



Urbano

ISSN: 0717-3997

ISSN: 0718-3607

azazo@ubiobio.cl

Universidad del Bío Bío

Chile

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Urbano, vol. 22, no. 40, 2019, November-, pp. 28-45

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DOI: <https://doi.org/10.22320/07183607.2019.22.40.02>

Available in: <https://www.redalyc.org/articulo.oa?id=19864321003>

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A METHODOLOGY TO EVALUATE PUBLIC USE AND THE PERCEPTION OF RIVERBANKS VALDIVIA AS A CASE STUDY

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river shorelines remain in the same state of abandonment they were left in over 50 years ago. This deterioration worsens in the context of Chilean urban planning, which has seen a fragmented extended growth, leading to a progressive degradation of public spaces and natural areas, as well as the consolidation of exclusive (Borsdorf, 2003; Espinosa et al., 2016) and extractive use of the riverbanks. It is important to mention that one of the problems of riverbank planning, that are legally public use national assets, is the limited coordinated and collaborative action among sectorial legislation in public property and urban organization matters (Cordero, 2007), a fact which inevitably results in the exclusion of uses and users, as well as the difficulty of including ecological value within its definition. In this context, the spread of Valdivia has entered areas with a high presence of wetlands (Osorio, 2009), threatening the conservation of these natural ecosystems. As a result, many of the shorelines have ended up being used as landfills and considered socially devaluated areas.

This article focuses on the study of two riverbanks: those of the southern sectors of Las Ánimas and of Isla Teja (Figure 1). These two cases have been chosen as both have suffered an abandonment of their social and public uses. A transdisciplinary study that addresses its urban, social and environmental dimension is set out. The sector of the Las Ánimas neighborhood corresponds to the Los Conales street, which connects the Teodoro Segovia, José Miguel Carrera settlements and the Arturo Prat shanty town. Before the earthquake, this was used for crops, pampas used by the population for sports and a public beach, known as “Las Ánimas beach”, or the “playa de los pobres (poor man’s beach)” (Jiménez et al., 2012). The second case study is located on Isla Teja. It is a neighborhood with dissimilar socioeconomic traits. There are also some buildings belonging to equipment of the Austral University of Chile. Although the land on the river’s bank in this second case study belongs to the industries installed by the German immigrants, the working neighborhood that lived in the current Teja Independiente neighborhood had a direct connection with this bank, which was used as a resort along different stretches of the island’s shore (Burgos, 2017).

The goal is to characterize the role of these two riverbank spaces, defining the objectified characteristics and the constants that describe the particular aspects of the land, considering the connection of the inhabitants with their landscape. This will be done using a research method that integrates an analysis of its urban, social and environmental dimensions. The research reviews the approach of social science to repair the relation between society and nature, evidencing the importance of the meanings society assigns to its territory and landscape (Aliste & Urquiza, 2010). The research also looks to connect these uses and meanings with the ecological state of the river shores, suggesting a connection among these dimensions (Baschak & Brown, 1995).

I. INTRODUCTION

The rivers and their banks play a role in preserving ecosystems, as well as social and economic roles when passing through human settlements. Different river cities around the world have had to adapt to face the ecological, social and economic transformations of their waterfronts; however, in Chile we are in debt when it comes to studying these spaces in river cities. Urban waterfront regeneration plans began with the regeneration of port cities in North America in the 1960s. One of the reactivation strategies for these areas which had been abandoned for their port use, was the creation of public recreation spaces (Beer & Rigby, 1996; Hoyle, 2000; Marschall, 2001). Nowadays these spaces are being revisited by environmental science and bioengineering with an approach on the renaturation or recovery of rivers, considering ecological and social variables in the case of urban rivers (Eden & Tunstall, 2006).

This article proposes a methodology to evaluate the state of the riverbanks in the city of Valdivia, which have experienced transformations in their landscape and use. The city of Valdivia is in the Los Rios Region in Chile, located at the confluence of the Calle-Calle and Cruces rivers, which join to form the Valdivia river. These rivers, on their banks, are home to wetlands, beaches and esplanades. The riverbanks of Valdivia experienced anthropic changes which began with defensive and communication interventions made by the first settlements. Then, with the arrival of German immigrants, as a result of the Colonization Law passed by the Government of Manuel Bulnes in 1845, these banks would see industrial activity, which used the river as a source of energy and river transport (Almonacid, 2013). The use of these banks was also shared by the industry’s workers who lived in the neighborhoods on the river’s shore, generating relevant social and collective activities with the appearance of rowing clubs, ferries and beaches. In 1960, with the Valdivia Earthquake, a large part of the city was flooded and destroyed, with areas alongside the river suffering the most. The flooding created new wetlands in the city because of new water levels and the land level dropping (Rubilar, 2002). To date, several of the

