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PERCEPTION OF BIOPHILIC VALUES IN THE ROCUANT ANDALIÉN WETLAND, METROPOLITAN AREA OF CONCEPCION,CHILE

PERCEPCIÓN DE VALORES BIOFÍLICOS EN EL HUMEDAL ROCUANT ANDALIÉN, ÁREA METROPOLITANA DE CONCEPCIÓN, CHILE

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Este estudio analiza la percepción de valores biofílicos en el humedal Rocuant-Andalién, ubicado en el área metropolitana de Concepción, Chile y examina cómo estas percepciones varían según las tipologías de barrios. El objetivo principal es comprender cómo las diferentes características urbanísticas y sociodemográficas influyen en la valoración de este espacio natural. Para ello, se aplicó un cuestionario georreferenciado a 326 residentes de distintas tipologías de barrios, en el que se evaluó nueve tipos de valores biofílicos (utilitarista, naturalista, ecológico-científico, estético, simbólico, humanista, moralista, dominionista y negativista). Se utilizó un enfoque de Sistemas de Información Geográfica de Participación Pública (PPGIS) y el análisis de hot spot para identificar clústeres de percepción. Los resultados revelaron que las percepciones del humedal varían significativamente según la tipología de barrio, destacándose una mayor valoración de los valores utilitarios y estéticos en áreas de baja densidad. Se identificaron hotspots que indican áreas con alta valoración de ciertos valores biofílicos. La integración de PPGIS y los valores biofílicos demuestra cómo los patrones espaciales influyen en la percepción de los humedales urbanos. Los resultados sugieren que mejorar la infraestructura y la accesibilidad podría fortalecer la conexión de los residentes con estos espacios naturales. Los hallazgos subrayan la importancia de desarrollar políticas de conservación y planificación urbana que sean inclusivas y efectivas, para promover una percepción y gestión más favorable de los humedales urbanos.

Palabras clave: humedales urbanos, valores biofílicos, percepción ambiental, sistemas de información geográfica participativa, planificación urbana

This study analyzes the perception of biophilic values in the Rocuant-Andalién wetland, located in the Concepción Metropolitan Area, Chile, and examines how these perceptions vary according to neighborhood typologies. The main objective is to understand how different urban and sociodemographic characteristics influence the valuation of this natural space. For this purpose, a geo-referenced questionnaire was applied to 326 residents of different neighborhood typologies, assessing nine types of biophilic values (utilitarian, naturalistic, ecological-scientific, aesthetic, symbolic, humanistic, moralistic, dominionist, and negativist). A Public Participation Geographic Information Systems (PPGIS) approach and hot spot analysis were used to identify perception clusters. Results revealed that wetland perceptions vary significantly by neighborhood typology, with a higher valuation of utilitarian and aesthetic values in low-density areas standing out. Hotspots were identified that indicate areas with a high valuation of certain biophilic values. The integration of PPGIS and biophilic values demonstrates how spatial patterns influence the perception of urban wetlands. The results suggest that improving infrastructure and accessibility could strengthen residents' connections to these natural spaces. The findings underscore the importance of developing inclusive and effective conservation and urban planning policies to promote a more favorable perception and management of urban wetlands.

Keywords: urban wetlands, biophilic values, environmental perception, participatory geographic information systems, urban planning

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I. INTRODUCTION

Urban wetlands are vital ecosystems that provide multiple ecosystem services, such as hydrological regulation, biodiversity conservation, and mitigation of the effects of climate change (Mitsch & Gosselink, 2015). In the Latin American context, these ecosystems are increasingly facing pressure due to changes in land use and the lack of planning and conservation policies, resulting in a significant loss in size and ecological functionality (Rojas et al., 2019). In Chile, the interest in urban wetlands has driven environmental research in recent years (Hidalgo-Corrotea et al.,2023). However, social interaction with these natural spaces remains an emerging field that seeks to understand, through perception instruments, how urban design influences the valuation of natural spaces and their biodiversity. Urban wetlands are also recreational spaces; therefore, it is essential to understand how different urban communities value them (Villagra et al., 2024; Alikhani et al., 2021).

The Concepción Metropolitan Area, located in the Biobío region, Chile (Latitude 36º South - Longitude 73º West), is a laboratory in the study of urban wetlands. Despite this, perception studies have received limited attention (Villagra et al., 2024). In perception studies, the biophilia hypothesis and place-based approaches provide a practical, theoretical approach to understanding how people value natural environments. The biophilia hypothesis, proposed by Kellert and Wilson (1993), suggests that the values people assign to the natural environment reflect universal and functional expressions of dependence as a human species on the natural world. Kellert and Wilson (1993) classify these values into nine categories:

- Utilitarian: The value of nature for providing benefits of a material nature that can be useful.
- Naturalist: The value obtained from direct contact with nature, accompanied by exploration and curiosity that can evoke a sense of fascination, astonishment, and wonder.
- Ecologist-scientist: The value of obtaining satisfaction from the study of nature, which facilitates problem-solving and other cognitive functions.
- Aesthetics: The value that provides visual satisfaction and appeals to the beauty observed in nature.
- Symbolic: The value observed in natural symbols that provide a way to communicate and express our thoughts.
- Humanistic: The value observed in strong attachment to individual elements of the environment, most commonly animals.
- Moralistic: The value of feeling a strong sense of ethical responsibility and affiliation towards the natural world.
- Dominionist: The value that arouses the desire to dominate or control the natural environment.
- Negativist: The value obtained in environments that transmit negative feelings such as fear, aversion, and antipathy.

The biophilic values, together with the methodological approach of Public Participation Geographic Information Systems (hereinafter PPGIS), help understand how individuals from different neighborhoods in Metropolitan Concepción perceive the value of wetlands near their residences (Villagra et al., 2024). The PPGIS has been used to map perceptions associated with specific locations, wildlife conservation, and land use conflicts (Brown & Kyttä, 2014).

