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PRODUCING PERIPHERIES: MORPHOLOGY AND HABITABILITY IN THE CONURBATIONS OF CUENCA, ECUADOR [1]

PRODUCIENDO PERIFERIAS: MORFOLOGÍA Y HABITABILIDAD EN LAS CONURBACIONES DE CUENCA, ECUADOR

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La expansión de las ciudades intermedias latinoamericanas ha dejado patrones de ocupación irregulares y discontinuos sobre sus territorios periféricos. En apariencia, las configuraciones urbanas de los bordes no difieren de manera relevante, sin embargo, cada estructura morfológica es heterogénea, posee conductas propias, diferentes motivaciones de ocupación y resulta en diversos modelos consolidados. En Cuenca, Ecuador, estas zonas difusas entre el límite urbano y rural están marcadas a su vez por dinámicas de segregación y dependencia al centro consolidado y en ellas se registran los índices de calidad de vida más bajos de la ciudad. En este contexto, el objetivo de la investigación fue encontrar una posible relación entre los tipos de morfologías periféricas y los niveles de habitabilidad urbana de cuatro núcleos urbanos de la ciudad. Se usó un diseño metodológico cuantitativo de alcance correlacional de dos etapas. Inicialmente, se clasificaron las morfologías urbanas y se calificaron los niveles de habitabilidad por separado, aplicando instrumentos independientes. Posteriormente se cruzaron los resultados para describir posibles vínculos entre variables. Los hallazgos resaltan disparidades significativas de habitabilidad entre conurbaciones y se define una aparente correlación directa entre ambas dimensiones de análisis.

Palabras clave: morfología urbana, habitabilidad, periferia, dispersión urbana, ciudad intermedia.

The expansion of Latin American intermediate cities has left irregular and discontinuous occupation patterns in their peripheral territories. In appearance, the configurations of the urban edges do not have relevant differences. In fact, each morphological structure is heterogeneous and has its own behaviors, different occupation motivations, and diverse resulting consolidated models. In Cuenca, Ecuador, these diffuse zones between the urban and rural limits are marked by segregation dynamics and dependence on the consolidated center and have the lowest quality-of-life indexes in the city. In this context, the objective of the research was to find a possible relationship between the types of peripheral morphologies and the levels of urban habitability of four city urban centers, using a quantitative methodological design with a two-stage correlational scope. Initially, urban morphologies were classified, and the habitability levels were rated separately, applying independent instruments. Then, the results were cross-checked to describe possible links between variables. The findings highlight significant disparities in habitability between conurbations and define an apparent direct correlation between the two dimensions of analysis.

Keywords: urban morphology, habitability, periphery, urban sprawl, intermediate city.

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I. INTRODUCTION

The growth of cities towards their peripheries has been constant throughout history since the formation of new communities alongside old cities that exceeded their natural boundaries (Mumford et al., 2014) through the accelerated expansion during the Industrial Revolution, which transformed urban morphology and lifestyles, giving rise to the phenomenon of the peri-urban (Bruegmann, 2005). This expansive process has been associated with the appearance of marginal and disorganized areas, linked to socioeconomic gaps and lack of planning (Freidberger, 2000), which has generated criticism of the 'dispersed city' model due to its negative impact on the quality of urban life and its surrounding rural environment (Hermida et al., 2015; Cabrera, 2016). Nowadays, urban edges are conceived as passive support of what the center rejects or cannot contain (Villamizar, 2014). Martins and Pereira (2022) mention that their uncontrolled growth will fragment the territory, decreasing the levels of habitability on the city's margins.

Particularly in Latin America, the most significant transformation of its territorial structure took place during the second half of the last century (Montero & García, 2017), moving from a rural predominance to an urban profile where the population of cities increased from 33% to 74% between 1940 and 1995 (Gilbert, 1997). This change was accompanied by a decrease in population density (Hermida et al., 2023), deepening the already entrenched segregation processes and transforming the region into one of the most urbanized in the world (ECLAC, 2020).

In Latin American cities, expansive dynamics result in specific morphologies linked to social and economic conflicts (Díaz & Medina, 2019; Ruiz & Romano, 2019; Segarra, 2021). The urban edge territories have been transforming into scenarios of shortcomings, which demand a broader reading, associated not only with their physical dimension but also social and political. The link between these dimensions is evident in several urban texts (Abdelrashid, 2023; Alexander, 1977; Gehl, 2010) and is addressed in this article by studying four peripheral neighborhoods of the intermediate city of Cuenca in Ecuador.

The main objective was to identify and describe the relationship between the types of peripheral morphologies and the habitability levels in the selected cases. The article is based on a literature review where it studies, on the one hand, morphology understood as the physical layout of the built area in a fabric that confers shape and structure to the urban environment and, on the other, habitability as the set of urban conditions that make a place suitable and comfortable to live (Mouratidis, 2018). A methodological design of a correlational scope quantitative approach, conducted in two stages, is used to achieve the objective. In the first, the morphological typologies of each neighborhood are defined using Spacematrix, while the habitability levels are evaluated on a table of indicators scored on the Likert scale. In the second stage, the results are correlated by comparing them with the literature. Finally, a discussion based on the comparison of analyzed data is raised.

II. THEORETICAL FRAMEWORK

Conceptual delimitation of periphery, morphology, and habitability

When addressing the relationship between morphology and habitability in peripheral neighborhoods, it becomes imperative to specify these concepts, which constitute the central line of this research. Firstly, the definition of 'periphery' refers to those areas named by the literature as edge, urban-rural interface, or peri-urban (Hermida et al., 2023) that are formed on the margin of cities, that "are cataloged or not as expansion and live permanent urbanization processes" (Toro et al., 2005, p.57) and are characterized by a dispersed, disjointed and unplanned growth model (Díaz & Medina, 2019).

On the other hand, 'morphology' is understood as the physical layout of the built area in a fabric that confers shape and structure to the urban environment (Pesántez & Cabrera, 2023). This configuration can be analyzed from various theoretical perspectives, including the historical-geographical approach that studies three fundamental elements: plot, building, and land use (Rocca et al., 2013); and the typological-project style approach, oriented to the interpretation of the territorial form and its building patterns (Oliveira, 2017). For Prieto et al. (2018), on the other hand, the approaches to urban morphology study are related to three major schools: the Anglo-Saxon, the Italian, and the French. The Anglo-Saxon emphasizes the study of roads, parceling, and land use, considering parcel dynamics as a product of social transformations. The Italian school emphasizes the formative aspects of building typology, where the most repetitive architecture becomes a decisive element of the urban form. Meanwhile, the French school presents the block as the unit of analysis that helps explain the city's structure and the urban project.

Finally, 'habitability' is defined as the conditions that make a place suitable and comfortable (Mouratidis, 2018), recognizing two interrelated aspects: the architectural and the urban. This variable faces the phenomenon of "inhabiting", which acquires different approaches in each country, so establishing its meaning is complex (Rodas, 2019). The most basic definition speaks of minimum sanitation standards in housing (Moreno, 2008), but the concept of habitability can transcend the urban environment. The first refers to the internal characteristics of homes, such as ventilation, lighting, and thermal comfort, while urban habitability deals with the ability of cities to meet the essential needs of their inhabitants, such as accessibility to services and equipment (Rodas, 2019).

Relationship between morphology and habitability

A growing focus of study in urban research has been the link between morphology and habitability from different methodological and thematic approaches. Among them, it is vital to highlight the repeated mention of urban compactness that underlines the importance of built density and land use efficiency in the configuration of habitable urban environments (Ananda, 2014; Hermida et al., 2015; Mouratidis, 2018; Pan et al., 2017; Zhang & Zhang, 2015). Ananda (2014) and Dave (2011) highlight how housing density, influenced by compactness, can directly impact the provision of public infrastructure and services as key elements for the quality of urban life. Another relevant aspect of these investigations is the inclusion of variables such as walkability and cyclability (Berghauser & Haupt, 2021; Ewing et al., 2016; Hermida et al., 2015; Lin & Yang, 2009). These indicators of adequate public transport and human-oriented urban design reflect a growing trend towards urban sustainability and reducing dependence on private transport (Houston et al., 2015; Zhang & Zhang, 2015).

