

# LAYOUTS, OCCUPATION PROCESSES AND HILLSIDE NEIGHBORHOODS IN INTER- ANDEAN VALLEYS: THE CASE OF THE NORTHEAST AREA OF CUSCO, PERU

TRAZOS, PROCESOS DE OCUPACIÓN Y BARRIOS DE LADERA EN LOS VALLES INTERANDI-  
NOS. CASO ZONA NORESTE DE CUSCO, PERÚ

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En el sur global, la producción de la ciudad enfrenta relecturas para una aproximación más cercana a la realidad emergente. Este estudio analiza los trazos y procesos de ocupación del territorio, así como los asentamientos y barrios de ladera en el valle del río Huatanay, mediante la historiografía y el mapeo urbano para la evolución morfológica, junto con una observación directa en la unidad de análisis. Los resultados muestran el trazado territorial como el mecanismo de emplazamiento progresivo en la producción sociohistórico-espacial que determina la morfogénesis en los periodos inca, hispano y modernizador, con una concepción dicotómica entre trazos de base y de laderas de valle. A diferencia del trazo mixto que emerge en los bordes irregulares de las parcelas ubicadas en la ladera de umbría del noreste, que expone la mejor adaptación a las condicionantes geomorfológicas durante la producción social del hábitat de ladera urbana en la ciudad.

**Palabras clave:** topografía, traza urbana, morfología urbana, barrios, hábitat de ladera

In the Global South, urban production is facing reinterpretation to better understand the emerging reality. This study analyzes the layouts and processes of territorial occupation, settlements, and hillside neighborhoods in the Huatanay River Valley, using historiography and urban mapping to examine morphological evolution, along with direct observation in the unit of analysis. The results reveal that the territorial layout serves as a mechanism for progressive location in the sociohistorical and spatial production, which determines morphogenesis in the Inca, Hispanic, and modernizing periods, characterized by a dichotomous conception between valley slope and base layouts. This contrasts with the mixed layout that emerges on the irregular edges of the plots on the northeastern shady slopes, demonstrating a better adaptation to geomorphological conditions during the social production of the urban hillside habitat in the city.

**Keywords:** topography, urban layout, urban morphology, neighborhoods, hillside habitat

## I. INTRODUCTION

In South America, some inter-Andean mountain valleys feature cities on steep slopes, creating hillside and ravine habitats. In the inter-Andean valley of the Huatanay River, several periods of occupation and a system of pre-existing structures, which shaped the historical city, were consolidated over around three thousand years, until the earthquake of May 21, 1950, a natural phenomenon that activated ideas for urban expansion (Samanez Argumedo & Kuon Arce, 2023), considering the population's socio-economic conditions. In this context, this study approaches the urban question not as disorganized systems, because underneath the apparent chaos and diversity of physical shape, there is an organization and pattern that emerges from the myriad of decisions and processes required for life (Batty, 2008; Tinh et al., 2023). Nor does it do so from the dichotomous visions between formal and informal, or legal and illegal. After all, these terms stigmatize the social production of neighborhoods and habitat (Massidda, 2023). Instead, it appeals to the urban morphogenesis of pre-existing and emerging settlements, which in the Global South are beginning to undergo more exploratory studies to provide a better understanding of the urban transformation processes in the territory and their interrelation with the scale of settlements, towns, and villages (Tinh et al., 2024), and even neighborhoods, built without academic planning (Dovey et al., 2020; Kamalipour & Iranmanesh, 2021).

For cities located in mountain valleys, the experts (Branca & Haller, 2021; Haller & Branca, 2022; Haller et al., 2023) recommend studying the morphological configuration of urban-rural ties to the verticality dimension, to overcome the classic dichotomous relationship between central squares and peaks, or the horizontal center and periphery perspective. In that sense, this study aims to analyze the spatial socio-historical process of the layout and occupation in pre-existing settings on three scales: the valley type territory (macroscale), the settlements (mesoscale), and the neighborhoods (microscale), to understand how these settings, the layout, and the social dynamics configure complex urban habitats from the valley base to the tops of the mountain slopes, a scenario where a large part of Cusco has emerged.

This study uses qualitative methods over two stages. First, urban historiography and mapping are employed to determine the morphogenesis of the settlement configurations in the valley and their surroundings. In the second stage, direct observation is added to urban mapping to recognize the layout and occupation process of three emerging neighborhoods on the city's northeastern shady slope. The article's structure begins with a theoretical framework, followed by the case study and methodology. The results are then presented, leading to a discussion, and closing with the conclusions.

## II. THEORETICAL FRAMEWORK

### The territorial layout

The layout comprises the relationship between the empirical and the existential. It is characterized by the fact that it disrupts a previous order, a reasoning of causality on the links of operations comprising human action over time (Ricoeur, 2009). In the territory occupation process, the layout represents potential information in the evolutionary link of the degree of culture and civilization that involves: the overlapping over another layout, the confrontation where a dialogue of elimination or conservation takes place, and a substitution where the pre-existing layout is replaced by a new one, with a use and characterization that is different from the original (Inostroza, 2008).

In a settlement, the layout refers to the organization of physical elements, whether natural or artificial, by arranging their size and shape across diverse spatial scales of interaction, network, and density (Kamalipour & Iranmanesh, 2021). It is a synthesis and expression of the social dynamics between the physical shape and land occupation, based on topographical possibilities (Caballero Zeitún, 2016). Each layout strategically forms closures and boundaries to separate, be separated, and, in turn, be integrated (Aureli, 2019; Vilchez Velenzuela, 2022).

### The socio-historical spatial process

The aspects regarding space are linked to the warnings mentioned by the sociologist Georg Simmel at the beginning of the 20<sup>th</sup> century against the classical conception of objectifying modern space. In this vein, Lefebvre (2013) proposes an approach where society produces its own space, as recognized in the spatial triad: perceived, conceived, and lived. From architecture, the first is the importance of the *conceived* space, of thoughts, being imagined and represented through common sense or academic disciplines. The *perceived* space is realized through the materiality of spatial forms, which allow for social production and reproduction, generating actions that lead to change or transformation. Furthermore, the *lived* space is where the representation of actors' symbolic production takes place through their spatial behaviors, as well as the collective and individual knowledge and experiences in the spatiotemporal organization (Kollmann, 2012). This approach allows understanding the practices, motivations, and intentions within the socio-historical spatial process, from both disciplinary planning and community management perspectives.

