily due to the prevalence of informal housing, especially on the northern side (seafront) which lacks the most basic building and construction standards. Some dwellings have been scheduled for demolition, and there are violations related to modifying facades (balconies), which legally should be 50 cm but have been extended to 1.5 m by residents. These are particularly common in Sector 1, the city center, at a rate of 19%.

Additionally, there are violations related to modifying windows and doors, building within 2 meters of the sidewalk, and building in the garden. Most of these violations are concentrated in Sectors 1 (city center) and 2. Regarding building without a permit, this violation is widespread in Sector 5 at a rate of 48% and in Sector 7 at a rate of 70%. Sector 4 also has several buildings without permits, except for state-owned facilities which are exempt from violations. There is also a violation related to encroaching on state land in Sector 5.

The city of Jijel is free from urban violations in Sector 6, a new neighborhood known as the new city of Mezghitan. The western side of this sector has allocations free from urban violations, and its facades are complete, except for buildings that are still under construction and can be considered open construction sites.

2-2 Assessment of Urban Equipment in the City:

The city of Jijel has experienced animbalance in the distribution of various urban facilities within its urban area. The majority offacilities, particularly administrative and financial ones (the administrative district), wereconcentrated in the city center. However, local authorities have recently alleviated thepressure on the center by relocating the administrative district to the eastern entrance of thecity, aiming to decongest the center and promote a more balanced distribution of facilities.

3- Classification of Urban Sectors Based on Their Level of Coherence: After studying and evaluating the level of coherence in each urban sector, we classified them according to this table based on their degree of coherence.

Urban Sectors	Allocations	Collective housing	Informal individual housing
Sector 1	1	1	1
Sector 2	0	1	1
Sector 3	1	0	0
Sector 4	1	0	0
Sector 5	0	1	1
Sector 6	1	1	1
Sector 7	0	1	0

Source: Field investigation 2024

(0): Incoherence

- The coherence is not present in the specified area.

(1): Coherence

- The coherence is present in the specified area.

Based on the table and the aforementioned data, we conclude that the city center, specifically Sector 1and Sector 6 (Mazghitan district), exhibit the highest level of urban coherence. These sectors are the most organized and coherence compared to other sectors, particularly in terms of building connectivity and height in both collective and individual housing units. In contrast, other sectors are characterized by variations in building heights and a high proportion of unfinished construction.

4- Urban interventions at the city level to create urban coherence:

Interventions in the built environment:

Interventions on dwellings: Interventions on dwellings are determined by their legal status, condition, and location within the urban area. There are several cases, including:

First: Demolition: This involves the demolition of buildings that do not meet the minimum construction and building codes. These are buildings whose situation cannot be regularized and that significantly disfigure the urban area. These are buildings that violate building and construction regulations, such as those connected to weak structures and at risk of landslides.

Second: Rehabilitation: This involves interventions on old buildings in a moderate state of disrepair, located in the city center, through rehabilitation. This is done to preserve the identity and protect historical landmarks.

Thirdly: Legal Regularization: Decree No. 01-85 of August 13, 1985 was enacted to regularize the status of unauthorized buildings that violate urban planning regulations. The regularization process aims to legalize buildings in terms of land ownership and building permits.

The most important points of this law include:

- Incomplete buildings: A building permit will be issued to complete the construction contract.
- For those who have a building permit but violated it during construction, the building will be reconciled with the permit through a new urban planning scheme.
- For completed buildings without a building permit, a permit will be issued to regularize their status.
- For buildings whose owners have neither a permit nor a construction contract, the possibility of regularization will be studied.
- Issuance of a building permit or work permit for buildings that comply with urban planning and construction standards, as well as for buildings that can be made to comply with these standards.

Building Conformity and Completion Law:

Legalization of property in accordance with Law 01-85:Law No. 08-15 of January 20, 2008

This law defines the rules for building conformity and completion. It is one of the most important new laws in the field of urban planning and engineering, and aims to:

- Put an end to cases of unfinished buildings.
- Achieve conformity for completed or partially completed buildings before the law was enacted.
- Determine the conditions for the occupation or use of buildings.
- Establish deterrent measures for non-compliance with construction deadlines and urban planning regulations.

The concept of conformity under this law includes four categories of buildings (buildings covered by this law). Therefore, all citizens and property owners are required to obtain a certificate of conformity or a regularization permit in accordance with the law, depending on the category:

1. Unfinished buildings for which the owner has obtained a building permit.
2. Completed buildings that do not conform to the issued building permit.
3. Completed buildings for which the owner has not obtained a building permit.
4. Unfinished buildings for which the owner has not obtained a building permit.

For collective housing, the following interventions are required:

- Eliminating distortions resulting from additions made by residents in the building.
- Paying attention to the external appearance of buildings, especially in the second sector.
- Repainting buildings located in the city due to exposure to humidity near the sea, and eliminating violations by removing air conditioners.
- Maintaining and renovating buildings to give them a good appearance.