The variability in the areas of habitability addressed is remarkable; while some studies focus on basic infrastructure and services, others extend their analyses to urban green and sociability (Dempsey et al., 2012), components that are increasingly recognized for their impact on the psychosocial well-being and health of residents. This analysis highlights approaches that prioritize efficiency and land use over those that integrate quality of life and sustainability. This change is fundamental to face the contemporary challenges of urbanization, especially for Latin American cities experiencing a rapid expansion and diversification of their peripheries (Hermida et al., 2023).

In the Latin American case, Marchant et al. (2023) examined how the spatial configurations of peri-urban areas, characterized by disorganized developments and horizontal expansion, directly impact the living conditions of their inhabitants. For example, the irregular distribution of housing and the lack of adequate infrastructure limit access to essential services such as drinking water, sanitation, and public transport, exacerbating social and economic vulnerability conditions. In addition, Flores et al.'s (2021) research has shown that spatial fragmentation and lack of planning result in low connectivity and accessibility, affecting the residents' social integration and economic opportunities. These reflections underline the importance of understanding urban morphology not only as the physical layout, but as a crucial determinant of the quality of life and social inclusion in the peri-urban contexts of Latin America that integrates psycho-social, physical-spatial and environmental aspects (Espinoza & Gómez, 2010)

Proposed approach

This research is based on a new approach to morphological study (Kropf, 2009), consisting of a series of mathematical techniques "whose purpose is to decipher shapes, patterns, and tendential behaviors" (Oliveira, 2017, p. 66), using calculations that are easy to replicate (García, 2016). Thanks to this method, it has been possible to triangulate quantitative data on density and compactness by analyzing spatial conditions, which determine certain perceptions of habitability. Alexander et al. (1988) distinguished three approaches to this type of quantitative data on morphology referring to the perceived, the physical, and the measured (García, 2016). For example, the perceived density depends on how each individual recognizes their environment; the physical density concentrates on the tangible and objective characteristics of the built environment, while the set of quantitative aspects forms the so-called measurable density. The latter represents the relationship between an area and the number of contained elements. This approach to urban morphology turns its components into indicators of spatial and perceptual qualities (Pesántez & Cabrera, 2023). The methodological item presented analyzes the morphology using quantitative indicators, focused on the measurable physical characteristics of urban tissues.

This research focuses on urban habitability due to its direct relationship with morphology. It approaches it as a condition where housing is physically integrated into the city, has accessibility to services and equipment, and has characteristics that decrease in marginal and difficult-to-access areas (Alcalá, 2007). Pérez (1999) explores these conditions from an objective-oriented approach, which includes physical characteristics such as infrastructure, transport, and location. On the other hand, Rodas (2019) proposes a more subjective approach that considers aspects such as comfort, security, social cohesion, and privacy. Urban habitability depends on the city model, which affects different variables such as the environment, infrastructure, mobility, and sociability (Pesántez & Cabrera, 2023). It is observed that a compact urban fabric encourages the use of public transport and sustainable modes of transportation, such as walking and cycling. However, it should be considered that the relationship between density and mobility is not linear. These dense urban areas generally

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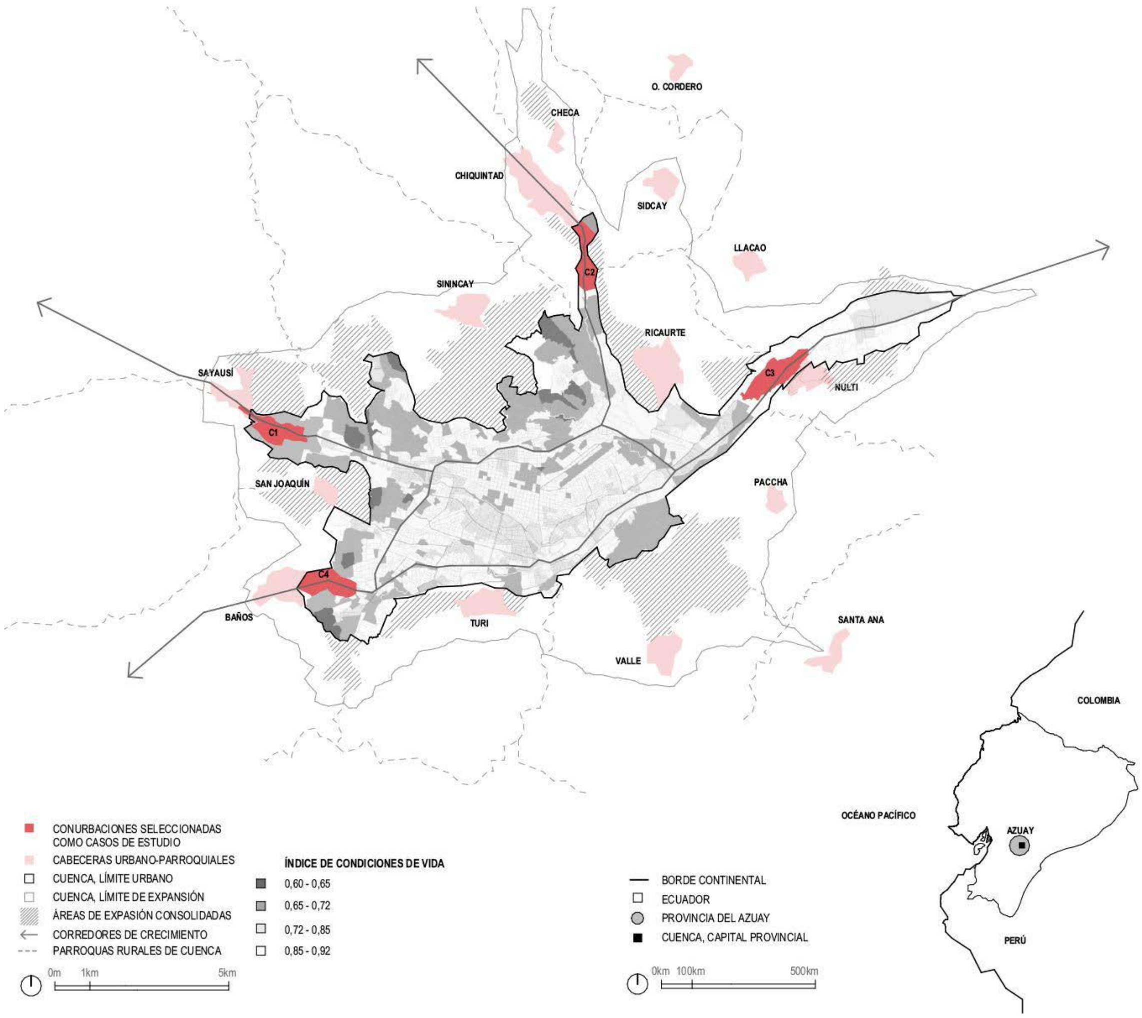


Figure 1. Growth Corridors, Living Conditions Index, and case studies: Sayausí, Chiquintad, Nulti, and Baños. Source: Cabrera, 2016; Orellana & Osorio, 2014.

have greater accessibility to public and private services, which benefits the economy and reduces dependence on commuting to other equipped centers, encouraging more frequent social interactions. On the other hand, compact cities tend to reduce greenhouse gas emissions and energy consumption (Hermida et al., 2015). In conclusion, the morphology of an urban fabric affects its environment, infrastructure, mobility, sociability, and health of its inhabitants.