### Analysis of the urban morphogenesis

In urban planning, the study and design of cities in terms of their layout, structure, expansion, reconstruction, or reform of the morphology–location relationship in humanized territories over time, is conducted from morphogenesis, to identify and

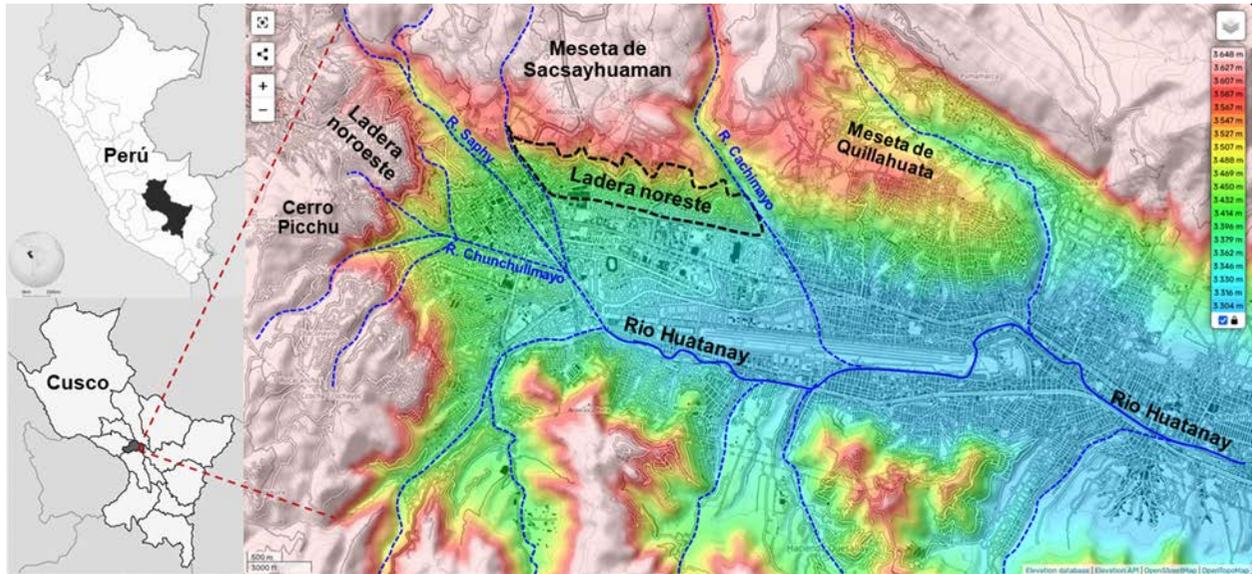


Figure 1: Topography and hydrography in the Huatanay River Valley. Source: Prepared by the author based on topographic-map.com

understand the patterns of historical evolution (Inostroza, 2008; Narváez Tijerina, 2010). The literature on morphogenesis reveals that the emerging settlements of the Global South develop from a microscale (Dovey et al., 2020) and continue their evolution towards a settlement expansion (mesoscale) in new territories of the macroscale (Kamalipour & Iranmanesh, 2021) with phases that contemplate the occupation, transformation, extension of the network formed by roads, and the increase of private and public buildings (Martínez Muñoz & Maroto Ramos, 2024).

This work, by addressing pre-existing layouts, transformations, and stratifications, as well as the permanence of historical territories, identifies the footprints of neighborhood and memory spaces. Namely, the social and built environment that has the potential for integration and contributes to the urban-landscape and cultural value of the city (Flores-Rodríguez et al., 2022; Golda-Pongratz, 2014). This is done to facilitate a better understanding of the proposed approaches and their causal relationship in the materialization of diverse types of neighborhoods (Cortés-Acuña & Castañeda-Pérez, 2023), while also acknowledging the tensions produced by the fragmentation logics (Vilches Valenzuela, 2022). This is what happens with the self-generating geomorphology that claims the land to “transform it according to the needs and aspirations of the community [...] together with the physical and natural conditions of the territory” (Haiek & Souto, 2024, p. 78). For the same reason, it is considered that the layout, regarding the spatial triad, becomes the creative mechanism that allows transferring the conceived (thoughts and ideas) to the territory at different scales to be perceived and lived in a given reality, and to know the continuity and diversity of the human habitat in time and space.

### III. CASE STUDY

The inter-Andean valley of the Huatanay River, oriented northwest-southeast, is situated at an altitude of 3,330 meters between the western and eastern mountain ranges of the southern Peruvian Andes. It has sunny southern slopes and shady northern ones, as seen in the cases of Sacsayhuaman and Quillahuata, which receive less of the sun's rays because they face south. It also has an abundance of underground water sources and springs that flow through streams and rivulets, resulting in greater humidity, a landscape with higher vegetation coverage, and an ideal environment for agriculture.

At the head of the valley, the northeastern area has the shady slope of the Sacsayhuaman plateau (Figure 1) with steep slopes of between 15% and 40%, running four kilometers from the Tullumayo River (the current historic district of San Blas) to the watershed of the Cachimayo River, adjacent to the district of San Sebastián. In this scenario, the analysis of three types of emerging hillside neighborhoods, which consider the vertical dimension in the layouts applied to the land, is conducted to understand the occupation processes and configuration of hillside habitats.

### IV. METHODOLOGY

This qualitative research used the morphogenesis and spatial interscalarity approach for the territory, settlement, and neighborhoods (Dovey et al., 2020; Vilches Valenzuela,

