

Reading the landscape: Walking along the main line of Ribeirão Tatu in Limeira/SP.

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Lendo a paisagem: Percurso pela linha principal do Ribeirão Tatu em Limeira/SP.

RESUMO

Objetivo - compreender a construção da paisagem de Limeira - SP a partir do estudo de caso do Ribeirão Tatu, analisando a dinâmica atual da paisagem e a superposição de camadas de atividades humanas que aconteceram ao longo de sua história, além de sua relação com o tecido urbano, cujas idiosincrasias históricas, sociais, políticas e econômicas afetaram esta construção.

Metodologia - os procedimentos metodológicos adotados compreenderam a Pesquisa Bibliográfica e documental (legislação, mapas, planos e projetos, arquivos de jornais); a Pesquisa de Campo, para identificar as estruturas espaciais e ambientais, observação de uso, comportamento e atividades; o levantamento fotográfico, fundamental para a leitura da paisagem; e a aplicação de questionários e entrevistas com técnicos da Administração Municipal.

Originalidade/relevância - as paisagens dos fundos de vale são de vital importância para o tecido urbano e a compreensão das diversas camadas humanas e naturais, que se interligam para formar o palimpsesto da história humana no território, ajudam a melhor compreender como atuar com a paisagem.

Resultados - este entrelaçamento entre o embasamento teórico e a análise dos dados e informações coletadas possibilitou a criação de mapas de leitura da paisagem ("layers") a fim de demarcar os potenciais e as problemáticas. Os resultados demonstraram que o ribeirão, apesar de degradado e segregado do tecido urbano, possui vitalidade e atrai as pessoas, que buscam uma sensação de pertencimento para com o espaço.

Contribuições teóricas/metodológicas - um novo olhar de leitura da paisagem, que se baseia na teoria de Besse (2014).

Contribuições sociais e ambientais - o estudo visa apontar como os aspectos de ordem humana (social, econômico, político e etc) se unem aos aspectos naturais para formar a paisagem dos fundos de vale.

PALAVRAS-CHAVE: Rios urbanos; Paisagem; Limeira (SP).

Reading the landscape: Walking along the main line of Ribeirão Tatu in Limeira/SP.

ABSTRACT

Objective – to understand the landscape construction of Limeira, São Paulo, based on the Ribeirão Tatu case study. This study analyzes the current dynamics of the landscape and the overlapping layers of human activities that have occurred throughout its history, as well as its relationship with the urban fabric, whose historical, social, political, and economic idiosyncrasies have affected this construction.

Methodology – the methodological procedures adopted included bibliographical and documentary research (legislation, maps, plans and projects, newspaper archives); field research to identify spatial and environmental structures; observation of use, behavior, and activities; photographic surveys, essential for interpreting the landscape; and questionnaires and interviews with municipal administration technicians.

Originality/Relevance – the valley bottom landscapes are vitally important to the urban fabric, and understanding the various human and natural layers that intertwine to form the palimpsest of human history in the territory helps to better understand how to interact with the landscape.

Results – this interweaving of the theoretical framework with the analysis of the collected data and information enabled the creation of landscape interpretation maps ("layers") to demarcate potentials and problems. The results demonstrated that the stream, despite being degraded and segregated from the urban fabric, is vibrant and attracts people seeking a sense of belonging to the space.

Theoretical/Methodological Contributions – a new perspective on landscape interpretation, based on Besse's theory (2014).

Social and Environmental Contributions – the study aims to identify how human aspects (social, economic, political, etc.) intertwine with natural aspects.

KEYWORDS: Urban rivers; Landscape; Limeira (SP).

Leyendo el paisaje: Caminando por la línea principal de Ribeirão Tatu en Limeira/SP.

RESUMEN

Objetivo – comprender la construcción del paisaje de Limeira, São Paulo, a partir del estudio de caso de Ribeirão Tatu. Este estudio analiza la dinámica actual del paisaje y las capas superpuestas de actividades humanas a lo largo de su historia, así como su relación con el tejido urbano, cuyas idiosincrasias históricas, sociales, políticas y económicas han afectado a esta construcción.

Metodología – los procedimientos metodológicos adoptados incluyeron investigación bibliográfica y documental (legislación, mapas, planos y proyectos, hemeroteca); investigación de campo para identificar estructuras espaciales y ambientales; observación de usos, comportamientos y actividades; levantamientos fotográficos, esenciales para la interpretación del paisaje; y cuestionarios y entrevistas con técnicos de la administración municipal.

