

# WALKING ACCESS TO URBAN WETLANDS<sup>1</sup>

## AN OPPORTUNITY FOR RECREATION AND WELLBEING

ACCEDER CAMINANDO A LOS HUMEDALES URBANOS  
UNA OPORTUNIDAD DE RECREACIÓN Y BIENESTAR

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Los humedales de las ciudades chilenas constituyen uno de los ecosistemas urbanos más afectados por los desarrollos inmobiliarios. A pesar de sus valores en recreación y en biodiversidad, sufren una constante pérdida de superficie, debido a deficientes procesos de planificación urbana. Sin embargo, ante el auge de las ciudades verdes y sustentables, se están revalorizando por medio de proyectos de restauración y de parques urbanos abiertos, de valor natural para el bienestar de los hábitats y la población. En este sentido, propiciar una accesibilidad con una infraestructura adecuada aportará a mejorar la calidad de vida de los habitantes y por supuesto del entorno urbano, concretamente a través de la integración de infraestructura verde-azul (*blue-green infrastructure*). Con la finalidad de contribuir al acceso a la naturaleza en ciudades, se realiza aquí un análisis de accesibilidad a pie, a una red de humedales llamada “La Ruta del Agua”, mediante una encuesta de percepción. Los humedales urbanos evaluados son 5 ecosistemas con distintos entornos barriales en Concepción Metropolitana (Chile). Si bien se trata de un caso de estudio local, representa una contribución metodológica relevante, dada la existencia de una gran cantidad de humedales urbanos degradados en Latinoamérica y en peligro de desaparecer. Los resultados de acceso muestran que los humedales son accesibles por vía de la caminata, pero el hecho de que sean poco visitados, pese a su cercanía a las zonas residenciales, revela su falta de integración como espacios abiertos, verdes, ricos en biodiversidad y aptos para la recreación en la ciudad de Concepción. Los resultados de este estudio son valiosos para el diseño de futuros proyectos de parques en humedales, parques que deben considerar los valores ecosistémicos, la biodiversidad y la recreación para el bienestar de las personas.

**Palabras clave:** hábitat, política pública, asentamientos precaristas

Urban wetlands in Chilean cities are one of the urban ecosystems most affected by real estate developments. Despite their importance for recreation and biodiversity, they are constantly shrinking due to deficient urban planning processes. However, with the recent boom of green and sustainable cities, wetlands are being revalued through restoration projects and open urban parks, with natural value for the well-being of habitats and the urban population. In this sense, promoting accessibility through suitable infrastructure will contribute to improving the quality of life of inhabitants and the urban environment, specifically through the integration of blue-green infrastructure. Walkable access to a network of wetlands called “La Ruta del Agua” (“the water trail”) has been analyzed here, through a perception-based survey, looking to improve access to nature in cities. The urban wetlands assessed comprise five ecosystems located in different types of neighborhoods in the metropolitan area of Concepción, Chile. Although this is a local case study, it is relevant from a methodological perspective, given the existence of a large number of degraded urban wetlands in Latin America that are in danger of disappearing. The results show that wetlands are accessible by walking, but the fact that they are rarely visited, despite being close to residential areas, reveals a lack of integration as open green spaces, rich in biodiversity, and as places of recreation in the city of Concepción. The results of this study are valuable for the design of future “wetland parks”, one which must consider the ecosystem values, biodiversity, and recreation for people’s well-being.

**Keywords:** accessibility, urban wetlands, walkability, perception, well-being

## I. INTRODUCTION

Today wetlands are in serious jeopardy of global disappearance (Darrah *et al.*, 2019) which is of great concern given that there is widespread evidence of their innumerable benefits for people and habitats. They mitigate floods, protect the coast from erosion, are biodiversity habitats, clean the air, and sequester carbon, among other contributions (Basu *et al.*, 2021; Dabrowska-Zielinska *et al.*, 2014; Penatti, Ribeiro, Ferreira, Arantes & Coe, 2015). In fact, more recently, they are being valued as nature-based solutions, to solve the problem of urban flooding, as well as for the design of urban parks focused on the common good (Zhai & Lange, 2021).

Urban growth has been one of the main contributors to the damage to these water ecosystems. It is for this reason that several protection, conservation, and restoration initiatives, among other actions, have emerged in cities. For example, in New York (USA), the restoration of wetlands and their transformation into public spaces, namely, into “flood parks”, has been a strategy to face the consequences of hurricane flooding (Campo, 2016). In Vitoria-Gasteiz (Spain), the restoration of the Salburua wetlands and their “green belt” have transformed the city into an internationally recognized green capital. In the U.K., the government is aiming to create 100,000 hectares of wetlands (Wildfowl & Wetlands Trust [WWT], 2021), and, in China, the so-called “Sponge Cities” are being created, which include parks with urban wetlands, whose goal is that 80% of Chinese cities absorb and reuse at least 70% of their rainwater by 2030 (Caprotti, Springer & Harmer, 2015).