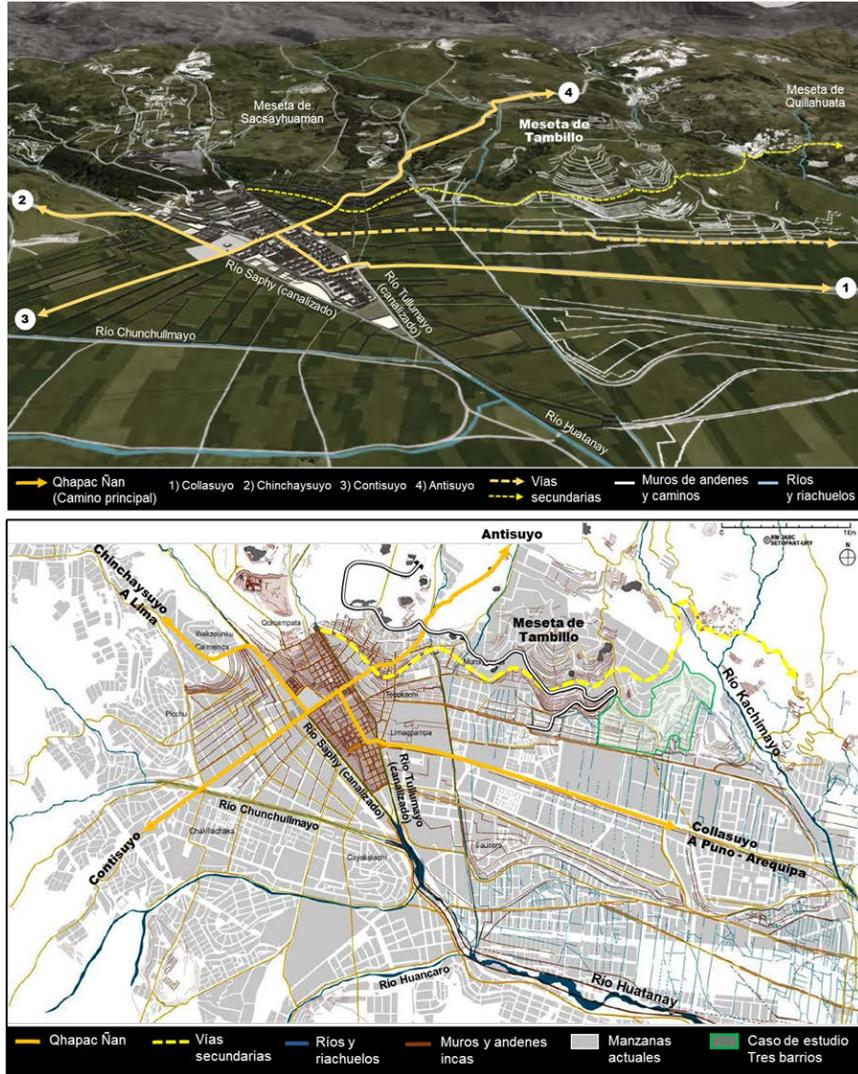


Figure 2: Inca ethno-layout site at the head of the Huatanay River Valley. Source: Above, Ancient topography Seminar (n/d). Below, Alfaro et al. (2015).

2022) to analyze the layout and occupation processes in two stages. First, in the Huatanay River Valley (macroscale), urban historiography methods were used with a critical review of physical and digital documents. Urban mapping was also used to detect morphogenetic patterns in the Inca ethno-layout settlements (mesoscale), as well as the hispanicizing and modernizing layouts before and after the 1950 earthquake, followed by the mixed layout that consolidated the emerging settlements of the valley's base and slopes. The second stage, using urban mapping, direct observation, and photographic records, took place on the northeastern shady hillside to analyze the settlement, which comprises several types of hillside neighborhoods (microscale).

The analysis unit was defined with the land use vertical complementarity criterion (Haller et al., 2023). This consisted of three urban hillside neighborhoods that share a natural micro-ravine in their configuration of access networks and rugged topography. As primary sources, this study used historical maps, aerial photographs, planning documents, and satellite images provided by Google Earth and Topographic-map, and plans edited with Autocad 2022, supplemented with relevant studies, reports, and planning documents (Think et al., 2024), to analyze the creative mechanism in the socio-historical spatial production of the urban hillside habitat.

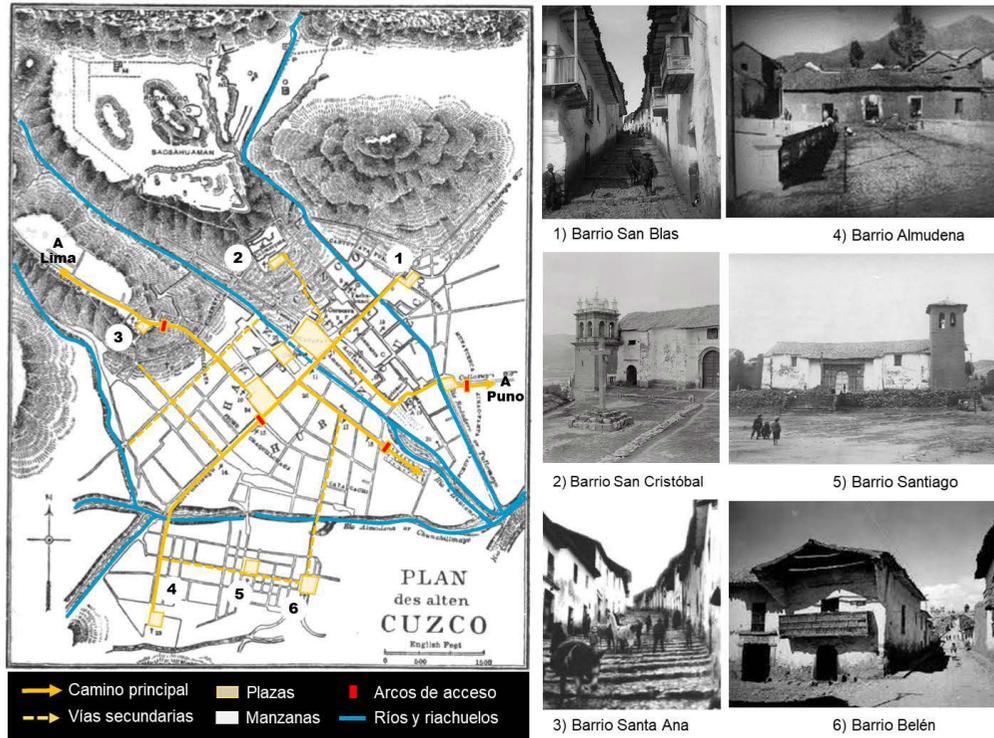


Figure 3: Hispanicizing layout superimposed on the ethno-layout, creating six historic hillside neighborhoods. Source: Prepared by the author based on the plan of Ephraim George Squier, 1860.

