

The Architectural and Urban Quality of the Built Environment in Algeria: Challenges and Issues

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Abstract

Demographic growth and migration movements have led to uncontrolled urban expansion and significant deterioration of the urban environment in Algeria. This has led to a loss of identity and decline in architectural and urban quality, despite the presence of laws and regulations that are often inadequately enforced, resulting in loss. This study explores the current state of architectural and urban quality on a broader regional scale. The article illuminates the profound transformations, challenges, and issues associated to the development of the built environment over recent decades. It elucidates the process of unplanned urbanization, uncontrolled expansion, and proliferation of illegal constructions, which have affected both traditional and colonial architectural heritage. This article provides a qualitative analysis of urbanization dynamics, examines architectural design practices, and explores the impact of modern design flaws on the built environment. Particular attention is given to traditional and patrimonial architecture by highlighting its advantages and qualities through key features such as, the courtyards, local material, windcatchers, compactness and the use of colors known for their climatic adaptability and ecological sustainability. The analysis underscores the importance of reviving principles of traditional building practices and incorporating them into contemporary contexts. Modern design errors, often poorly suited to local conditions, are identified as significant contributors to architectural and urban decline. Relevant solutions were sought, including the integration of heritage protection legislation, the adaptation of modern projects to climatic realities, and the enhancement of traditional and patrimonial architecture.

1. Introduction :

Over the last decades, Algeria's architectural and urban landscape has experienced significant transformations. Recent shifts in social, cultural, and political spheres have greatly impacted both planned and spontaneous architectural and urban development. Form and space are not architecture. Architecture only happens when there is a person to experience it (William Wayne Caudill, 1971). Architecture is defined as the art of transforming, designing, and constructing buildings, interiors, cities, landscapes, and outdoor spaces according to specific aesthetic, technical, economic, social, and environmental criteria. Architecture creates protective volumes that shelter human beings, in the various aspects of their lives, from all natural and artificial disturbances. Architecture is a multidisciplinary field that cannot ignore geometry, physics, mathematics, philosophy, sociology, law, politics, and technology. It is a discipline that combines the art and science of constructing terrestrial or naval buildings and structures. The classical definition of architecture, as found in the writings of Vitruvius (Fleury 1990) is based on a harmonious and balanced combination of three fundamental principles: utility, solidity, and beauty. Utility involves functional, practical, and economic aspects. Solidity encompasses structural strength and ecological durability. Beauty and attractiveness refer to the qualities of buildings and the built environment, which must now be given a more precise meaning than before. Architecture is linked to time and place. Time connects buildings and their environment to our cultural heritage and history. Place connects architecture, environment, and nature (Schulz 1980). Architecture is important because the built environment is the physical framework of human activities,

and architecture plays a crucial role in the quality of this framework. Many strong meanings are associated with architecture, and it is one of the components of national and local identity (Giedion 2009). The cultural environment of cities and countryside represents part of our wealth. Different historical periods must be respected (Choisy 1899). An architect (from the Greek *arkhitekton*, meaning "master builder") is often a creative professional whose job is to design (through drawings and plans) and oversee the construction of buildings (Hanrot 2002). More broadly, the architect works with space and creates spaces: surfaces (facades, floors, areas...), like a painter; volumes (spaces of connection and