However, in Latin America, the integration of urban water ecosystems with the city is more complex. The region leads the global loss of wetlands due to land use changes (Darrah *et al.*, 2019). Even so, some successful experiences stand out, such as the case of the “Pantanos de Villa” wetland in Lima (Peru) which, despite its intervention, has been recognized as a Ramsar wetland, and as a point for ecotourism, leisure, research, and environmental education. “Pantanos de Villa” is an example of biodiversity protection in one of the most desert-like cities in the world (Chung-Velásquez & Lopez-Manrique, 2021; León Sulca, 2020). The Várzeas de Bacia do Alto Tietê Park in Sao Paulo (Brazil) is equally successful, where flood plains have been restored, improving risk mitigation and access to green infrastructure (Mayorga-Moral, 2013).

In Chile, thanks to the “Urban Wetlands Protection Law 21.202” (de Urresti, 2019), which recognizes wetlands as areas of natural value, there is a growing interest in protecting and visiting them. Consequently, a greater demand is predicted for the planning of parks with

wetlands and, with it, an increase in the possibilities of accessing and enjoying their benefits in Chilean cities. Thus, in a scenario of a potential increase in demand for access to these valuable ecosystems, this work proposes research that analyzes, through a perception instrument, people’s access to a potential urban wetlands network, trying to answer the question: how is access to these natural ecosystems perceived? The objective of the study is to support future blue-green infrastructure projects in the Concepción Metropolitan Area (Chile), one of the areas with the greatest presence of wetlands, and one most affected by urban pressure, thus contributing to reducing knowledge gaps on access to urban wetlands.

### The value of accessing urban wetlands

Access to nature contributes to well-being, as has been demonstrated by different research projects that associate the benefits of proximity to nature with people’s physical and mental health (Van den Berg *et al.*, 2015; Gascon *et al.*, 2016; Crouse *et al.*, 2018). Nevertheless, access to nature can also be approached from a distance, as a critical aspect, since it refers not only to distance from home or proximity but also to the ability to access and interact with natural spaces. In fact, from a distance, the 15-minute paradigm has been consolidated, as a suitable travel time to receive the benefits of the city such as parks. Currently, and especially after the pandemic, several studies are evaluating 15-minute accessibility to different opportunities (Abdelfattah, Deponte & Fossa, 2022; Pinto & Akhavan, 2022), a threshold that has been consolidated as a suitable time to access multiple services (health facilities, education, food, green areas, among others). This aspect constitutes an attribute of the sustainable city and a strategy for climate change, which prioritizes mobility by walking and zero-emission trips.

The evaluation of people’s accessibility to natural spaces is considered very timely and contributes to the future design of parks with urban wetlands. With the latter, the pandemic has revealed more empirical evidence on the benefits of this type of park for people’s health. In China, the closure of wetland parks and the limitation of access to these spaces increased users’ perception of the psychological benefits of visiting them in a normal year (Zhai & Lange, 2021). Consequently, urban wetlands represent a concrete alternative for the development of blue-green infrastructure projects for leisure, biodiversity, and people’s well-being, especially in cities that lack green areas. Considering urban wetlands in this green infrastructure network could increase accessibility, as has been seen for the city of Valdivia in Chile, where the grouping of green spaces, together with wetlands and longer walks, has led to higher levels of accessibility (Rojas, Paéz, Barbosa & Carrasco, 2016).

### ROCUANT-ANDALIÉN WETLAND



Type of Wetland	Coastal with saline intrusion
Surface Area	2,860 hectares
Vegetation	Halophiles, Glasswort ( <i>Sarcocornia fructicosa</i> ) and Denseflower Cordgrass ( <i>Spartina densiflora</i> )
Birds	Grey Plover, South American Tern, Whimbrel, Black Swan, White-faced Ibis, Oystercatcher, and the Lesser Yellow Legs
Ecosystem Services	Cultural, leisure, tourism, education, and research ES Regulation ES, flooding, controllers of rainfall flooding, water reservoir, as support for agricultural activity, and water regulation.
Urban Fabric	Medium density residential fabric.
Land uses	Forestry plantations, open areas with bare soils and little vegetation, and industrial areas
Neighborhoods	Medium-density neighborhood units, and low-density social housing
Green Infrastructure	Pedestrian access from the Talcahuano sector
Barriers and Threats	Micro-landfills Invasive species, and real estate development pressure