III. CASE STUDY

Like other Latin American countries, Ecuador experienced economic and political phenomena that transformed the shape and density of its cities. The change of its economic model towards a neoliberal one expanded the dimensions of the real estate market's intervention and, with the increase of private motorization, promoted an unprecedented expansion in the country's central municipalities. This study was carried out in four areas of the periphery of Cuenca. This Ecuadorian intermediate city is the one that has the greatest expansion record in recent decades, having grown ninefold since 1950 in a dispersed and atomized pattern with an urban footprint difficult to delimit (Hermida et al., 2015).

During the selection of cases, it was found that the expansion of the periphery of Cuenca is marked by physical and service dependence between its rural parish capitals and the consolidated city (Hermida et al., 2015). This periphery visibly accentuates growth around the road corridors connecting the urban area with the city's

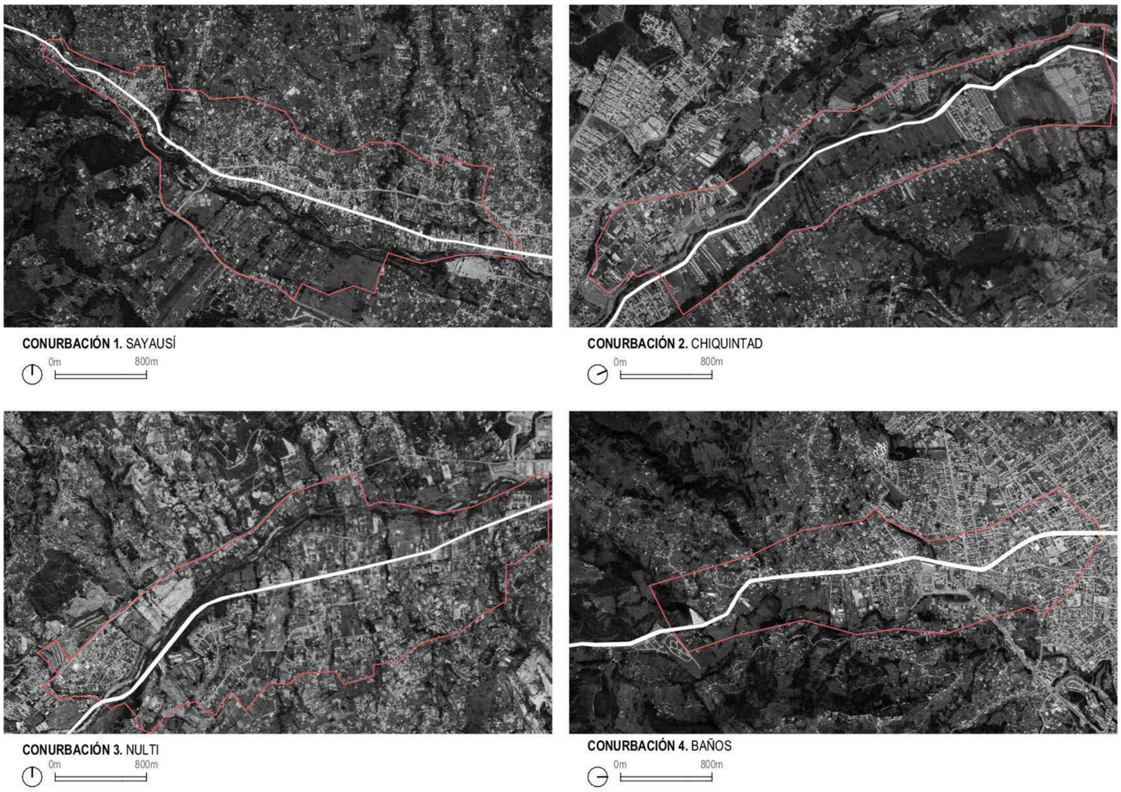


Figure 2. Orthophotos of the selected case studies: Sayausí, Chiquintad, Nulti, and Baños. Source: Preparation by the authors, 2024

populated centers (Cabrera, 2016) (Figure 1). Additionally, the sectors with the lowest Living Conditions Index (LCI) are located in the peripheries, except the Nulti conurbation, where the LCI is one of the highest in the city (Orellana & Osorio, 2014) (Figure 1).

Under these considerations, it was established as sample inclusion criteria that the conurbations should: (1) be part of the edge of the city, cataloged in the ordinance as an urban area in the process of consolidation; (2) be adjacent to a main rural parish, and (3) have developed around a road corridor or primary urban expander. The conurbations chosen were Sayausí, Chiquintad, Nulti, and Baños (Figure 2).

IV. METHODOLOGY

The methodological approach used is quantitative with a correlational scope. The urban morphologies classification was carried out in *Spacematrix* (Berghauser & Haupt, 2021), while the urban habitability evaluation is presented in a parametric rating table on A Likert scale (Berghauser et al., 2021; Rodas, 2019; Segarra, 2021; Moreno, 2008). Finally, the morphological typologies were associated with the habitability levels analyzed in the discussion, which coincided with other systematized studies in the literature review.

Classification of morphologies

The morphologies were classified BY their level of built dispersion. *Spacematrix*, an empirical tool with a quantitative approach, was used to typify urban configurations based on a survey of four metric indicators: built intensity (FSI), built compactness (GSI), height (H), and amplitude (OSR) (Berghauser & Haupt, 2021). The indicators were calculated using the same data series: study area by block, built area, and unbuilt area, which required obtaining dimensions from cartographic data, aerial photographs, and field visits. According to the tool, the compactness (GSI: *Ground Space Index*) is calculated by dividing the constructed area on the ground floor for the study area by block, equivalent to the GOS (Ground Occupancy Coefficient) in Ecuador according to current regulations.

GSI

GSI=Área construida en planta / Área de estudio (por manzana)

FSI

FSI=Área construida total / Área de estudio (por manzana)

L

L= FSI / GSI

OSR

OSR= (1 - GSI) / FSI

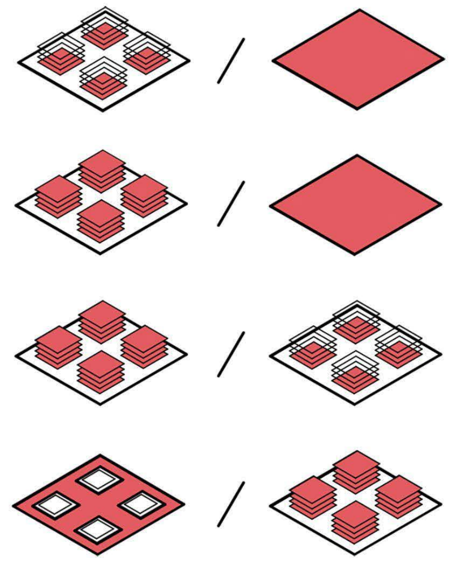
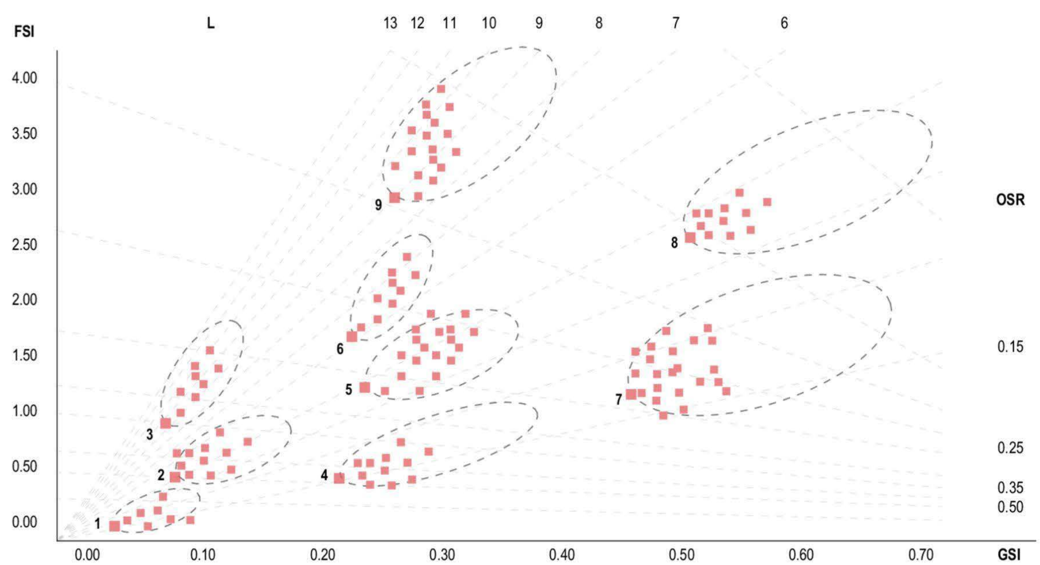


Figure 3. Outline for the calculation of the four indicators to classify morphologies. Source: Berghauser & Haupt, 2021.