## V. RESULTS

### Inca Ethno-layout

The Inca cosmovision and organization are based on creating places to live in harmony with nature and for worship. Understanding sacred geography in its main manifestations of orography and hydrography (Salas Velásquez, 2023; Zecenarro Benavente, 2001) determines the territory's outline and configuration on two scales: the first related to the *Apullaqta* (sacred settlement, in Quechua) at the base of the valley, and the *chawpi* (center) of the Tawantinsuyu, and the second, related to the hillside and its micro ravines that connect the base of the valley with the tops of the plateaus. The layout, as an organization (Figure 2), considered the natural landmarks of rocks and water as *Waka* (sacred place), consolidating the landscape of the *Qhapac Ñan* (Inca Trail) between the Antisuyo and Collasuyo, with walls for platforms on the slopes in the *Seq'e* (sacred axis) system, which organizes both society and the geo-sacred (sacred geometry) in the overall management of the territory. The Inca territorial ethno-layout reinforces the socio-spatial conception of *Hurin* (below in Quechua) and *Hanan* (above in Quechua) by occupying the base of the valley with an orthogonal lattice geometry to locate the *Apullaqta*. On the

other hand, the undulating organic geometry is integrated into the topography of the shady hillside for ceremonial agricultural use on platforms and secondary trails of the *Qhapac Ñan*.

### Hispanicizing layout

This is the result of instilling the Hispanic Renaissance ideals considered in the Royal Ordinances of 1513, 1521, and 1523, which laid the foundation for Hispanic American towns and cities, characterized by an orthogonal geometry that expands outward from a central square-based public space called the Plaza Mayor. This layout was superimposed on the ethno-layout from March 23<sup>rd</sup>, 1534, with the foundation of "the very noble and great city of Cusco." It determined the public meeting spaces, the urban plots, and the buildings on the valley floor's terraces and, above all, the reductions on the slopes (Villegas Ormachea & Estrada Iberico, 1990) to configure the historical neighborhoods during the first urban expansion (Figure 3), preserved as such until the 20<sup>th</sup> century.

This marks the beginning of living in separation from nature, considered only for the extraction, production, and commodification of resources. It illustrates the dichotomous relationship in land distribution, such as plots in urban areas and those in green areas, pastures, and rural lands, which

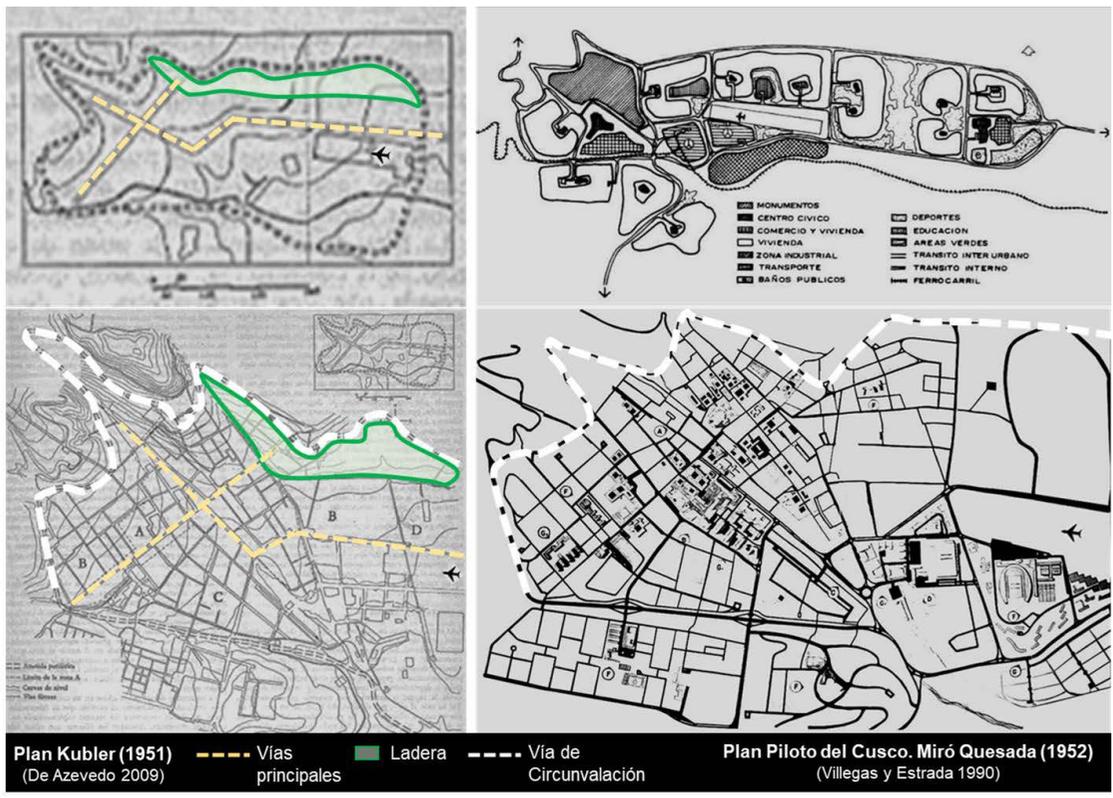


Figure 4: Post-earthquake layouts in the Huatanay River valley as per urban planning. Source: Preparation by the author based on De Azevedo (2009), and Villegas Ormachea & Estrada Iberico (1990).

were allocated to the conquerors and religious orders. This action of confronting the ethno-layout concept would ultimately lead to a syncretism in the management of the territory and its resources.

**Modernizing layout**

This began in the 20<sup>th</sup> century with the arrival of the railway, tram, automobile, airplane, electric energy, piped sanitation, and the channeling of rivers and streams into sewers, in a city that in 1920 housed 20,000 inhabitants on 202 hectares (Samanez Argumedo & Kuon Arce, 2023). The discovery of Machu Picchu in 1911 led engineers to plan a railway line, which was completed in 1914, with undulating shapes on the northwestern slopes. This was added to the ideals of modernizing the city for tourism (Esquivel Coronado, 2016), as expressed in 1920 by Alberto Giesecke, an American who was then the rector of the National University of San Antonio

Abad in Cusco. In this vision, the Quispiquilla Airport was inaugurated in 1933 at the base of the valley, determining the path of expansion of the city to the southeast. On residential issues, the Lima architect Emilio Harth Terre<sup>2</sup>, designer and supervisor of the neocolonial-style Tourist Hotel, proposed a master plan in 1934 for the city's expansion towards the Inca platforms located at the base of the northeastern slopes (Cusco Provincial Municipality [MPC], 2006).

The first modern layouts for land use and urban development were officially presented following the earthquake on May 21<sup>st</sup>, 1950 (De Azevedo, 2009). The Kubler Plan of 1951 incorporated the recommendations of Harth Terre, as it delineated the intervention area at the start of the platforms on the northeastern slopes. In contrast, Miró Quesada's Pilot Plan of 1952 only contemplated the possibility of urban expansion in the flat section, following the Athens Charter of 1933.

