Model of population densification in consolidated collective housing in the urban fabric from Juliaca city

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Research paper

Model of population densification in consolidated collective housing in the urban fabric from Juliaca city.

Modelo de densificação da população em habitações coletivas consolidadas no tecido urbano da cidade de Juliaca.

Modelo de densificación poblacional en vivienda colectiva consolidada en el tejido urbano de la ciudad de Juliaca.

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Contribuição dos autores
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Abstract

The analysis of the peripheries reveals the existence of important problems of residential precariousness and exclusion for a high-density collective housing project. The purpose is to model the population density in consolidated collective housing in the urban fabric of the city of Juliaca. Size and density are fundamental characteristics that define any city, but they have not always received the same attention. Although density figures prominently in any urban planning manual as a key variable governing the urban environment, city size is often treated as an immeasurable factor beyond the control of planning. However, it is unclear whether these two variables can be analyzed independently, as the correlation between the two is significant. To assess how scale and density interact, a new approach was adopted to new forms of modern urbanization. The results obtained from a sample of 96 blocks allow the classification of the two districts in terms of aggregation, which will be used to determine the location of the high-density residential project by analyzing one side of the site according to the calculated proportion. of housing. the combined urban development is located in the South, so the residential district will be located on the North side, as it is less consolidated and characterized by one, two, and three-story buildings according to the kernel density analysis.

Keywords:
Spatial analysis.
Housing.
Block.
Urban fabric.

Resumo

A análise das periferias revela a existência de importantes problemas de precariedade e exclusão residencial para um projeto habitacional coletivo de alta densidade. O objetivo é modelar a densidade populacional em habitações coletivas consolidadas no tecido urbano da cidade de Juliaca. Tamanho e densidade são características fundamentais que definem qualquer cidade, mas nem sempre recebem a mesma atenção. Enquanto a densidade figura de forma proeminente em qualquer manual de planejamento urbano como uma variável-chave que rege o ambiente urbano, o tamanho da cidade é frequentemente tratado como um fator imensurável além do controle do planejamento. Entretanto, não está claro se estas duas variáveis podem ser analisadas independentemente, pois a correlação entre as duas é importante e significativa. Para avaliar como a escala e a densidade interagem, uma nova abordagem adaptada às novas formas de urbanização moderna. Os resultados obtidos de uma amostra de 96 blocos permitem a classificação dos dois distritos em termos de agregação, que será utilizada para determinar a localização do projeto residencial de alta densidade, analisando um lado do local conforme a proporção calculada de moradias. O

desenvolvimento urbano combinado está localizado no lado sul, portanto o distrito residencial estará localizado no lado norte, uma vez que é menos consolidado e caracterizado por edifícios de um, dois e três andares conforme a análise de densidade do núcleo.

Palavras-chave:
Análise espacial.
Habitação.
Bloco.
Tecido urbano.

Resumen

El análisis de las periferias revela la existencia de problemas importantes de precariedad residencial y de exclusión para un proyecto de vivienda colectiva en alta densidad. El propósito es modelar la densidad poblacional en vivienda colectiva consolidada en el tejido urbano de la ciudad de Juliaca. El tamaño y la densidad son características fundamentales que definen a cualquier ciudad, pero no siempre han recibido la misma atención. Aunque la densidad ocupa un lugar destacado en cualquier manual de planificación urbana como una variable clave que rige el entorno urbano, el tamaño de la ciudad a menudo se trata como un factor inconmensurable que escapa al control de la planificación. Sin embargo, no está claro si estas dos variables se pueden analizar de forma independiente, ya que la correlación entre las dos es importante y significativa. Para evaluar cómo interactúan la escala y la densidad, un nuevo enfoque adaptado a las nuevas formas de urbanización moderna. Los resultados obtenidos de una muestra de 96 manzanas permiten la clasificación de los dos distritos en términos de agregación, que se utilizará para determinar la ubicación del proyecto residencial de alta densidad mediante el análisis de un lado del sitio según la proporción calculada. de la vivienda. el desarrollo urbano combinado se encuentra en el Sur, por lo que el distrito residencial se ubicará en el lado Norte, ya que es menos consolidado y se caracteriza por edificios de uno, dos y tres pisos según el análisis de densidad de kernel.