The Rocuant-Andalién wetland, located in the communes of Talcahuano and Penco, 15 km and 12 km from the city of Concepción, respectively, exemplifies the challenges and opportunities in coastal urban wetland conservation, especially since the Ministry of Environment recently created its management instruments (Management Plans). This study contributes to understanding how neighborhood typologies of their surroundings influence the perception of biophilic values in the Rocuant-Andalién wetland, which provides valuable information for sustainability in a Latin American urban context.

Specifically, a questionnaire was developed in three types of neighborhoods. The sample included 326 respondents, distributed proportionally according to the population size of each neighborhood typology. A spatial analysis was conducted to explore variations in the distribution of biophilic values (Villagra et al., 2024). By exploring the relationship between neighborhood typologies and the perception of wetlands, the aim is to highlight the importance of considering the diversity of urban and socio-economic contexts in formulating conservation policies. The hypothesis of this study is to confirm whether there are differences in the perception of biophilic values and if the urban surroundings and access to nature can explain these. Although this methodology was already used for the Los Batros wetland in the study by Villagra et al. (2024), on this occasion, a coastal wetland is explored that is not fully urbanized as the palustrine Los Batros wetland, whose densification presents more elements of planned urban design such as the "medium density fabric neighborhoods." In the Rocuant-Andalién wetlands, urbanization is dispersed and fragmented, and the area has been strongly impacted by floods, such as those of the 2010 tsunami. This influences the perception of the community's biophilic values. The findings of this study suggest that effective urban wetland management must consider and value these biophilic aspects in wetlands impacted by disasters from the people's perspective.

II. THEORETICAL FRAMEWORK

The value of perception in Urban Wetlands

Urban wetlands play crucial roles in maintaining human health and well-being. They are recreational and educational spaces that contribute to the urban populations' psychological and physical well-being (Rojas-Quezada et al., 2022; Villagra et al., 2024). These contributions have mainly been measured from perception studies,

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Neighborhood Typology	Low-Density Neighborhood Units	Medium-Density Neighborhood Units	Landscaped Housing
Sample N°	166	144	16
Population density (inhab/ha)	50.9	63.41	3.99
Housing density (house/ha)	19.26	19.73	1.41
Green area density (inhab/m2)	2.37m2/person	1.51m2/person	3.47m2/person
Description	Low-density neighborhoods with medium and lower-class single-family houses. Intermediate connection and transport networks in a regular state, close to industrial areas with a lack of infrastructure and facilities	These are medium-density residential neighborhoods with both new and old single-family homes and residential complexes. The area has suitable connectivity, and the roads are in regular to good condition, although there is a limited proportion of vegetation and green areas.	A medium—and low-density residential neighborhood with medium—and medium-high-class homes. There is excellent coverage of green areas. There is also good connectivity, with roads in good condition.
Type of Housing	Predominantly, one- or two-story single-family homes of acceptable to heterogeneous materiality.	Two-story single-family homes predominate, with a linear and semi-detached distribution, which include small back and front yards. Social housing blocks also have internal and external green areas, all with good materiality.	One or two-story single-family homes with backyards and good materiality.
Example			

Table 1. Definition of Neighborhood Typologies. Source: Preparation by the authors

which have mainly targeted the valuation of ecosystem services. People have valued cultural services most for their beneficial effects on everyday life (Alikhani et al., 2021). In urban design, perception changes by including natural elements, whether wetlands or streets with open, blue, and green spaces. This improves human interaction with their surroundings (Johnson et al., 2024; Sun et al., 2024). Also, the high valuation of nature depends on years of education and environmental awareness, which foster perceptions that promote the conservation and sustainable use of wetlands (Kaplowitz & Kerr, 2003; Rojas et al., 2017).

Biophilia reflects the inherent connection of humans with nature. Kellert and Wilson (1993) expand upon this hypothesis by identifying nine biophilic values that reflect how people perceive and value the natural environment. In line with the biophilia hypothesis, the perception of individuals towards nature is the product of an interaction between innate (genetic) and environmental factors of the setting (Gunnarsson & Hedblom, 2023). Therefore, the human connection with urban wetlands could be of a utilitarian, naturalistic, ecologistic-scientific, aesthetic, symbolic, humanistic, moralistic, dominionistic, and negativist nature, where each one captures a different aspect of the human-nature relationship (Kellert & Wilson, 1993).

In the case of wetlands, the perception of biophilic values recognizes the predominance of ecological-scientific and aesthetic values (Debbie & Green, 2013). However, in Latin American contexts, the perception of biophilic values depends on proximity, accessibility, and sociodemographic variables such as education and income, where neighborhoods with landscaped housing have a greater appreciation for aesthetic and humanist values (Villagra et al., 2024). Similarly, the diversity of urban wetlands, determined by the presence/absence of infrastructure, lighting, and visible water bodies, among other factors, conditions people's use of them (Villagra & Dobbie, 2014). Biophilic values are essential in these cases to understand how people interact with their natural environment. Consequently, the results contribute to developing effective environmental management policies by examining the human-nature relationship.

III. METHODOLOGY

PPGIS as a Tool for Participatory Planning

PPGIS has established itself as a valuable tool for mapping and analyzing community perceptions of natural environments,

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Figure 1.Neighborhoods adjoining the Rocuant Andalien Wetland. Communes of Talcahuano and Penco. a) El Morro, b) Las Salinas, c and d) Los Forjadores. Based on field records and Google Earth. Source: Preparation by the authors.

including urban wetlands, facilitating a deeper understanding of the interactions between the community and its natural environment (Brown & Kyttä, 2014).

