



Valuation of landscape intangibles: Influence on the marina management

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ABSTRACT

The landscape values reflect the user's preferences related to the landscape. It represents a genuine key in marina managing processes. However, there is no economic value of how much these intangibles represent within the marina management. This study estimated the monetary value associated with landscape intangibles in marinas by combining the hedonic pricing method (HPM) and the valuation of Marina del Este in the coastal locality of La Herradura in Almuñécar, Granada, Spain. The real estate data price of houses sold during 2023, from real estate data, was used as the dependent variable, and house structural, location, and neighborhood served as independent variables. Results showed that coastal residents considered proximity to the beach and expanded sea views two of the most important factors when buying a house. Other amenities related to landscape intangibles were quietness and exclusivity. Comparing the market with intrinsic value at nearby properties, the marina value can be estimated through a direct comparison approach and, hence, obtaining an estimation of the landscape intangibles' contribution to the marina's valuation. They can represent a value of €2,386,736.87, representing 7.91% of the marina's value. Findings can help marina management quantify the value loss of the marina if they are not considered. They also allow landscape policymakers to determine the economic impact of landscape policies. Maintaining the landscape and its values in the marina is an effective way to preserve an attractive environment for users and visitors, and it can be an effective way to make the marina a lively destination that not only offers environmental benefits but also creates economic opportunities.

1. Introduction

This study addresses the relationship between landscape intangibles and the valuation of marinas. The definition given to landscape by the European Landscape Convention (ELC) introduces the concept of human perception, including a physical level and a subjective one (Council of Europe, 2000). The landscape is not just what is seen but also the set of interactions with what is seen. The conceptualization of landscape bears inherently the subjective element in its processes of understanding what it is. Although the subjective perception is easily influenced by the observer's personality, sight place, and socioeconomic profile (Kang et al., 2023), it represents the meaning individuals and society provide to the landscape (Butler and Åkerskog, 2014). Moreover, this diversity ensures landscape variety and richness (Council of Europe, 2000). Understanding tangible and intangible elements of the landscape is crucial for this management. In this sense, there is a growing concern about intangible elements in landscape (Martín and Yepes, 2022a; Piao and Lee, 2022; Urbanc et al., 2021).

Land and sea interact in coastal areas, where natural and human activities occur, creating complex and sensitive interrelationships (Gong et al., 2023). These sites have exceptional scenic quality, implying an advantage in tourist attraction (Er-Ramy et al., 2023; Lagarias and Stratigea, 2023; Williams et al., 2023). Marinas have a twofold advantage concerning the coastal landscape. Firstly, they are privileged viewpoints of the surrounding coastline (Martín and Yepes, 2019). Secondly, marinas are the base for visiting and discovering coastal territory (Mazzola and Bove, 2023). However, considering the landscape within marinas represents a potential advantage for management (Martín and Yepes, 2021). Like any other landscape, it is possible to find tangible (physical) and intangible (subjective) elements in marinas.

The tangible elements of marinas are the most evident within their landscape (Martín and Yepes, 2022a). An attractive landscape represents an option for economic benefits (Martín and Yepes, 2017; Petrosillo et al., 2009). The aesthetic of the marina has plenty of visual elements. The style of architecture is a key visual point (Blain, 1992; Chaney, 1961; Navickas et al., 2020), but also the materials and the

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colors used (Chaney, 1961; Girard, 2013; Trisutomo, 2017), creating a particular skyline of the marina (Girard, 2013; Trisutomo, 2017). Nevertheless, physical perceptions should also incorporate non-visual perceptions, such as smell, hearing, or thermal sensation (Agapito et al., 2013; Chen et al., 2023a,b; Luo et al., 2023). The distinctive smell of the sea, the sound of the waves, or the sound of the cables against the masts are also characteristic elements of the marina landscape (Martín and Yepes, 2019).