■ Punto o par ordenado (manzana)

□ Clústers de acumulación de puntos (define la tipología según Berghauser y Haupt)

Tipologías propuestas

1. Disperso con construcciones aisladas de baja altura
2. Disperso con construcciones aisladas de media altura
3. Disperso con construcciones aisladas de gran altura
4. Compacidad media con construcciones adosadas de baja altura
5. Compacidad media con construcciones adosadas de media altura
6. Compacidad media con construcciones adosadas de gran altura
7. Compacto con construcciones en bloque de baja altura
8. Compacto con construcciones en bloque de media altura
9. Compacto con construcciones en bloque de gran altura

Figure 4. Diagram of interpretation of results and classification of morphological typologies. Source: Berghauser & Haupt, 2021.

The intensity (FSI: *Floor Space Index*) is calculated by dividing the total built-up area for the study area by block, being, instead, equivalent to the LUC (Land Use Coefficient). The height (H) is calculated by dividing FSI over GSI, or, in other words, the area built in height over that built on the ground floor. Finally, the open space relation (OSR), which indicates the relationship between the unbuilt space and the built-up area in each block, is calculated by subtracting GSI from the study area and dividing the resulting value for FSI (Berghauser & Haupt, 2021) (Figure 3).

Once the indicators are raised, these four datasets become a point on the Cartesian plane. The values calculated in each block determine the ordered pair (x,y), and the morphologies are classified under the clusters formed by points (blocks) in certain areas of the plane, using the criteria defined by Berghauser and Haupt (2021) (Figure 4).

Habitability assessment

Urban habitability was evaluated using a table of indicators adapted and scored on the Likert Scale according to standards established by related methodologies (Moreno, 2008; Rodas, 2019; Segarra, 2021). The table covers four general rating parameters: access to infrastructure, sustainable mobility, sociability potential, and preservation of urban green. These criteria were identified as recurrent in previous studies in the region, supporting their relevance and applicability in this context (Moreno, 2008).

Specific indicators were defined within each parameter and adapted to the particular characteristics of the peripheral neighborhoods to ensure their relevance. Each indicator was evaluated on a scale of 1 to 5, where 1 represents the worst rating, and 5 is the best. Subsequently, an equitable weighting of the results of each parameter was carried out to calculate a final score out of 100 points. Each contributed 25% of this score, recognizing that each equally influences the built-up neighborhoods' urban habitability level. That is, regardless of the number of initiators, each of the four parameters is equivalent to 25% of the final score (Table 1, Table 2, and Table 3)

Access to infrastructure			
Aspect	**Indicators**	**Major (5) and minor (1) qualification standards**	**Source**
Public infrastructure	Access to water and sanitation	5. The drinking water service is regular every day of the week. 1. There is no drinking water service.	ETAPA EP (Public Telecommunications, Drinking Water and Sewerage Company of Cuenca).
	Access to electricity	5. The electricity service is regular every day of the week. 1. There is no electricity service.	ETAPA EP (Public Telecommunications, Drinking Water and Sewerage Company of Cuenca).
	Access to telecommunications service	5. Telephone and internet services are regular every day of the week. 1. There is no telephone or internet service.	ETAPA EP (Public Telecommunications, Drinking Water and Sewerage Company of Cuenca).
Service infrastructure	Intensity of mixed uses	5. There are 5 or more types of uses in most sections. 1. There is only 1 type of use in most stretches.	Land Use and Management Ordinance. Google Earth. Onsite revision
	Distance to health and/or education services	5. Maximum walking distance of 200 meters to a health and/or education infrastructure. 1. More than 1 km away from a health and/or education infrastructure.	Google Earth. Onsite revision
	Distance to commercial supply services	5. Maximum walking distance of 200 meters to a commercial supply infrastructure. 1. More than 1 km away from a commercial supply infrastructure.	Google Earth. Onsite revision

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Access to infrastructure			
Aspect	**Indicators**	**Major (5) and minor (1) qualification standards**	**Source**
Green infrastructure	Public green area per inhabitant	5. The public green area per inhabitant equals or exceeds 9 m^2. 1. The public green area per inhabitant is less than 3 m^2.	Google Earth. Geoportal of the Municipal GAD of Cuenca.
	Ratio between permeable and impermeable surface	5. The ratio between impermeable and permeable surfaces is 2:1. 1. The ratio between impermeable and permeable surfaces is 8:1 or higher.	Onsite revision
Recreational infrastructure	Effective public area per inhabitant	5. The area of effective public space per inhabitant is equal to or greater than 4.5 m^2. 1. The effective area of public space per inhabitant is zero.	Google Earth. Geoportal of the Municipal GAD of Cuenca.
	Number of services in the public space	5. There are 5 or more types of use in most public spaces, including essential services. 1. There is only 1 type of use in most public spaces without essential services.	Onsite revision

Table 1. Aspects, indicators, qualification standards, and sources to assess access to infrastructure. Source: Preparation by the authors, 2024

Sustainable mobility			
Aspect	**Indicators**	**Major (5) and minor (1) qualification standards**	**Source**
Walkability	Size of the sidewalk	5. The minimum sidewalks are 1.80 meters wide or more. 1. The minimum sidewalks are less than 1.20 meters wide.	Onsite revision
	Continuity of sidewalk	5. The sidewalks are linear throughout the section, and their continuity is not interrupted. 1. There is no linearity in the sidewalks, or there is no sidewalk.	Onsite revision
	Conditions of the sidewalk	5. There are no holes, steps, or unevenness. 1. More than 50% of the area contains holes, steps or unevenness.	Onsite revision
Cyclability	Accessibility to bike paths	5. The streets have lanes for cyclists, segregated from the flow of motorized transportation. 1. There is no infrastructure for bicycles.	Onsite revision
	Lane size	5. The cycle lanes are 2 meters wide or more. 1. The cycle lanes are less than 1.20 meters wide.	Onsite revision
	Lane continuity	5. Cycle lanes have continuity throughout the city. 1. The cycle lanes have no continuity.	Google Earth. Onsite revision
Public transport	Distance to public transport stops	5. Maximum walking distance of 200 meters to a public transport station (metro, train or bus). 1. More than 1 km away from a public transport station.	Google Earth. Moovit app.
	Number and frequency of trips	5. Constant trips every 10 minutes throughout the day. Trips every 20 minutes or more from morning to afternoon.	Moovit app.
Private transportation	Average number of cars per family	5. Less than one car per family. 1. More than two cars per family,	INEC(2014) (National Institute of Statistics and Censuses). EMOV EP (Public Mobility Company of Cuenca).
	Distance and travel time	5. Daily car trips of a maximum of 15 minutes. 1. Daily car trips of more than 30 minutes.	Google Earth. Moovit app.

