

Impact of biophilic urban planning on public space design: The case of Isla Blanca Boulevard, Chimbote

Impacto del urbanismo biofílico en el diseño del espacio público: caso Boulevard Isla Blanca, Chimbote

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Abstract

This research aimed to understand the impact of biophilic urbanism on the design and use of the public space "Boulevard Isla Blanca" in Chimbote. To this end, we analyzed the boulevard's relationship with its urban environment and its functionality, describing users' uses and appropriations of the space. We also examined the influence of natural elements on visitors' experience, identifying biophilic patterns present in the design and exploring perceptions related to contact with nature. The study adopted a qualitative approach with phenomenological design, employing semi-structured interviews with specialists and users, complemented by field observation sheets. The data were processed using ATLAS.ti 9 software, which allowed us to generate semantic networks and Sankey diagrams that showed limited integration of natural elements, poor management of street furniture, and poor social appropriation of the space. The results indicate that, although the incorporation of biophilic criteria promotes emotional connection, collective identity, and urban well-being, there are shortcomings on Isla Blanca Boulevard that prevent these benefits from being maximized. It is concluded that it is necessary to enhance the integration of nature and improve spatial management to achieve greater social ownership and environmental quality in this public space.

Keywords: biophilia, public space, biophilic urban planning.

Resumen

La presente investigación tuvo como objetivo comprender el impacto del urbanismo biofílico en el diseño y uso del espacio público "Boulevard Isla Blanca" en Chimbote. Para ello, se analizó la relación del boulevard con su entorno urbano y su funcionalidad, describiendo los usos y apropiaciones del espacio por los usuarios. Además, se examinó la influencia de los elementos naturales en la experiencia de los visitantes, identificando los patrones biofílicos presentes en el diseño y explorando las percepciones relacionadas con el contacto con la naturaleza. El estudio adoptó un enfoque cualitativo con diseño fenomenológico, empleando entrevistas semiestructuradas a especialistas y usuarios, complementadas con fichas de observación en campo. Los datos se procesaron utilizando el software ATLAS.ti 9, lo que permitió generar redes semánticas y diagramas de Sankey que

evidenciaron una limitada integración de elementos naturales, una gestión deficiente del mobiliario urbano y una escasa apropiación social del espacio. Los resultados indican que, aunque la incorporación de criterios biofílicos favorece la conexión emocional, la identidad colectiva y el bienestar urbano, en el Boulevard Isla Blanca existen deficiencias que impiden maximizar estos beneficios. Se concluye que es necesario potenciar la integración de la naturaleza y mejorar la gestión del espacio para lograr una mayor apropiación social y calidad ambiental en este espacio público.

Palabras clave: biofilia, espacio público, urbanismo biofílico.

Introduction

The connection between individuals and nature serves as a fundamental axis for human well-being, encompassing both physical and emotional dimensions. However, recent events, notably the COVID-19 pandemic, have dramatically altered this relationship by enforcing lockdowns that restricted interactions with the natural environment. This isolation underscored the significance of public spaces as venues for recovery and social engagement, as well as their impact on mental health and emotional stability (Oe et al., 2022). Moreover, the pandemic highlighted the urban inequality in access to green areas, disproportionately affecting populations residing in densely populated regions with limited recreational infrastructure (González, 2020). According to the World Health Organization, there was a reported 25% increase in anxiety and depression disorders during this period, emphasizing the urgency of promoting healthy and sustainable urban environments (Organización Mundial de la Salud, 2022).

In Latin America, this issue becomes even more critical. The Economic Commission for Latin America and the Caribbean (Comisión Económica para América Latina y el Caribe, 2020) states that approximately 80% of the population lives in established urban areas, where the average green space per person is merely 3.5 m²—significantly below the recommended minimum standard of 9 m² per inhabitant (Patterson-Watson et al., 2022). This shortfall reflects an urban growth model focused on built infrastructure rather than social and environmental well-being, resulting in unequal planning and restricting access to natural spaces. Consequently, this directly impacts quality of life and the balance between individuals and their environment. In Peru, the situation is even more dire: only 2.9% of established urban areas are designated as public green spaces, a figure deemed inadequate according to WHO recommendations, indicating issues in environmental governance and management (Ministerio de Vivienda, 2024).