First, the photointerpretation and fieldwork were carried out to map the characteristics of the wetland environment (1km radius). The surrounding neighborhoods were classified into three typologies: 1) Low-Density Neighborhood Units, 2) Medium-Density Neighborhood Units, and 3) Landscaped Housing. The following population and urban structure variables were used in the characterization: population density, housing density, density of green areas, and type of housing. (Table 1).

To identify the perception of the wetland's biophilia, a semi-structured survey was conducted based on a probabilistic sample of 326 households with a margin of error of 5%, a confidence level of 95%, and a p-value of 0.7 regarding the wetland's positive assessment as an area of ecological value. The 326 surveys were made one per household and are geographically distributed in the three neighborhood typologies: a) Low-Density Neighborhood Units (166 respondents), b) Medium-Density Neighborhood Units (144 respondents), and c) Landscaped Housing (16 respondents). The neighborhoods bordering the wetland (El Morro, Las Salinas, and Los Forjadores, Figure 1) in the Talcahuano and Penco communes are characterized by their medium-density and 2-story single-family homes. In the case of Talcahuano (El Morro and Las Salinas), the houses are separated by the street and sidewalk (Figure 1. a and b). The neighborhoods bordering the wetland in the commune of Penco (Villa Belén and Los Forjadores) are located at an elevation and have a panoramic view of the wetland (Figure 1. c and d).

The survey was conducted door-to-door with adults in three dimensions: spatial and sociocultural, comprising a characterization of the respondents' profiles, and perceptual. The latter starts with the question, "What is a wetland for you?" This has alternative definitions that represent the values: natural, spiritual, negative, and productive to continue with the list of specific phrases that

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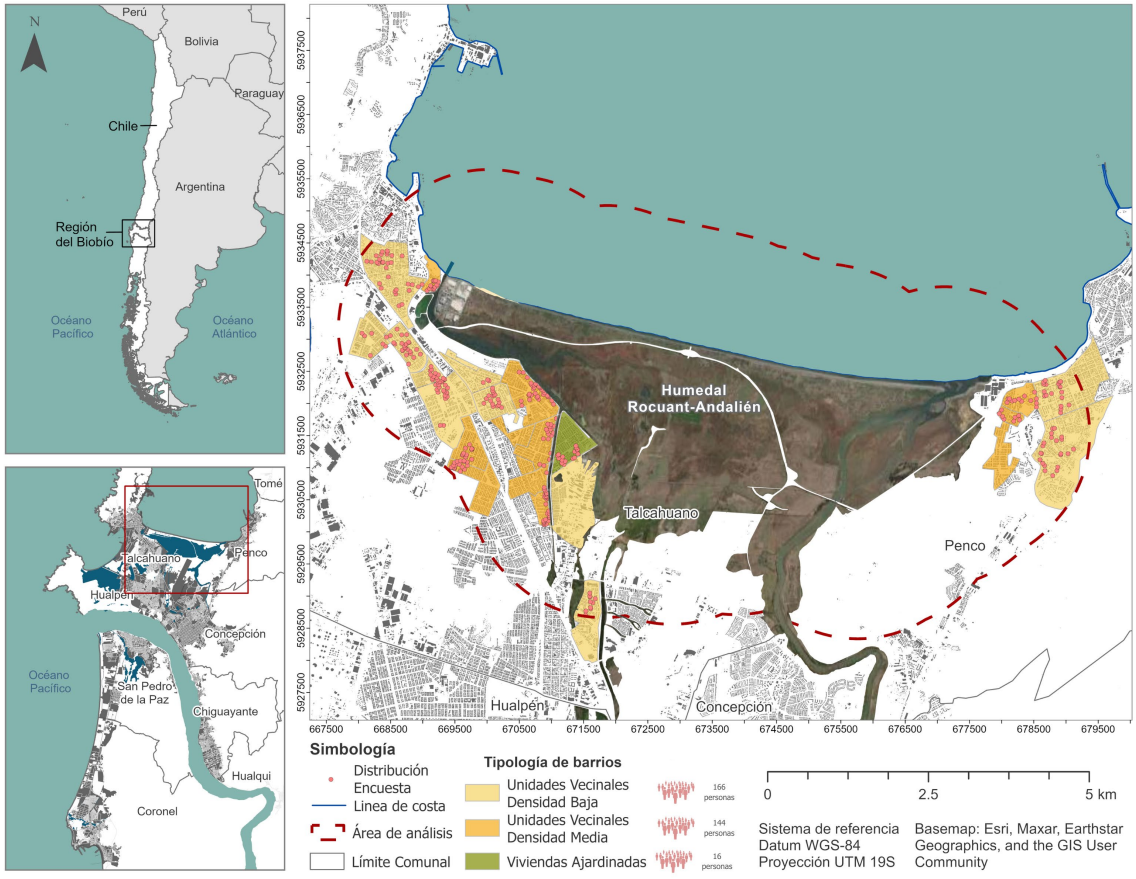

Figure 2. Neighborhood typology and georeferencing of the 326 surveys applied. Source: Preparation by the authors, 2024.

evaluate the nine biophilic values established by Kellert and Wilson (1993) with the Likert scale of 1-5, where 1 is "Strongly Disagree", 3 is "Neutral," and 5 is "Strongly Agree", that later for the cluster analysis were reclassified into 3 "Agree" "Neutral" and "Disagree" (Figure 2).

The geographical distribution of the survey responses was determined based on spatial analysis using the classification of the biophilia value:

1. Agree: All responses by biophilia typology that fall between the values of 1 and 2 are considered.
2. Neutral: All responses by biophilia typology equal to 3 are considered.
3. Disagreement: All responses by type of biophilia between 4 and 5 are considered.

With the biophilia classification, the values were clustered using "hot spot" analysis on a 300x300 m grid.