Originalidad/Relevancia – los paisajes de fondo de valle son de vital importancia para el tejido urbano, y comprender las diversas capas humanas y naturales que se entrelazan para formar el palimpsesto de la historia humana en el territorio ayuda a comprender mejor cómo interactuar con el paisaje.

Resultados – esta integración del marco teórico con el análisis de los datos e información recopilados permitió la creación de mapas de interpretación del paisaje ("layers") para delimitar el potencial y los problemas. Los resultados demostraron que el arroyo, a pesar de estar degradado y aislado del tejido urbano, es vibrante y atrae a personas que buscan un sentido de pertenencia al espacio.

Contribuciones Teóricas/Metodológicas – una nueva perspectiva sobre la interpretación del paisaje, basada en la teoría de Besse (2014).

Contribuciones Sociales y Ambientales – el estudio busca identificar cómo los aspectos humanos (sociales, económicos, políticos, etc.) se entrelazan con los naturales.

PALABRAS CLAVE: Ríos urbanos; Paisaje; Limeira (SP).

1 INTRODUCTION

The landscape, a result of the interaction between culture and nature, is a complex fabric, a collective artifact built by man upon an existing nature that manifests itself in the territory (Besse, 2014). Natural elements, such as water bodies and valley bottoms, when shaped by human actions, reveal the intrinsic relationship between man and nature, because, as Besse (2018) states, we weave our existences with the so-called 'natural' elements.

In Brazilian urban centers, valley bottoms, essential elements for the environmental and social health of cities, suffer from degradation due to inadequate urbanization practices. These generate various negative impacts for cities, in the form of serious environmental, social, and economic problems, such as a "significant increase in the frequency of floods, in sediment production, and in water quality deterioration" (Tucci, 1997, p.3, our traduction).

In Limeira, the landscape of the valley bottoms has also been altered by human interventions, such as river rectification, removal of riparian forest, and pollution from sewage and other waste, which have generated negative impacts for the environment and for the quality of life of the population, and whose impacts can be severe, insofar as waste generated by activities ends up being directed into the waters (Hellmund; Smith, 2006).

Therefore, to better understand this landscape, the analysis of its history and consequent production in an urban environment is of vital importance.

In the process of construction and transformation of the urban landscape, its meanings and attributes can be further revealed and valued, making them visible. From this perspective, many of our rivers are yet to be inhabited. "To recognize the river as landscape, therefore, is to inhabit the river" (Costa, 2006, p. 11 our traduction). Furthermore, for the same author, in the densification of the built space, rivers make an important contribution to the urban experience, because as spaces free of buildings, they expand the possibility of enjoying the city's landscape.

The care for the landscape currently occupies a crucial place in social and political concerns for the quality of life offered to populations, in relation to questions about the identity of places, about the governance of territories, or about the protection of natural environments (Besse, 2014, p. 7, our traduction).

Thus, given that the analysis of the landscape and consequent production in an urban environment are of vital importance to improve the quality of life in the city and the health of citizens, considering that they are places disconnected from the urban fabric and highly degraded, it becomes essential to study in detail these places so neglected within the urban fabric, since their current reality in medium-sized cities (as in the case of the city of Limeira) is still little studied - considering the existing scientific production -, especially regarding valley bottoms.

2 OBJECTIVES

The main objective of this work was to understand the construction of the landscape of Limeira, a medium-sized city in the interior of São Paulo state, from the perspective of the valley bottoms, analyzing its relationship with the urban fabric, whose historical, social, political,

and economic idiosyncrasies affect it, as well as the current dynamics of the landscape, land use and occupation.

The study also aimed to trace the history of occupation since the beginning of the city's formation, to better understand the environmental and landscape issues involving the Ribeirão Tatu valley bottom, and to investigate the relationship between the watercourse and the population, in order to discover the attributed values (its meanings and attributes) that directly impact the current landscape aspect of the watercourse, pointing out confluences and possibilities. The landscape of Limeira's valley bottoms suffers due to interventions in the river's course/rectification, removal of riparian vegetation, and discharge of sewage and other waste.

3 METHODS OF ANALYSIS

Based on the theoretical framework, the methodological procedures adopted included bibliographic and documentary research (legislation, maps, plans and projects, newspaper archives) ; field research to conduct photographic surveys, identify spatial and environmental structures ; observe usage, behavior, and activities; and apply questionnaires and interviews with municipal administration technicians. This article highlights the importance of photographic surveys, which are fundamental for interpreting the landscape, and their intertwining with the theoretical framework, enabling the analysis of collected data and information, through maps ("layers") where potentials and problems were demarcated.