perception), like a sculptor; atmospheres (light, color, texture effects), like an artist (Ching 2023). The profession of architect as it is understood today—as a liberal discipline (non-mechanical and closer to arts and sciences than to manual building trades)—is relatively recent in the Western world. It dates back to the Renaissance, 16th century. In most societies before the Renaissance, “architects” already existed, more precisely called master masons or master carpenters. They combined the roles of what we now call architects, engineers, and contractors, but were mainly responsible for the technical aspects of major constructions ; prestigious public or private buildings (Avermaete and Teerds 2016). Outside these exceptional cases, buildings were constructed by their occupants using patterns developed over centuries through experimentation, without the need for specialists. This process is known as vernacular construction or typological building (Burr and Jones 2010). Urban planning is both an academic and professional field concerned with the study of urban phenomena, the process of urbanization, and the organization of cities and their territories (Scott and Rowe 1977, Taylor 1998). Depending on academic traditions, this discipline is associated either with architecture or geography, but it also draws on sociology, economics, and political science. Thinkers such as Le Corbusier strongly influenced an architectural vision of the city, while scholars such as Henri Lefebvre developed a more social and critical approach to urban space (Stanek 2011). Urban planning focuses on the design, organization, and transformation of urban spaces, taking into account social, economic, environmental, and political dimensions (Benevolo 1971, Benevolo 1977). Historically, modern urban planning emerged in the 19th century with industrialization and major urban reforms, such as those led by Georges-Eugène Haussmann in Paris (Benevolo 1977, Jordan 2004). These interventions aimed to improve hygiene, circulation, and control in rapidly growing cities (Levin, Forgan et al. 2010). Today, urban planning faces new challenges, including urban population growth, socio-spatial inequalities, and climate change. Organizations such as UN-Habitat emphasize the importance of promoting sustainable, inclusive, and resilient cities (Gupta 2025). The urban landscape refers to the totality of visible urban forms as perceived by inhabitants or observers. It results from the combination of built elements such as housing, buildings, and monuments; infrastructure such as roads and transport networks; and public spaces such as streets, squares, and parks. It also includes nature in the city, such as trees, gardens, and waterways, which help structure and enhance urban space. The form of the city, studied through urban morphology, plays a key role in shaping the landscape. Some cities have a regular layout, such as New York with its grid plan, while others, such as Paris, combine an old historic core with newer developments. The urban landscape also reflects the different functions of the city: living, working, consuming, and leisure, with each district often having a dominant function that shapes its appearance (Frampton 2020). However, the urban landscape is not limited to its physical aspects, as it also depends on perception. Urban theorist Kevin Lynch showed that inhabitants understand their city through visual landmarks, paths, and boundaries that structure their mental image of space (Lynch 1960). Finally, the urban landscape is constantly evolving due to urbanization and planning policies, which gradually transform neighborhoods, for example by converting former industrial zones into modern and attractive spaces. In the absence of appropriate strategies and cultural and environmental reflection, the rapid expansion of suburban areas has led to a decline in quality and an insufficient response to basic needs. Despite the richness of Algeria’s architectural heritage—Arab-Islamic, Amazigh, and colonial—the

current built environment seems to be evolving without clear reference points, gradually losing identity, coherence, and quality. It has become imperative—if it is not already too late—to initiate a debate on the future of architectural and urban quality in Algeria. In this context, many questions arise, both practical, political, and aesthetic.

Does architecture in Algeria fulfill its role in shaping identity?

Does it reflect the level of culture of its creators?

Does it project a sense of quality, and to what extent?

Can we truly speak of architectural and urban styles specific to and meaningful in Algeria?

What are we doing?

Architecture or “ANARCHITECTURE”: anti-architecture?

Urbanization or de-urbanization?

Building or deconstructing?

How can we save and transform the Algerian architectural and urban landscape in crisis?

How far can we go in transforming the architectural and urban product?

What solutions should be adopted in the face of an already critical situation?

2. Architectural quality: Criteria, issues, and evaluation tools

Except for the Modern Movement, which conceives architecture as an “isolated object,” every architectural project must take into account the environment, materials, climate, as well as the cultural and economic context. In this way, each building contributes to shaping the identity of the territory in which it is located. Architectural quality is the result, throughout the design and implementation process, of a coherent relationship between the program, its economy, its use, its siting and orientation, the site, materials, volumes, colors, and its cultural context (architecture is an expression of culture). High-quality architecture is architecture that reduces energy needs and creates a comfortable environment in occupied spaces, with pleasant temperatures, sufficient natural lighting, reduced noise, controlled ventilation, and respect for local culture. Quality seeks harmony between the function of the building, occupant comfort, and environmental respect, by making extensive use of architectural principles. This involves taking into account, during the design process, the environmental elements most influential on the future project. Project design should incorporate the positive aspects offered by the environment and eliminate those that are harmful to occupants’ well-being.