IV. RESULTS

Neighborhood categories and the effects on the meaning of the Rocuant-Andalién wetland

The survey's spatial analysis shows that, in all neighborhood typologies, about 70% of the population defines the wetland as a natural space. Figure 3 shows how different neighborhoods categorize the meaning of the wetland. Although most low- and medium-density neighborhood units categorize it as a natural space, many residents negatively perceive the wetland, 15.6% and 19.4%, respectively, in Talcahuano and Penco. The negative perception of the wetland is also highlighted with 25% of the "landscaped housing." This is followed by the productive meaning, perceived by 6% of the respondents of the "low-density neighborhood units" and "landscaped housing."

The following map in Figure 4 shows the spatial distribution of the purpose of visiting the wetland. In low-density

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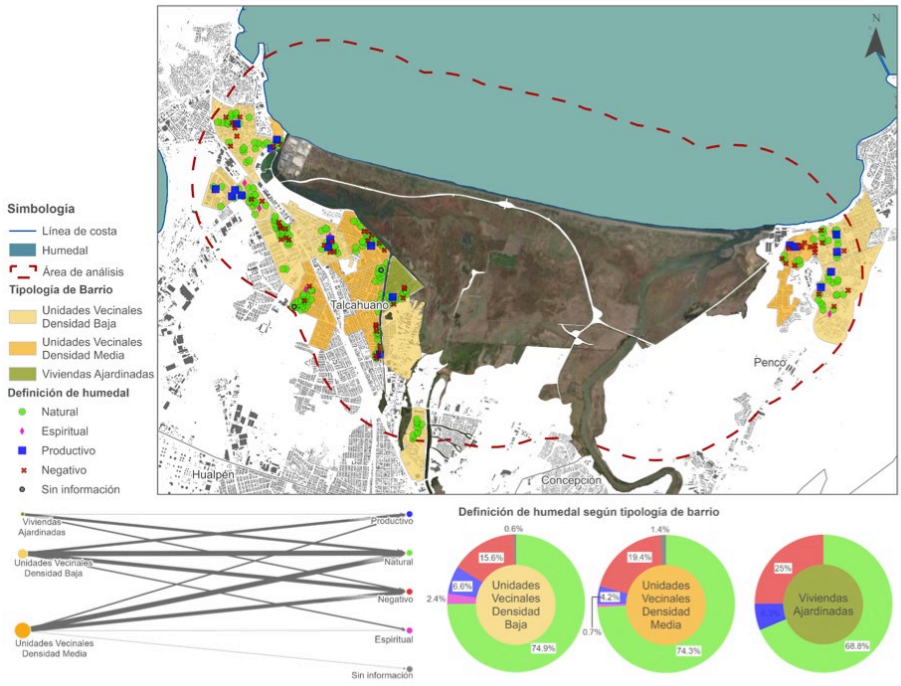

Figure 3. Spatial distribution of the meaning of the Rocuant-Andalién wetland. Source: Preparation by the authors, 2024. A Google Earth satellite image represents the wetland in all the figures.

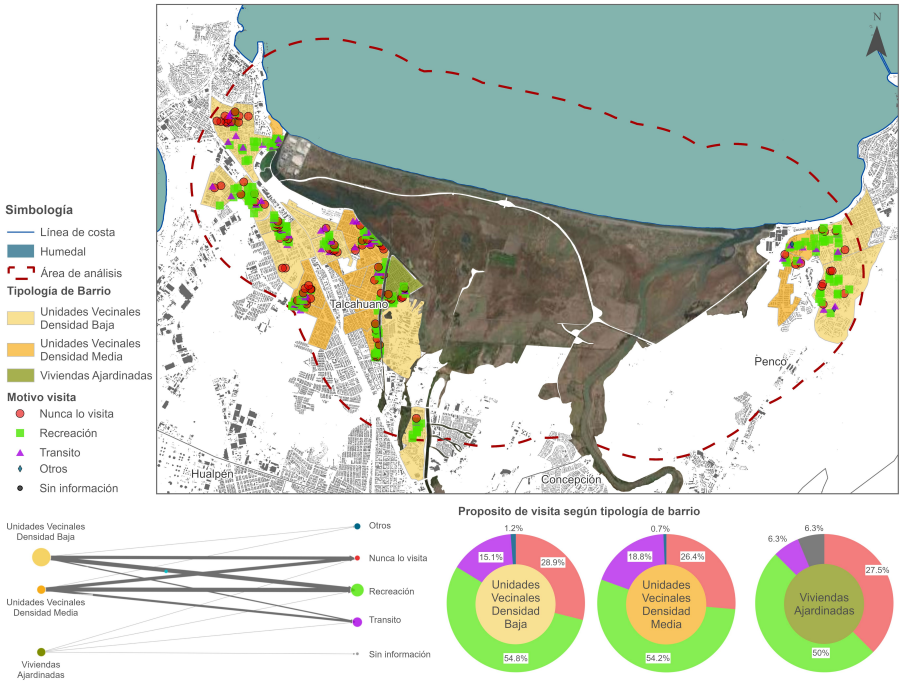

Figure 4. Purpose of the visit to the Rocuant-Andalién wetland. Source: Preparation by the authors, 2024.