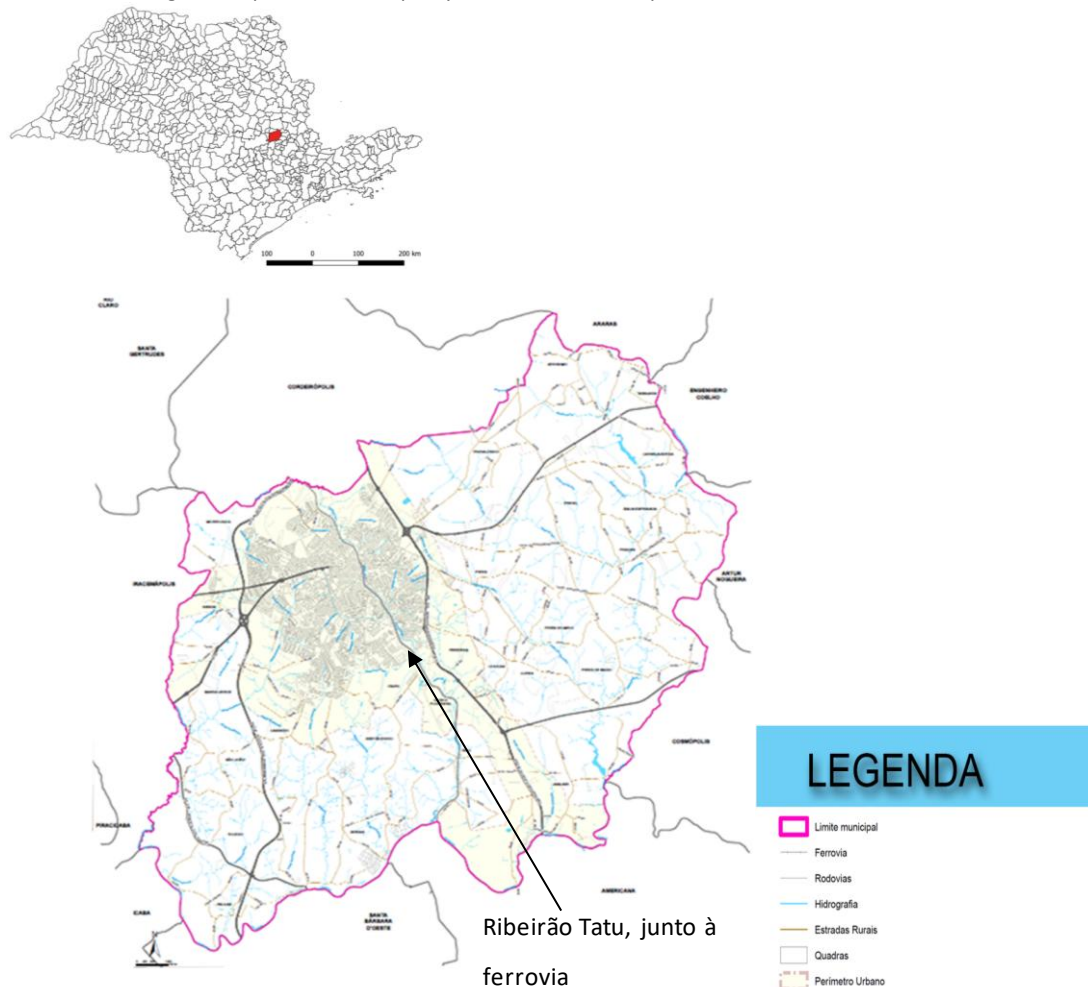
The analysis of the relationship between rivers and urban landscape demands an integrated approach that considers the diverse factors influencing this dynamic, such as morphological, historical, social, environmental, cultural, economic, and political issues.

4 THEORETICAL FRAMEWORK: LIMEIRA AND THE RIBEIRÃO TATU

With 303,000 inhabitants in an area of 580 km² (IBGE, 2018), the municipality of Limeira is considered a medium-sized city in the interior of São Paulo state, both by its size and by its role within the urban network in which it is inserted, being surrounded by other important medium-sized cities in the region.