Palabras Clave:
Análisis espacial.
Vivienda.
Manzana.
Tejido urbano.

Introduction

Neighborhood analysis revealed significant problems of housing instability and exclusion, but nothing compared to the ghettos of North America today. In the context of the crisis, the need for state intervention in these areas is even more urgent (Casado, 2015). Urban growth problems are directly related to land ownership, related agents, and land management (Bernal, 2018). Cities grow and expand, change spatially very rapidly and create wide spheres of influence, the ever-increasing and changing density is an integral part of the theoretical debate on decentralized versus compact cities around the world, especially in Latin America (Ramirez, 2017). A city can be understood as a living organism supported by several systems that interact to ensure and develop according to its internal urban logic that prevails in the context of a given period. These logics are imposed by people, driven by their political and economic needs, in search of greater productivity and efficiency of processes, as well as a better quality of life (Ballén, 2009). Residents tend to invade fragile areas and develop cities based on precarious urban habitats to build their homes without high-quality services and public spaces (Ccapatinta, 2016). Each neighborhood or urban area has heritage, spaces, buildings, open spaces and routes, monuments, and signs that are self-identities and need to be preserved and restored to help preserve the memory and promote the evolution of the city (Walker et al., 2010).

On the one hand, there is a strong contrast between the closed hamlets and the shantytowns; on the other hand, the low density of the small towns is connected with the low density of the closed residential neighborhoods around them, but they do not manage to find an adequate form of integration (Lucio, 2012). Starting from the idea of an urgent need to raise alternative and inclusive projects that improve the quality of life, and based on the information presented here, a series of proposals were built that, analyzed in depth, could contribute positively to a city change (Calonge & Rodriguez, 2015). Conflicts and urban violence are some of the fundamental problems afflicting modern cities, especially in the developing world. The reason is the coexistence of two types of settlements that belong to two parallel worlds: informal and informal, although they are part of the same urban phenomenon and are largely physically dependent. No view of spatial interaction (Graue, 2009). Due to the lack of flexibility, the housing sector is being built and renovated in an obsolete state. The house should have a long life, it should not be dominated by light and outdated fashions, and it should be able to adapt to the changes it experiences during its use due to social, technological, demographic, and market changes (Goñi, 2014). The purpose of this paper is to study and analyze the situation of collective housing and public spaces in the development and progress of integrated urbanization in Juliaca and to estimate the proportion of integrated urban structures suitable for increasing collective housing in Juliaca.

Methodology

The present research work is of quantitative type, the geographic data have been registered in the variables Latitude, Longitude, and altitude in UTM coordinates, ordered in double entry tables being 120 geographic registers in the WGS 1984 protocol of the 19S zone. For data processing, the Kernel density was used with a search radius of 50 meters, the resulting areas will be smoothed with a range of colors.

The city of Juliaca was considered with a density of 159 inhabitants per hectare, which is at an intermediate scale located in southern Peru with a growth rate of 2.6% (Ramos et al, 2004). The study area is located in the northeast of the city of Juliaca in the new district of San Miguel, on the east side of Manco Cápac Avenue, on the west side of Independencia Avenue, on the south side of Horacio Zevallos Gámez Avenue, and the north side of Circunvalación II ring road.

Figure 1
Study area

In addition, the coordinates of points A, B, C, and D have been identified with a GPS Garmin MAP 65 to develop the spatial analysis. The collection of information was of remote

secondary order using GIS geographic information systems, which allows creating, sharing, and using intelligent maps, compiling geographic information, creating and managing geographic databases, solving problems with spatial analysis, creating map-based applications, and publicizing and share information through geography and visualization. ArcGIS v. 10.3 software was used, where the spatial analyst tools were used with the Kernel density cabinets as shown in formula (1), and Euclidean distance as shown in formula (2) which allowed us to develop the spatial analysis (Lucio, 2012).

$$SD = \sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{X})^2}{n} + \frac{\sum_{i=1}^{n}(y_i-\bar{Y})^2}{n} + \frac{\sum_{i=1}^{n}(z_i-\bar{Z})^2}{n}} \qquad (1)$$

$$d_{(p1,p2)} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad (2)$$

Results

The calculation part of the reinforced urban building structure is located on the south side of the analyzed terrain, as shown in Figure 1, the area suitable for housing planning is located on the north side due to the low degree of reinforcement. The analysis is based on the density of primary, secondary, and tertiary blocks. Perform a block survey for the density analysis and classify the blocks with one, two, and three-story residential buildings to achieve a better reinforcement effect.