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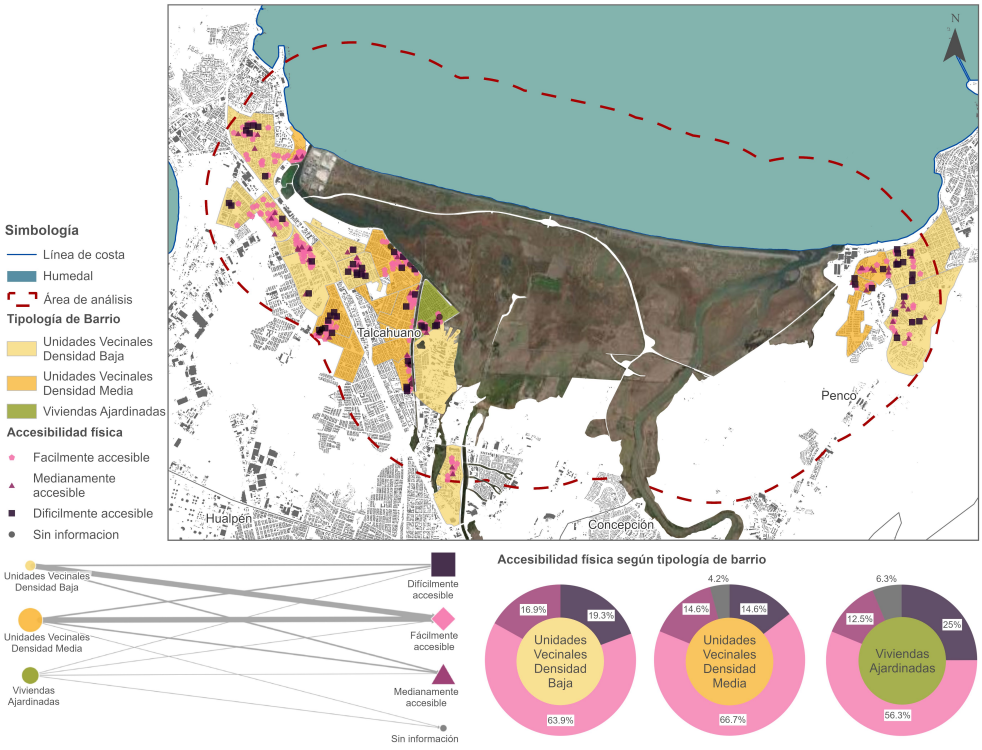

Figure 5. Spatial distribution regarding the perception of physical accessibility to the Rocuant-Andalién wetland. Source: Preparation by the authors, 2024.

neighborhood units, 54.8% of respondents visit the wetland for recreational purposes, highlighting its importance as a leisure space. However, 28.9% never visit it, indicating a disconnect with the natural space. In the medium-density neighborhood units, a high recreational use of 54.2% is also observed, followed by a transit use of 18.8%, which reflects their functional usefulness. On the other hand, 50% visit it for recreation in the landscaped housing, and 27.5% never visit it, the highest percentage of disconnection (Figure 3).

The spatial analysis of the perception of physical accessibility to the Rocuant-Andalién wetland reveals notable variations between the different types of neighborhoods. In low- and medium-density neighborhood units, most respondents (63.9% and 66.7%, respectively) consider the wetland to be easily accessible, although a percentage find it difficult to access (19.3% and 14.6%, respectively). On the other hand, residents of landscaped housing also consider it to be easily accessible, with 56.3%, while 12.5% find it to be moderately accessible and 25% consider access difficult (Figure 5).

Perceived Biophilic Values

The maps of Figures 6a, 6b, and 6c present the hotspots of biophilic values (utilitarian, naturalistic, scientific-ecological, aesthetic, symbolic, moralistic, dominionist, negativist, and humanist) perceived by the respondents in the area of influence of the Rocuant-Andalién wetland. The interpretation of these values is presented next, relating them to neighborhood typologies described in the methodology.

For the utilitarian value, a concentration of agreement responses is observed in the Talcahuano Norte area, particularly in low-density neighborhood units. This suggests that the residents of these areas see the wetland mainly as a helpful resource. In contrast, in the Penco area, identified as medium density, the neutral cluster stands out, indicating a more moderate valuation of the wetland in utilitarian terms. The naturalistic perception shows clusters according to the low-density neighborhoods in Talcahuano, indicating an appreciation of the wetland's nature. However, medium-density neighborhoods have clusters of disagreement, suggesting a lower assessment of the wetland's naturalistic aspects in these areas. The scientific-ecological perception reveals that low-density neighborhoods have clusters of agreement, although with a low Z score, indicating scattered responses. In contrast, neutral and disagreement valuations have high Z-scores, indicating well-defined hot spot clusters (Figure 6a).

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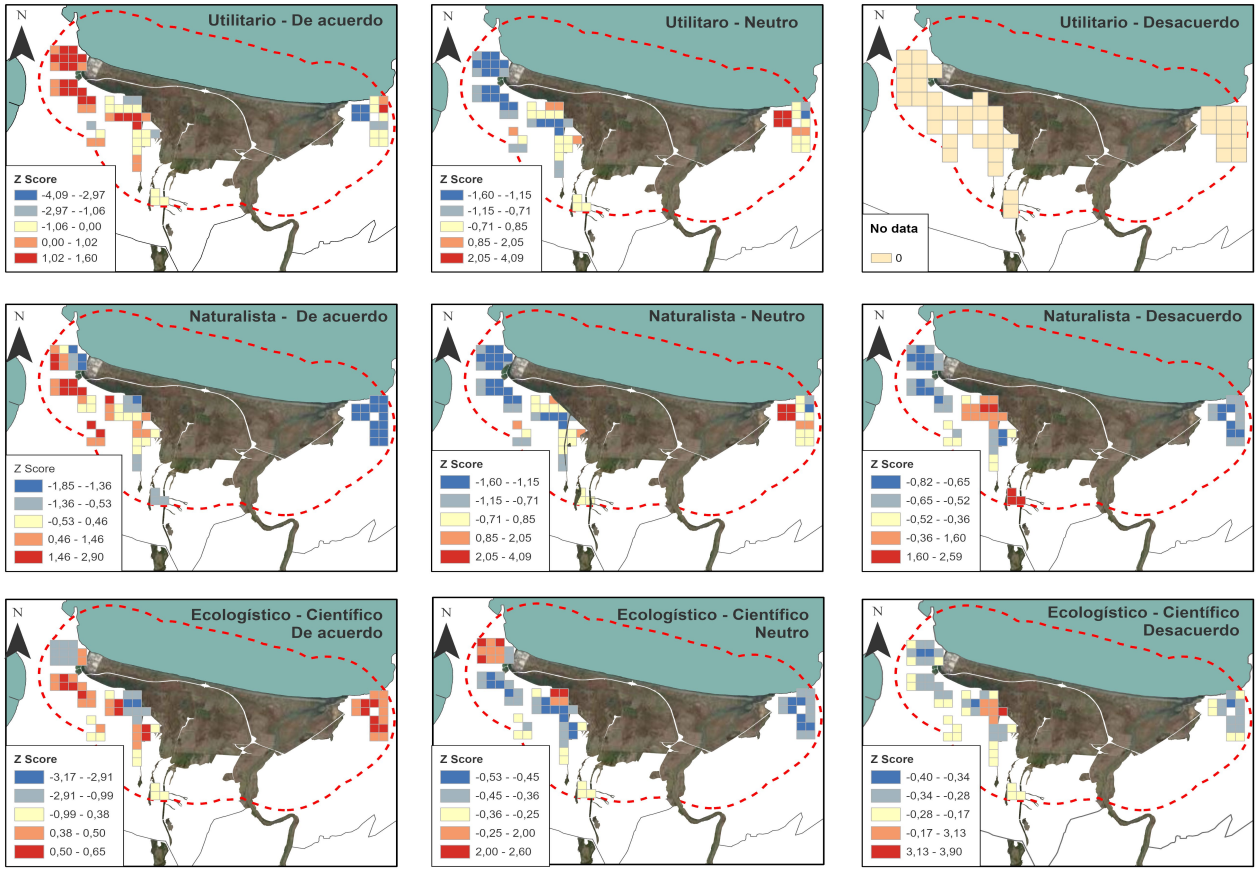