The main urban hydrographic basin is that of the Ribeirão Tatu (Figure 1), which comprises 75% of Limeira's urban area and has an extension of 6.5 km, originating in the rural area of Cordeirópolis and desembogues into the Piracicaba River after receiving contributions from another 14 watercourses (Prefeitura de Limeira, 2007).

Image 1: Map of the municipality of Limeira, and it's placement in the São Paulo state.



Source: Secretaria de Planejamento e Urbanismo (2006), modified by the authors.

The city of Limeira was founded in 1824, in a passage point for pioneers and drovers, on the banks of the Ribeirão Tatu, through the donation of a plot of land by Captain Luiz Manoel da Cunha Bastos to the Catholic patrimony. Subsequently, a road connecting the Fazenda do Morro Azul to Campinas was built to improve connections with the state capital, for the transport of cargo, people, furniture, and machinery (Queiroz, 2007).

The second half of the 19th century was marked by Limeira's urban expansion, driven by the wealth generated by the coffee economy. The "Coffee Barons" invested in commerce and housing, and also brought the arrival of the railway in 1876, another instrument for the expansion of the coffee economy, built by the Companhia Paulista de Estradas de Ferro on the right bank of Ribeirão Tatu, which revolutionized the transport of people and goods, consolidating the city's growth (Manfredini, 2010; Heflinger, 2017).

Here, the importance of Ribeirão Tatu for Limeira becomes clear, as it served both as a territorial landmark used to demarcate the city's first urban fabric and as the line that guided the laying of the railroad tracks. Another important use of the Ribeirão, though not beneficial to its environmental health, was for the installation of the first industries and for the disposal of industrial waste (Queiroz, 2007).

Given the urbanization process of Limeira, it can be seen that the valley bottoms, so important as cultural and natural heritage of the city, were extensively degraded due to the discharge of sewage and other waste from the city's industries and the contamination of the soil by pesticides, coming from its agricultural power, in addition to human intervention in its course, causing rectification and removal of riparian forest.

5 RESULTS: READING THE LANDSCAPE

Landscape, as considered in this work, is the succession of human traces and attributes superimposed on the territory, a mixture of social, economic, environmental, cultural, and political variables over space, as well as a place of memory that is shaped by the passage of time, that is, a palimpsest of human occupation over nature (Besse, 2014).

The importance of water bodies in the landscape, especially rivers, as an element in the formation of cities, is undeniable. In addition to influencing visual perception and urban structure, they are also considered visual and landscape elements that have a great influence on the legibility of the city, as they facilitate its "reading" by citizens "insofar as its line crosses the city, and has attracted and attracts other symbolic, constructed and natural elements" (Matos; Veloso, 2007, p. 227, our traduction), meaning they demarcate the morphology of cities and create boundary markers in the delimitation of urban morphology.

Today, however, they are largely perceived as elements of repulsion, due to the "devaluation of rivers given the landscape, geographical, economic, cultural, and environmental conditions analyzed; potentialities exist, obstacles and threats are also verified regarding the landscape structure and the quality of life of the riverside population; encounters and mismatches are perceived in the landscape of the waters" (Matos; Veloso, 2007, p. 222, our traduction).

Authors such as Besse (2018, p.44) point out that, for the landscape to be fully understood and experienced, it must first be heard, read, and observed, noting its rhythms and particular spaces, and seeking to understand what helped it become what it is today, as well as what it can become. In this sense, field observation is fundamental, analyzing and recording the landscape to provide a more complete view of what it is and what it can become.

Therefore, to better understand the dynamics of water landscapes and their importance within the city for the population, as well as to emphasize the need to give greater value to urban valley bottoms, a photographic survey and field observation of the Ribeirão Tatu case study in the city of Limeira were carried out.

5.1 Reading the landscape of Ribeirão Tatu: photographic survey¹

¹ This article is partially based on the content presented in the author's Master's dissertation in Architecture and Urbanism, titled "The Landscapes of Ribeirão Tatu: Idiosyncrasies, Confluences, and Possibilities – LIMEIRA/SP," completed in 2021 at the Graduate Program in Architecture and Urbanism, in Universidade Estadual Paulista (UNESP), Campus Bauru, Brazil. The material presented in this article does not encompass the entire content covered in the dissertation.

Given the importance of field work and with the intention of better understanding the course that Ribeirão Tatu takes within the urban perimeter in Limeira/SP, a photographic survey was carried out, divided into sections, which provide a more complete view of its characteristics, problems, and idiosyncrasies.