The intangibles of landscape play a prominent role in marina management. The landscape's character, identifiable and distinctive, improves the marina's business (Benevolo and Spinelli, 2019). The marina should become a place to share sailors' experiences (Viola, 2005) and be perceived by users as their own (Martín and Yepes, 2021). The achievement of an attractive atmosphere represents a significant goal of landscape intangibles (Roff, 1987; Trisutomo, 2017), transforming the marina into a focal point of attraction to its surroundings with a positive effect on management. The landscape values reflect the user's preferences related to the landscape. It represents a genuine key in managing processes. Even it is possible to value the marina landscape as a reflection of its social importance, representing a tangible input into management decision-making. The above represent tools through which marina managers intuit the importance of intangible landscape intangibles. However, they do not have an economic value of how much these intangibles represent within the marina management. The economic valuation of marina rarely considers nonmarket values (Lee and Yoo, 2016).

Estimating the value of landscape intangibles, such as quietness or exclusivity, is difficult because they are not directly traded in the market (Dahal et al., 2019). Recent studies have focused on considering the influence of landscape on the price of housing. Castro Noblejas et al. (2023) highlight the economic impact of the perceived landscape in single-family houses in a Mediterranean urban area (Marbella, Spain), considering sea views a highly requested factor. Castro Noblejas et al. (2022) provide an automatic method for analyzing the quality of the views in a coastal area (Benalmádena, Spain), estimating the economic weight of views on real estate value. Riccioli et al. (2021) explore the relationships between real estate values and the individual perception of satisfaction by landscape types in Tuscany (Italy). Martín and Yepes (2022b) apply an analytic multicriteria to determine the economic value of a landscape in a marina (La Herradura, Spain). Although this study compares the importance of the landscape to the activities in port management, the rest of the above works do not consider the intangible elements of the landscape.

With this study, we pretend to answer the following research question: Does considering the landscape's intangible elements contribute to the overall value of the marina and its surroundings? We attempted to determine the contribution of landscape intangibles in the valuation of a marina in the coastal locality of La Herradura in Almuñécar, Granada, Spain, as well as an insight into the increase in the value of objects in the environment due to the existence. To this end, we combined the hedonic pricing method (HPM) and the valuation of Marina del Este. The results of applying HPM to identify the central landscape intangibles and their influences on nearby housing prices are presented. Comparing market value with intrinsic value at close properties may estimate the intangible landscape value. Determining the value of a marina through a direct comparison approach allowed us to attribute an approximation of the landscape intangibles' contribution to the value.

The novelty of this study lies in its blended-method approach, which involves the participation of local stakeholders in selecting the apartment's attributes (Beck et al., 2023). In addition to direct knowledge input, stakeholder participation in landscape management is achieved. Monetary valuation helps marina managers realize the importance of landscape intangibles and the need for their preservation. Results provide economic quantification of the contribution of landscape intangibles and, thus, their influence on marina valuation. For landscape policymakers, this study provides tools to assess the impact of the

landscape on the territory in which it is implanted.

2. Background

2.1. Valuation of marinas

Marinas are essential facilities for recreational boats, providing shelter, berths, and supply services. However, they also include a set of services for nautical users and visitors, which implies an economic, social, and environmental impact on local development that goes beyond the mere attention to the boats (Martín and Yepes, 2023; Martínez-Vázquez et al., 2022; Toro-Sánchez et al., 2023). Essential destination attributes are included in the key drivers of the maritime yachting tourism experience (Mikulić et al., 2015).

Value is the quality of something for which a certain sum of money or equivalent is given for possessing it. For this, value is, by nature, a subjective concept. It is the price the market is willing to pay for something based on supply and demand. The scientific literature on the valuation of marinas is scarce. Likewise, the methodologies used differ. Lee and Yoo (2016) estimate the economic value of a marina by using the willingness to pay (WTP) method, surveying 1000 householders. Heidkamp (2008) proposes a theoretical framework for integrating the economic and environmental aspects into the decision-making process for sustainable development strategies applied to a marina development. It provides an initial discussion about some of the available methods of valuation nature and the possibility of spatial adaptation through cost-benefit analysis methods. Leersnyder et al. (2005) discuss charging regimes to marinas for coastal occupation based on lost opportunity to use, access, and enjoy coastal open space.