Figure 6a. Biophilia value clusters: Utilitarian, Naturalistic, and scientific-ecological. Source: Preparation by the authors, 2024.

In the aesthetic value, a concentration of agreement scores is observed in Talcahuano, especially in low-density neighborhoods, with positive Z scores indicating a strong agreement with the aesthetic value of the wetland. The neutral scores are scattered, but there is a slight concentration in the central part of the study area. Significant disagreement is found in the low-density neighborhoods of the northern sector of Talcahuano, with very negative Z-scores, especially in blue and dark gray. A pattern similar to the aesthetic value is observed in the symbolic value, with concentrations of agreement in low-density neighborhoods. The neutral scores are more dispersed, with a slight concentration on the landscaped dwellings.
For the moralistic value, the areas of agreement are mainly concentrated in the western and central parts of the wetland in both communes, with positive Z-scores. The neutral scores are pretty dispersed, while the areas of disagreement with the moralistic value are concentrated mainly in the low-density neighborhoods of Talcahuano Norte (Figure 6b).

In the Dominionist category, the areas with agreement scores are concentrated in the low-density neighborhoods. The Z-scores range from 0.62 to 1.68, indicating a high dominionist rating in these areas. The neutral scores are distributed in the central area corresponding to landscaped housing and part of medium density, with Z scores varying between -1.88 and 2.50, which evidences a moderate valuation. For the negativist value, the areas of agreement are more dispersed, but they are concentrated in the landscaped housing (Z-scores vary between 0.94 and 1.80). Neutral scores are well spread, with Z-scores ranging from -1.78 to 2.44. The areas of disagreement are concentrated mainly in the neighborhoods of medium and low density, with very negative Z-scores. In the humanistic category, the areas of agreement are concentrated in the central zone in the three neighborhood typologies, with positive but low Z-scores. The neutral scores are concentrated in the low-density neighborhoods of Talcahuano (Figure 6c).

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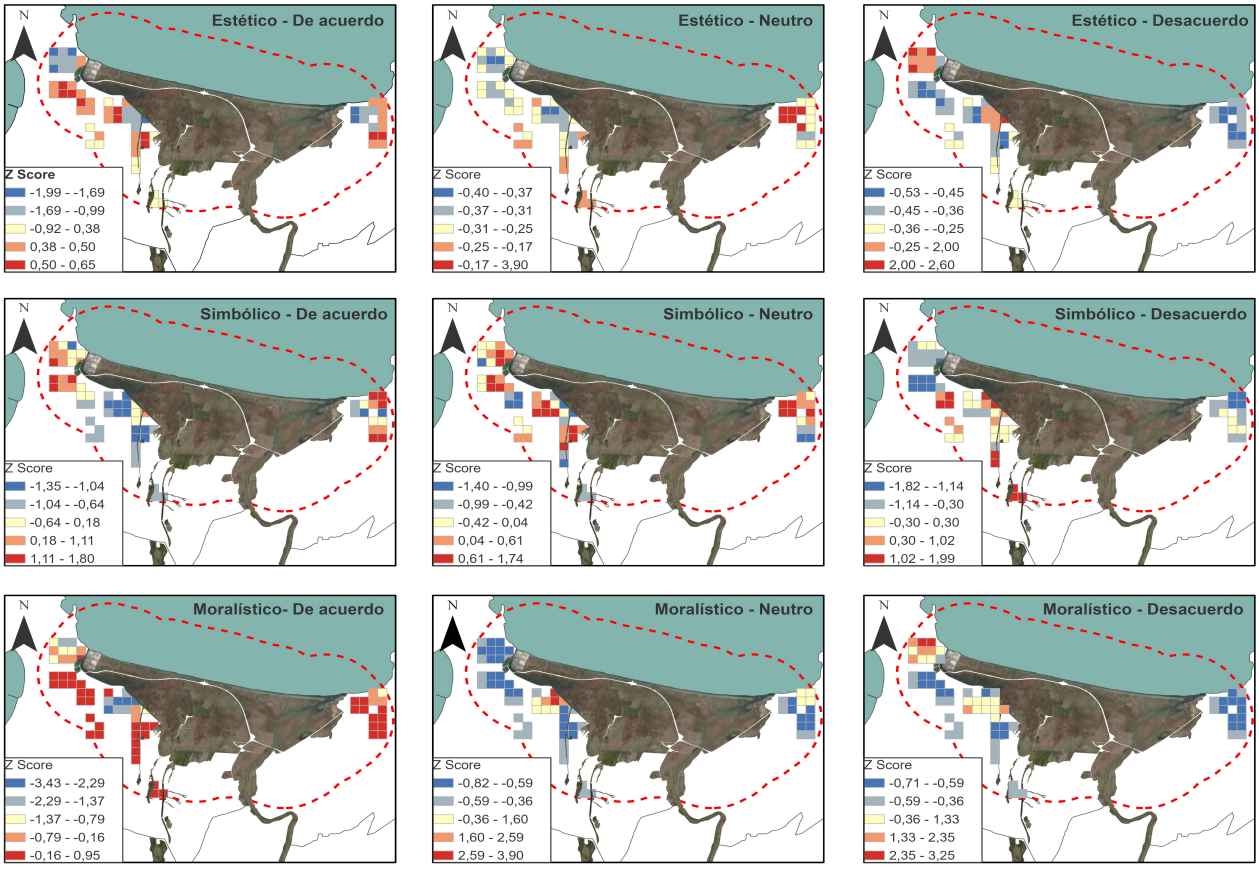