### VASCO DE GAMA & PAICAVI WETLAND



Type of Wetland	Palustrine
Surface Area	91 hectares
Vegetation	Hydrophyte, reeds or bulrushes ( <i>Schoenoplectus californicus</i> ), sedge ( <i>Cyperus eragrostis</i> ), and pond sedge
Birds	Southern lapwing, Black-crowned night heron, Cinnamon teal, White-tailed kit, and Austral kestrel
Ecosystem Services	Cultural, leisure, tourism, education, and research ES Regulation ES, flooding, controllers of rainfall flooding, water reservoir, as support for agricultural activity, and water regulation.
Urban Fabric	Medium density residential fabric.
Land uses	Open areas with little vegetation, educational areas
Neighborhoods	Low-density neighborhood units, and housing blocks
Green Infrastructure	There is access, and green areas alongside the wetland
Barriers and Threats	Micro-landfills and real estate and industrial development pressure

### LOS BATROS WETLAND



Type of Wetland	Palustrine
Surface Area	149 hectares
Vegetation	Hydrophyte, reeds or bulrushes ( <i>Schoenoplectus californicus</i> ), sedge ( <i>Cyperus eragrostis</i> ), and native vegetation like the olive.
Birds	Spectacled tyrant, Whimbrel, and Black Swan
Ecosystem Services	Cultural, leisure, tourism, education, and research ES Regulation ES, flooding, controllers of rainfall flooding, water reservoir, as support for agricultural activity, and water regulation.
Urban Fabric	Low-density residential fabric.
Land uses	Forestry plantations, wetland, and agricultural plantations
Neighborhoods	Garden city, and residential condominiums
Green Infrastructure	Access to the wetland and wetland urban park
Barriers and Threats	Micro-landfills

### BOCA MAULE WETLAND



Type of Wetland	Palustrine, river, and coastal
Surface Area	65 hectares
Vegetation	Lesser bulrush ( <i>typha angustifolia</i> ), reeds ( <i>Schoenoplectus californicus</i> ), common reed ( <i>phragmites Australia</i> ), Macrophytes – floating pennywort ( <i>hydrocotyle ranunculoides</i> ), South American spongeplant ( <i>limnobium laevigatum</i> ) and fat duckweed ( <i>lemna gibba</i> ).
Birds	Kelp gull, Brown-hooded gull, and Neotropical cormorant
Ecosystem Services	Cultural, leisure, tourism, education, and research ES Regulation ES, flooding, controllers of rainfall flooding, water reservoir, as support for agricultural activity, and water regulation.
Urban Fabric	Low-density residential fabric.
Land uses	Wetland, open areas with bare soils, and forestry plantations
Neighborhoods	Low-density social housing, and low-density neighborhood units
Green Infrastructure	Current access, along with green infrastructure improvement projects
Barriers and Threats	Natural barriers for invasive species, micro-landfills, and land taken for self-builds.

Figure 1. Characterization of the “Water Route” wetlands network. Source: Preparation by the authors based on fieldwork (2021) and Water Route (Regional Government - Consultant, Edáfica 2019), Rojas & Jorquera (2021).

	Wetland				
	Los Batros	Rocuant - Andalién	Paicaví - Vasco Da Gama	Boca Maule	Total
Total base	210	125	187	118	640
Gender	%	%	%	%	%
Male	30.5	39.2	43.3	47.5	40.1
Female	69.5	60.8	55.6	52.5	59.6
Other	0	0	1.1	0	0.3
Age (average)	45	49	42	45	45
Main occupation	%	%	%	%	%
Primary (fishing, agriculture)	0	1.6	3.2	0	1.2
Secondary (industry)	11.9	13.6	8.6	21.2	13.8
Tertiary (services)	22.4	28.8	24.1	22	24.3
Full-time Head of household	34.3	26.4	17.1	30.5	27.1
Studying	12.4	8.8	25.1	11.9	14.6
Retired	10	16	16.6	13.6	14.1
Unemployed	9	4.8	4.3	0.8	4.7
Does not answer	0	0	1.1	0	0.3
Educational level	%	%	%	%	%
Without studies	1	0.8	0	1.7	0.9
Elementary School	15.2	11.2	4.8	17.8	12.3
High School	49.5	36	47.6	55.1	47.1
Higher	34.3	52	47.6	25.4	39.8
Participates in environmental organizations	%	%	%	%	%
Yes	1.9	0.8	3.2	0	1.5
No	98.1	99.2	96.8	100	98.5

**Table 1.** Sample characterization (N=640). Source: Preparation by the authors.

## II. CASE STUDY

Of the Chilean cities, Metropolitan Concepción is recognized for its diversity of coastal and lake wetlands. Even though urban wetlands are presented as an open space to access nature, the city of Concepción has not yet consolidated a restoration and valorization process by improving access, infrastructure, signage, and information on the species found in the wetlands. However, their valorization is incipient. In 2018, the Regional Government implemented the "Water Route" project, to increase urban green infrastructure projects<sup>5</sup> comprising: (A) the