Table 2. Aspects, indicators, qualification standards, and sources for assessing sustainable mobility. Source: Preparation by the authors, 2024

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Potential for sociability			
Aspect	**Indicators**	**Major (5) and minor (1) qualification standards**	**Source**
Channelizers of social interaction	Amount of furniture for resting	5. There is more than one possibility to sit on the public furniture in most sections. 1. No furniture or structure offers the opportunity to sit and rest	Onsite revision
	Number of places of shade and shelter	5. walking under a shelter for rain and sun is possible along most sections. 1. No structure provides shade or shelter.	Onsite revision
Safety enhancers	Amount of public lighting	5. Public lighting is directed to the sidewalk and/or the crossings in most sections. There is no public lighting on the road.	Onsite revision
	Number of blind facades	5. There are no blind facades that block the visibility of the private space in most sections. 1. More than 50% of the extension of most sections is composed of blind facades.	Onsite revision
Preservation of urban greenery			
Aspect	Indicators	Major (5) and minor (1) qualification standards	Source
Lost green area	Amount of green area lost in the expansion	5. 5% of the green area of the selected area has been lost in the last 5 years. 1. It has lost more than 50% of the green area of the selected area in the last 5 years.	Geoportal of the Municipal GAD of Cuenca. PDOTs 2015 and 2022.

Table 3. Aspects, indicators, qualification standards, and sources to evaluate the potential of sociability and the preservation of urban green. Source: Preparation by the authors, 2024

V. RESULTS

Identified urban morphologies

From the application of *Spacematrix* in the four conurbations, the results revealed a distinctive typification for each periphery, depending on its degree of dispersion. When locating the collected data, the points accumulated in the Cartesian plane corroborated that the Sayausí conurbation is of type 4, of medium compactness with low-rise terraced buildings; Nulti of type 1, scattered with isolated low-rise buildings; Chiquintad, of type 2 or scattered with isolated mid-rise buildings and Baños, of type 5 or medium compactness with mid-rise terraced buildings (Figure 5). In other words, the findings describe Sayausí and Baños as more compact conurbations than Chiquintad and Nulti, which are significantly diffuse.

The scattered typologies 1 and 2 have low constructed intensity indices (FSI) and low constructed coverage indices (GSI). The difference between the two lies in the height of their buildings (H) and the area of retreats, or non-built areas per block (OSR). In morphological typology 1 of Nulti, a larger area of retreats was measured, generally on the four fronts of the houses, and the constructions are lower than in Chiquintad of morphological typology 2. In the same way, this happens with the typologies of medium compactness 4 and 5, Sayausí and Baños, where the one with the highest height (L) and the lowest open space (OSR) is that of morphologies type 5 of Baños.

Urban habitability levels

The findings of the urban habitability assessment pointed out deficiencies in access to infrastructure, sustainable mobility, sociability potential, and preservation of urban green in the four peri-urban neighborhoods. After evaluating each indicator on the Likert Scale of the proposed table, it was obtained globally that the Sayausí conurbation reached 51 out of 100 points, Chiquintad 28, Nulti 38.75 and Baños 54.5 (Figure 6).

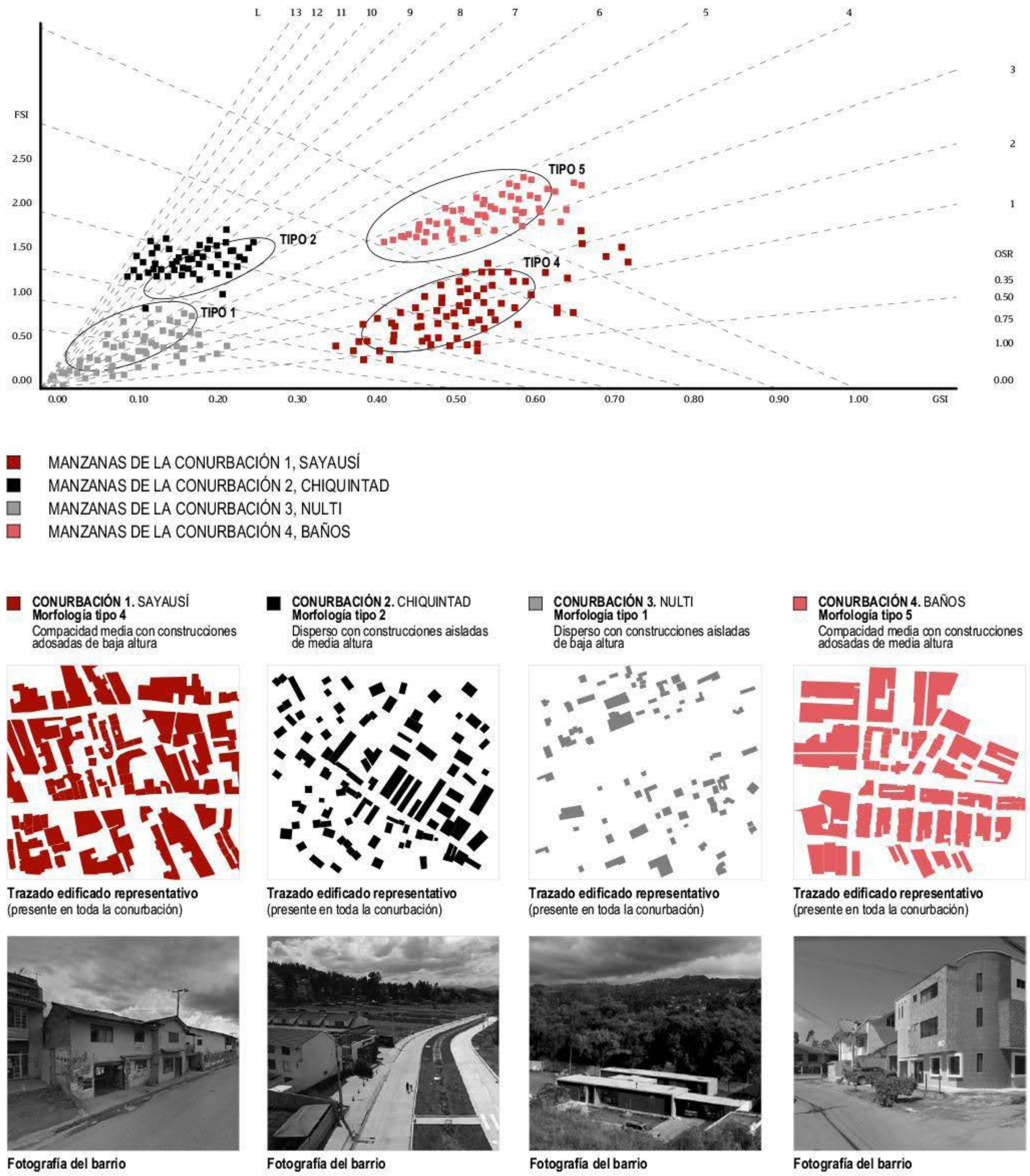

Figure 5. Results of the classification of morphologies of the studied conurbations. Source: Preparation by the authors, 2024