At the national level, the city of Chiclayo exemplifies deficiencies in sustainable urban planning. Initially established as a fishing cove, its rapid development was driven by the steel and fishing industries, neglecting the inclusion of adequate green spaces (Municipalidad Provincial del Santa, 2020). The Boulevard Isla Blanca, now known as the Paseo de la Cultura, was intended to enhance urban heritage and provide a public space for the community. However, over time, it has lost functionality and social connectivity due to deterioration, maintenance shortcomings, and a lack of natural elements that promote community ownership and a sense of belonging. Despite its reopening in 2023, the improvements implemented did not succeed in establishing either urban identity or a lasting emotional connection between residents and the space.

Thus, this research poses the central question: What is the impact of biophilic urbanism on the design and use of the public space of Boulevard Isla Blanca in Chiclayo? Accordingly, the primary objective is to understand the influence of biophilic urbanism in this space, addressing dimensions such as functionality, perception, usage, and natural design patterns. Specific objectives include analyzing the boulevard's relationship with its urban context, describing user appropriations, examining the presence of natural elements, identifying biophilic patterns, and exploring visitor perceptions. The aim is to reveal how the inclusion or absence of biophilic criteria conditions citizen experience and the social sustainability of the space.

The theoretical framework for this research is grounded in the principles of biophilic urbanism, originally conceptualized by Wilson (1984) and expanded upon by Kellert and Wilson (1995), who viewed biophilia as a human biological and emotional necessity to connect with nature. In this context, scholars such as Gehl (2006, 2011), Lefebvre (1974), and Carmona et al. (2003) provide the perspective of public space as a stage for social interaction, symbolic appropriation, and collective well-being. Moreover, the fourteen biophilic design patterns proposed by Browning et al. (2014), along with recent research by Reeve et al. (2015), Hung and Chang (2022), and Zhong et al. (2023), elucidate how built environments can restore attention, mitigate stress, and enhance emotional connections with surroundings. This study aims to integrate these theoretical perspectives with the specific urban context of Chiclayo, articulating sensory, social, and environmental dimensions.

In conclusion, this research is justified by its academic, social, and practical relevance. Theoretically, it expands the understanding of biophilic urbanism in Latin American contexts, where studies remain sparse. From

a social perspective, it aims to highlight the imperative need to design public spaces that foster the mental and emotional well-being of the population. Practically, it offers guidelines for future sustainable urban interventions in Chimbote and other Peruvian cities. Ultimately, the study aspires to demonstrate that incorporating nature into urban design not only enriches urban aesthetics but also reconstructs the relationship between individuals, their environment, and their collective identity.

Methodology

This research focuses on proposing enhancements for the conception and management of public spaces from a biophilic perspective. In this regard, Donadei (2019) emphasizes that urban studies should begin with concrete social situations, as this facilitates an understanding of the human and environmental context that gives meaning to a space. Correspondingly, Castellví et al. (2023) assert that architectural projects necessitate an analysis that integrates user experience with methods and techniques reflecting their interaction with the built environment. Within this framework, the study was developed by considering the relationship between the city, nature, and the everyday experiences of users of the Boulevard Isla Blanca in Chimbote.

This chapter outlines the type, design, and approach of the research, along with the methodological procedures applied to achieve the overarching objective: to comprehend the impact of biophilic urbanism on the public space of Boulevard Isla Blanca. According to Ríos (2017), the choice of approach depends on both the nature of the data and the study's purpose; thus, a qualitative approach was adopted to allow for an in-depth interpretation of individual experiences and perceptions. In this vein, Swift (2022) contends that the qualitative approach captures the richness of human experience, while Denzin and Lincoln (2017) highlight that this type of research aims to unravel the complexity of social phenomena and the meanings attributed to them by participants.

Additionally, a phenomenological design was deemed most appropriate for this study, as its purpose is to analyze the lived experiences and perceptions of participants concerning a specific phenomenon: public space. Rodríguez et al. (1996) explain that this philosophical approach provides access to the essential structures of human experiences to understand them in their real context. Consequently, this methodology allowed for the gathering of information on perceptions and uses of the Boulevard Isla Blanca based on direct experiences. In accordance with this, Creswell (n.d.) points out that phenomenological analysis relies on a meticulous description of testimonies to construct the essence of the observed phenomenon.