Figure 2
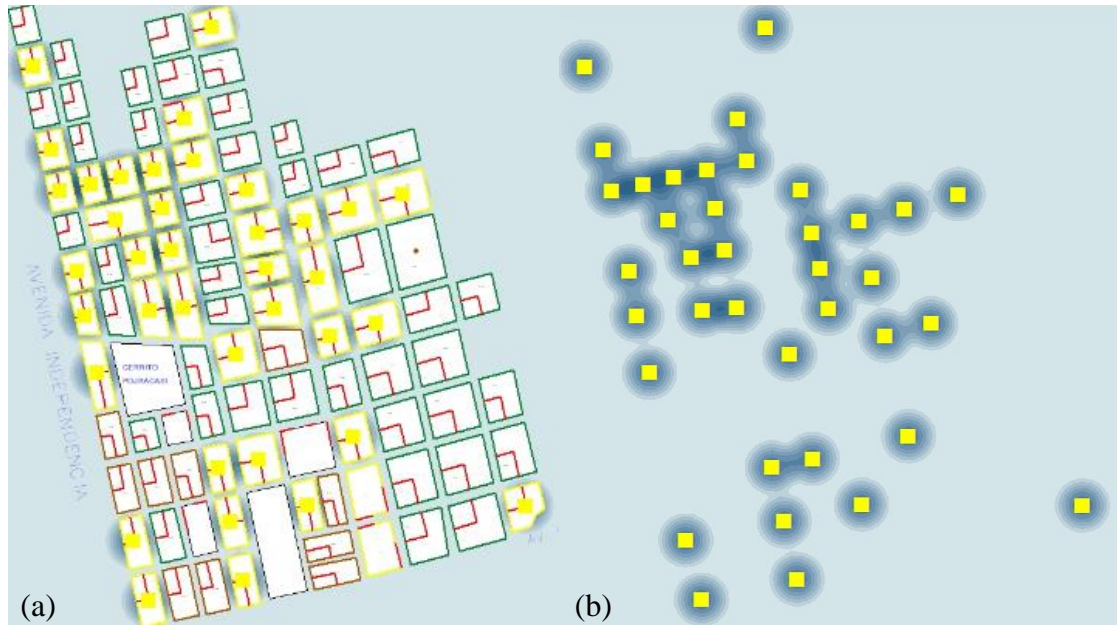*Kernel density for first level building height*

(a) (b)
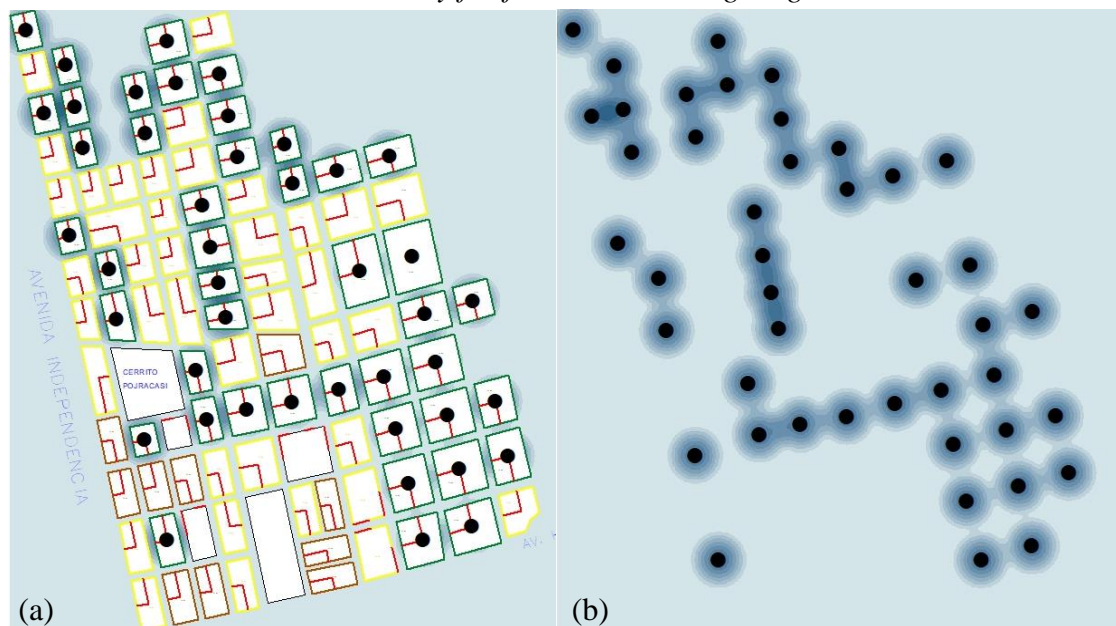
(a) vectorized plan of the study area, (b) building density of the first level