Figure 1: Location of the riverbank of the southern sector of Las Ánimas and of Isla Teja in Valdivia. Source: FONDAT 449559

II. THEORETICAL APPROACHES

Urbanism and landscape: Accessibility, legibility, permeability and barriers

The research comprises an urban and landscape analysis, which looks to conceptually separate the parts from the whole, to examine their interrelations and improve their understanding. The structures of the landscape, how the landscape is organized and understood, and how we position ourselves within it, will all be studied (Stahlschmidt et al., 2017). We understand the landscape and urban environment as an experience we take part in, so we approach it from the relations of use and from the sensorial experience established with the landscape. For Kevin Lynch, the banks are border elements that can form organizing traits in the territory. Thus, a river which crosses a city becomes, from the very beginning, an important principle of urban design, given that this is an identifiable, legible place. These are the limits between two phases, linear breaks of the continuity. The banks may be more or less penetrable fences, which separate one region from another, or they may be sutures, where two regions have a relationship and come together. Using this definition as the starting point, we evaluate the permeability of the river as a bank. The access, use and visual connections play an important role in the transformation of a dominant barrier into a place of interaction. A bank may be more than a simple barrier if it allows some visual or motor penetration. The pedestrian, moving through a three-dimensional space like the landscape, is generally guided by morphological aspects of the environment, that are determining factors in the assessment of the principles of legibility and in the accessibility of the public space being crossed. The legibility of the place that lets us find our bearings in a space, depends mostly on visual elements. Legibility corresponds to the quality of locating ourselves in spaces that are shown and not hidden, spaces that I recognize (Lynch, 1959; Rodríguez & Carrasco, 2016). Likewise, these spaces allow generating visibility which contributes to safely moving in the public space. Understanding accessibility as the quality of having access to a space or an experience. This principle, first of all refers to the social and physical accessibility of all human beings (Jacobs & Appleyard, 1987; Sevtsuk et al., 2016; Calonge-Reillo, 2018; Hosni & Zumelzu, 2019). Secondly, it refers to the spatial accessibility which allows its connectivity with the rest of the city (Singh, 2016).

Ecology: the ecological value of the banks

One of the characteristic values of this type of bank spaces is that these are meeting places between the city and the river,

understanding this from its ecological value. The ecological value is generally the level of benefits that the space, water, minerals, biota and other factors comprising a natural ecosystem, provide to keep the species living there alive. The ecological value may be provided for humans and other species. For humans, these benefits generally correspond to the proportion of clean air and water. For other species, the ecological value is more direct, more specific and depends on each site and on the needs of each species. The ecosystems that contribute the highest ecological value are generally those in their most natural state. In the most natural state, the health of the ecosystems is at its peak, providing the maximum to sustain the life of the species in this location (Cordell et al., 2005).

Ethnography: the perspective of the inhabitants and users

The research looks for an interpretation of the case studies built from the stories of the inhabitants and users, asking the question about the experience and history of the place on the riverbank. If a place can be defined as an identified, relational and historic place, a space which cannot be defined as either a space of identity or as relational, or indeed as historic, it will define a non-place. The hypothesis defended here is that hypermodernity is the producer of non-places, that is to say, of spaces which are not anthropological in themselves and that, contrary to Baudelairian modernity, do not integrate older places: these, cataloged, classified and promoted to the category of places “in the memory”, occupy here a circumscribed and specific place” (Augé, 1993:44).

Ethnography as a method, as fieldwork or reflection, contributes to research from its intentions to strategically consider the space, insofar as it assumes the “being there” and integrates the opinion of the people who are part of the territory. However, it is necessary to mention that “ethnography”, in its broadest sense, refers to at least three levels of work (Guber, 2001). First, it refers to a connecting technique or tool by means of participation and observation. On the other hand, ethnography is understood as a methodological framework, inasmuch a description plus the respective interpretation. Finally, ethnography can be developed as a type of reflexive, literary genre and/or descriptive narrative writing, which generally becomes a text. In this sense, it is worth remembering the meaning of ethnography as a “method to guide an understanding of living” and, therefore, under interpretive premises, as long as it lets us situate the person in their day to day life. The concept of location also refers to the way daily experiences allow or inhibit certain types of judgment (Rosaldo, 1991).