Rocuant-Andalién wetland, located between the commune of Talcahuano and Penco; (B) the Vasco de Gama wetland, in the commune of Hualpén, and the Paicaví wetland, in the commune of Concepción; (C) the Los Batros wetland, in the commune of San Pedro de la Paz; (D) and the Boca Maule wetland, in the commune of Coronel. The main ecological and urban environment characteristics of this route are shown in Figure 1. In the same year, the first Park in the area was inaugurated, recognizing a portion of the Los Batros Wetland. Today, the Boca Maule Wetland Park is being developed, and the Santa Clara Park on the edges of Rocuant-Andalién is in the files.

<sup>5</sup> The objective of the project is to characterize and enhance the water system of the Concepción Metropolitan Area, protecting and promoting wetlands as urban spaces of ecological and social value. In this way, it is connecting public spaces with ecosystems of high value and biodiversity.

<sup>6</sup> Financed by ANID FONDECYT, N° 1190251.

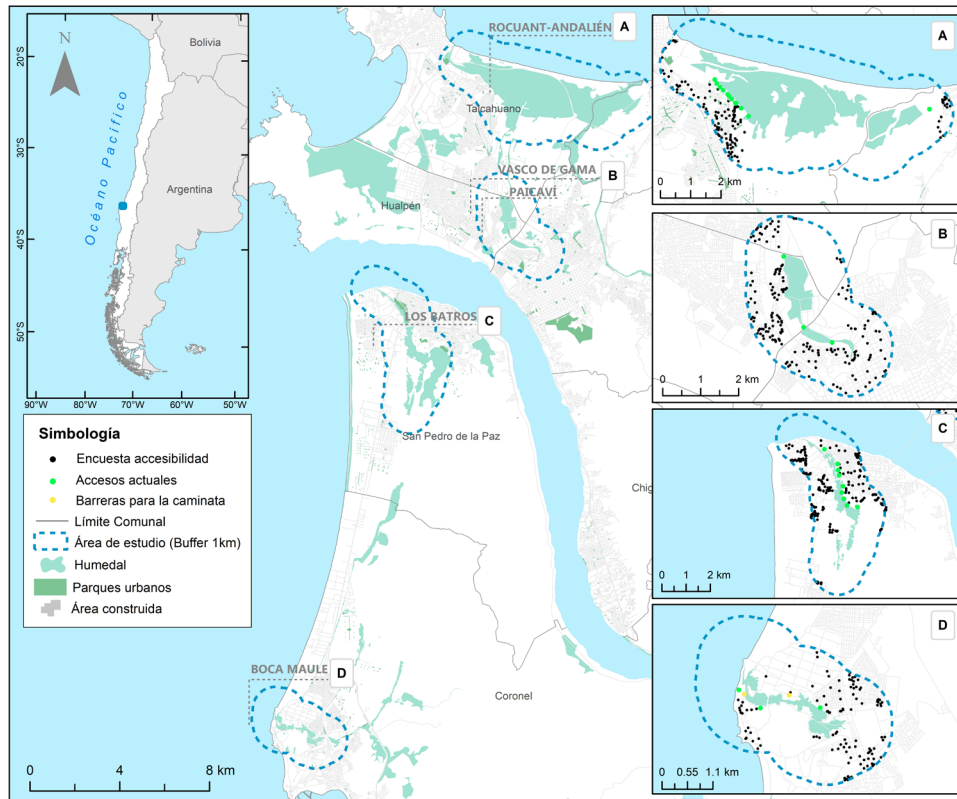


Figure 2. Spatial distribution of the surveys in the urban wetlands of Metropolitan Concepción: (A) Rocuant-Andalién; (B) Paicaví and Vasco de Gama; (C) Los Batros; (D) Boca Maule. Source: Preparation by the authors based on a wetlands perception survey (Urbancost, 2021).

### III. METHODOLOGY

#### Accessibility survey

The perception of accessibility was made through a residential field survey, between January and March 2021. This was applied to residents living near the urban wetlands<sup>6</sup>. A representative population sample of 640 surveys was determined using the results of the 2017 population census. The distribution by wetland is shown in Table 1.

The survey was residential, i.e., it was carried out at the respondent's home. It used georeferencing of the home and location in the neighborhood adjacent to the wetland (Figure 2). The sample (N=640) had a gender distribution of 59.6% women and 40.1% men with an average age of 45. The main occupation registered was that of the head of household (27.1%), followed by that of tertiary sector worker (services) (24.3%). For participation in environmental organizations, 98.5% stated that did not participate (Table 1).