Figures 2, 3, and 4 show the process of first, second, and third-floor housing density according to the dominant position of the block in our study area. For the results, the core density within a radius of 50 meters was used and the resulting area will be smoothed as shown in the mapping and inset table.
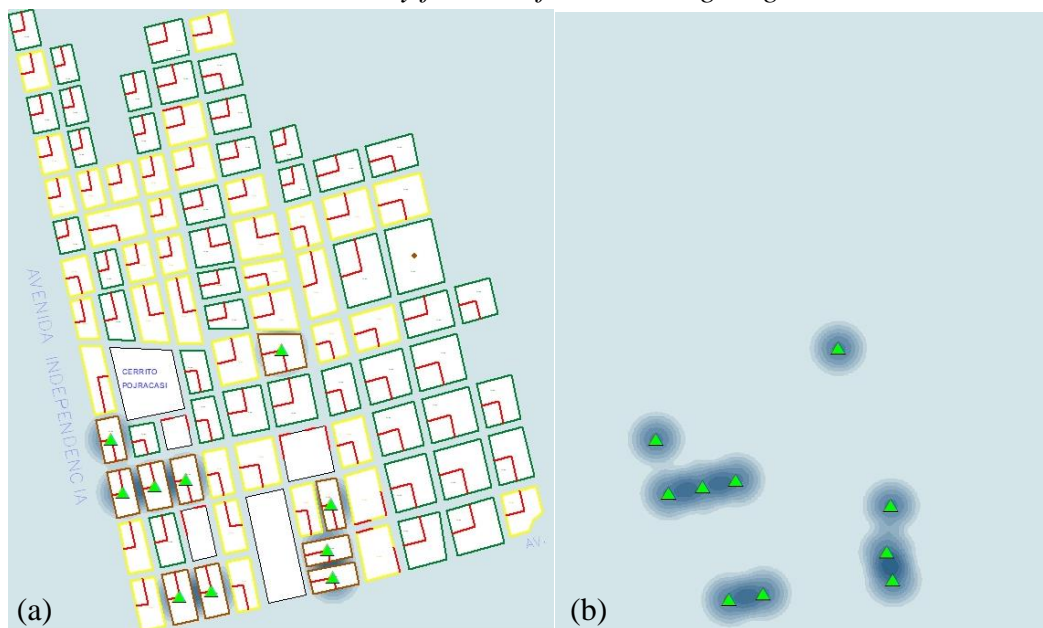
Figure 3
Kernel density for second level building height

(a)   (b)

(a) vectorized plan of the study area, (b) building density of the second level,

Figure 4
Kernel density for third floor building height

(a)   (b)

(a) vectorized plan of the study area, (b) building density of the third level

It can be seen that the area where the color darkens has the highest degree of consolidation, and the number of blocks can reach more than 3 layers. As can be seen in the map, the less consolidated areas are areas where light colors and single-story dwellings predominate.

The calculation of the Euclidean distance, the mapping of the Euclidean distance shows us the distance in meters that exists from each of the cells or blocks between each of them, in this case, those of yellow color its radius of action shows us who with the closest to the blocks and then a range of colors of oranges, pinks, and purples that are increasing the distance every 5 meters.

Figure 5

Euclidean distance for building height.