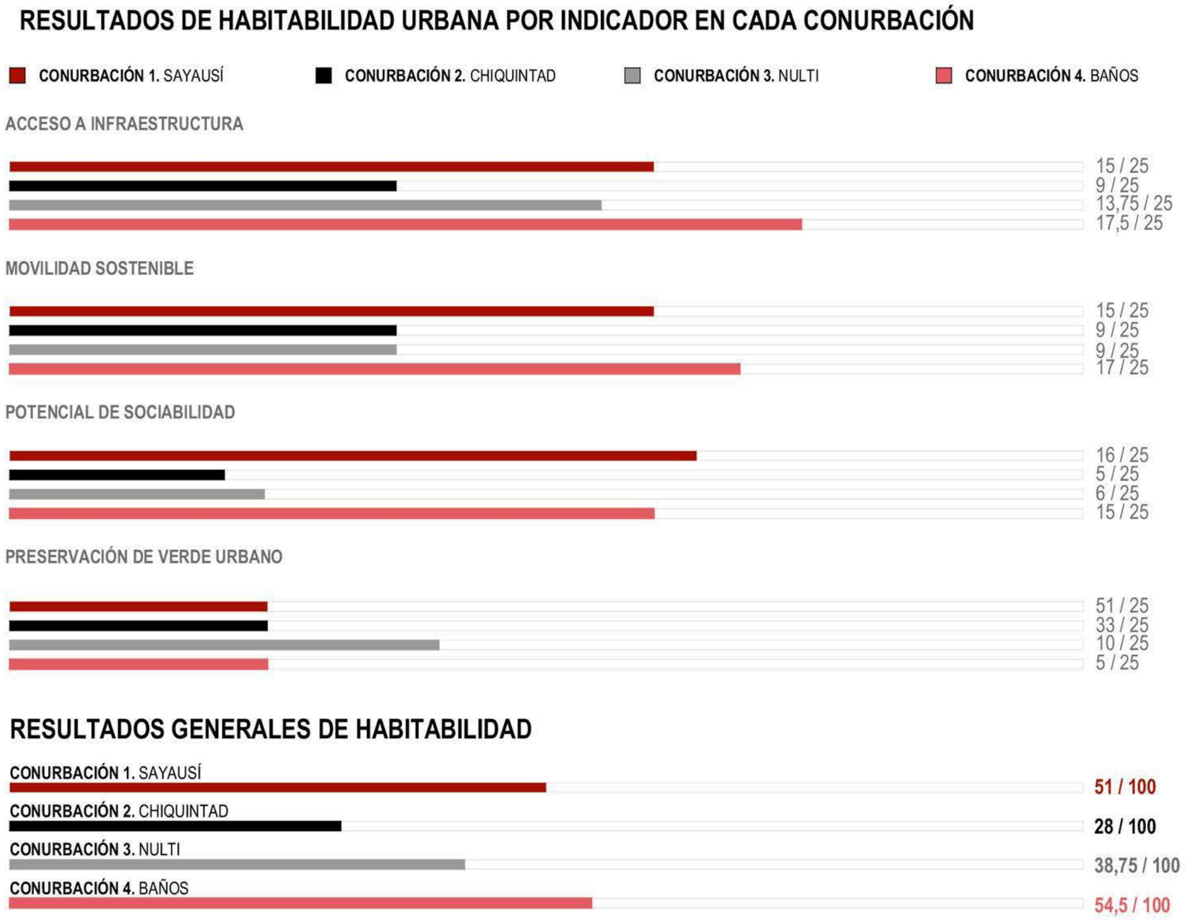

Figure 6. Results of the evaluation of urban habitability of the studied conurbations. Source: Preparation by the authors, 2024

Concerning infrastructure, the conurbations of Sayausí and Baños stood out for their accessibility to public services, diversity of uses, and presence of equipment, while Nulti and Chiquintad present more restrictions. In evaluating sustainable mobility, it was evident that all conurbations have difficulties accessing passive transport. The conurbations most dependent on private cars are Nulti and Chiquintad, while Sayausí and Baños showed less dependence due to access to more frequent and effective public transport lines.

None of the conurbations has adequate rest places, parks, or squares that encourage social interaction. However, the Sayausí conurbation obtained the best score in this parameter thanks to the permeability and versatility of its facades, which provide opportunities for neighborhood meetings. Finally, when evaluating the preservation of post-expansion natural areas, the Sayausí, Baños, and Chiquintad conurbations almost doubled their occupation area in the last decade. At the same time, Nulti grew by about 30% in the same period.

As can be seen in Figures 5 and 6, the more compact morphologies exhibit better urban habitability conditions. The typologies of medium compactness, represented in red, obtained more than 50% of the habitability rating, although they are still considerably low. Among these two, the morphology of medium compactness with medium height constructions (type 5) in Baños obtained the best rating. On the contrary, the scattered morphologies obtained the lowest habitability ratings, although the height difference did not indicate the same relationship between these two.

VI. DISCUSSION

Firstly, it was found that the scattered morphologies, characterized by isolated constructions, effectively face difficulties accessing public infrastructures and are far from essential services such as hospitals and schools. In addition, the recreational infrastructure is insufficient. According to the literature, the relationship between compact morphologies and the efficient provision of infrastructure is positive regarding technical sustainability and energy efficiency, as Schiller (2007) points out in his work "*Urban Infrastructure: Challenges for Resource Efficiency*." This is due to the noticeable increase in the use and waste of material and economic resources in providing and maintaining services in scattered morphologies. In contrast, in compact neighborhoods, these services are generally more diverse and efficient (Dempsey et al., 2012).

On the other hand, there is also a theoretical consensus stating that higher occupancy densities contribute to the increase in the use of public transport and active modes of transport while reducing the use of cars and the distances traveled (Hermida et al., 2015; Ingvardson & Nielsen, 2018; Pan et al., 2017; Zhang & Zhang, 2015). In theory, urban transport modes are classified into public transport, active transport (walking or cycling), and private motorized transport (Ewing et al., 2016; Houston et al., 2015; Kim, Park, and Hong, 2018; Lin & Yang, 2009); and all of them are crossed by urban morphological conditions that determine the behavior of the trip, the distance and the choice of the modality. This research indicated that mobility to and from the conurbations is conflicting for the four neighborhoods studied. However, it was evidenced that the bus lines are less efficient for type 1 and 2 conurbations in Nulti and Chiquintad. Stops are generally scarce within these conurbations, and the travel time is more than 20 minutes. Baños and Sayausí, probably due to the influx of people, have more transport lines connected to important points of the urban area, and the routes are made more frequently. The walkability and other passive modes of transport are very difficult to realize due to the urban configuration of the conurbations. However, the more scattered morphologies are more dependent on the use of the car, particularly Nulti, whose economic conditions also favor the choice of this mode of transfer.

According to related studies, compactness and high density also positively affect the opportunities to meet people and favor, for example, the frequency with which people interact with their immediate neighbors (Berghauser & Haupt, 2021; Mouratidis, 2018). However, Bramley and Power (2009) add that this relationship is not always linear and that social interaction tends to improve as density increases only up to a healthy level, to then decrease drastically. In this study, the sociability potential obtained the most contrasting results when comparing the scores of the scattered and medium compactness morphologies. Morphologies 1 and 2, with scattered characteristics, obtained the lowest results because the city in these neighborhoods does not offer safe spaces to stay and does not favor community life or neighborhood encounters. The most problematic conurbation was Chiquintad, which, in addition, is beginning to be populated with closed condominiums en masse and isolated housing that harm urban life (Gehl, 2010; Dave, 2011). On the contrary, it was found that the morphologies of medium compactness offer opportunities for community encounters, and Sayausí particularly enjoys living spaces, shade, and permeability, which gave it the highest rating of this criterion.

Finally, it was found that, regardless of their morphological typology, the four conurbations have grown without any concern for preserving the natural and rural green space. There are still places for cultivation, livestock farming, and new subdivisions for city residents. In this sense, Ávila (2008) identifies the phenomenon of "deruralization" as the result of the drastic changes that the rural territory has suffered physically and socially due to accelerated growth, and suggests a change of perspective. The urban edge, discontinuity, and fragmentation studies must also be seen from a territorial perspective, which implies expanding the planning scale from urban to regional (Ballén, 2014, cited by Cabrera, 2016). On the urban scale, borders are growth scenarios that must conform to internal norms (Salazar & Zuleta, 2014). A purely urban approach would exclude the dynamics, uses, and inhabitants of the rural environment and open up the perspective and elucidation of the conflict faced by natural habitats and their primary uses in the face of expansion (Ruiz & Romano, 2019; Cabrera, 2016).