The questionnaire lasted 15 minutes and included questions on accessibility, wetland definition, attachment, and ecosystem services. On this occasion, only the answers to the accessibility dimension are analyzed, whose questions were the following:

- How long have you lived in your current neighborhood? (Less than 1 year, More than 1 year)
- Can you see the wetland from your home? (Yes/No)
- What can you see of the wetland? (water, vegetation, fauna, people, garbage, others)
- Walking to the wetland from home is: (Easy, Normal, or Difficult)
- How often do you visit the wetland? (At least once a week, at least once a month, at least once a year, Every day, Never)
- During a typical visit, how long do you visit the wetland? (Less than an hour, 1-2 hours, Half a day, All day, Never)
- What is the most frequent purpose of your visit? (Sport, Transit, Photography, Work, Walking, Contemplating, Meeting Friends)
- How do you normally visit the Wetland (wetland name)



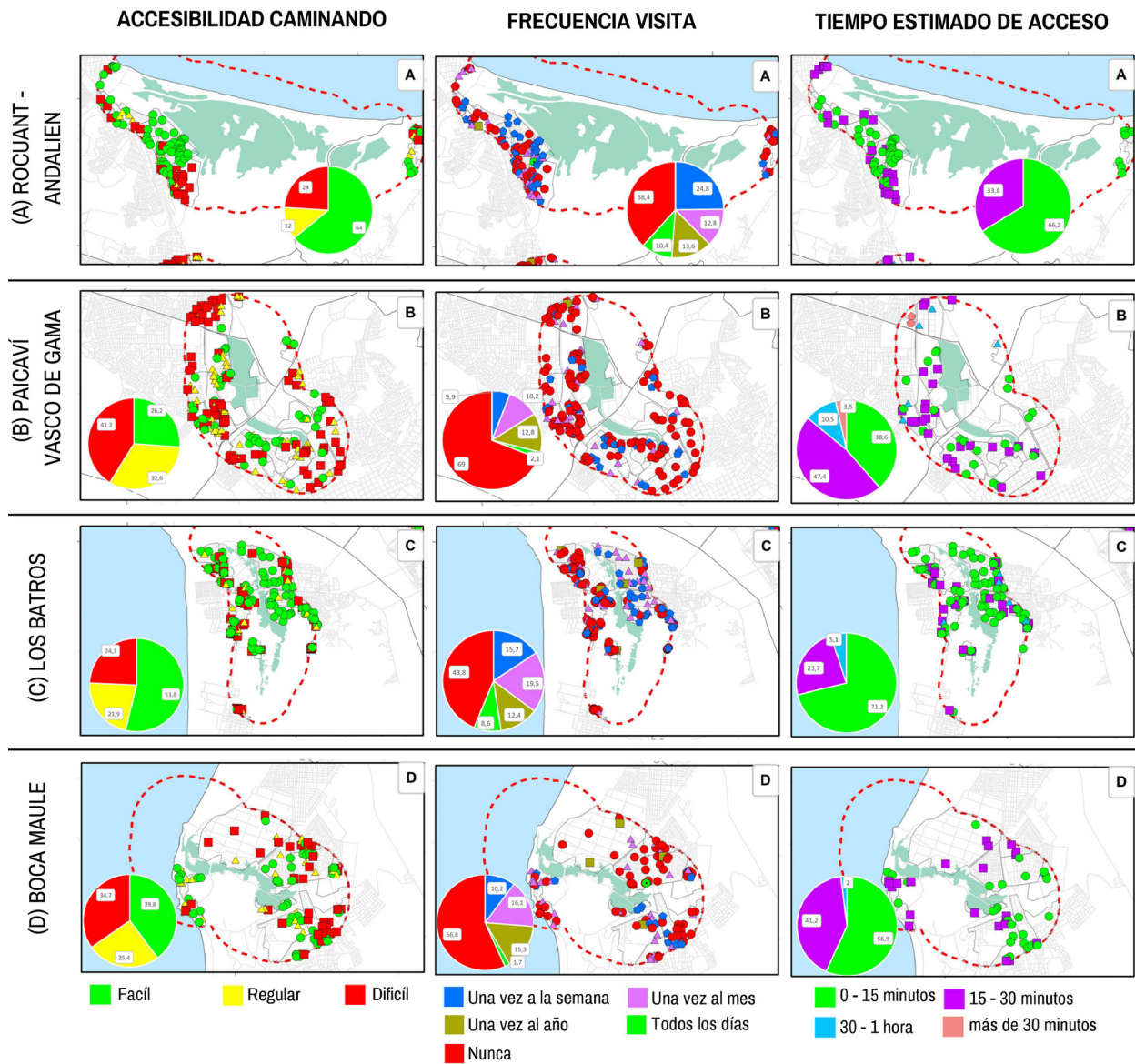


Figura 3a. Perception of accessibility to wetlands based on the results of the "Concepción Urban Wetlands Perception Survey" (Urbancost, 2021). Source: Preparation by the authors.