The research proposes that we cannot act using one of these three dimensions, without considering the other two. Landscape is understood, for the purposes of this research,

as a medial reality for the study of riverbank public spaces. The logic of the landscape allows this role, given that it could be considered as what sociology has called a frontier object (Arts et al.). “Frontier objects” fall within the *grounded theory* model (Charmaz, 2006), and correspond to objects/subjects of diffuse limits which allow the meeting between different social worlds and languages. The word *Landschaft*, landscape in German, reflects the holistic nature of the term. On one hand, the word *Land* refers to the area where the people belong, highlighting the local value and cultural belonging and, on the other, the term *schaft* refers to the shape of an area (Prominski, 2004). Thus, the landscape has an multifunctionality on being capable of representing the geomorphology, biophysics, economies and the sense of places for the people. Below, the article presents the research methodologies used, to then show the specific results from disciplinary approaches. The conclusions develop a cross-sectional reading of the issues and potentialities associated to the inhabitability of Valdivia’s urban riverbank.

III. METHODOLOGY

The methodology combines different analysis methods, in a dialog between urbanism, ecology, ethnography and the architecture of the landscape.

On one hand, an urban and landscape study was made of the residential neighborhoods and public spaces that share the riverbank. Work was done based on a research methodology of the landscape, where the direct experience of the landscape is the core idea for its interpretation. To understand the spatial relations of our landscape, a morphological study of the neighborhood and a spatial-visual analysis of the landscape is made. Elements within the landscape, like paths, banks or barriers and access points, are defined. The analysis is illustrated with maps using symbols inspired in the work of Kevin Lynch, along with photographs of the places. On the other hand, the “isovist” and “agent” analysis methodology was used, whose purpose is analyzing the relationship between the built shape, natural landscape and human spatial behavior. This is done by means of two syntactic concepts, from the *Space Syntax* theory (Al Sayed, 2014; Hillier, 1996) and the *Depthmap* software. The isovist analysis has the purpose of analyzing the visual qualities of the space. The directly visible area is analyzed from a point in a built and natural setting, representing the intervisibility between all points of vision of the system being studied. The visual perception that the user has of the system will affect their movement in this space. On the other hand, the agent analysis made uses the adaptive behavior of people with the space, studying individual movement patterns of an agent in the space; and how these are added to form group patterns. The agents act considering

their visual perception field, choosing their route according to their possibilities.

The research also involved a methodology that proposes the application of a qualitative situated approach, done to consider an ethnographic sense which structures a work plan based on the organization of data collection, starting from the stories of interviewees who live in the territory, and establish values about the uses. For this purpose, the grounded theory to distinguish qualitative attributes was considered, starting from the testimony of different contextual oral sources. Therefore, this theory uses the systematic application of different techniques to generate an inductive theory related with an area of human activity (Raymond, 2005). Non-participant observations were made along with interviews to key informants, in community centers, homes, and walking along the riverbank, following routes (Andersen & Balbontin, 2019). The article will present the results of this ethnographic method performed on the riverbank of Las Ánimas, given that this study on Isla Teja is still ongoing.

This study, alongside the urban landscape and social analysis methodologies, deemed the application of an ecological value assessment methodology of the case studies as necessary, dividing sectors into similarly sized polygons and considering 3 health indicators to determine the ecological value of each site: The state of the soil, the flora and the fauna.

IV. RESULTS

The two riverbanks studied are complicated to walk along and fully record. The researcher is always an outsider in the place, where there are no markers which make it legible, and where the visibility of its limits or extension is partial. In this way, starting from the isovist analysis, it can be seen in the case of Isla Teja, that the field of vision is given by a series of visual access points from streets of greater connectivity to the riverbank, by fewer visual barriers (like trees and high-rise buildings) and by the morphological condition of the land, namely sloping. This condition allows having a higher integration of the green areas into the urban area, due to the delimitation and connectivity there is in Isla Teja’s neighborhoods (Figure 2A). Isla Teja, from the Agents analysis, has greater access to the natural systems it comprises. According to Figure 2B, a greater spatial amplitude is seen, controlled by pedestrian and vehicle accesses, from the Andwanter, Seguro Social and Cervecería settlements. This generates a greater integration of the built space with the natural landscape of the shore, as there are no large natural or built barriers that interrupt the visible qualities of the surroundings. Ultimately, this allows providing a greater morphological potential to promote pedestrian circulation. Its potential allows the visibility of the natural space to be perceived from any of the fronts. The spatial conditions also promote the visual control and the perception of spatial security on Isla Teja.