To address and resolve the urban disorder that has characterized the urban areas of Jijel city, and to foster a cohesive urban environment and provide solutions to existing challenges, we propose the following recommendations:

- Citizen engagement in the organization and administration of the urban realm through the establishment of neighborhood committees.
- Specification of dimensions and criteria for architectural forms, ornamentation, apertures, colors, and building materials employed in facade design to ensure overall aesthetic coherence.
- Adoption of a zoning pattern to densify the urban fabric of the city.
- Continuous urban surveillance by local communities and enforcement of urban planning and construction regulations upon residents.
- Establishment of a municipal urban police force to monitor the urban milieu.
- Finalization of regularization processes.
- Mandating adherence to specified construction timelines by residents.

- Fostering urban integration of informal settlements and addressing all are.

Interventions at the level of the unbuilt framework :

Interventions at the road level :

- Road interventions will vary according to their classification and hierarchical level, aligning with established standards.
- In the city center (primary sector), characterized by wide roads in good condition, interventions will involve repairing or replacing non-compliant public lighting fixtures.
- Furthermore, efforts will be made to enhance the urban green infrastructure by increasing tree density on sidewalks and islands.
- Traffic management, particularly during the peak summer season, will be prioritized.
- Existing parking facilities will be upgraded, and new ones will be created to address congestion. The city's sole passenger station will be modernized.

For informal settlements, allotments, and collective housing, interventions will focus on the following: Regarding secondary roads, which are in moderate to poor condition, the following interventions are required:

- Paving and developing sidewalks to facilitate pedestrian movement.
- Cleaning and installing new drainage systems to prevent flooding during winter.
- Covering all neighborhoods with a public lighting network and providing appropriate furniture.
- Planting trees to enhance the aesthetic appeal of the roads.
- For tertiary roads, the following interventions are required:
- Paving roads and constructing sidewalks where space permits, especially in informal settlements.
- Providing public lighting, particularly in informal settlements.
- Planting trees on sidewalks.
- Creating parking spaces as most city residents suffer from a shortage of them.

The city center has a relatively adequate amount of green space compared to other areas. To further enhance this, vacant and non-developmental sites should be converted into green spaces. Furthermore, public squares should be well-designed and equipped with appropriate seating and urban furnishings.

- Interior spaces between buildings should be developed into child-friendly play areas
- Planting trees on sidewalks to cool the air and beautify the surroundings.
- Landscaping slopes by planting trees to prevent soil erosion, enhance the area's aesthetic appeal, and creating stairs to facilitate movement.
-

Environmental interventions:

- Implementing strict laws against littering.
- Setting specific nighttime hours for taking out household waste.
- Replacing old garbage containers with new ones and distributing garbage containers to informal settlements.

Stakes :

At the level of work and economic development:

- Developing the railway system.
- Expanding the airport and making it international.
- Developing and improving the level of facilities.
- Encouraging tourism investment.
- Organizing various cultural events.

At the level of social cohesion:

- Addressing the phenomenon of rural exodus and its resulting problems.
- Eliminating unemployment.
- Relying on planning and strategic standards in labor policy.
- Embodying solidarity through mosques, associations, and other entities.
- Providing social security.
- Monitoring markets and promoting commercial activities.

At the living environment level:

- Maintaining water distribution networks.
- Equipping each citizen with a water meter to ensure rational water consumption.
- Linking various directorates (health directorate, Algerian water company, irrigation directorate) and different sectors to monitor the potability of water.
- Providing treatments at health centers and multi-service clinics and raising awareness among the population of the need to move to treatment units located at the level of their neighborhoods.
- Providing private clinics at the level of Jijel city.
- Creating a technical center for waste disposal outside the city of Jijel.

At the level of the external environment:

- Creating landscaped green spaces.
- Taking the necessary precautions against various significant hazards such as earthquakes, floods, etc.

At the level of urban planning:

- Rational reorganization of space with a halt to urban sprawl.
- Optimal utilization of existing space through renovation and restructuring without neglecting vacant spaces.
- Development of green spaces.
- Removal of informal settlements and their replacement with green spaces.
- Finding opportunities to develop mountainous areas.
- Implementation of urban development and renewal policies.

Conclusions.

Through the study of the urban spatial coherence of Jijel city, we have observed a lack of coherence between the various urban sectors, particularly in terms of buildings. This is due to the unregulated construction by residents, who have violated building and urban planning laws, resulting in a heterogeneous urban environment. There is an overlap between residential patterns in various urban sectors, with most housing units being open workshops, and the presence of informal settlements in the northern part of the city. We have also observed an imbalance in the distribution of various equipment and facilities, which has created disparities between city sectors. Additionally, some technical networks in certain neighborhoods have deteriorated, and there is a complete absence of green spaces and children's playgrounds. To address this imbalance and lack of coherence in the urban components of the city, it is necessary to develop an urban coherence plan. This requires concerted efforts between the concerned authorities and residents to organize and enforce the existing laws, ensure a fair distribution of various facilities across all urban sectors, and attempt to regularize the status of informal settlements and remove dwellings that do not meet the required standards to improve the overall urban appearance of the city.

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