from your home? (Bicycle, Walking, Car, Public Transport, Other)

On the most frequent route to visit the wetland from your home: How long does it take? (0-15 min, 15-30 min, 30-1 h, more than 1 h)

Why do you not visit the wetland? (It is dangerous, I have no access, There is no light, There are no signs, It is not interesting, It is dirty, It is very far away, Others)

#### IV. RESULTS

The general results (Figure 3) indicate that 96.7% have been living in the neighborhood for "more than a year" and that only 3.3% have lived there for less than a year, so this is a settled population in the area.

Regarding the ability to see the wetland from their neighborhood, 95% cannot see it, and only in Los Batros and Rocuant-Andalién, is

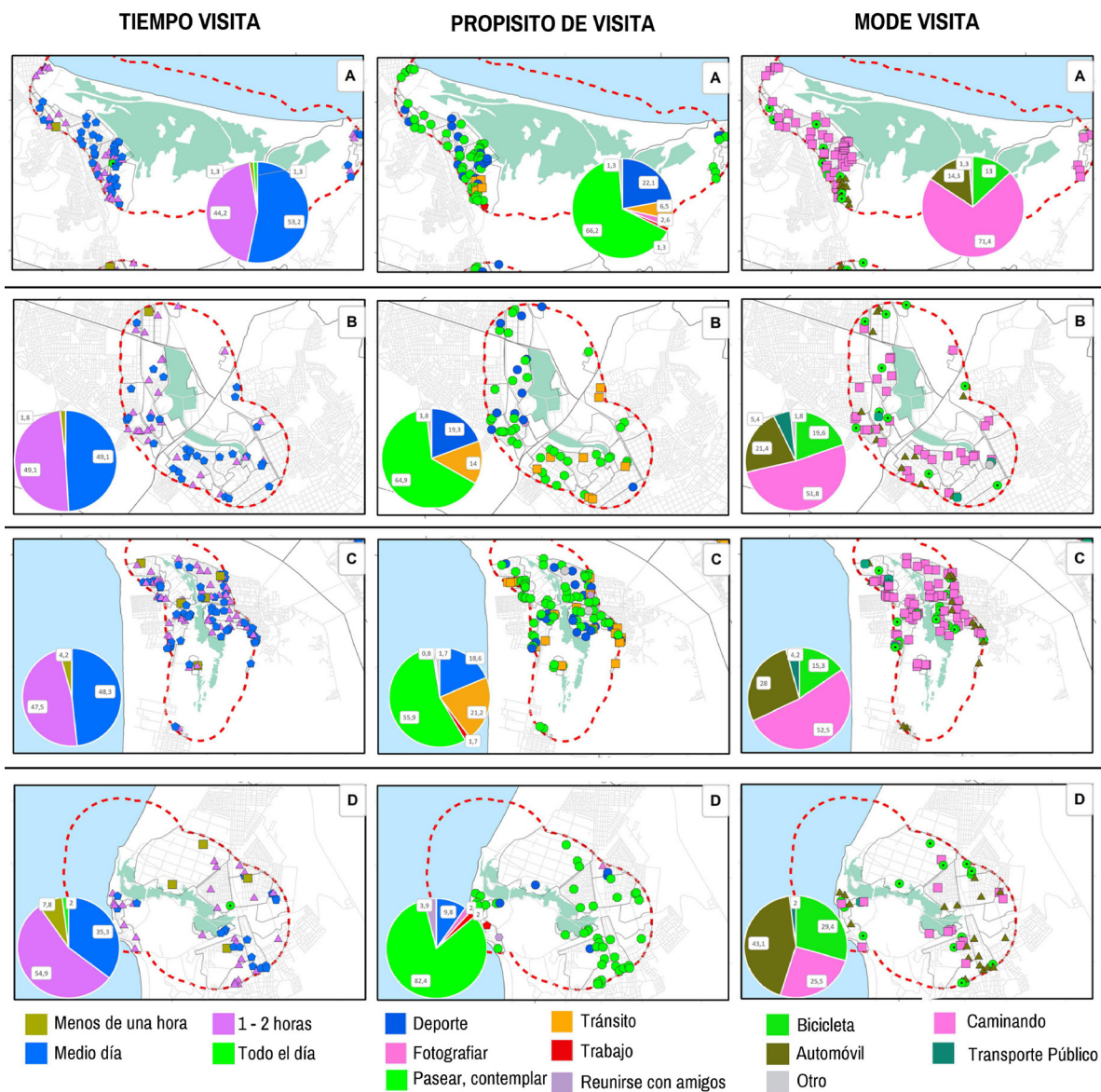


Figura 3b. Perception of accessibility to wetlands based on the results of the "Concepción Urban Wetlands Perception Survey" (Urbancost, 2021). Source: Preparation by the authors.