Figure 2A Isovist Analysis – Isla Teja – Source: FONDART 449559
 Figure 2B Agents Map in the Isla Teja sector. Source: FONDART 449559

In the Las Ánimas sector, however, the built bank has a high compactness, that generates a low visual integration of the riverbank's natural system. The only condition with higher potential is seen in the sports pitch sector, given its visual and spatial opening, as this is the only visual access from the main road to the neighborhood (Figure 3A). This condition compacts and disconnects, making direct pedestrian access to the riverbank impossible (Figure 3B). On the other hand, the appearance of natural vertical elements or barriers is seen towards the shore, which interfere in the visibility and low consolidation of access towards it: bushes over 1.5 meters high, low quality of paths, bushes grouped around the pedestrian access to the river. These elements block visibility of the space, promote spatial insecurity and low visual control within the built-up environment of the neighborhood.

Figure 3A: Las Ánimas Isovist. Source: FONDART 449559.
Figure 3B: Las Ánimas Agents. Source: FONDART 449559

The spaces of the riverbank which currently have a good access, lack a good legibility of access points, as is the case of Prochelle Park and the UACH Cultural Campus on Isla Teja or the High-Performance Center (CAR in Spanish) in Las Ánimas. In turn, these strips of land, just like the riverbank in the Teja Sur neighborhood, have restrictions for public use. In the case of the UACH Cultural Campus and Prochelle Park, these have fences which restrict access times. In the case of the Teja Sur sector, although there are no fences blocking access to the riverbank, there is permanent private vigilance and exclusive access for the sector's residents (Figure 4). The only public access to use and gaze at the riverbank is, in the case of the Las Ánimas sector, where there is a small beach located at the end of Bombero Clasing road. However, this space has poor accessibility, visibility and legibility, as well as lacking upkeep as a public space.

Figure 4 Landscape analysis map of the Isla Teja southern bank. Source: FONDART 449559
 Figure 5. Landscape analysis map of the Las Ánimas southern bank. Source: FONDART 449559

In both case studies, riverbank spaces are seen that have scenic and ecological qualities. According to the ecological value assessment made, the riverbank in the southern sector of Isla Teja has better ecological conditions than the riverbank of Las Ánimas' southern sector. However, there are two areas with high ecological value on the Las Ánimas bank, where there is still native vegetation and wetlands with limited intervention. The wetlands, which are a habitat for animals,

areas with vegetation that halt the overflow of rivers and avoid excessive evapotranspiration, are not easy-to-access places and, therefore, show very few signs of human use or intervention. These areas correspond to an area located to the east of the High-Performance Center (CAR) and to a wetland located in the east sector of the riverbank studied in Las Ánimas. On the other hand, in the case of Isla Teja Sur, the wetlands with the highest ecological value are those that have the best visibility, upkeep and care. However, these are difficult to reach and are on the lowest levels. As a conclusion, there is a certain interrelation between the ecological value and the accessibility the areas have. The Las Ánimas sector, on having a limited demand from the property market, maintains a higher ecological value than the green banks of Isla Teja. However, in spaces with a medium accessibility and not as visible, the ecological degradation is higher. Interestingly, the most public and urban areas of the southeast bank of Isla Teja, like Prochelle Park, were evaluated with a high ecological value, given the upkeep, as a public park, of a diverse range of vegetable species and the presence of animals, although these do not correspond to natural ecosystems. In both study cases, the lowest ecological values are found in sites which, although accessible, are not maintained and in many cases have visual barriers. These sites show an increase in terms of made-up ground and landfills. In these areas, there are many species whose seeds have been introduced due to the material with foreign soils in the made-up ground.

The barren land on the riverbank embodies a discontinuity in the urban area, a group of wetland areas or sites with made-up ground awaiting property development. We can see this in the Teja Sur neighborhood, where the land value is more expensive, several sites are enclosed for sale or with ongoing development projects. The urbanization of these shores with housing for high socio-economic groups is privatizing the access to the river. In the case of Las Ánimas, the made-up ground is also a practice which responds to the growing needs of families and the arrival of residents without title deeds. In this case, the informal urbanization advances organically towards the river.

A metaphoric neighborhood, the case of Las Ánimas

Figure 6. Mapping of stories, Las Ánimas. Source: FONDART 449559

Starting from an ethnographic study carried out on the Las Ánimas riverbank, specifically in the sector of the former Las Ánimas beach, we can see how this riverbank space is perceived by the inhabitants. This perception corresponds to a memory of a lived-on shore, full of collective experiences (Figure 6), with the current perception of the riverbank being negative or, at least, indifferent. The shoreline is perceived

today as practically absent. However, throughout the 20th century, Las Ánimas, had been the home of a place full of memories related to the river, covering testimonies with a high degree of memory devices and perceptions of how the city worked on its ecological, public and recreational limits, being the home of the first settlements and its use and joy as a resort, those are the main stories from the local perspective. The metaphoric city is broken down through these dialogs, talking about its access routes with its hidden nooks and corners. The memories of waste ground, machines, sirens and summers, describe a visual and acoustic landscape which was inexorably changed towards other seasons.