<sup>2</sup> Since 1932, this has had a significant impact on the emerging awareness of urban law and on the Federation of small and modest urban landowners, particularly due to the real estate speculative pressure resulting from the 1924 and 1931 regulations governing urban expansion in Lima. He was an advisor to the Technical Commission of the IV Centenary of the Spanish Foundation of Cusco.

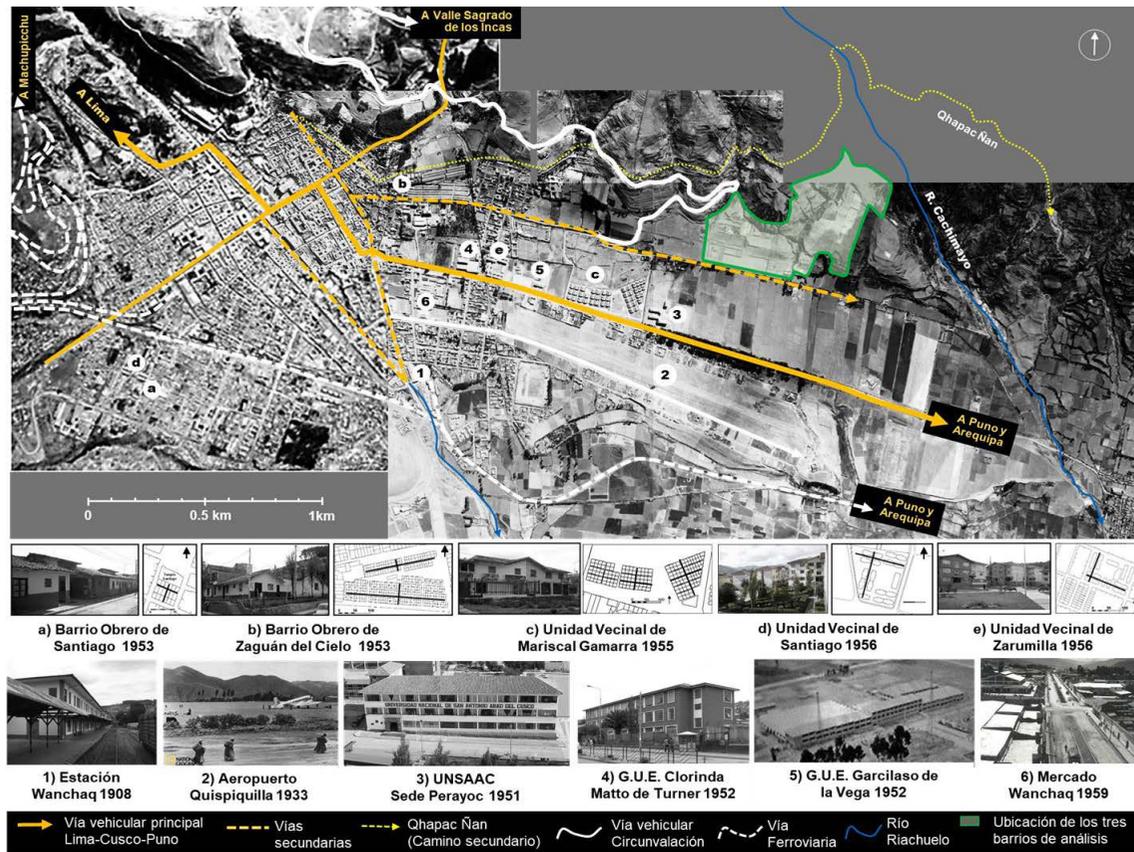


Figure 5: Mixed geometry layouts in the aerophotography of the Huatanay River Valley (1956). Source: Prepared by the author based on Alfaro et al. (2015).

In both cases (Figure 4), two types of layouts were projected. The first is for the ring-road type infrastructure between the northwest and northeast slopes, where the geomorphology imposes undulating and zigzagging shapes. The second emphasizes urban growth along the base of the valley through straight road layouts parallel to Quispiquilla airport, following the Inca ethno-layout of the *Qhapac Ñan* towards Collasuyo.

### Mixed layout

Product of the post-earthquake layout, the urban expansion in 1956 housed 80,000 inhabitants in 437 hectares (De Azevedo, 2009) using architectural projects of an orthogonal regular layout, considering private and state housing with two working-class neighborhoods and three neighborhood units, along with urban equipment: train station, airport, university higher education, two large schools and the market, all at the base of the valley, unlike the weaving layout proposed by civil engineers for the bypass road towards the Sacred Valley of the Incas on the northeastern slope

(Figure 5). Since 1964, the Zoning Plan, designed by architect Galimberti, has been the primary urban planning instrument for the prefiguration and morphological organization of the different land uses and building typologies, in addition to facilitating the processing of urban files, paving projects, and urban interventions (MPC, 2006). However, it is possible to determine the relationship between agricultural plots and urban organization, albeit only at the base of the valley.