The main techniques to establish the value of a property are through the different methods: direct comparison, income, or cost approach. The direct comparison approach considers the value is assimilated to that of other recent similar sales in the market. The property sold must have a similar or identical use to the property to be valued (Aihie et al., 2023). The income approach establishes value by the property's income-generating capacity. To this, a detailed income and expenditure analysis is required to ascertain the anticipated revenue and expenses and the relevant capitalization rate (Ifeanacho and Egbenta, 2023; Valuation Office Service, 2017). The cost approach determines the value by assimilation to the current cost of reproduction or replacement of the asset, including the market cost of the land (Li, 2023).

2.2. Hedonic pricing method

Assessing the economic benefit of different landscape intangibles constitutes a matter of apparent interest in managing marinas. It allows policymakers to compare implications on decision-making processes. Unlike tangible goods, landscape intangibles do not lie in evident quantifiable price. To this, two valuation categories may assess the nonmarket value of landscapes: the contingency valuation method and the hedonic pricing method.

Firstly, by answering hypothetical questions, the contingency valuation method asks a representative sample of individuals about their preferences or willingness to pay for some benefits. This method has been used in different fields, such as medicine (Al-Aqeel et al., 2023; Goodoory et al., 2023; Palanca-Tan, 2023), waste management (Cheng et al., 2023; Li et al., 2023; Xu et al., 2023), natural spaces conservation (Fauziyah et al., 2023; Lan et al., 2023; Yu et al., 2023), or clean energies (Lee and Cho, 2023; Lee and Shin, 2023; Zhang et al., 2023). However, the validity of findings has been questioned because these preferences are based on hypothetical transactions in assumed scenarios, with a high subjectivity that is sometimes unrelated to the prices willing to pay in a given situation (Jim and Chen, 2010; Ke et al., 2023).

Secondly, the hedonic pricing model (HPM) is grounded on the translation of part of the house transaction price to different housing attributes (e.g., Aziz et al., 2023; Ke et al., 2023; Museleku, 2023; Wahid

et al., 2023). The HPM is a widely acceptable and reliable valuation approach based on actual transaction data. This method has also been used in the hotel industry (Aroul et al., 2023; Giannoni et al., 2023; Mitsis, 2023) and tourist accommodation (Santos et al., 2023; Solano-Sánchez et al., 2021; Solano-Sánchez et al., 2023). Although HPM has been used for commercial ports (Li and Jia, 2019; Santos et al., 2016; Tchang, 2020), marina references are scarce.

The HPM was introduced by Rosen (1974) based on the hypothesis that goods could be differentiated by their utility-bearing attributes or characteristics. It was initially employed to evaluate the value of non-spatial composite goods (Hussain et al., 2019). Nowadays, it is a widely adopted methodology applied to analyze the variations in residential prices. The fundamental proposition of HPM is that residential houses are composed of a set of characteristics, both internal/implicit—structural attributes—and external/explicit—location and neighborhood attributes— (Dou et al., 2023; Islam et al., 2020; Belcher et al., 2019). They contribute to setting the selling or rent price. Hence, the house price is composed of the sum of combined characteristics, and HPM determines the implicit cost of each one considered. In this sense, HPM could quantify the benefit provided to the consumer by nonmarket attributes.

Structural attributes of the houses are physically recognized. They relate the specific characteristics of the property unit. Asset type, floorspace, floor number, number of rooms and bathrooms, year built, whether the apartment is refurbished and when, and whether there is a carpark are the most common characteristics that describe the property (e.g., Choy and Ho, 2023; Dai et al., 2023; Hyung and Heinig, 2023). These attributes align with The General Directorate of Cadaster guidelines, which report to the Spanish Ministry of Finance and Public Function. This organism establishes the criteria for determining the reference values of real estate.