Table 1
Summary of categories, subcategories, and codes

Categories	Subcategories	Codes
Public Space	Environment and External Functionality	Connectivity – Versatility
	Internal Use	Activities – Appropriation
Biophilic Urbanism	Natural Elements	Vegetation – Water – Light/Shadow
	Patterns	Organic Forms
	Perceptions	Sensory – Emotional – Memories

Note. Developed by the authors based on the theoretical framework and study objectives

The setting for this research was the Boulevard Isla Blanca, a linear park located in the city of Chimbote, at the end of Avenida José Pardo, between the neighborhoods “La Caleta” and “El Acero.” This space, measuring approximately 2,218 linear meters, was designed as a cultural and recreational axis for public circulation. However, after its construction, it was enclosed by fences, severely limiting its usual use primarily to large events, such as the San Pedrito festival.

Figure 1
 Location of Boulevard Isla Blanca



Note. Source: Google Maps, showing the city of Chimbo, situated between the neighborhoods “La Caleta” and “El Acero”

The analysis categories and subcategories were defined in alignment with the theoretical framework and study objectives (Castellví et al., 2023). They emerged from the data coding process, which facilitated the organization, transcription, and interpretation of collected information. It is important to highlight that the categories are not rigid; rather, they can adapt as the study's needs evolve or new patterns emerge during the analysis. Thus, the researcher maintains the necessary flexibility to adjust methods and instruments based on observed realities.

The first main category was (1) Public Space, grounded in the contributions of Jan Gehl, as cited by Mansur (2018), who stresses the cultural and social role of urban spaces as places for interaction and civic coexistence. From this perspective, a quality public space must guarantee connectivity, accessibility, and safety for all users. Within this category, two subcategories were established:

- **Environment and external functionality:** Analyzing the connection of the space with the city, urban furniture, and facilities.
- **Internal use:** Examining necessary, optional, and social activities, as well as the degree of user appropriation of the space.

The second category corresponds to (2) Biophilic Urbanism, based on the principles of Wilson (1984), who defines biophilia as the human inherent need to connect with nature. This category allowed for an exploration of the emotional and sensory bonds that individuals have with the natural elements present in the urban environment. It included three subcategories:

- **Natural elements (vegetation, water, light, and shadow):** Analyzing the impact of these environmental components on user experience.
- **Biophilic patterns:** Focusing on identifying organic forms, natural materials, and ecological analogies.
- **Perceptions:** Addressing the sensory, emotional, and symbolic aspects that shape experiences within the space.

Participants in this study included both urban design specialists and regular users of the Boulevard. A total of 15 participants were involved, which is considered an adequate number for in-depth qualitative case studies. Hernández-Sampieri and Mendoza (2018) emphasize that participants should be direct witnesses to the phenomenon to ensure the contextual validity of the findings.

Table 2
Participant coding

Experts	
A1	Arch. Erickson Mamani
A2	Arch. Paulo Castro
Users	
B1	MPS cleaning staff
B2	Teacher at Pre-Vocational School
B3	Local resident
B4	Visitor

Note. Authors' own elaboration

For data collection, various complementary techniques were employed. First, according to Sánchez et al. (2021), documentary review allowed for the extraction of valuable information from both primary and secondary sources. Additionally, Monje (2011) and Izcara (2014) emphasize the importance of semi-structured interviews as a key instrument for delving into participants' experiences and opinions. Furthermore, Hernández et al. (2010) highlight the analysis of repetitions as an effective technique for identifying emerging categories during the research process.