Two categories of elements can be distinguished:

- elements related to human factors
- elements related to the physical environment

Human-related elements include culture, history, etc. Physical elements are thermal, acoustic, visual, aerodynamic, and spatial. Thermal aspects concern solar radiation (sun exposure), ventilation (air circulation), ambient temperature, and humidity. Acoustic aspects concern noise from various sources. Visual aspects concern vision, natural lighting, and preferred views. Spatial aspects concern the site and its elements: topography, vegetation, and the surrounding built environment.

3. Current situation : overview and critical analysis

3.1 Deficiencies in architectural and urban spaces :

Blinded by the enthusiasm and urgency of rebuilding a modern independent state, and by the need to respond to the demands of a rapidly growing urban population, the built environment in Algeria is deteriorating and gradually losing its identity, heritage, and qualitative values. Uncontrolled urbanization, shortcomings in urban management, and the insufficient consideration of environmental issues are causing serious damage to the environment, as well as the degradation of natural resources and spatial quality. The city thus becomes synonymous with discomfort, insecurity, and poor living conditions for its inhabitants. Urban spaces are experiencing strong disintegration and a degradation of the built environment, characterized by arbitrary and standardized forms that are poorly adapted to climatic, cultural, and environmental contexts. This uncontrolled urban expansion leads to spatial dysfunctions, environmental deterioration, and a decline in residents' quality of life.

I must state here, with full objectivity, honesty, transparency, and clarity, that the situation is bitter and the assessment is negative. The situation is in an advanced stage of "illness," and there are no miracle solutions, at least in the short and medium term. There is, unfortunately, a tendency—marked by disregard for the symbolic and identity values of our country and at the expense of the sacrifices of Algerian society—to repeat, for many years, the same patterns of architectural and urban production, with the same mistakes, across the north and south, east and west, in urban and rural areas alike: mass housing estates, dormitory towns, illegal constructions, non-environmental subdivisions, and a lack of any national or local strategy. The use of generic solutions reflects a disregard for reference or original approaches drawn from our historical heritage.

3.1.1 From an architectural perspective

- 1- Low quality façades enhanced with expensive materials in various forms and styles, without providing thermal comfort. Lack of harmony and integration (figures 1-2). High-quality architecture is architecture that reduces energy consumption and creates a sense of well-being in occupied spaces, with comfortable temperatures, sufficient natural lighting, reduced noise, controlled ventilation, and respect for local culture. It seeks harmony between the building's function and the comfort of its occupants.



Figure 1. A façade composed of various styles and materials in Mila city (left). Two buildings owned by the same person with façades combining different styles and materials in Jijel (right).



(a)



(b)

Figure 2. In the city of Jijel : two juxtaposed buildings (on the same street) with non-harmonized architectural styles (a). Illegal individual construction in Ayouf Est featuring an exaggerated number of balconies at the expense of comfort; four air-conditioning units are installed to ensure comfort (b).

2- Large-scale housing developments with buildings of contradictory volumes and different architectural styles within the same neighborhood, which erode the urban landscape like unsightly “growths,” or extend into a bleak accumulation of stacked cubes (Figures 3-4).



Figure 3. On the same street in Jijel, buildings with different volumes and architectural styles are found side by side. There is a clear lack of integration and continuity in terms of style and scale: a five-story building (R+5) stands next to a two-story individual dwelling (R+2).



Figure 4. On the same urban frontage, individual and collective dwellings are juxtaposed without any sense of integration or harmonization, in El-Milia -Jijel.

3- Excessive vertical extensions without compliance with the urban planning regulations set out in the Land Use Plans (P.O.S.) result in the piling up of multiple storeys, which prevents sunlight from reaching neighbouring buildings during cold seasons (Figures 5a-b).