Despite the results, which suggest a positive correlation between variables, it is essential to clarify that habitability is also influenced by economic, social, and political factors that were not addressed in this study but are understood as fundamental to achieving a comprehensive vision of the reality of the peripheries of Cuenca. Although the quantitative approach of correlational scope and the tools used (*Spacematrix* and parametric rating on the Likert scale) provide quantifiable and comparative information, they do not entirely address the complexity and multidimensionality of the phenomena studied. Therefore, the results and conclusions cannot be generalized, although they show a trend that could be repeated with the corresponding differences in similar environments. In future research, addressing these limitations through methodological triangulation approaches that integrate quantitative and qualitative methods and the active participation of residents and other key players in the research process would be beneficial. Having said that, the relationship between urban habitability and morphology in terms of dispersion is supported by the theory (Ananda, 2014; Hermida et al., 2015; Mouratidis, 2018; Pan et al., 2017; Zhang & Zhang, 2015) and is ratified in this study. Being the most scattered conurbations, those with the lowest habitability, and those with medium compactness, those with the highest habitability.

VII. CONCLUSIONS

The results obtained from this study in four peripheral areas of Cuenca, in Ecuador, show a correlation between the morphological typology and the levels of habitability in the studied conurbations, with the most compact tending to better urban habitability conditions, compared to those more scattered, with which the central research objective, consisting of identifying and describing these relationships in the selected cases, is fulfilled. It was observed that scattered morphologies face more significant difficulties in access to public infrastructures and a greater dependence on private transport, which does not contribute to sustainable mobility. In addition, these areas lack adequate public spaces that encourage social interaction, which can negatively affect community cohesion and the well-being of residents.

On the other hand, the compact morphologies presented a greater diversity of land uses, better accessibility to public services, and less dependence on private transport, offering more opportunities for social and community interaction, which could contribute to a greater sense of belonging and quality of life for residents. However, it is essential to highlight that urban habitability is influenced by various economic, social, and political factors not addressed in this study. Therefore, to understand the reality of the Latin American peripheries, it is necessary to consider these aspects in future research and integrate qualitative and participatory methods to deepen urban margins' territorial dynamics and livability narratives.

The relationship between morphology and habitability in the Latin American peripheries is a topic of great relevance and complexity, and the management of both is decisive for the quality of life of cities. This implies implementing policies to ensure compact growth models that favor social, economic, and environmental sustainability in urban edges. The findings of this study support the importance of considering urban morphology when designing urban development policies and strategies in the Latin American peripheries, promoting compaction and diversification of land uses. Finally, it highlights the importance of comprehensive urban planning that addresses morphology and habitability to improve the population's living conditions. Finally, the lack of density and green spaces in the peripheral territories highlights the urgency of addressing these challenges coherently and systematically to move towards more sustainable and inclusive cities.

VIII. REFERENCES

Abdelrashid, D., Khalifa, A., Serag, Y., & El Fayoumi, M. (2023). Investigating The Common Perceptual Qualities of Urban Morphology and Subjective Wellbeing Scales for Urban Mobility Studies: A Literature Review. *Future Engineering Journal*, *1*(4), 1-14. https://digitalcommons.aaru.edu.jo/fej/

Alcalá, L. (2007). Dimensiones urbanas del problema habitacional. El caso de la ciudad de Resistencia, Argentina. *Revista INVI*, *22*(59) 35-68. https://doi.org/10.5354/0718-8358.2007.62133

Alexander, C. (1977). A pattern language: Towns, Buildings, Constructions. *Oxford University Press*. https://www.patternlanguage.com

Alexander, E. R., Rees, K. D., & Murphy, P. Y. (1988). *Density measures and their relation to urban form. Center for Architecture and Urban Planning.* http://dc.uwm.edu/caupr_mono/37 12/1/2024

Ávila, H. (2008). Enfoques geográficos en torno a la nueva ruralidad en E. Pérez, M, Farah y H. Cartón de Grammont. *La nueva ruralidad en América Latina. Avances teóricos y evidencias empíricas* (1ª Ed., pp. 103-132). *Pontificia Universidad Javeriana*. https://www.flacsoandes.edu.ec/sites/default/files/agora/files/1254927167.luciano_martinez_la_descentralizacion_0.pdf

Ananda, J. (2014). Evaluating the Performance of Urban Water Utilities: Robust Nonparametric Approach? *Journal of Water Resources Planning and Management*, *9*(140) 40-54. https://doi.org/10.1061/(ASCE)WR.1943-5452.0000387

Berghauser, M., & Haupt, P. (2021). SPACEMATRIX Space, Density and Urban Form. *Nai Publishers Netherlands*. https://www.researchgate.net/publication/351049141_Spacematrix_-_Space_Density_and_Urban_Form

Berghauser, M., Haupt, P., Berg, P., Alstäde, V., & Heyman, A. (2021). Systematic review and comparison of densification effects and planning motivations. *Buildings and Cities*, *2*(1), 378-401. https://journal-buildingscities.org/articles/10.5334/bc.125

Bramley, G., & Power, S. (2009). Urban form and social sustainability: the role of density and housing type. *Environment and Planning B: Planning and Design*, *36*(1), 30-48. https://journals.sagepub.com/doi/abs/10.1068/b33129

Bruegmann, R. (2005). Sprawl: a compact history. *The University of Chicago Press*. https://press.uchicago.edu/ucp/books/book/chicago/S/bo3614185.html

Cabrera, N. (2016). Metodología para el diagnóstico y la ordenación de los corredores de crecimiento de ciudades intermedias ecuatorianas: Cuenca como caso de estudio [Tesis de magíster, Universidad de Cuenca]. http://dspace.ucuenca.edu.ec/handle/123456789/25256

CEPAL. (2020). Panorama Social de América Latina. CEPAL. https://repositorio.cepal.org/entities/publication/61652648-a144-413a-bab4-1eae639b3ecf

Dempsey, N., Brown, C., & Bramley, G. (2012). The key to sustainable urban development in UK cities? The influence of density on social sustainability. *Progress in planning 77*(3), 89-141. https://www.sciencedirect.com/journal/progress-in-planning/vol/77/issue/3

Dave, S. (2011). Neighborhood Density and Social Sustainability in Cities of Developing Countries. *Sustainable Development, 19*(3), 189-205. https://doi.org/10.1002/sd.433

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Dempsey, N., Brown, C., & Bramley, G. (2012). The Key to Sustainable Urban Development in UK cities? The Influence of Density on Social Sustainability. *Progress in Planning, 77*, 89-141. 10.1016/j.progress.2012.01.001

Díaz, M., & Medina, M. (2019). Concepto de Compacidad urbana en el contexto de borde urbano en D. A. Arias-Caicedo, J. J. Castiblanco-Prieto, M. Castillo-de Herrera, M. S. Díaz-Osorio, I. F. Medina-Arboleda, M. Medina-Ruiz, . . . A. Y. Vallejo-Rivas. El borde urbano como territorio complejo. Reflexiones para su ocupación (1a ed., pág. 24). Bogotá: Universidad Católica de Colombia. https://hdl.handle.net/10983/26147

Espinoza, A., & Gómez, G. (2010) Hacia una concepción socio-física de la habitabilidad: espacialidad, sustentabilidad y sociedad. *Palapa, 5*(1) 59-69. https://www.redalyc.org/pdf/948/94820714006.pdf

Ewing, R., Hajrasouliha, A., Neckerman, K., Purciel, M., & Greene, W. (2016). Streetscape Features Related to Pedestrian Activity. *Journal of Planning Education and Research, 36*(1), 5-15. https://doi.org/10.1177/0739456X15591585

Freidberger, M. (2000). The rural-urban fringe in the late twentieth century. *Agricultural History*, *74*(2), 502-514. https://doi.org/10.1215/00021482-74.2.502

García, F. (6 y 7 de junio del año 2016). Morfología urbana en la periferia del siglo XX de Murcia: compacidad y densidad de los tejidos urbanos. [Discurso principal]. VIII Seminario Internacional de Investigación en Urbanismo. Barcelona, España. https://doi.org/10.5821/siiu.6264

Gehl, J. (2010). *Cities for People*. Island Press.