this above 5%. Of the 5% of inhabitants who can see the wetland (35 people), they appreciate the vegetation (62.8%), the fauna (52.1%), and the water (49.5%); three positive aspects of wetlands. In Los Batros, what is most appreciated is the vegetation (78.9%) and the fauna (52.6%); in Rocuant-Andalién, it is the vegetation (88.9%) and the water (77.8%); and in Vasco de Gama, the fauna (100%). As for visible negative attributes, garbage is mentioned, in 60.5%, especially in the Los Batros wetland.

Specifically, for walking, it was asked whether, walking to the wetland from home, was "easy, normal, or difficult". 46% indicated that the wetland is easily accessible, 23%, that it is normal, and 31%, that it is difficult. The Los Batros wetland stands out as the easiest to access and Paicavi – Vasco De Gama and the Boca Maule as the most difficult (the latter is being transformed into an urban park). Regarding how often people visit the wetland, 52% of the population indicated they "never"



visit it; 14.7%, "once a month"; 14.2%, at least "once a week"; 13.5%, "once a year"; and 5.6%, "every day". The most visited wetlands are the Rocuant-Andalién and Los Batros, even registering visits "every day" (10.4% and 8.6%, respectively). The survey ended here for the respondents who do not visit any wetlands, so the following questions were only applied to the remaining 48%.

303 people regularly visit the wetlands. A typical visit lasts "less than an hour" in 46.5%; "between 1 to 2 hours", in 48.9%; "half a day", in 3.8%; and "all day" in just 0.9%. In the visits of the largest group (less than an hour), Rocuant-Andalién, Paicaví-Vasco de Gama, and Los Batros stand out. The most frequent purpose of the visit is to "walk and contemplate" (53.9%), which is directly related to leisure; the Boca Maule, Rocuant Andalién (66.2%), and Paicaví-Vasco de Gama (64.9%) wetlands lead the visits to "walk and contemplate", (82.4%). "Sport" is still relevant, led by Rocuant-Andalién (22.1%), and "transit", mainly, in Los Batros (21.2%) through the Boca Sur and Candelaria neighborhoods.

As for the mode of transport to visit the wetlands, walking is the main way, with 40.2%, followed by the car (21.4%), the bicycle (15.5%), and, in a distant last, public transport (3.6%). According to the survey, the most walkable wetlands are the Rocuant-Andalién and Los Batros, and the most "cyclable" are Boca Maule (43.1%) and Paicaví-Vasco de Gama (21.4%). Regarding the estimated time it takes to get to a nearby wetland (travel time), 46.6% of those consulted perceive that they arrive in less than 15 minutes, or the best accessibility threshold. For the Los Batros wetland, this threshold is 71.2%, and in Rocuant, 66.2%. In any case, more than 90% can reach a wetland within 30 minutes of walking.

Finally, to understand the reasons why the wetland is not visited, 41.3% comment that they do not find it interesting; 33.9% do not point out any specific aspect; 18.8%, that it is remote - which contradicts the mentioned travel times; and 9.2%, that it is dangerous.

## V. DISCUSSION

This research is valuable for the design of blue-green infrastructure in cities, even more so when the coronavirus pandemic has increased the demand for green safe spaces (Grima *et al.*, 2020).

The study strengthens the discussion on the urban fabrics built in the area (Rojas & Jorquera, 2021). The inability to see wetlands from home only reaffirms the

fact that low-density urbanism has turned its back on natural ecosystems, despite their proximity to residential areas. Of the components that are visualized, water – although it is not the main visual resource – presents a huge opportunity for restoration, because it has been shown that living near water spaces, or blue spaces, also has benefits for the sake of a healthier life (Crouse *et al.*, 2018)

A key point for accessing urban wetlands is biodiversity. Recent research has found that people who visit wetlands do so for biodiversity (Song, Albert & Prominski, 2020). In this case, biodiversity as such was not measured, which is a limitation of the study, but the visualization of vegetation was captured, which ends up being the most important attribute. The value of fauna is also demonstrated in the survey, coinciding with the fact that one of the most valuable features of wetlands is its birds. It is important to emphasize here the attractiveness these spaces represent for ornithological tourism, although there is not always suitable or accessible infrastructure for birdwatching (Vivanco Calderón, 2020). These attributes contribute to the leisure value, which is consolidated as the main purpose of the trip. Of course, this is related to a healthier life, consistent with the evidence about improvements in mental health, specifically, with the reduction of stress (Reeves *et al.*, 2019) and improvement of well-being (Hartig, Mitchell, de Vries & Frumkin, 2014), an aspect that should be addressed and connected to access in future research.