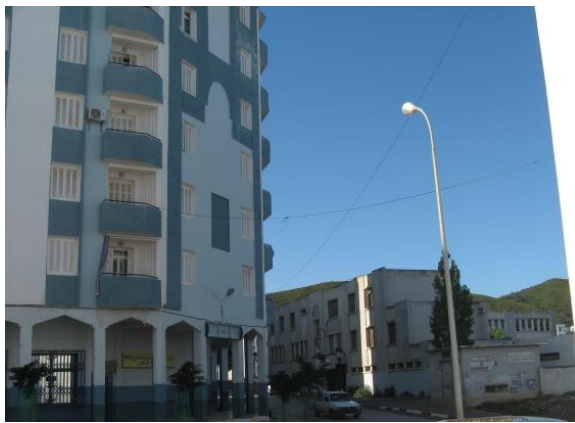
(a)



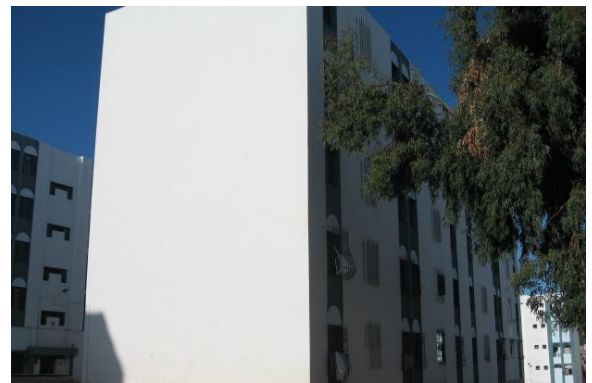
(b)

Figure 5. Excessive vertical extensions of building overshadows the surrounding low building levels in (a) 40 Ha, and (b) Village Moussa districts in Jijel city.

- 4- Design of large housing complexes without taking into account climatic factors, such as solar exposure during the cold season. A blank façade receives good morning sunlight, while the façade containing the openings remains in full shadow. This indicates arbitrary orientation (Figures 6a-b).



(a)



(b)

Figure 6. A newly constructed six-storey collective building casts morning shadow over a school (a), and open façades (b), located in the 40 Ha district in the city of Jijel.

- 5- Use of non-ecological and non-sustainable materials, which degrade the environment and reduce comfort (Figure 7). The use of poor-quality materials or defective workmanship in a collective building leads to the rapid deterioration of exterior wall finishes.



Figure 7. A façade in a deplorable condition due to poor-quality materials and substandard workmanship in Ayouf district (Jijel city).

6- Non-compliance with the construction standards for cavity wall systems is frequently observed in contemporary building practices. In some cases, walls are executed with a (10 + 15 + 10) cm configuration instead of the recommended (15 + 5 + 10) cm assembly. This deviation eliminates the required 5 cm air cavity intended to ensure proper thermal insulation performance. Such modifications are often motivated by cost reduction or construction speed, but they compromise the building's thermal efficiency. As a result, occupants experience increased heat loss in winter and excessive heat gain in summer, leading to higher energy consumption for heating and cooling systems. Ultimately, this practice reflects a short-term economic approach that undermines long-term comfort, durability, and environmental performance (Figure 8).



Figure 8. A poorly executed cavity wall in the Herraten district, in the suburbs of Jijel, constructed for cost-saving reasons but at the expense of thermal comfort and overall building performance.

7- Spatial anarchy is widespread; no one seems able to stop this proliferation of illegal constructions, the degradation of the natural environment, and the disregard for regulations. Electrical pylons are poorly positioned within an informal settlement, placed directly in the middle of the street. Advanced balcony structures extend dangerously close to electrical pylons, creating a risk of electric shock, reducing visibility, and further degrading the aesthetic quality of the façades (Figure 9).



Figure 9. Unsafe proximity of extended balconies to electrical pylons, causing safety hazards, reduced visibility, and visual degradation of façades in « Camp Chevalier » district (Jijel city).



Figure 10. Spatial appropriations (modifications) of public building façades (balconies) without authorization in 400 housing district (Jijel city).



Figure 11. Extended balconies obstructing pedestrian circulation on the sidewalk (a). Concrete flower boxes positioned at very low heights (b), causing inconvenience and sometimes leading to accidents in « Camp Chevalier » district (Jijel city).



Figure 12. Poor execution of a foundation in Herratene: the reinforcement bars of the ground beams are placed directly on the soil, without a blinding concrete layer.

3.1.2 From urban planning perspective

Urban extensions on the fringes of Algerian towns and villages, extending and encircling the old cities and colonial urban centers, have created residential areas that are dysfunctional with these existing structures. The old cities are characterized by a compact and dense urban fabric. The colonial urban centers are characterized by more open, regular, grid-like, and hierarchical layouts that follow a defined geometry. These are important features that the new urban extensions have been unable to replicate and integrate (Figures 13).