However, the external attributes are also essential. They relate to the territory in which the property resides. Neighborhoods are distinguishable qualities around the residential area, such as greenery, views, and public services. Location attributes are related to distance to amenities and services. People prefer to pay more for a house with services that improve their quality of life and well-being. Numerous studies on hedonic pricing method have been carried out in different geographical locations around the world to assess the effects of external attributes on nearby property values, such as natural landscape (Dai et al., 2023; Ke et al., 2023), proximity to neighborhood services (Aziz et al., 2023), to power plant (Kim et al., 2023; Zemo et al., 2019), to incineration siting (Sun et al., 2023), to high-speed rail (Di Ruocco et al., 2023; Zhang et al., 2022), to waterfront (Dahal et al., 2019), impact of air pollution (Liang, 2023; Zou et al., 2022), flooding risk (Chandra-Putra and Andrew, 2019; Mutlu et al., 2023; Tu et al., 2023), of wildfire (Fitch et al., 2023; Shi et al., 2022), accessibility to public parks and green spaces (Chen et al., 2023a,b; Hu et al., 2022; Laszkiewicz et al., 2022), to transport infrastructures (Maselli et al., 2022; Nesticò and Russo, 2022), to urban public transport (Chwiałkowski and Zydroń, 2022; Liu et al., 2022), to sports facilities (Joshi et al., 2020), between others.

2.3. Coastal amenities

Regarding coastal areas, the amenities are different because there are other interest points in housing. Coasts provide much welfare to householders, including aesthetic amenities and recreation, leisure, and sights (Landry et al., 2022; Ling, 2022). The landscape is one of the driving forces behind the urbanization process. In tourist destinations, the landscape represents one of the attraction factors over and above the centrality of the location (Villar, 2013). The aesthetic value of scenic views in coastal areas substantially influences the price of houses (Boto-García and Leoni, 2023; Somphong et al., 2022). The perceived value of nearby amenities often influences the selling price of properties (Parton, 2023). Beaches are sources of economic productivity because of their relationship with tourism and the activities developed (Yepes and

Medina, 2005).

Concerning coastal amenities, Table 1 shows the amenities considered in recent beach and coastal studies. The search process has been focused since 2020 because COVID-19 pandemic restrictions have substantially changed mobility patterns (Cheung and Fernandez, 2021).

Regarding amenities, two topics are growing interest: sustainability and vulnerability. Sustainability responds to the adverse side effects of the predominant focus on economic expansion (Navarro et al., 2018). It has become one of the significant issues for the tourism sector (Bilbao-Terol and Bilbao-Terol, 2020). Amenities that improve health

Table 1
Summary of the recent list of amenities for coastal properties in beach and waterfront locations.