The photographic survey was conducted in two stages (January and February 2021), with the aid of Google Maps, to map and characterize the two sections presented, with the objective of better understanding how the landscape is configured, its diversity, and the changes that have occurred along its route in different regions of the city.

Image 2: Photographic survey: demarcation of sections.



Source: Google Earth, modified by the authors.

In this field survey, two sections were identified that comprise most of the urbanized area, starting near the CPKelco company, on the northern urban fringe of the city, down to the Ponte Preta area (railway crossing), in the southern perimeter.

From this survey, it was possible to identify that, in the northern urban fringe, the areas are less urbanized, maintaining part of the riparian forest, as well as the natural course of the water body (Images 3 and 4). Some of these areas are better maintained due to the "Praça Viva" initiative, in which a company takes on the role of caring for the green space, receiving exemption from some municipal taxes (Prefeitura de Limeira, 2009).

In the historic city center, there are greater problems related to drainage (floods, inundations), due to increased soil impermeabilization and rectification of the stream, in addition to a closer proximity between the water body and the roads and/or train line. It can be verified that the location is considered marginal and unsafe by the population due to physical barriers and also due to the presence of trash and neglect of vegetation (Image 5).

Image 3: Green space in the valley bottom that the CPKelcon company takes care, by the Praça Viva initiative.



Source: the author, 2021.

Image 4: the valley bottom next to the CPKELCO company.



Source: the author, 2021.

Image 5: Section of the Ribeirão next to the Bus Terminal, seen from the pedestrian bridge.



Source: the author, 2021.

Smaller watercourses are more susceptible to the impacts of urbanization, such as pollution, silting, and erosion, in addition to often being rectified and recovered when urbanization reaches them. There are also fewer interventions to enrich the banks of smaller water bodies, as their landscape and environmental importance is not taken into account, only their role as an urban byproduct (Mello, 2008). Thus, we can see that the occupation of the area around the Ribeirão Tatu valley bottom has reduced the space intended for the water body and its floodplain to the point of interfering with ecological issues and causing all these problems for the city, in addition to making the landscape less attractive to people.

Dense vegetation is another point related to negative topoceptive, sociological, and affective effects, as it does not allow visual contact, either with the water or with other users of the space, causing a feeling of insecurity, since "the surrounding vegetation can hide criminals and illicit activities" (Mello, 2008, p.183, our traduction).

However, many cities have been seeking to add identities and functions to areas along urban rivers, where "banks previously used for industrial and port purposes have been transformed into social gathering spaces" (Mello, 2008, p. 171, our traduction). According to the author:

The uses that generally exhibit this performance are: commercial (shops, restaurants, snack bars, cafes), institutional (churches, schools, sports areas, health institutions, social assistance), entertainment (cinemas, theaters, event venues, dance, games). The urbanity performance, with regard to this aspect, occurs especially in the configuration of constitutiveness, when the openings of lots and buildings with such a destination face the open space of the bank. (Mello, 2008, p. 185).

One of the areas in the second section (Image 6) that presents better urban furniture infrastructure, such as benches, trash cans, and walking paths, attracts the population for leisure activities, contemplation, and daily exercises, despite the poor state of conservation.

In terms of the space's connectivity, it is observed that there are some bridges and viaducts connecting the two sides of the Ribeirão Tatu, although some of these connections present better quality than others. An example is this pedestrian bridge (Image 7) which, despite being degraded, allows for the contemplation of this landscape.

Spaces like these allow for a versatility of simultaneous uses and functions, and can be planned, designed, and managed to promote people's connection with nature, foster environmental education, and generate socioeconomic benefits, making the most of the landscape and its attributes.

Image 6: Walking paths and the current state of the urban infrastructure in the west river bank of the Ribeirão tatu.



Source: the author, 2021.

Image 7: Pedestrian bridge and its view, the landscape of the Ribeirão Tatu.