Figure 6b. Clusters of biophilia values: Aesthetic, Symbolic, and Moralistic. Source: Preparation by the authors, 2024.

V. DISCUSSION

Integrating biophilic values with the PPGIS method allowed showing how spatial patterns influence the perception of urban wetlands, as has already been demonstrated in the case of the Los Batros wetland in Concepción (Villagra et al., 2024). The spatial analysis results revealed that the distribution of the biophilic values varies according to the neighborhood typology. Identifying biophilic value hotspots facilitates the implementation of actions such as restoration and infrastructure to take advantage of health benefits and opportunities to live near nature and naturalize urban environments.

The "agree" hotspots in the low-density neighborhood units in Talcahuano Norte suggest that these residents perceive the wetland mainly as a helpful resource. The evidence highlights that the utilitarian values of ecosystems, such as the provision of resources and services, are highly valued in urban areas due to the need for multifunctional spaces (Brody et al., 2005). Utilitarian perception may be influenced by dependence on ecosystem services provided by wetlands, such as flood regulation and water provision (Mitsch & Gosselink, 2015; Rojas et al., 2017). For the naturalistic value, the "agree" in low-density neighborhoods in Talcahuano and the clusters of "disagree" in medium-density neighborhoods suggest a variable appreciation of the nature of the wetland. This indicates that the appreciation of naturalistic values may be influenced by the degree of connection with nature (Kaplowitz & Kerr, 2003). Areas with greater access to natural spaces tend to show a higher naturalistic valuation due to the possibility of interacting with biodiversity and enjoying its psychological and recreational benefits (Marselle et al., 2020). In addition, the results show that access to this wetland is adequate and easy, facilitating visiting the wetland and enhancing the demand for recreation infrastructure.

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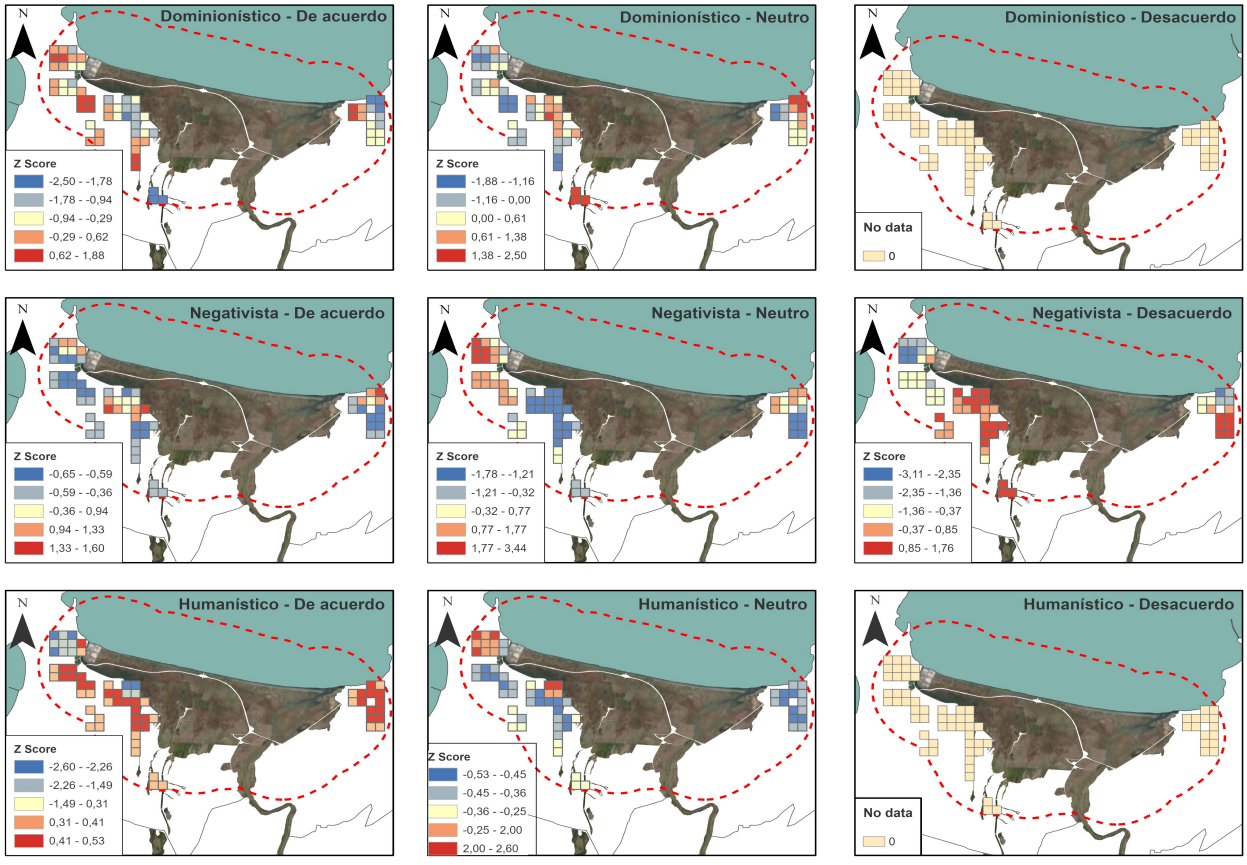