Amenities	Variables	References
Location		
Coastal nearness	Distance to coastline	Awondo et al. (2023); Ayoola et al. (2022); Bechard (2021); Beck and Lin (2020); Bilbao-Terol and Bilbao-Terol (2020); Catma (2021); Chandra-Putra and Andrew, 2019; Dahal et al. (2021); Fernández-Ferrero et al. (2022); Iliyasa et al., (2023); Landry et al. (2022); Lautrup et al. (2023); Ling (2022); Morgan et al. (2023); Nguyen et al. (2022); Osseni et al. (2021); Petroliia et al. (2023); Salvo et al. (2021); Sharaan et al. (2020); Somphong et al. (2022)
Coastal front	Sights to waterfront	Catma (2021); Cheung and Yio, 2022; Ling (2022)
Coastal characteristics		
Beach length	Beach length	Boto-García and Leoni (2023); Sharaan et al. (2020); Somphong et al. (2022)
Beach width	Beach width	Boto-García and Leoni (2023); Catma (2021); Landry et al. (2022); Sharaan et al. (2020); Somphong et al. (2022)
Beach's sand type	Predominant type of sand	Boto-García and Leoni (2023)
Coastal background	Type of environment behind the coastline	Boto-García and Leoni (2023)
Vegetation/forest	Presence of vegetation	Boto-García and Leoni (2023); Somphong et al. (2022)
Sea surface	Sea conditions (tide, currents and swell)	Boto-García and Leoni (2023); Landry et al. (2022)
Accessibility	Degree of accessibility to the coastline	Boto-García and Leoni (2023)
Urbanization	Degree of urbanization	Boto-García and Leoni (2023); Salvo et al. (2021)
Beach slope	Beach slope	Somphong et al. (2022)
Variations	Shoreline variations	Catma (2021); Salvo et al. (2021)
Coastal structures	Beach nourishment	Brucal and Lynham (2020)
	Coastal protection structures of harbour installed	Brucal and Lynham (2020); Salvo et al. (2021); Somphong et al. (2022)
Harmful algal blooms		
Area	Area of crops with fertilizers	Osseni et al. (2021)
Concentration	Chlorophyll concentration	Fernández-Ferrero et al. (2022)
Sea level rise		
Exposure	Total area projected to be impacted by sea level rise	Beck and Lin (2020); Chandra-Putra and Andrew, 2019; Cheung and Yio, 2022; Iliyasa et al., (2023); Lautrup et al. (2023); Morgan et al. (2023); Nguyen et al. (2022)
Evacuation	Proximity to evacuation area	Morgan et al. (2023)
Windstorm		
Fortified	Indicator variable for resilience to windstorm	Awondo et al. (2023); Petroliia et al. (2023)

should be taken into account. Mental/emotional health is considered one of the most important benefits of visiting a beach (Elrick-Barr et al., 2023). Furthermore, quality of life and environmental health are negatively affected when the territory's carrying capacity is exceeded, and there is little care for the urban environment. Environmental health and real estate prices are inversely proportional (Salvo et al., 2021). Concerning vulnerability, there is a growing concern about environmental risks because they are negatively capitalized in housing prices due to both material and immaterial damages, such as stress or uncertainty (Lautrup et al., 2023). Moreover, vulnerability is increasingly being used for strategic planning due to climate change (Salas and Yepes, 2018).

3. Materials and method

3.1. Study location

La Herradura is a town belonging to the municipality of Almuñécar on the coast of Granada (Spain). According to data from the National Institute of Statistics, the population of La Herradura exceeds 4400 inhabitants. However, during the summer period, this figure can be duplicated.

The proximity of the mountain, which range to the coast, conditions the morphology of this area. The topography is abrupt and rugged, with medium to steep slopes. In some areas, there are cliffs. The terrain only presents smooth profiles at the mouth of rivers and streams, with alluvial plains. La Herradura stands out for its impressive bay, bathed by the Mediterranean Sea. Wedged between the Punta de la Mona to the East and the Peñón de Cerro Gordo to the West, the beach is in a privileged area protected from the east and west winds. The waters that bathe these mountain features are protected areas. It has driven La Herradura to become an essential center for underwater activities. The urban center of La Herradura is located on the slopes of a hill next to the mouth of the Jate River. The old case was developed on this mountain, with narrow cobbled streets between the terraced construction, reaching the sea's edge. Subsequent urban developments have been carried out on either side of the plain, covering an urbanized strip along the entire bay with little development inland. The urbanizing processes on the two hills stand out. In the western direction, extensive urbanizations are developed in the direction of Peñón de Cerro Gordo. At the other extreme,

there is a more significant presence of villas with extensive gardens along Punta de la Mona. On the other side, developments along the road run towards the marina (Fig. 1).

The Marina del Este is located in a natural landscape of great beauty on the eastern slope of Punta de la Mona, in a privileged setting between the mountains and the sea. This marina is based on an initial construction project in 1978, which was approved in 1981. During the execution of the project, several incidents occurred (landslides and storms) that led to modifications, increasing the original surface. The marina has an area of land (including breakwater and non-trafficable emergent parts) of about 37,849 m² and a sheet of water of about 63,804 m² (see Fig. 2 and Table 2). The marina has 227 berths, varying between 3.5 and 30 m. The drafts vary between 3 and 6 m.