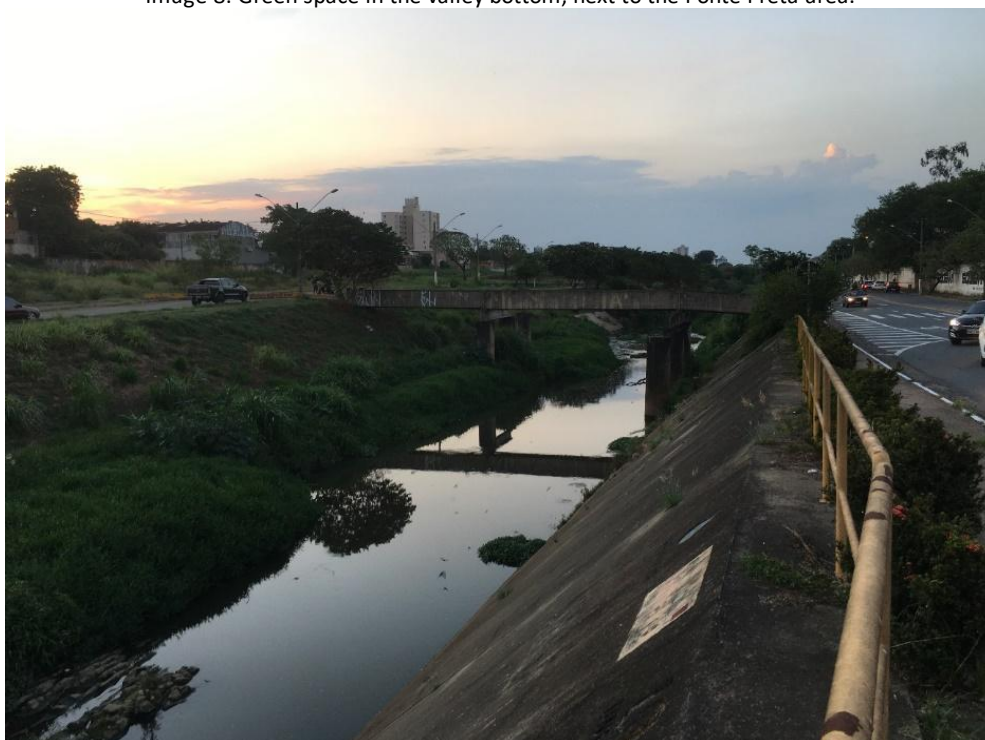
Source: the author, 2021.

Although riparian vegetation is scarcer in the central areas through which the stream flows, it can be noted that the vegetation is beginning to recover, and the existence of fauna (birds, reptiles, fish, and other animals) was observed in the area, indicating that nature can regenerate despite anthropogenic alterations (Image 8).

These more open and natural places allow for greater proximity between people, bringing them a sense of belonging in the space, which makes them want to stay there, take care of it, and experience everything this landscape can provide.

In this sense, Besse (2018) considers how the "will for landscape," that is, perceptions based on both our bodily experience within space and our landscape education, makes one want to be there, which makes experiencing the space essential.

Image 8: Green space in the valley bottom, next to the Ponte Preta area.



Source: the author, 2021.

5.2 Potentials and problems

Analyzing the two sections and their singularities, clear counterpoints can be identified between the areas, highlighting their potentials and problems. Among the problems found in section 1, the flooding problem that occurs in the more central area of the city due to the constriction of the floodplains by urbanization stands out.

In addition, large empty and abandoned open spaces were observed, product of the former industries that were on the banks of the stream, but are now redirected to the area near the highways.

One of the most relevant issues is the occurrence of inactive facades facing the valley bottoms, as well as fences, which make the area desolate and abandoned and, consequently,

cause a feeling of marginality and insecurity, especially in the central area with the deactivated old factories.

Image 9: Inactive facades in the valley bottom areas.



Source: the author, 2021.

The absence of people in public spaces, as well as the closure of residences and commercial establishments, leads to the loss of these "eyes on the street" (Jacobs, 1961), which provide a sense of security and belonging (Image 9). Similarly, Mello (2011) points out that the absence of projects for an area, or the lack of regulating laws, turns these valley bottom spaces into "no man's land," or an "empty space between places" (Hough, 1998, p.58) which causes insecurity and the predominance of use by the marginalized population.

In Section 2, the same problems were observed: areas of flooding, unqualified urban open spaces, and marginal and unsafe areas, but on a smaller scale. A problem identified, not evident in the other area, was the intense erosion on the banks of the stream over a large extent of its margins, requiring containment, drainage, or green infrastructure projects (Image 10). However, the prioritization of artificial solutions, such as large concrete walls, to contain the banks of the water body, as highlighted in the central section, resulted in the alteration of the natural hydrological cycle. Current studies indicate the use of more naturalized alternative forms to contain erosive processes.

Regarding the potentialities identified in this space, the historical heritage in the downtown stands out in the first section as a consolidated urban core (Image 11), with a large offer of facilities and services, which over time has become a place of great historical and affective value for citizens, preserving the city's memories and stories. Another highlight is the greater connectivity of the banks in this area, through bridges and viaducts, which creates a more intricate dynamism and connectivity.