Table 3
Relationship of objectives, techniques, and instruments

Specific objectives	Technique	Instrument	Research method
Analyze the characteristics of the environment and functionality of Boulevard Isla Blanca in relation to the city of Chimbote	Application of interview	Interview	Qualitative
	Observation	Observation sheet	Qualitative
Describe the usage characteristics of spaces within Boulevard Isla Blanca according to activities and user appropriation.	Application of interview	Interview	Qualitative
	Observation	Observation sheet	Qualitative
Examine the influence of natural elements in Boulevard Isla Blanca on user experience.	Application of interview	Interview	Qualitative
	Observation	Observation sheet	Qualitative
Identify the patterns of Boulevard Isla Blanca	Application of interview	Interview	Qualitative
	Observation	Documentary analysis	Qualitative
Interpret users' perceptions of Boulevard Isla Blanca	Application of interview	Interview	Qualitative
	Observation	Documentary analysis	Qualitative

Note. Authors' own elaboration

Data analysis was conducted through processes of coding, categorization, and interpretation, supported by the use of ATLAS.ti 9 software. Additionally, source triangulation was employed, combining interviews, observations, and documentary reviews, which enhanced the reliability and validity of the study (Ruiz, 2012).

Lastly, the credibility of the research was ensured by recording user perceptions in their real context; the applicability of the findings was confined to Boulevard Isla Blanca, while confirmability was guaranteed by preventing biases or manipulations. The entire study was developed under strict ethical principles and followed the American Psychological Association (APA) guidelines in its seventh edition.

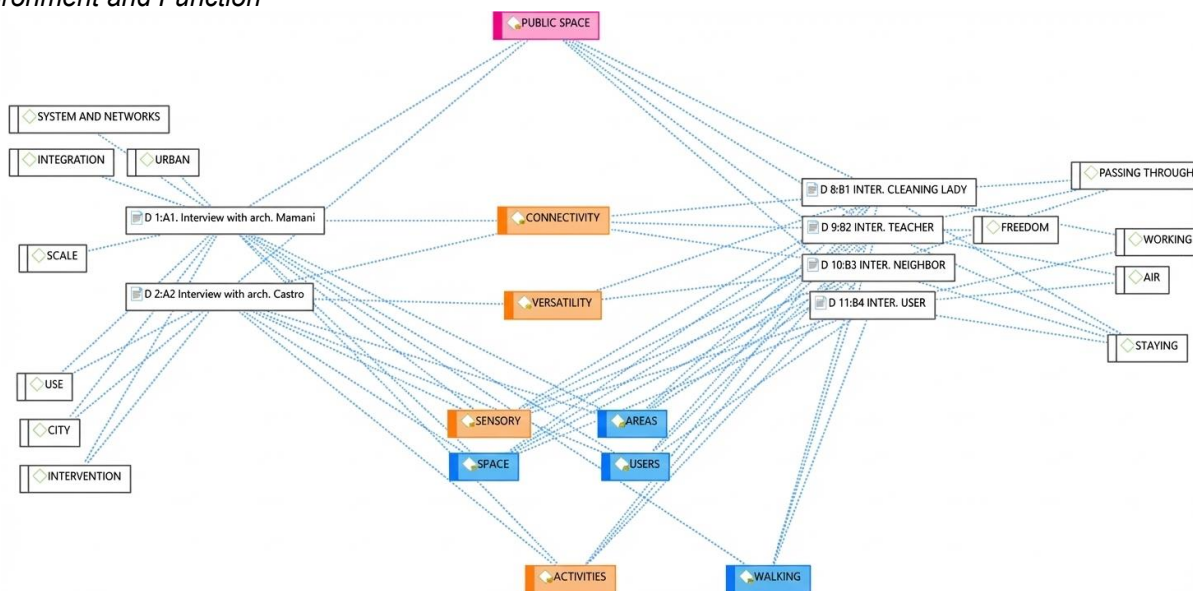
Results and discussion

This chapter integrates the results obtained from interviews with experts, users, and field observations, along with a theoretical discussion grounded in academic references. Its aim is to interpret perceptions and experiences related to Boulevard Isla Blanca in Chimbote, organized around the categories of public space and biophilic urbanism. The findings are presented in a narrative and analytical manner, highlighting the most relevant aspects for the design and management of contemporary urban spaces.

Regarding the first specific objective, the results identified the relevance of connectivity and versatility as essential qualities of public space. Experts concurred that accessibility, integration with the urban fabric, and the adaptability of usage areas are determining factors for the functionality of Boulevard Isla Blanca. This underscores the importance of aligning physical design with local policies that promote social appropriation and inclusive usage of the space (Gehl, 2011; Carmona et al., 2003).