(a)   (b)   (c)
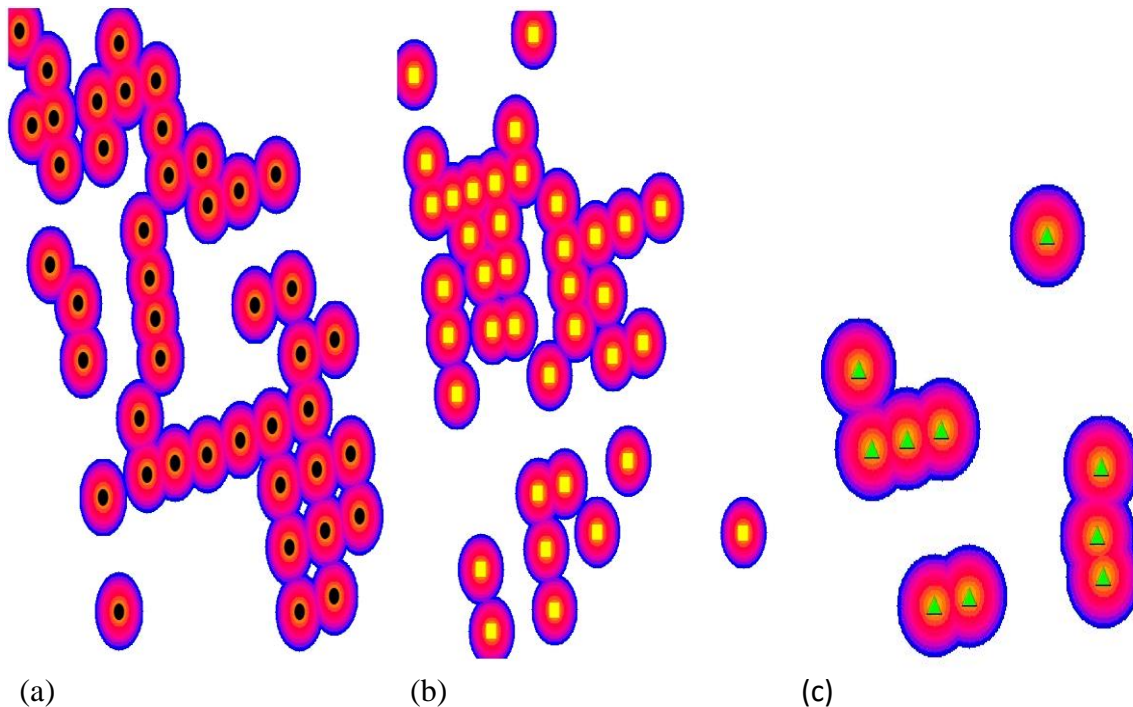
(a) first level buildings, (b) buildings with second level, (c) buildings with the three levels.

As shown in Figure 5, the radius used is 50 meters since it is half of a block to make the Euclidean distance of the map. The Euclidean distance describes the relationship of each cell or in this case each block with an origin based on the straight line distance, i.e. it gives us the distance from each block to the nearest origin and results in a mapping with color ranges according to their distance. The purpose of using the Euclidean distance is to estimate the proportion of urban fabrics with a higher percentage of the degree of consolidation using the distance radius of each block to pose dwellings.

The debate on urban density continues today, focusing mainly on urban compactness and high density as a requirement for sustainable urbanization. Some authors consider it the most important debate in the renewal of the discipline of urbanism (Hermida et al, 2017). This topic has gained such notoriety not only nationally, but also internationally, that it is easy to

find in the media various articles or news that defend the need to densify the city through the construction of high-rise buildings, as well as positions against that. Operating in areas close to rural or densely populated areas. It is the responsibility of the urban planner and designer to shape mechanisms that contribute to the policies, strategies, and action plans that are designed to overcome the problems mentioned above. These conceptual approaches are offered to initiate discussions which, if carried out, should be confronted, modified, or adapted in response to questions elaborated by interdisciplinary teams and with the participation of the affected communities (Graue, 2009).

Conclusions

By understanding the initial patterns revealed by the structure of the case study, an attempt was made to generate an urban projection method capable of identifying, adapting, and densifying the existing structural neighborhood; in such a way that all previous studies and analyses were incorporated and materialized in the reconstruction. Using a model to offer collective housing. Likewise, it has been identified the prevalence in a greater quantity of single-story housing, the urban land coverage is horizontal and the possibility of building vertical growth housing complexes is possible.

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