(a)



(b)

Figure 13. Urban extensions of the city of Mila (a) and Jijel (b).

The floods that occurred in Ghardaïa on October 1st, 2008, triggered by severe and dramatic weather conditions, illustrate the consequences of poorly planned urbanization on unsuitable land. The ancient Mozabites demonstrated great wisdom by avoiding construction on the wadi bed of the Oued M'zab (Figure 14).



(a)



(b)

Figure 14. New urban extensions : Ghardaïa, Melika and Beni-Izguen).

We are witnessing the emergence of true dormitory towns or “planned housing estates” — such as the “200-unit housing estate,” the “400-unit housing estate,” etc. — which degrade the urban landscape, as well as the quality of our living environment and overall well-being. The built environment in which we now live increasingly forces us to adopt a defensive stance, if not

to live in a state of anxiety. Should we speak of errors to be corrected, or at least not repeated?

In reality, the situation is not that simple. Urban sprawl, the rapid increase in urban populations, and the profound transformations of landscapes, mindsets, and production modes imposed by industrialization have led to a restructuring and functional reorganization of urban space. This process is difficult to control because it involves multiple interconnected issues, requiring a combination of expertise, political action, and administrative measures. High-rise buildings (R+6) with flat roofs that disrupt the silhouette of the village of Belghimuz, which is traditionally characterized by single-storey (ground-floor) houses with pitched, tiled roofs (Figure 15).



Figure 15. Degradation of the urban landscape of the former agricultural village of Belghimouz through the scattered development of collective housing buildings – Jijel.

The amount of land consumed by urbanization since independence has been very significant, despite the existence of legal texts aimed at protecting agricultural land and formally prohibiting its conversion to other uses. Pressure on agricultural land has intensified the already existing strain around urban areas, where villages and rural centers are weakened by the poorly planned expansion of peri-urban housing. Rather than fostering and stimulating rural development, this process has reinforced the divide between rural and urban areas. As an illustration, the urban expansion of Mila has taken place mainly on land with the highest agricultural potential (Figure 16a). In Jijel, planned and unplanned urban extensions are spreading over agricultural land, tourist sites, and sometimes into valleys and protected or restricted areas (Figure 16b).



(a)



(b)

Figure 16. Boussof housing subdivision developed on agricultural land in Mila (a), and Herraten in Jijel (b).



(a)



(b)

Figure 17. Social housing project of 1,173 collective dwellings in Harratene (a) – Jijel. Chemaïem Hill (b) in Jijel, a tourism potential site, is being urbanized and occupied by construction.



(a)



(b)

Figure 18. Uncontrolled urbanization on Laakabi (a), and Romane Riverbed (b) in Jijel.

4. Responsibilities: Key actors, roles, and levers for action

The responsibility for this unfortunate situation is widely shared and falls particularly on:

- The legislator, who enacts laws that are often ill-adapted to the cultural, social, and environmental context. Building legislation is a fundamental tool. Its purpose is to define the framework and create the necessary conditions for balanced community development and for construction in general. It should foster a high-quality architectural and urban living environment. When building regulations fail to achieve satisfactory outcomes, alternative strategies must be explored.
- The State, which bears a multiple and extensive responsibility in shaping the built environment. It must ensure the strict enforcement of existing regulations. However, legislation alone is not sufficient. Decree No. 94-07 of 18 May 1994, relating to the conditions of architectural production and the practice of the architectural profession, clearly states that the quality of construction, its integration into the surrounding environment, respect for natural and urban landscapes, and the preservation of heritage and the built environment are matters of public interest.

However, an Architecture, Urban Planning and Built Environment Committee has been established in each province (wilaya) to provide advisory opinions on the issues mentioned in the decree, but only when it is referred to by local authorities.

We are witnessing a lack of initiative and political will among decision-makers and professionals to confront this bleak and critical situation, as socio-economic concerns tend to prevail over rational planning. We are experiencing a “forward escape” policy that results in powerlessness in the face of crisis.