Figure 2

Semantic network of interviews with experts and users regarding the category “Public Space,” subcategory “Environment and Function”



Note. The semantic network integrates the responses from interviews with experts and users. Colors represent the category “Public Space,” the subcategory “Environment and Function,” and the codes “Connectivity” and “Versatility.” Analysis conducted with ATLAS.ti

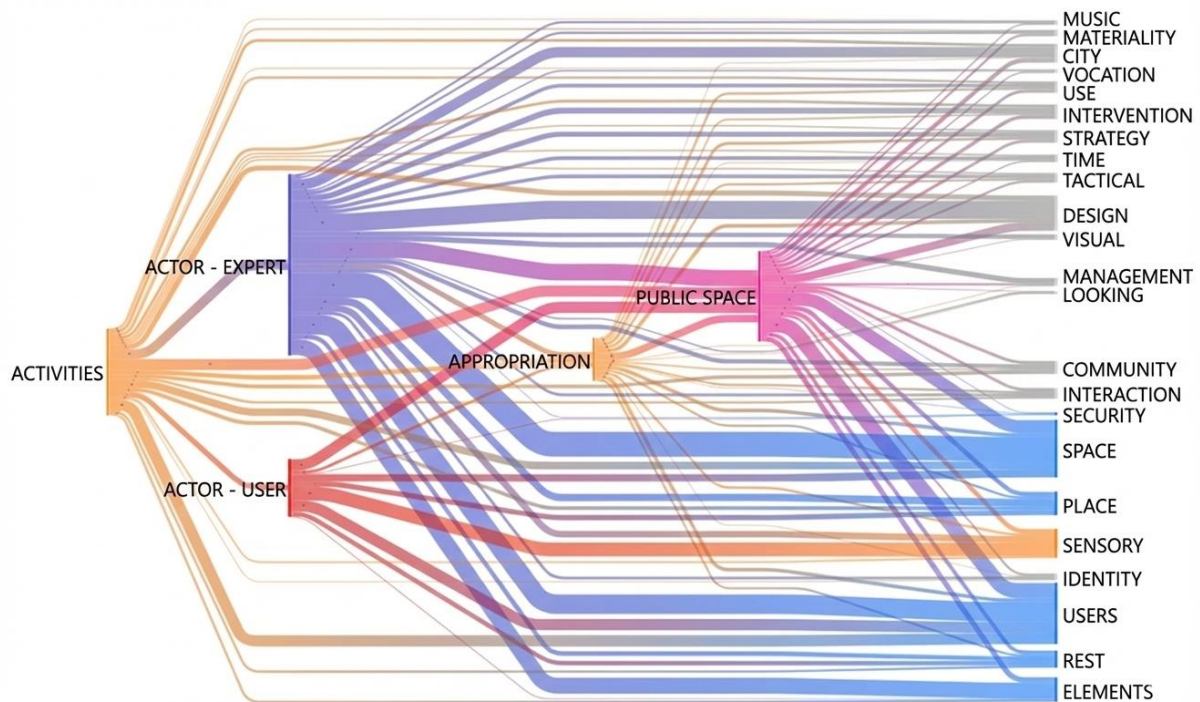
The presented semantic network reflects a complex structure of relationships among concepts linked to the category “Public Space,” demonstrating how participants’ perceptions and experiences coalesce around connectivity, versatility, sensory experience, and activities shaping the use of Boulevard Isla Blanca. The central node “Public Space” serves as an integrative axis for the subcategories, indicating that connectivity is associated with perceptions of freedom, mobility, and urban belonging, while versatility pertains to the space’s capacity to adapt to varying uses and users.

Moreover, the connections to the codes “sensory” and “activities” indicate that the experience of the space depends not only on its physical form but also on the sensations it provokes—such as walking, breathing fresh air, or simply being present—reinforcing the notion that urban well-being arises from the continuous interaction between body, environment, and the function of the location. Collectively, this network reveals that the Boulevard is perceived as an incomplete urban system, with real potential for social integration and appropriation that requires bolstering through more inclusive, accessible, and emotionally attuned planning to the daily experiences of its users.

Concerning the second objective, the analysis focused on the activities carried out and the appropriation of public spaces. The results indicated that users perceive the Boulevard as a flexible space that facilitates a variety of activities, from relaxation to social interaction. However, appropriation is constrained by a lack of maintenance and poor management of urban furniture.