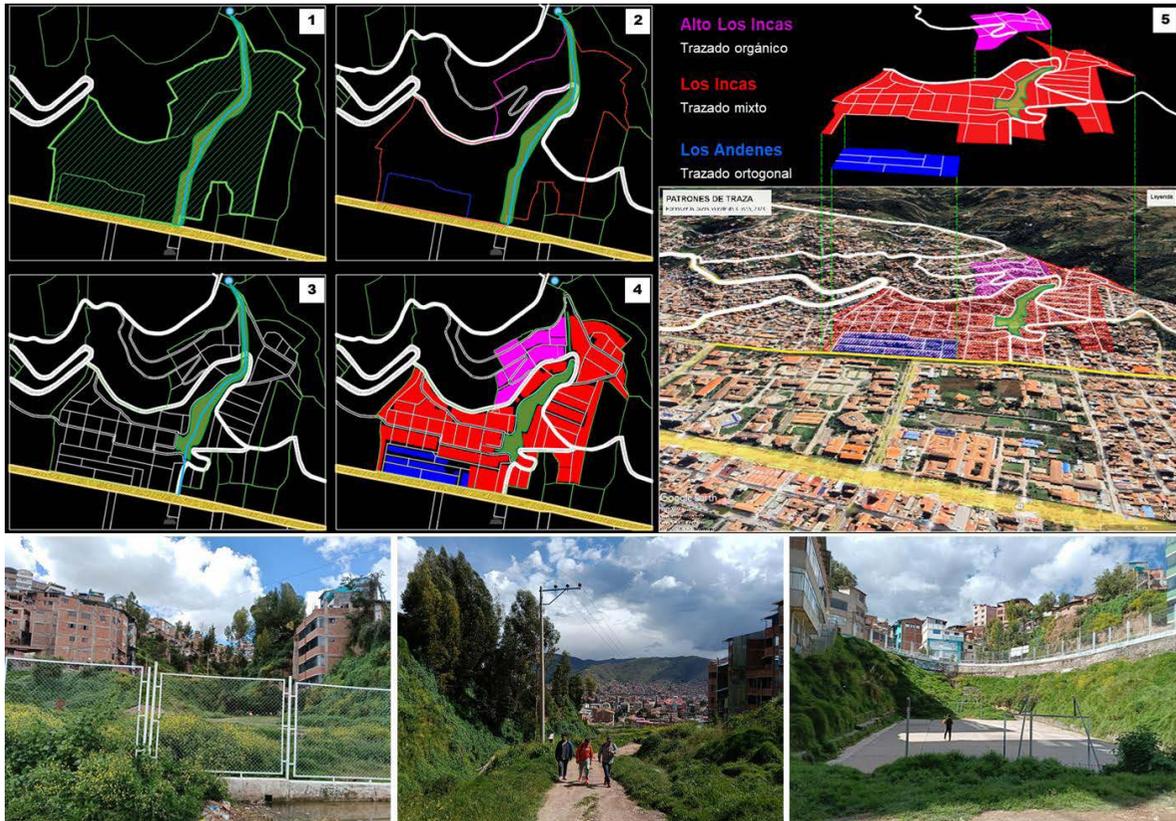
Since 1960, the city has been receiving rural migration due to the constant droughts and the implementation of the 1969 Agrarian Reform. This phenomenon has led to the emergence of a rural land market on the northwest and northeast slopes, near the railway line and road network. The need for housing has triggered a community management process to utilize the various agricultural plots, with private technical assistance due to the rugged topographical conditions and the desire to be recognized by municipal management in urban development plans. As a result of this socio-historical spatial process, by 1972, 127,000 inhabitants were living on 872 hectares, with a density of 146 inhab/ha.



Figure 6: Cross-sectional views of the valley and landscapes of the northeast urban slope. Source: Prepared by the author based on Google Earth and personal archive.

In the following decades of the 20<sup>th</sup> century, the city's morphology was already shaped by two types of layouts that continue to influence the perception of the urban landscape in the 21<sup>st</sup> century. One at the base of the valley, based on the Inca ethno-layout, reinforced by the modernizing layout of the Quispiquilla Airport and by the urban planning, zoning, and infrastructure. The other is on the surrounding slopes, which, in the case of the shady northeastern slope (Figure 6), is supported by the straight and undulating ethno-layout for the platforms and pedestrian trails of the *Seq'e* system, on which the ring-road layout was superimposed. The dichotomous pattern between the valley's base and slope is consolidated in this way.

The ring road was a determining factor in the progressive housing occupation undertaken by rural migrants through community actions, who managed to transform agricultural plots, heritage areas, and underground and surface water, which was considered a form of water heritage (Salas Velásquez, 2023). Only with the creation of the Sacsayhuaman Archaeological Park by Law N° 23765 in 1982 were the limits of the urban edge defined, stopping the continuous occupation of the heritage area. In this scenario, between 1950 and 1990, a variety of neighborhoods emerged from the base to the top of the slope (only the most representative are analyzed).



Hillside neighborhood		Main plot			Layout	
Name	Location	Area (ha.)	Edge	Slope	Pre-existence	Residential activation
Alto Los Incas	Above	4,057	Irregular shape	Steep, 35%	Rural trail	Organic
Los Incas	Medium	30,592		Moderately steep, 25%	Micro-ravine and creek	Mixed (Orthoganic)
Los Andenes	Below	2,817	Regular shape	Moderately inclined, 10-15%	Inca ethno-layout on the platform	Orthogonal

Note: 1) Irregularly shaped plots. 2) Main access layout. 3) Access routes layout. 4) Blocks of the three hillside neighborhoods. 5) View of the overlapping layouts in Google Earth 2024. Below are views of the public spaces for meeting, mobility, and recreation, known as “La Bombonera.”

**Table 1:** Layouts, views of the micro-ravine, and internal factors of the hillside neighborhoods. Source: Preparation by the author.

### Layout and verticality in northeastern hillside neighborhoods

The northeast slope features a steeply sloping geomorphology with sinuous, concave, and convex shapes that harbor micro ravines, such as Barranquito, which has a 241-meter slope. It is here that the namesake freshwater spring and stream originate. Around this natural element, community action has acquired agricultural land since the 1970s, and through technical assistance, has altered the land

use under the principle of urban continuity. Given the rural origin of many of the community management’s members, the rugged topography did not impede splitting the land into plots with road networks, blocks, and lots for single-family housing, and areas for facilities, because it considered obtaining urban habilitation deeds in the future through regularization, finally achieved with the Qosqo Plan of 1993 (Municipality of Qosqo, 1993).



Figure 7: Mobility and equipment spaces in urban hillside neighborhoods. Source: Preparation by the author.

This socio-historical process, which placed the neighborhoods around the micro-ravine, with the Los Incas neighborhood in the middle and the Alto Los Incas neighborhood near the top, followed by the Los Andenes neighborhood near the base of the valley in the 1980s, produces a vertical complementarity in the use of land through the residential habilitation on the hillside. Table 1 presents a summary of the layout analysis related to the micro-ravine's geomorphology, considered as the vertical integrating element of the urban structure, since this facilitates the adequate evacuation of rainwater due to the soil's permeability and because it houses the main recreational public space, a sports pitch known as "La Bombonera". As for the neighborhoods, the analysis reveals the internal factors represented in the main plot used for the layout.

Regarding the public spaces for mobility and equipment generated by the layout (Figure 7), in Los Andenes, the orthogonal layout produces hierarchy for vehicle and pedestrian mobility next to the equipment spaces. In Alto los Incas, a very sinuous, organic layout is created for the road infrastructure to achieve spatial continuity in the fragmented main plot. In Los Incas, there are two types of layouts: first, continuous with the orthogonal grid of the neighborhood below, and second, transitional, which is subjected to the topography's conditions, featuring a sinuous, organic layout for vehicle access and a straight layout for pedestrian mobility on stairs. The mixed route, called *orthogonic*, as an innovative attribute, helps to optimize the fragmented land use for road networks, public spaces, equipment, and blocks with lots that will house private buildings.