- Architects and construction professionals, who often lack sufficient creativity and in-depth knowledge of the environment in its broadest sense.
- Citizens, who do not respect the regulations governing building construction.

The absence of knowledge of identity-based architectural culture rooted in tradition and heritage among builders, citizens, and decision-makers further worsens the situation.

5. Solutions : Does Traditional and Heritage Architecture Offer Models of Quality?

In the past, most designers fully took environmental factors into account, particularly the local climate, when designing buildings. They were well aware of how to benefit from its advantages and avoid its constraints, while remaining within the limits of their available resources and means. Traditional architecture illustrates a wide diversity of methods and techniques for responding to the physical environment and often harsh living conditions, while ensuring comfort at both urban and architectural levels. It demonstrates how the site is used to provide protection, promote natural ventilation, facilitate drainage, and offer shelter from the sun, while adapting to a challenging local climate (Bouchair and Dupagne 2003, Bouchair, Tebbouche et al. 2013, Bouchair 2014, Bouchair 2015).

5.1 The Courtyard House

The principle of the courtyard house is often associated with hot and dry regions; however, it is also found in temperate climates, particularly in the Mediterranean region. This internal courtyard, sometimes referred to as a patio, constitutes the central element around which the house and its social and family activities are organized.

Its physical functions include:

- thermal regulation and ventilation
- natural lighting

Thermal regulation operates in two main ways:

Chimney effect ventilation:

The upper, sun-exposed part becomes warmer. Air in contact with these surfaces, due to its lower density, tends to rise and creates an upward airflow. Fresh air enters from lower openings located in cooler areas (basements, cisterns, shaded zones). The efficiency of this thermal pumping can be enhanced through evaporation (fountains, water flow, pools, vegetation, sprinkling or irrigation).

Heat deficit storage through nocturnal radiative cooling:

The mass (soil, walls, water) at the bottom of the courtyard heats up only slightly during the day and radiates heat at night toward the clear sky, especially when it has a high emissivity (light-colored surfaces, marble, etc.). This creates a sustained thermal deficit compared to the warmer external environment. Cold air masses, due to density differences, remain in spaces with only high-level openings, allowing the creation of distinct microclimates within open-air spaces. This method is widely used in M'zab architecture. These courtyards collect, through density differences, the cool air produced by contact with the ground surface when it has released its solar heat back into the night sky through radiation.

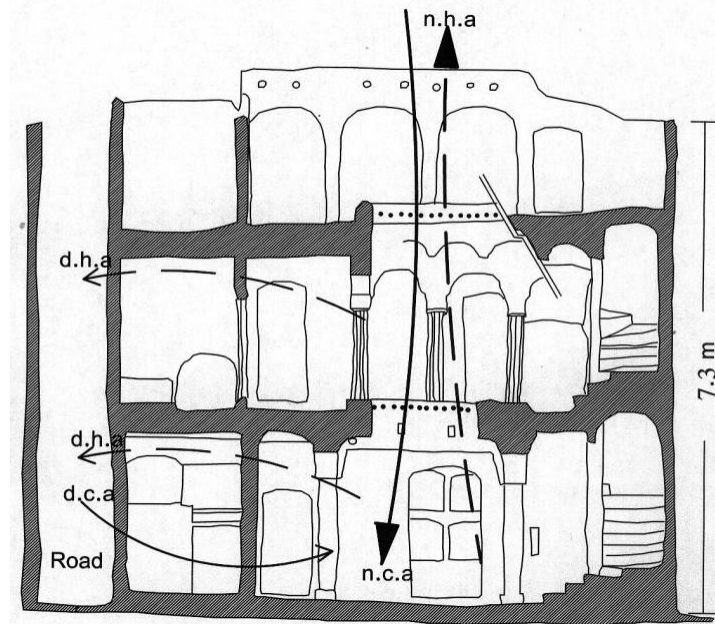


Figure 19. Schematic diagram for a typical courtyard used in M'zab architecture (Bouchair 2004). (d = day, n = night, h = hot, c = cool, a = air).