On the other hand, there are some divergences between the value of biodiversity and the increase in accessibility to enhance leisure and the number of visits, since the increase in visitors could have consequences in the degradation and homogenization of the landscape, for example, with the proliferation of exotic plants (Pauchard, Aguayo, Peña & Urrutia, 2006; Price, Spyreas & Matthews, 2020). In fact, it has been shown that areas denser in population, located on the edges of wetlands, have better access possibilities, but they are areas of lower biodiversity and more intervened (Rojas, Sepúlveda, Jorquera, Munizaga & Pino, 2022). Taking this situation into account, "edge access" could be promoted with landscape criteria, such as the one made in Llanquihue, considering several aspects: geographical scope, a vision of territory, conservation objectives, urban well-being, threats, their monitoring, among others (Gárate & Fernández, 2020; Moreno & Gárate, 2020). It is important to note that there are already design proposals that aim to adapt the existing vegetation for rainwater collection (Bellalta, 2021). Likewise, it is key to consider biodiversity in its breadth when developing a green-blue infrastructure network,

and not just vegetation, of which homogenization and intervention in dense areas have been documented (Pauchard *et al.*, 2006; Rojas *et al.*, 2022). The same goes for the distribution and nesting periods of birds. In this sense, it will be necessary to distinguish coastal wetlands from marshes, because the former are more sensitive in terms of bird nesting: this is the case of the Oystercatcher, where 1% of the population reproduces in the Rocuant-Andalién wetland, from August to February (Barros, 2018).

Given that more than 50% of the population never visits wetlands, it will be important to explore how much the lack of infrastructure affects walking around them, visiting them, recognizing their biodiversity, and understanding the ecological functions they perform. Thus, it will be necessary to incorporate into new research, an assessment of the wetlands' capacity for tourism as a preventive planning mechanism, due to the potential increase in visitors to spaces of high natural value (Martín Varisto, Rosell & Rosake, 2009) along with evidence of stress reduction.

Finally, for accessibility to nature studies, from the population mobility approach, in addition to the health benefits, it has been proven that there is also a purpose of "transit" travel, mainly in the Los Batros Wetland, which is linked to horticultural and neighborhood activity. In fact, some of these spaces are used as a "shortcut" to the final destination (Villagra, C. Rojas, Alves & O. Rojas, 2022). For the same reason, and given the lack of accessible open and green spaces, using edges as walkways that promote walking and cycling, is a very good fit (Vivanco Calderón, 2020).

## VI. CONCLUSIONS

This work contributes to reducing the gap in research of these areas, providing support for the integration of wetlands into cities, for example, in the design of parks and/or the definition of routes or guided tours for their valorization. It was shown that, even though the population resides in the study area, they do not know the wetlands and, for the most part, do not visit them. Alongside this, it was found that the built neighborhoods have not integrated the natural value of the environment in urbanization, since many of its attributes are invisible. Regarding access, the network's wetlands are reachable on foot, although most of them do not have a suitable infrastructure.

There is an imminent potential to develop a green-blue infrastructure network with walkable access, mainly for "walking and contemplating" because today, even without

infrastructure and information, they are considered easily accessible and "once a month" and "once a week" visits are mentioned, lasting between less than 1 hour to 2 hours. Therefore, by promoting environmental education and self-guided tours to get to know and contemplate nature, this value would undoubtedly be enhanced. Transit in wetlands constitutes, at the same time, an opportunity that can be developed by implementing trails, insofar as these are a valid alternative for people who prefer to walk through natural spaces than through normal and noisy streets, especially when going to work, which ratifies the potential for connectivity and linearity offered by urban wetlands. However, these urban wetlands are ecosystems with a delicate ecological balance, since they house habitats of flora and fauna species, hence, when enabling access, care must be taken with biodiversity and planning well in urban terms.

The Rocuant-Andalién, Los Batros, and Boca Maule wetlands are the ones with the greatest opportunity for walking access. They are apt for working with their edges and integrating them with the neighborhood. As for the Paicaví and Vasco de Gama wetlands, despite their proximity to residential areas, they have difficult access, so they require a prior restoration process to recover biodiversity and enhance their qualities to generate better accessibility to the landscape for residents.

In short, having good accessibility from residential neighborhoods to natural open spaces or public green spaces, which in the future will tend to be a single system, makes the city a more attractive place, where the likelihood of walking is increased and active mobility and healthy habits are promoted, which encourage better mental health, more social interaction, and a better quality of life and well-being.

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