Figure 3

Sankey diagram of interviews with experts and users regarding the category “Public Space,” subcategory “Use”



Note. The diagram presents the flows of responses from participants in interviews with experts and users pertaining to the category “Public Space,” subcategory “Use,” and codes “Activities” and “Appropriation.” Analysis conducted with ATLAS.ti

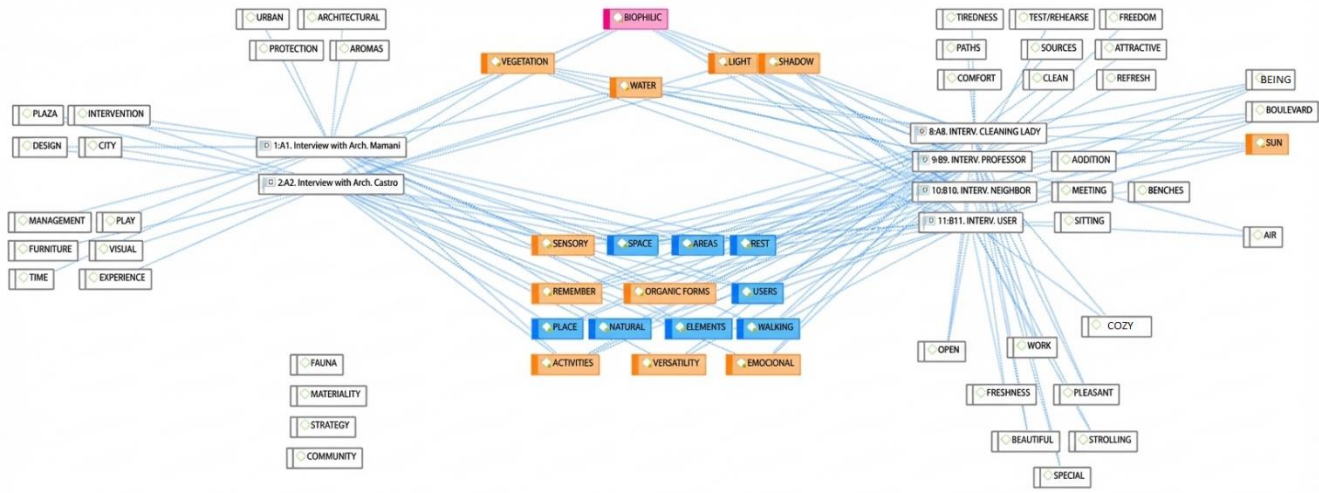
The Sankey diagram reveals the dynamic interaction among stakeholders (experts and users), activities, and the elements shaping the appropriation of public space. This visualization shows how the activities undertaken by both groups—albeit from different perspectives—converge in understanding public space as a multifunctional environment intertwining physical, social, and sensory dimensions. On one hand, experts tend to associate their perceptions with management, design, urban strategy, and materiality aspects, highlighting a technical outlook focused on planning and sustainability. Conversely, users correlate their experiences with categories like place, identity, rest, community, and interaction, bringing to the forefront the experiential and emotional dimensions of the space.

The fluid connection between the nodes of appropriation and public space suggests that the collective experience of Boulevard Isla Blanca relies on both the physical design and the symbolic relationship individuals establish with it. The flow between sensory experiences, safety, and belonging indicates that daily usage of the space is mediated by perceptions of well-being, comfort, and acknowledgment of the environment. In sum, the diagram evidences that the Boulevard is perceived as a space with potential for social cohesion, although its full activation demands the integration of technical perspectives from experts with the subjective experiences of users, steering urban management toward more empathetic and participatory practices.

In terms of biophilic urbanism, the findings reveal a limited integration of natural elements within Boulevard Isla Blanca. While vegetation is present, it lacks strategic planning, and water features are out of operation. These factors diminish the potential for achieving environmental comfort and fostering a positive sensory experience (Wilson, 1984; Hung & Chang, 2022).