5.2 Wind towers :

In vernacular Arab-Islamic architecture, particularly in arid regions, buildings are often equipped with wind towers designed to capture cooler winds and channel them inside the structure (Bahadori 1985, Bahadori 2018). This passive system helps reduce indoor air temperature and improves thermal comfort by promoting natural ventilation (Figure 20).



Figure 20. General view of unilateral wind towers in Meybod, Yazd Province, Iran ((Lukhi 2018).

5.3 Building envelope using local materials with high thermal inertia

The external walls of a building envelope form its “skin,” through which a large portion of heat exchange occurs. High thermal inertia allows walls to store heat, thereby reducing the amount of heat retained in the air (Li and Xu 2006, Reilly

and Kinnane 2017). This is why old houses with thick stone walls remain cool during summer. In the hot regions of Algeria, vernacular architecture is distinguished by the use of locally available materials adapted to climatic conditions, including lime, natural stone, palm branches, and raw earth. These materials help ensure thermal comfort while also promoting the integration of buildings within their natural environment (Figure 21a). During the day, the building envelope acts as a thermal reservoir (Figure 21b). During the night, the heat stored in the envelope is partially released inside and largely dissipated outside (Figure 21c). Roofs are also constructed with thermal insulation properties such as palm brances and adobe (Figure 22).

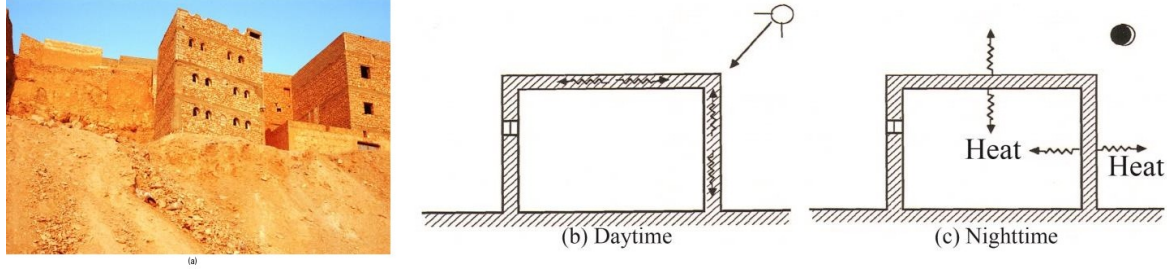


Figure 21. The use of high inertia material. (a) General view for a building in Melika, Ghardiaia. (b) Heat performance during the day. (c) Heat performance during the night .



Figure 22. Use of palm brances as insulating materials in roofing in Ghardaïa (Bouchair 2004).

5.4 Use of bright colors adapted to the climate

The use of bright colors adapted to the climate is an important architectural strategy in hot and sunny regions. Light-colored surfaces reflect a significant portion of solar radiation rather than absorbing it, which helps reduce heat gain within buildings and improves indoor thermal comfort (Pal, Goyal et al. 2020). By limiting the accumulation of heat on walls and roofs, bright colors contribute to lowering surface temperatures and reducing the need for artificial cooling (Yuxuan, Yunyun et al. 2020). In traditional architecture, especially in arid and Mediterranean climates, white and light earth tones are commonly used because of their high reflective capacity and their ability to respond effectively to intense sunlight. Beyond their environmental function, bright colors also enhance the aesthetic quality of urban spaces by creating visually pleasant and luminous environments (Figure 23).



Figure 23. Traditional use of bright colors for climatic adaptation in the Ksar of Ghardaia.

5.5 Exploitation and adaptation of settlement sites

Certain architectural practices, such as those found in the cities of the M'zab Valley, clearly demonstrate a long evolution of styles, materials, site adaptation, orientation, and the integration of all these elements within a hot and arid climate. The inhabitants adapted their dwellings to the environment by selecting the most suitable sites. They built their homes on hills overlooking the M'zab Valley in order to intelligently preserve the fertile agricultural land along the wadi, avoid flood risks, and facilitate the drainage of wastewater and runoff water (Figure 24) (Bouchair and Dupagne 2003, Bouchair 2004, Bouchair 2014).



(a)



(b)

Figure 24. Position of settlements on highlands and hills. (a) Melika Ksar, (b) Ghardaia Ksar.