The widening of the river after the 1960 earthquake constitutes a substantial change in the way of perceiving the inhabited space along the imaginary border. There, the living memory of the narration connects that border with its displacement structures:

The “non-places” (Augé, 1993) devoured the contours of these memories, the only devices that the inhabitant had to talk about those times, leaving invisible and vague sites. These spaces are perceived by the inhabitants as *no man’s lands* or sites awaiting construction, which are transformed during this wait into spaces that take in what the city rejects or does not want to be seen. These practices manufacture, aside from the planned and legible city, the metaphoric city, constituting “another spatiality”, a poetic and mythical experience of the space, which resists through *manières de faire* (De Certeau, 1990: 142). Thus, the informal temporary occupations and settlements appropriate the wetland soils of the riverbanks through different made-up ground, walkways, farms and permanent extensions of the encampments along the shore. The studied riverbanks are characterized by their loss of accessibility and legibility, transforming them into urban interstices. The uses and practices not integrated into urban planning, like informal settlements, micro landfills and other practices sanctioned by law, are informally expressed on these shores, creating a feeling of insecurity and social barriers to access and walk along them. The barren sites with wild vegetation and lack of urban design or landscaping provide a poor visibility and pedestrian access to the banks, impeding the use, contemplation or walk along the river and its shores, where some sections see their presence going completely unnoticed. However, this condition of impenetrability allows some places to conserve the forms of animal and vegetable life outside the city’s view. We can then say, that, although both study cases have different morphological conditions, of public use and inhabitant perception, neither has good levels of accessibility (Jacobs & Appleyard, 1987) or legibility (Lynch, 1959; Sternberg, 2000; Rodríguez & Carrasco, 2016). Nor do they have a diversity of uses (Jacobs, 1961) which fosters sociability on the riverbank. Using this study as a starting point, we can detect some issues the riverbanks have in Valdivia to become quality public spaces.

In addition, regarding the public uses of the studied riverbanks, we can see that these have something in common, on them being hidden areas, invisible, difficult to access with a lack of definition or indetermination of their use. These spaces are fractures of the urban scene, a fracture which turns into a discontinuity, but also into availability for marginal activity, hospitality for the rejected, availability for plans for the future. These fractures of the riverbank have an important ecological and aesthetic value, full of memories of a regional identity in transformation. The functional lack of definition of these riverbank spaces complicates their social construction, but at the same time represents spaces of possibility of the experience of the other, unlike hyperfunctional places of modernity where the experience of surprise and of the other disappears. This is why we can say that, on certain areas of the riverbank, there are spaces that meet Augé’s definition (1993). On the other hand, the same condition of indetermination transforms them into spaces available for property development which wants to transform these sites into capital, by made-up ground, division into lots and construction.

V. CONCLUSIONS

The research characterizes spaces which experienced transformations in their use and in the perception that the inhabitants have about them. It is seen how the urban development of the neighborhoods alongside the studied riverbanks does not consider the construction of public spaces in continuity with the memories, either in the natural landscapes or in the spatial communication with the existing urban area. The characteristics of the fluvial spaces studied can conceptually approach the term of *terrain vague*, concept which Manuel De Solà-Morales and Philippe Vasset define as unurbanized vacuums, associated to abandoned equipment on the outskirts of the cities. *Terrain vague* embodies discontinuity, indetermination, interrupting the urban rhythm (Vasset, 2007). Thus, these spaces with *terrain vague* features, understanding their Latin origin *vacuus*, can be read as a vacuum among the full, where the unit of the shore with the river is a vacuum that separates both banks, without the river connectivity of the times of Valdivia’s industrial peak, as well as being read as a meaning of vague, as undefined and in constant transformation, a trait of the geomorphology of rivers and natural ecosystems.

The results of this research show us the importance of looking after the public use of riverbanks shores and channels. The planning of a network of free spaces would generate relations of visibility, of mixed uses and of accessibility from the city’s network of public spaces and from the urban development of the neighborhoods alongside its shores. In this sense, this study shows that the segregation caused by the exclusive uses and by property speculation on areas with high ecological

value produces a social degradation of the riverbanks, as well as an ecological degradation, transforming them into barriers and borders within the city. Starting from this complex characterization of the riverbanks, what this research recommends is a multidimension assessment methodology of these spaces, for a design and planning of riverbanks that protect their ecosystems (Baschak & Brown, 1995), as well as recovering the tangible and intangible heritage of these spaces, as both river communication and public use spaces.