Gilbert, A. (1997). *La ciudad latinoamericana*. Siglo XXI. https://www.redalyc.org/articulo.oa?id=67601722

Hermida, M., Hermida, C., Cabrera, N., & Calle, C. (2015). La densidad urbana como variable de análisis de la ciudad. El caso de Cuenca, Ecuador. *Revista Eure*, 41(124), 25-44. http://dx.doi.org/10.4067/S0250-71612015000400002

Hermida, M., Cabrera, N., & Durán, M. (2023). Crecimiento y urbanización en L. Fuentes, M. Greene, R. Mora (Eds.) *Dinámicas urbanas*(1a ed., Vol. 1, pp. 12-31). Pontificia Universidad Católica de Chile. https://www.researchgate.net/publication/376112098_Crecimiento_y_Urbanizacion

Houston, D., Boarnet, M. G., Ferguson, G., & Spears, S. (2015). Can Compact Rail Transit Corridors Transform the Automobile City? Planning for More Sustainable Travel in Los Angeles. *Urban Studies, 52*(5), 938-959. https://www.jstor.org/stable/26146022

INEC (Instituto Ecuatoriano de Estadísticas y Censos). (2014). Estadísticas. http://www.inec.gob.ec/estadisticas/

Ingvardson, J., & Nielsen, O. (2018). Effects of new bus and rail rapid transit systems – an international review. Transport Reviews, *38*, 96-116. https://www.worldtransitresearch.info/research/6699/

Kim, D., Park, J., & Hong, A. (2018). The Role of Destination's Built Environment on Nonmotorized Travel Behavior: A Case of Long Beach, California. *Journal of Planning Education and Research*, *38*(2), 152-166. https://doi.org/10.1177/0739456X16688765

Kropf, K. (2009). Aspects of Urban Form. *Urban Morphology*, 13(2), 105–120. https://doi.org/10.51347/jum.v13i2.3949

Lin, J., & Yang, A. (2009). Structural Analysis of How Urban Form Impacts Travel Demand: Evidence from Taipei. *Urban Studies,* 9(46), 51-67. https://doi.org/10.1177/0042098009106017

Marchant, C., Riesco, M., & Monje, Y. (2023). Crecimiento y fragmentación del periurbano valdiviano. Efectos del urbanismo neoliberal en una ciudad intermedia del sur de Chile. *EURE, 49*(147), 1-25. http://dx.doi.org/10.7764/eure.49.147.09

Martins, F. & Pereira, G. (2022). Produção imobiliária de habitação em Curitiba na década de 2010: algumas reflexões. *Cadernos Metrópole*, 24(53), 311-336. https://doi.org/10.1590/2236-9996.2022-5312

Montero, L., & García, J. (2017). Panorama multidimensional del desarrollo urbano en América Latina y el Caribe. *CEPAL*. https://repositorio.cepal.org/entities/publication/f5b33bfe-0c64-4f2f-88a0-0e53b0639727

Moreno, S. (2008). La habitabilidad urbana como condición de calidad de vida. *Palapa, 11*(7), 47-54. https://www.redalyc.org/pdf/948/94814774007.pdf

Mouratidis, K. (2018). Built Environment and Social Well-being: How does urban form affect social life and personal relationships? *Cities*, 74, 7-20. https://doi.org/10.1016/j.cities.2017.10.020

Mumford, L. (2014). La ciudad en la historia: sus orígenes, transformaciones y perspectivas. Logroño: Pepitas de calabaza. Sociología histórica. https://revistas.um.es/sh/article/view/246771/186591

Oliveira, V. M. (2017). Morfologia urbana: diferentes abordagens. *Revista De Morfologia Urbana*, 4(2), 65–84. https://doi.org/10.47235/rmu.v4i2.7

Orellana, D., & Osorio, P. (2014). Segregación socio-espacial urbana en Cuenca, Ecuador. *Analítika: revista de análisis estadístico*, 8, 27-38. https://dialnet.unirioja.es/servlet/articulo?codigo=5004620

Pan, H., Li, J., Shen, Q., & Shi, C. (2017). What Determines Rail Transit Passenger Volume? Implications for Transit-Oriented Development Planning. *Transportation Research Part D: Transport and Environment, 57*, 52-63. http://www.sciencedirect.com/science/journal/13619209

Pesántez, M., & Cabrera, N. (2023). Morfología y habitabilidad urbana en el borde de una ciudad intermedia. Caso de estudio Cuenca, Ecuador *[Tesis de magister. Universidad del Azuay]*. http://dspace.uazuay.edu.ec/handle/datos/13224

Pérez, A. (1999). *"La construcción de indicadores Bio-Ecológicos para medir la calidad del ambiente natural urbano"*. Documento de investigación del Grupo de Calidad Ambiental Urbana. Mérida: Facultad de Arquitectura y Arte de la Universidad de Los Andes. https://docplayer.es/15445317-La-construccion-de-indicadores-bio-ecologicos-para-medir-la-calidad-del-ambiente-natural-urbano.html

Prieto, P., Romero, V., Moyano, A., Solís, E., & Coronado, J. (2018). Identificación, clasificación y análisis de las formas urbanas en ciudades medias: aplicación a las capitales provinciales de Castilla-La Mancha. *Anales de Geografía de la Universidad Complutense, 38*(1), 87-112. https://dialnet.unirioja.es/servlet/articulo?codigo=6484433

Rocca, M., Lancioni, A., Ríos, L., Dellachaux, A., & Sgroi, A. (2013). *Expansión urbana en municipios de la provincia de Buenos Aires: avances del proceso y vínculos con las políticas territoriales. Mundo Urbano, 41.* http://www.mundourbano.unq.edu.ar/index.php/ano-2013/75-numero-41/243-expansion-urbana-enmunicipios-de-la-provincia-de-buenosaires-avances-del-proceso-y-vinculoscon-las-politicas-territoriales

Rodas, A. (2019). La vida social en la vivienda. Fenomenología de la habitabilidad programa habitacional socio vivienda, Guayaquil-Ecuador *[Tesis de doctorado. Universidad de Morelos]*. http://riaa.uaem.mx/handle/20.500.12055/1173

Ruiz, J., & Romano, S. (2019). Mezcla social e integración urbana: aproximaciones teóricas y discusión del caso chileno. *Revista INVI*, 34(95), 45–69. https://revistainvi.uchile.cl/index.php/INVI/article/view/63073

Salazar, C., & Zuleta, B. (2014). La noción de borde en la narrativa urbana. Estudio de caso: Medellín, Colombia. Revista Bitácora Urbano Territorial, 24(2), 31-39.

Schiller, G. (2007). Urban infrastructure: challenges for resource efficiency in the building stock. *Building Research y Information*, 35(4), 399-411. https://doi.org/10.1080/09613210701217171

Segarra, G. (2021). Narrativas en la periferia de la ciudad intermedia. El caso de Loja-Ecuador. *Revista Eidos*, 17, 75–85. https://dialnet.unirioja.es/servlet/articulo?codigo=8489524

Toro, C., Velasco, V., & Niño, A. (2005). El borde como espacio articulador de la ciudad actual y su entorno. *Revista Ingenierías Universidad de Medellín*, *4*(7), 55-65. https://www.redalyc.org/pdf/750/75004705.pdf

Villamizar, N. (2014). Bordes urbanos: teorías, políticas y prácticas para la construcción de territorios de diálogo. *Bitácora Urbano Territorial*, 2(24), 31-33. https://issuu.com/bitacoraurbanoterritorial/docs/bit__cora_24_v2_/1

Zhang, W., & Zhang, M. (2015). Short- and Long-Term Effects of Land Use on Reducing Personal Vehicle Miles of Travel: Longitudinal Multilevel Analysis in Austin, Texas. *Transportation Research Record, 2500*, 102-109. https://doi.org/10.3141/2500-12

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