Figure 4

Semantic network of interviews with experts and users on the category “Biophilic Urbanism,” subcategory “Natural Elements”



Note. The semantic network integrates responses from interviews with experts and users. The colors highlight the category “Biophilic Urbanism,” the subcategory “Natural Elements,” and the codes “Vegetation,” “Water,” and “Light/Shadow.” Analysis conducted with ATLAS.ti

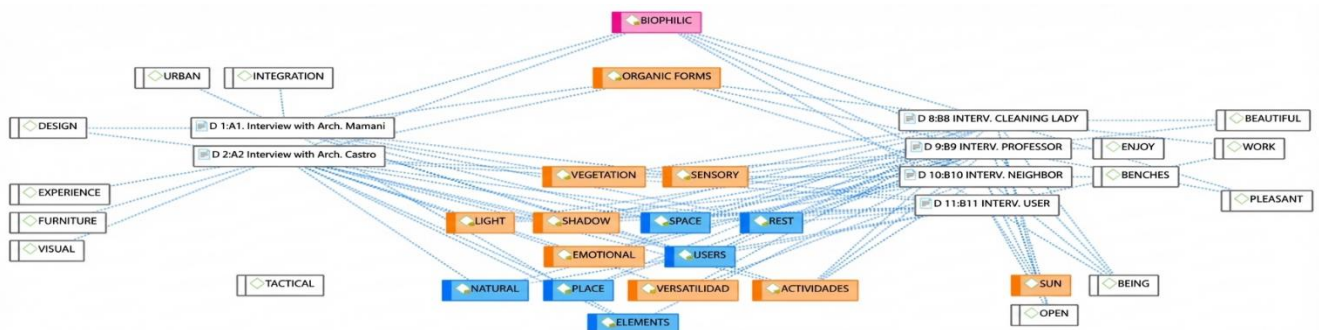
This semantic network illustrates the conceptual structure of biophilic urbanism surrounding perceptions, experiences, and natural elements identified in Boulevard Isla Blanca. The central node, “Biophilic,” connects with key components such as vegetation, water, light, and shadow, which act as mediators between the built environment and human experience. These categories transcend the visual by integrating sensory and emotional dimensions, demonstrating how nature influences well-being, memory, and appropriation of space.

Both experts and users concur that vegetation and water are perceived as the primary generators of comfort and attraction, although their presence in the Boulevard is limited or poorly managed. The nodes related to sensations and emotions—such as coolness, freedom, rest, and pleasure—reflect that the biophilic experience is constructed through direct interaction with the natural environment. However, the lack of shade, active water features, and functional furniture diminishes the space’s potential to promote sustained well-being. Together, this network indicates that the biophilic dimension of Boulevard Isla Blanca is still in its nascent stage and lacks a comprehensive strategy to enhance emotional and sensory connections between people and urban nature.

Furthermore, the importance of incorporating organic patterns into urban design is highlighted. Specialists noted that natural forms foster perceptions of harmony and comfort, while users associate them with feelings of identity and well-being. Therefore, the Boulevard in Chimbote needs to rethink its architectural language to include structural natural elements, not just ornamental ones.

Figure 5

Semantic network of interviews with experts and users on the category “Biophilic Urbanism,” subcategory “Patterns”



Note. The semantic network integrates responses from interviews with experts and users. The colors highlight the category “Biophilic Urbanism,” the subcategory “Patterns,” and the code “Organic Forms.” Analysis conducted with ATLAS.ti