In this context, the socio-spatial process generates the layout pattern considering the different slopes on the main plot, i.e., the lower the slope, the greater the orthogonal layout and land use for meeting in the public space, while the higher the slope, the greater the sinuous organic layout and land use for mobility in the public space. Thus, these three neighborhoods, unlike previous ones, are significant because, together, they demonstrate the continuous verticality on the urban hillside's micro scale.

## VI. DISCUSSION

The results of this research reveal four types of layouts used in the occupation of the Hautanay River inter-Andean valley, identified by valid signs of human activity over time (Ricoeur, 2009), revealing the historical evolution of the city of Cusco, situated between mountains (Branca & Haller, 2021).

The territorial layout is a creation mechanism in the system of scales. In the inter-Andean valley macroscale, it allows recognizing the complex diversity that underlies the city's apparent physical-spatial disorganization (Batty, 2008; Kamalipour & Iranmanesh, 2021). The mesoscale settlement reveals the types of organization according to the valley's natural elements on the mountain. In the case of slopes and ravines, their conditions of relief and altitude interact with land use access, particularly regarding the verticality criterion (Kamalipour & Iranmanesh, 2021; Martínez Muñoz & Maroto Ramos, 2024; Haller & Branca, 2022). In the neighborhood microscale, it contributes to recognizing the causal

relationship between the social and the built in the different types created (Cortés-Acuña & Castañeda-Pérez, 2023; Flores-Rodríguez et al., 2022) through the constant integrated fragmentation to generate the public and private in the urban continuity (Aureli, 2019; Vilches Valenzuela, 2022).

The valley's socio-historical occupation process is understood through the transformative contributions of different social groups during the spatio-temporal production (Lefebvre, 2013; Kollmann, 2012). This is unlike the sanctioning vision that stigmatizes what is produced (Massidda, 2023) and that, in different scenarios of the Global South, remains outside the formally authorized maps (Thin et al., 2023) without giving the option to value the process as a successful urban-landscape contribution to be established in the collective memory (Golda-Pongratz, 2014).

Urban morphogenesis helps to understand occupation through the actions of creation, initially where pre-existing elements are successively confronted and preserved (Inostroza, 2008; Narváez Tijerina, 2010), or superimposed, replaced, and eliminated with other approaches (Thin et al., 2024), as identified in the transformation processes in the inter-Andean valley of the Huatanay River. Studies conducted in informal settlements and neighborhoods with rugged topography (Dovey et al., 2020; Martínez Muñoz & Maroto Ramos, 2024) reveal a morphogenesis from the natural topography, characterized by undulating or zigzag-shaped access networks. This pattern is confirmed on the slopes of Cusco, as evidenced by the modernizing road layouts. In the case of the northeastern shady hillside, the ethno-layout respects the geo-sacred elements for the access network, a process that culturally shows the current geomorphological force in the emerging configuration of an urban hillside habitat (Alfaro et al., 2015; Caballero Zeitún, 2016; Haiek & Souto, 2024).

## VII. CONCLUSIONS

This urban study, conducted through morphogenesis, contributes to understanding how pre-existing elements, layouts, and social dynamics shape complex urban habitats in the inter-Andean valley occupied by the city of Cusco.

The analysis of the reality on the valley's northeastern shady slope contributes to spatial knowledge, by the emergence of the innovative so-called orthogonic layout that emerges from the main plot's internal factors -overcoming the dichotomous pattern - by the influence of natural elements in the development of the best adaptation to the micro-ravine's geomorphological conditions, and optimizing the fragmentation and vertical complementarity in the use of land for the hillside neighborhoods. It is a contribution to the habitat's social production, which is part of the city and its landscapes.

The earthquake, in particular, as a natural phenomenon, has triggered social phenomena that lead to divergent ideas for urban expansion. In this sense, accessing relevant historical planimetric and aerophotographic information is a limitation that can be overcome by building overlapping diagrams with data from different sources, ensuring that the scales are as close as possible between the figures.

As we begin to reveal how hillside neighborhoods produce habitable land, with access networks, and public and private spaces, studies that address the incremental production of the built environment according to the real estate market and urban dynamics should continue, both in the city of Cusco and in other inter-Andean valleys.

It is recommended to implement interdisciplinary strategic interventions that incorporate nature and community management thinking, based on ancestral knowledge, to conceive the hillside as a safe habitat for life, using geomorphology to integrate spaces and minimize the impact on natural drainage systems, thereby mitigating risks. It is also necessary to train new professionals who value and strengthen the appropriate cultural production in the urban landscape, through projects and designs with a partial fragmentation of public spaces that integrate the urban structure towards rural ecosystems, adapting socio-cultural conditions to the pre-existing environment, to contribute to the sustainable management in the occupation of new urban areas on slopes and ravines.

## VIII. CONTRIBUTION OF AUTHORS CREDIT:

Conceptualization, V.M.S.V.; Data Curation, V.M.S.V.; Formal analysis, V.M.S.V.; Acquisition of financing, V.M.S.V.; Research, V.M.S.V.; Methodology, V.M.S.V.; Project management, V.M.S.V.; Resources, V.M.S.V.; Software, V.M.S.V.; Supervision, V.M.S.V.; Validation, V.M. S.V.; Visualization, V.M.S.V.; Writing – original draft, V.M.S.V.; Writing – revision and editing, V.M.S.V.