The greatest potential observed in the second section was the presence of a large riparian forest area, being one of the most appreciated places by people for exercising and walks,

a use related to the sense of belonging by the people, as can be observed in Image 12, where some citizens take care of the vegetation's maintenance.

Image 10: Areas that present intense erosion.



Source: the author, 2021.

Image 11: Downtown, where there is the historical heritage, such as the Old Railroad station.



Source: the author, 2021.

The presence of urban furniture for leisure and exercise was also considered a potential, despite the need for maintenance and requalification of the equipment, in order to be in perfect conditions of use.

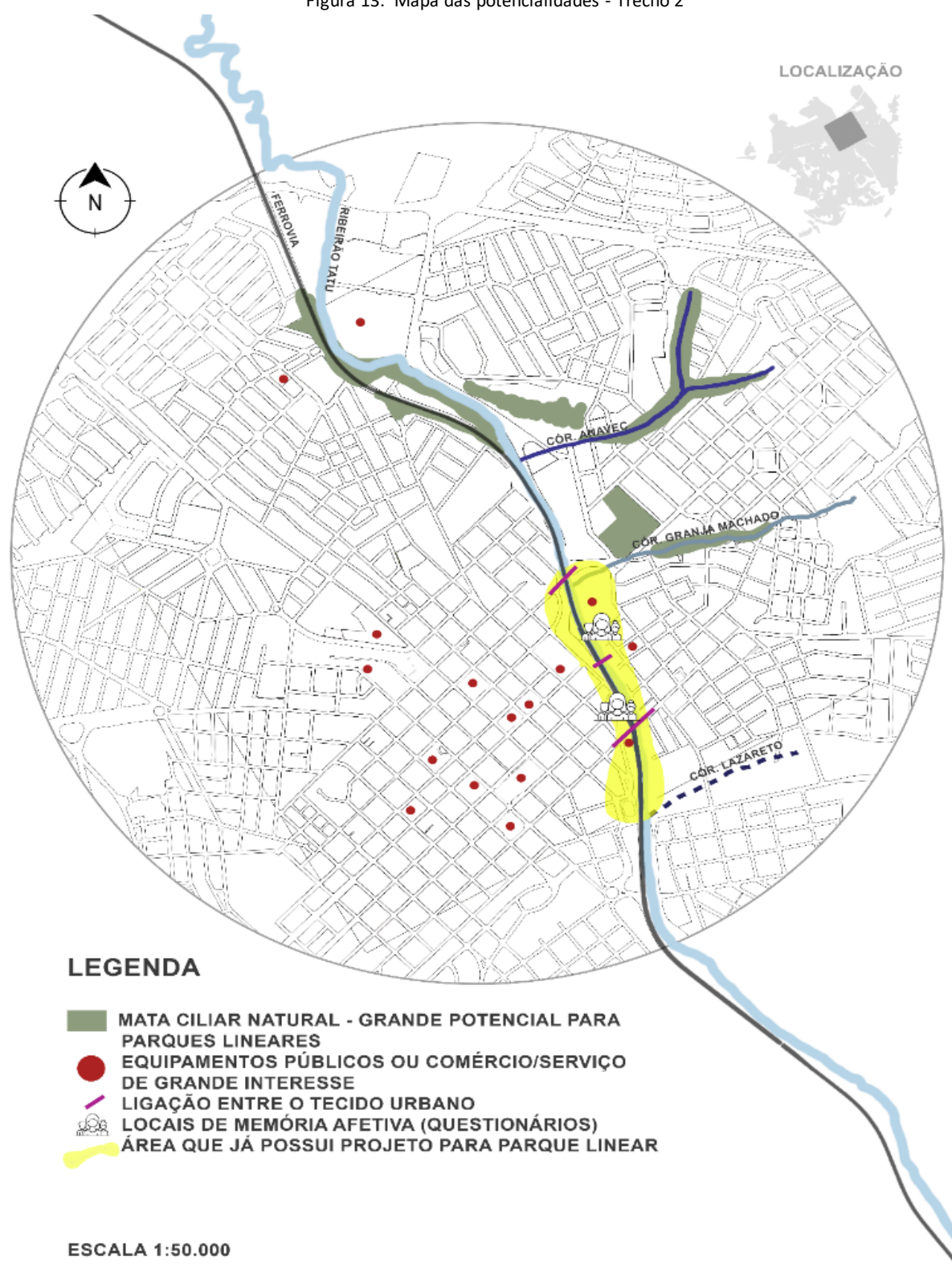
The potentials analyzed in Section 2 can be observed in Image 13.