5.6 Minimizing surfaces exposed to direct solar radiation or wind

To protect themselves from direct solar radiation, desert inhabitants construct their buildings in a compact manner by reducing the façades exposed to the sun (Figure 25) (Bouchair 2004, Bouchair, Tebbouche et al. 2013).



(a)



(b)

Figure 25. Clustered buildings in Ghardaia Ksar (a) and Ben-Izguen Ksar (b).

5.7 Providing shade and aesthetic value on façade

Architectural features are included into façades for both practical and decorative reasons. In addition to providing shaded areas that lessen direct solar exposure, inclined flat stones set into the façades aid in shielding structures from heavy downpours (Attia 2022). In a similar vein, the placement of bricks or stone masonry on façades enhances the architectural style and improves thermal comfort by creating shading effects. These strategies show how conventional building practices integrate architectural expression with environmental adaptability to improve both look and performance (Figure 26).



(a)



(b)

Figure 26. Façade design techniques for shading and climatic protection. (a) Flat stones embedded in an inclined manner for protection against torrential rain and for shading (b) Brickwork on facades to provide shade (in Yemen).

5.8 Use of small openings facing the exterior to avoid excessive heat



Figure 27. Building façades with small openings in El atteuf Ksar, Ghardaia.

5.8 Use of vegetation

Vegetation modifies the microclimate. The ideal species for hot, dry desert climates is the palm tree. Vegetation reduces the warmth of the ground and building surfaces by offering shade. It also lowers evaporation and soil erosion while using evapotranspiration to chill the surroundings. Additionally, vegetation produces timber for construction. It improves environmental comfort and safeguards constructed structures by acting as a natural filter, capturing dust and sand particles and creating a barrier against winds carrying sand. In general, vegetation contributes to the biological stability of desert areas, improves climatic conditions, and supports conventional building methods (Figure 27).



Figure 28. Palm grove of Beni Isguen in the M'zab.

5.9 Colonial heritage

Colonial towns and urban centers present a variety of physical settings and a diversity of architectural and urban landscapes, where public spaces contribute to the atmosphere of the city and enhance its visual identity. Colonial urban planning is well integrated into the site and is based on a strict cadastral layout, where street patterns are geometric and regular, and building façades are carefully ordered to define and structure the streetscape. Today, this form of urban design often appears more refined and coherent than that found in newer urban extensions, whether planned or informal, which are frequently less visually harmonious and less pleasant to the eye (Figure 29).



(a)



(b)

Figure 29. Typical colonial towns and urban centers (a) Jijel triangle, (b) Mila square.

The urban architecture of colonial cities can serve as a lesson for future urban transformations and changes. It represents a particular historical era that needs to be read, comprehended, and conserved. Both political commitment and extensive interventions targeted at its conservation are necessary for the preservation of this historical legacy. Regretfully, entire colonial-era cities have been destroyed to provide space for communal housing projects. The building forms of colonial architecture

in the city of Jijel display more rational and refined aesthetic and functional qualities than many contemporary buildings. They feature a limited number of balconies with shallow depths, onto which French windows open, while still respecting alignment and urban planning regulations. Sometimes French windows have no balconies and are just shielded by railings that line up with the façades. In addition to improving the openings and façades, simple ornamental features also contribute to the structures' overall architectural character and visual coherence. Large amounts of balconies are typically constructed on façades that face public areas (Figures 30).



Figure 30. Colonial buildings with adapted balconies located on 1st November Avenue.

6. Conclusion

Achieving high-quality architecture requires a thoughtful appreciation of history as a source of inspiration, insight, and depth rather than as a retreat or a rejection of modernity. In order to create contemporary architecture that is based on our social, cultural, identity, and environmental values, this approach entails utilizing, appreciating, and analyzing prior experiences. Architectural creation, the quality of buildings, their harmonious integration into the surrounding environment-both natural and cultural-and the respect for natural and urban landscapes, as well as for heritage, must be the subject of a national consensus and culture. High-quality architecture helps create a better environment for all citizens. Every individual has the right to a healthy living environment and to high-standard architecture. It is the responsibility of every person and public institution to ensure that this right is effectively respected.

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