Figure 6c. Biophilia value clusters: Dominant, Negative, and Humanistic. Source: Preparation by the authors, 2024.

In the scientific-ecological values, the "agree" hotspots in low-density neighborhoods and the "disagree" hotspots in areas with high scores indicate scattered but significant responses. The scientific-ecological perception is related to the recognition of the value of wetlands for research and conservation (Brown, G., & Kyttä, 2014). Although this is recognized in the Los Batros Wetland (Villagra et al., 2024), in the Rocuant-Andalién wetland, the lack of valuation can be explained by the absence of educational activities, as an "agree" valuation is closely linked to the presence of educational institutions and environmental awareness programs in operation.

The aesthetic value shows a high level of agreement in low-density neighborhoods, which implies a recognition of scenic beauty and opportunities for recreation and contemplation (Rojas-Quezada et al., 2022). The high aesthetic valuation can be influenced by the visual quality of the landscape and the perception of tranquility and natural beauty (Kaplowitz & Kerr, 2003). While the "agree" values in the symbolic value were observed in low-density neighborhoods, the neutral scores of the same biophilic value in landscaped housing suggest a varied perception of the symbolic value. The variability in the perception of these values has been observed in previous studies, and it is related to cultural diversity and differences in the local history of communities (Nassauer, 2004).

The "agree" values in low-density neighborhoods are associated with the biophilic value of dominance, suggesting an ecosystem control attitude. This can become favorable if reflected in management actions where the community participates. As for the negative value, the "agree" hotspots in landscaped housing and the "disagree" areas in medium and low-density neighborhoods indicate a negative perception with spatial variability. Problems such as the lack of garbage

management and the perception of dangers often influence a lower perception of psychological benefits (Wyles et al., 2016). However, improvements in infrastructure and proper management can reduce negative perceptions (Villagra et al., 2024). This could be remedied if the Biobio Urban Wetlands Heritage Route, promoted by the Ministry of National Assets, is implemented because it would include proposals to locate signs and viewpoints, among other infrastructures. Finally, the humanist value presents agreement in the central area and the three neighborhood typologies, showing that people associate the wetland with their emotional and social well-being. The presence of accessible and well-managed green spaces can increase humanistic perception and improve the quality of urban life (Rojas-Quezada et al., 2022). Therefore, working in this line in the studied wetland would ensure a favorable perception that promotes its care and conservation.

VII. CONCLUSIONS

Understanding community perceptions and the biophilic values of wetlands is critical to developing inclusive and effective conservation and territorial planning policies. The PPGIS identified three trends.

Differentiation in biophilic values by neighborhood type. The perception of the Rocuant-Andalién wetland varies significantly depending on the type of neighborhood. Residents of low- and medium-density neighborhood units value the wetland for its utilitarian and aesthetic benefits. In contrast, residents of landscaped housing demonstrate a closer relationship with the wetland based on humanistic and naturalistic values. This differentiation suggests that urban and socio-demographic characteristics directly influence how natural spaces are perceived and the relationships that arise between humans and nature, highlighting the importance of considering these variations in urban wetland planning and management.

Accessibility and recreational uses: The perception of physical accessibility to the wetland varies between types of neighborhoods, with a higher proportion of residents of landscaped housing considering access as easy compared to those of low- and medium-density neighborhood units. Recreational uses of the wetland are predominant in all typologies, especially in low-density neighborhood units, where 54.8% of respondents visit it for recreational purposes. However, the notable disconnection of some residents, particularly in the landscaped housing, shows that 27.5% never visit it. This highlights the need to improve the access infrastructure and the urban fabric to promote a more equitable use of the wetland.

Biophilia assessment: The biophilic assessment of the Rocuant-Andalién wetland shows an evident spatial variability influenced by proximity and accessibility. Utilitarian and aesthetic values are predominantly appreciated in low-density neighborhood units, while naturalistic and humanistic values are more valued in landscaped housing. This variability in the biophilic assessment suggests that the integration of educational and environmental awareness programs, together with the improvement of infrastructure and accessibility, could strengthen the connection of residents with the wetland and promote a more positive and balanced perception of its multiple biophilic values.

As for the contribution to conservation policies, biophilic values can be considered in the territorial planning initiatives of the wetland management plans (PGI). Management plans should define conservation objects, which could be identified from perception instruments. Similarly, the management plans define certain threats. At the same time, the biophilic values PPGIS method helps to locate areas of conflict and generate consensus regarding biodiversity, facilitating a more inclusive management approach adapted to the needs and perceptions of the community.

VIII. CONTRIBUTION OF AUTHORS

Authors contribution: Conceptualization, C.R., P.V.; Data Curation, C.R., F.J.; Formal analysis, C.R., F.J.; Acquisition of financing, C.R.; Research, C.R., F.J., P.V.; Methodology, C.R., P.V.; Project management, C.R.; Resources, C.R.; Software, F.J.; Supervision, C.R., P.V.; Validation, C.R.; Visualization, F.J.; Writing – original draft, C.R., F.J.; Writing – revision and editing, C.R.

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