Image 12: Sense of belonging in the Ribeirão Tatu landscape: people tending to the vegetation.



Source: the author, 2021.

Figura 13: Mapa das potencialidades - Trecho 2



Fonte: Azevedo, 2021

6 FINAL CONSIDERATIONS

Landscape is understood as "the index of the degree of realization, in a community, of culture with the natural place and its possibilities" (Bonesio, 2011, p.457-458, our traduction), and taking into consideration the importance of water bodies and valley bottoms as natural elements of the landscape, their articulation with human elements contributes significantly to the population's quality of life.

To better *act with* the landscape (Besse, 2018), careful observation, recording, and analysis of the space is the best way to get to know them, in order to make them an integral part of the urban fabric and the lives of citizens.

For this reason, it is so pertinent to study the landscape of valley bottoms, especially in medium-sized cities, such as Limeira. Such spaces, unlike metropolises, have idiosyncrasies in relation to their morphology that make them unique.

In the case of Limeira, economic, industrial, agricultural, and urban occupation factors contributed to environmental degradation (SMDRMA, 2018). In addition to the pollution that affects water bodies, the Ribeirão Tatu is rectified in sections of the urban area, being intensely disfigured and presenting a high degree of silting due to the loss of a large part of the riparian forests, reducing the environmental and landscape quality of the valley bottom (SMDRMA, 2018).

When the Ribeirão Tatu lost its natural meanders and suffered channel constriction through rectification, semi-canalization, bridge construction, and industries, it gained a much higher speed than its original, resulting in greater erosion and soil transport from the banks to the riverbed, which contributes to constant floods and urban insect infestations. All of this generates environmental disturbances and causes discomfort to the population of the city of Limeira. (Rodrigues, 2002, p.7).

The environmental quality of a space is directly linked to the degradation caused by urbanization, with rivers being the most affected natural elements in urban environments, that is, "the greater the transformation in the landscape, according to existing urbanization patterns, the more intense and negative the effects on environmental quality" (Costa, 2006, p. 52, our traduction).

The photographic research presented in this article revealed that the main problems of the stream are: inadequate drainage, abandonment of the historic heritage downtown (which causes an intense feeling of insecurity), lack of urban furniture, and fragmentation of the urban fabric, with few forms of connectivity between both banks of the stream (either for pedestrians or vehicles).

However, it is observed that there is great potential in areas where the riparian forest remains more naturalized, as does the course of the stream, something that would contribute to improving the quality of life in the surrounding neighborhoods and throughout the city. The importance of the sense of belonging in relation to the space, when people use it in their daily practices, can also be highlighted.

The issue of urban landscape related to valley bottoms is complex, involving a series of interconnected challenges and a joint effort from different sectors of society, with solutions

to be built over time, based on the needs and demands of the population, in a collaborative process involving public authorities and civil society.

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DECLARATIONS

CONTRIBUTION OF EACH AUTHOR

The conception, investigation, and execution of the study were carried out by the author Patrícia Cereda de Azevedo, for her master's dissertation in the Postgraduate Program in Architecture and Urbanism, at the São Paulo State University (UNESP), Bauru Campus. Likewise, she was responsible for the choice of methodology, the photos of the route, and the curation of the data collected in the field, as well as the analyzes presented here.

The author Norma Regina Truppel Constantino was the advisor for this master's dissertation and instructed her advisee (the other author) throughout the entire process.

Both were responsible for writing and reviewing, both the dissertation and this article.

DECLARATION OF CONFLICTS OF INTEREST

We, **Patrícia Cereda de Azevedo** and **Norma Regina Truppel Constantino**, declare that the manuscript titled "**Reading the landscape: Walking along the main line of Ribeirão Tatu in Limeira/SP.**":

1. **Financial Ties:** There are no financial ties that could influence the results or interpretation of the work. No funding institution or entity was involved in the development of this study.
 2. **Professional Relationships:** There are no professional relationships that could impact the analysis, interpretation, or presentation of the results. No professional relationship relevant to the content of this manuscript has been established.
 3. **Personal Conflicts:** There are no personal conflicts of interest related to the content of the manuscript. No personal conflict related to the content has been identified.
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