## IX. BIBLIOGRAPHIC REFERENCES

- Alfaro, C., Matos, R., Beltrán-Caballero, J. A., y Mar, R. (2015). *El urbanismo Inka del Cusco. Nuevas aportaciones. Arqueología y arquitectura en la capital del Tawantinsuyu*. Editorial Municipalidad del Cusco, Smithsonian, Universitat Rovira i Virgili. <https://setopant.com/wp-content/uploads/pdf/urbanismo-del-cusco-inka-2ed.pdf>
- Aureli, P. V. (2019). *La posibilidad de una arquitectura absoluta*. Puente Editores.
- Batty, M. (2008). The size, Scale, and Shape of Cities. *Science*, 319(5864), 769-771. <https://doi.org/10.1126/science.1151419>
- Branca, D. y Haller, A. (2021). Cusco: Profile of an Andean city. *Cities*, 113, 103169. <https://doi.org/10.1016/j.cities.2021.103169>

Caballero Zeitún, E. L. (2016). El Concepto de Ladera Urbana. *Ciencias Espaciales*, 4(1), 41-61. <https://doi.org/10.5377/cev4i1.2549>

Cortés-Acuña, C. M. y Castañeda-Pérez, Y. (2023). Configuración morfológica del tejido urbano de Villavicencio (Colombia): estudio urbanístico en una ciudad intermedia fragmentada. *Ciudad y Territorio. Estudios Territoriales*, 55(215), 184-202. <https://doi.org/10.37230/CyTET.2023.21510>

De Azevedo, P. O. D. (2009). *Cusco, continuidad y cambio*. Municipalidad Provincial del Cusco. [https://www.pauloormindo.com.br/pdf/inter\\_artigo\\_1982.pdf](https://www.pauloormindo.com.br/pdf/inter_artigo_1982.pdf)

Dovey, K., Van Oostrum, M., Chatterjee, I. y Shafique, T. (2020). Towards a morphogenesis of informal settlements. *Habitat International*, 104, 102240. <https://doi.org/10.1016/j.habitatint.2020.102240>

Esquivel Coronado, J. (2016). La modernidad en el Cusco: La necesidad de contar con un plan director y un reglamento de construcciones durante la primera mitad del siglo XX. *Crónicas Urbanas, análisis y perspectivas urbano regionales* 18(19), 113-137. Centro Guamán Poma de Ayala.

Flores-Rodríguez, C., Fajardo Velázquez, L. y Ramos Delgado, R. (2022). Tras las huellas del Barrio. La doble categoría, la doble dimensión. *CONTEXTO Revista De La Facultad De Arquitectura De La Universidad Autónoma De Nuevo León*, 16(24), 26-39. <https://doi.org/10.29105/contexto16.24-359>

Golda-Pongratz, K. (2014). Memoria urbana. Palimpsestos, huellas y trazados en Lima Metropolitana. *EST, Espacio Sociedad y Territorio* 1(1), 9-22. <https://revistas.uni.edu.pe/index.php/est/article/view/1835/2157>

Haller, A. y Branca, D. (2022). La urbanización y la verticalidad de los vínculos rurales-urbanos en las montañas. *Revista Kawsaypacha: Sociedad y Medio Ambiente*, (10), A-011. <https://doi.org/10.18800/kawsaypacha.202202.011>

Haiek Coll, A. y Souto, P. (2024). El futuro de las formas urbanas. Una relectura a la geomorfología autogenerativa. *Dearq*, (39), 70-80. <https://doi.org/10.18389/dearq39.2024.07>

Haller, A., Branca, D. y Cano, D. (2023). Between plaza and peak: a montological perspective on verticality and urbanization in highland Peru. *Journal of Mountain Science*, 20(10), 2783-2803. <https://doi.org/10.1007/s11629-023-8118-2>

Inostroza, S. (2008). La herencia de las trazas en la ciudad existente: geometría y continuidad en la morfogénesis del proyecto urbano contemporáneo. *Revista Arteoficio* 7, 8-12. <https://www.revistas.usach.cl/ojs/index.php/arteficio/article/view/883>

Kamalipour, H. e Iranmanesh, A. (2021). Morphogenesis of Emerging Settlements: Mapping Incremental Urbanism. *Land*, 10(1), 89. <https://doi.org/10.3390/land10010089>

Kollmann, M. I. (2012). *Espacio, espacialidad y multidisciplinariedad*. Eudeba

Lefebvre, H. (2013). *La producción del espacio*. Capitán Swing Libros.

Martínez Muñoz, C. A. y Maroto Ramos, F. J. (2024). Informal/formal morphogenesis in Latin American settlements: A response to the problem of urban fragmentation. *Journal of Urban Management*, 13(3), 497-520. <https://doi.org/10.1016/j.jum.2024.05.001>

Massidda, A. L. (2023). Slums, Villas Miseria, and Barriadas: Why Terms Matter. *Journal of Urban History*, 49(3), 552-570. <https://doi.org/10.1177/00961442221127308>

Narváez Tijerina, A. B. (2010). *La Morfogénesis de la ciudad, Elementos para una teoría de los imaginarios urbanos*. Plaza y Valdés Editores.

Municipalidad del Qosqo. (1993). *Plan de desarrollo urbano de la ciudad de Qosqo*. Municipalidad del Qosqo.

Municipalidad Provincial del Cusco [MPC]. (2006). *Plan de desarrollo urbano del Cusco 2006-2011*. Municipalidad Provincial del Cusco.

Ricoeur, P. (2009). *Tiempo y Narración III. El tiempo Narrado*. Siglo XXI editores, S.A.

Salas Velásquez, V. (2023). Fuentes de agua. Patrimonio hídrico en el Centro Histórico del Cusco. *Devenir. Revista de estudios sobre patrimonio edificado* 10(20), 47-68. <https://doi.org/10.21754/devenir.v10i20.1572>

Samanez Argumedo, R. y Kuon Arce, E. (2023). *Cusco. Entre la tradición y el desarrollo 1950-2000*. Fondo editorial de la Caja Cusco.

Seminario de topografía antigua. (s/f). [https://www.youtube.com/watch?v=3O8P\\_zA9qC4](https://www.youtube.com/watch?v=3O8P_zA9qC4)

Thinh, N. K., Kamalipour, H. y Gao, Y. (2023). Mapping the emerging forms of informality: A comparative morphogenesis of villages-in-the-city in Vietnam. *Habitat international*, 134, 102864. <https://doi.org/10.1016/j.habitatint.2023.102864>

Thinh, N., Kamalipour, H. y Peimani, H. (2024). Morphogenesis of forgotten places: A typology of villages in the city in the Global South. *Habitat International*, 153, 103184. <https://doi.org/10.1016/j.habitatint.2024.103184>

Vilches Valenzuela, F. (2022). Sopesando las formas en el fragmento residencial. El barrio de Achupallas en Viña del Mar (Chile). *Dearq*, 1(32), 59-67. <https://doi.org/10.18389/dearq32.2022.07>

Villegas Ormachea, A. y Estrada Iberico, E. (1990). *Centro histórico de Cusco: rehabilitación urbana y vivienda*. UNSAAC-PNUD/UNESCO-INVI.

Zecenarro Benavente, G. (2001). *Arquitectura arqueológica en la quebrada de Thampumachay*. Municipalidad provincial del Cusco.