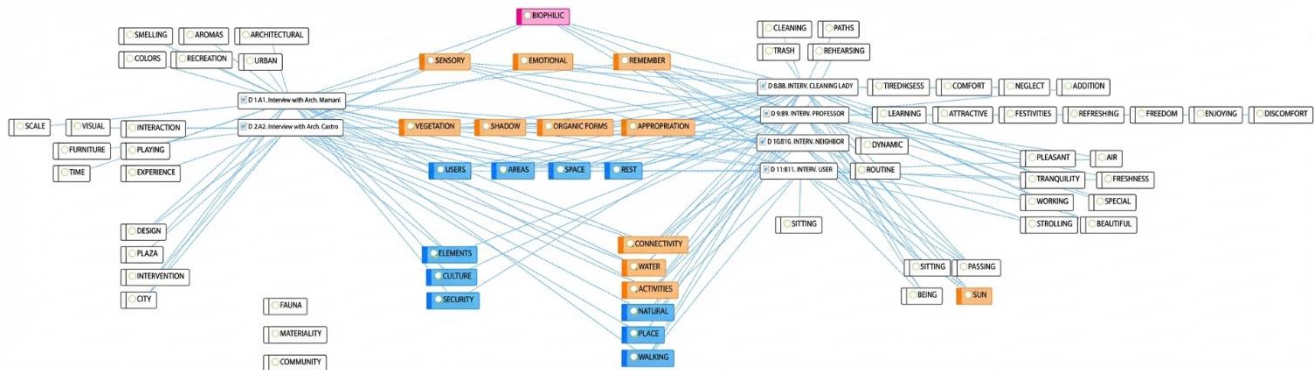
This semantic network reveals the structure of biophilic urbanism from the perspectives of experts and users, emphasizing how natural and organic patterns influence the experience of public space. The central node, “Biophilic,” articulates subcategories such as organic forms, vegetation, light, shadow, and sensoriality, evidencing that the perception of the environment is mediated by natural stimuli that promote emotional and physical well-being. The interviews reveal that the presence of natural light and balanced shadows, along with vegetation, contributes to thermal comfort, pleasant aesthetics, and a sense of refuge. However, these elements are fragmented, limiting their potential to create an integral experience of connection with nature.

On the other hand, connections to nodes such as emotional, natural, place, and activities show that the biophilic space relates not only to physical design but also to human interaction and daily enjoyment. Users express feelings of pleasure, rest, and enjoyment related to simple activities like “being,” “working,” or “walking,” reaffirming that biophilia manifests in urban routines. Collectively, the network highlights that Boulevard Isla Blanca possesses latent biophilic potential: it includes natural and visual elements that provide aesthetic pleasure but requires greater functional and emotional integration to become a truly restorative and meaningful environment for its users.

Finally, user perceptions reflect an emotional and sensory bond with the Boulevard. Interviews revealed feelings of tranquility, childhood memories, and a strong appreciation for contact with nature. However, negative emotions related to neglect and lack of maintenance in certain areas also emerged. These findings align with the theory by Ulrich (1983) concerning the human affective response to natural environments.

Figure 6

Semantic network of interviews with experts and users on the category “Biophilic Urbanism,” subcategory “Perceptions”



Note. The semantic network integrates responses from interviews with experts and users. The colors highlight the category “Biophilic Urbanism,” the subcategory “Perceptions,” and the codes “Sensory,” “Emotional,” and “Memories.” Analysis conducted with ATLAS.ti

This semantic network highlights the complex structure of the concept “Biophilic” as an axis that articulates the natural, emotional, and social dimensions of public space. The analysis reveals how sensory, emotional, and memory elements closely relate to physical components such as vegetation, water, shadow, and organic forms, thereby configuring an urban experience where nature mediates well-being and spatial appropriation. Experts stress the importance of integrating these elements into architectural and urban design, while users associate them with sensations of tranquility, coolness, enjoyment, and a sense of belonging.

Additionally, the network shows that the daily use and connectivity of Boulevard Isla Blanca are conditioned by factors such as cleanliness, maintenance, and safety, aspects that decisively influence the perception of comfort and identity of the place.

Conclusion

The analysis demonstrated that Boulevard Isla Blanca in Chimbote exhibits a weak integration of biophilic urbanism principles in its design and management. Although this space fulfills a significant social and cultural function, it lacks planning that effectively incorporates the natural, sensory, and symbolic elements necessary to

strengthen the connection between people and their environment. Observations and testimonies reveal that the user experience is limited by the absence of structured vegetation, deteriorated urban furniture, and the lack of strategies promoting collective appropriation. This reality underscores the urgency to revalue public space as a vibrant environment capable of generating emotional well-being and social cohesion through contact with nature.

Thus, it is concluded that incorporating biophilic criteria into urban planning can transform public spaces into more inclusive, healthy, and sustainable settings. Boulevard Isla Blanca requires a comprehensive intervention that not only restores its functionality but also revitalizes its identity through a harmonious balance between the natural and built environment. Furthermore, strengthening local environmental management, citizen participation, and urban education are fundamental conditions for consolidating a city model that is more sensitive, resilient, and oriented toward human well-being.

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