3.2. Methodology of investigation

This study estimated the monetary value associated with landscape intangibles in marinas, combining HPM and the valuation of a marina. The HPM determined the market value's expression through the house attributes, including landscape intangibles and their partial effects. Comparing market with intrinsic value at nearby properties, the marina value can be estimated through a direct comparison approach, including the comparison between market and intrinsic value and nearby properties. Thus, an estimation of the intangible landscape's contribution to the marina's valuation may be obtained.

Firstly, the market value is the balance between the value the seller is willing to receive for a good and the buyer is willing to pay. It is integrated by the intrinsic and the instrumental value. The intrinsic one refers to the essential character, not because of its connection with other things. The instrumental value relates the contribution to another goal (Navickas et al., 2020). Therefore, by comparing the market value of a property with its intrinsic value, it is possible to determine other amenities inherent to the real estate but not conditioned by its structural characteristics. These hidden attributes are implicit in the total house price. Its monetary value is revealed through the price a buyer is willing to pay for a house, which includes that attribute (Dahal et al., 2019). Most sellers and buyers need more experience assessing the value of the total property's characteristics. Therefore, they tend to rely on market information, such as the transaction price history of comparable properties in the local market (Hyung and Heinig, 2023). The market value is

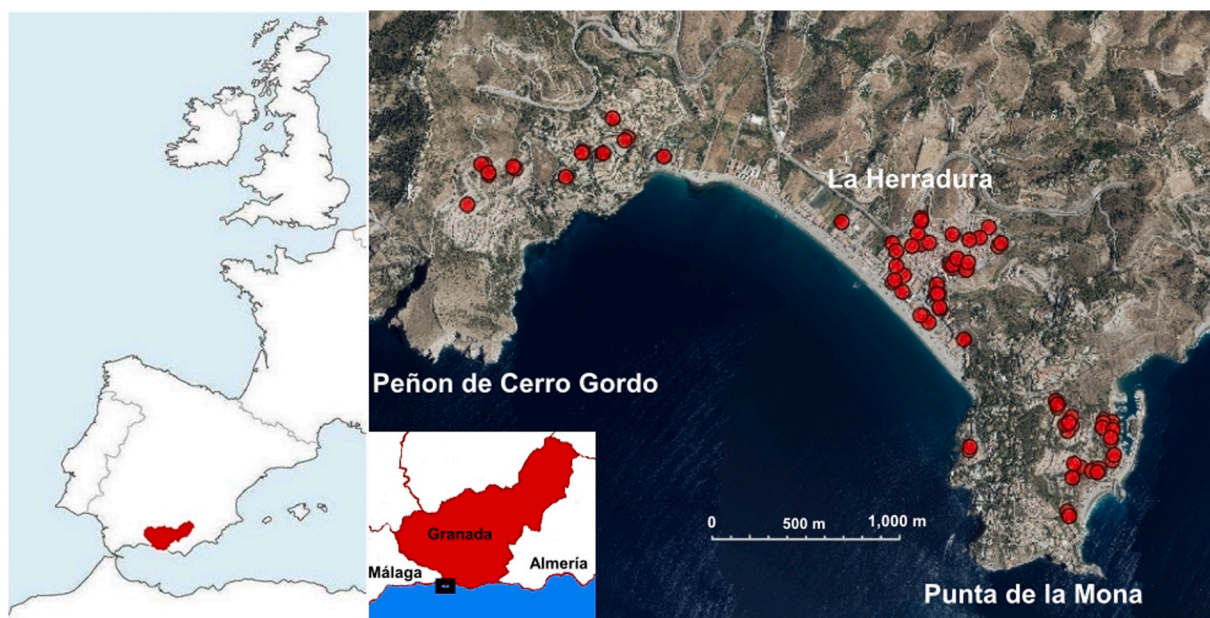


Fig. 1. Study area and property's location in La Herradura, Granada, Spain.

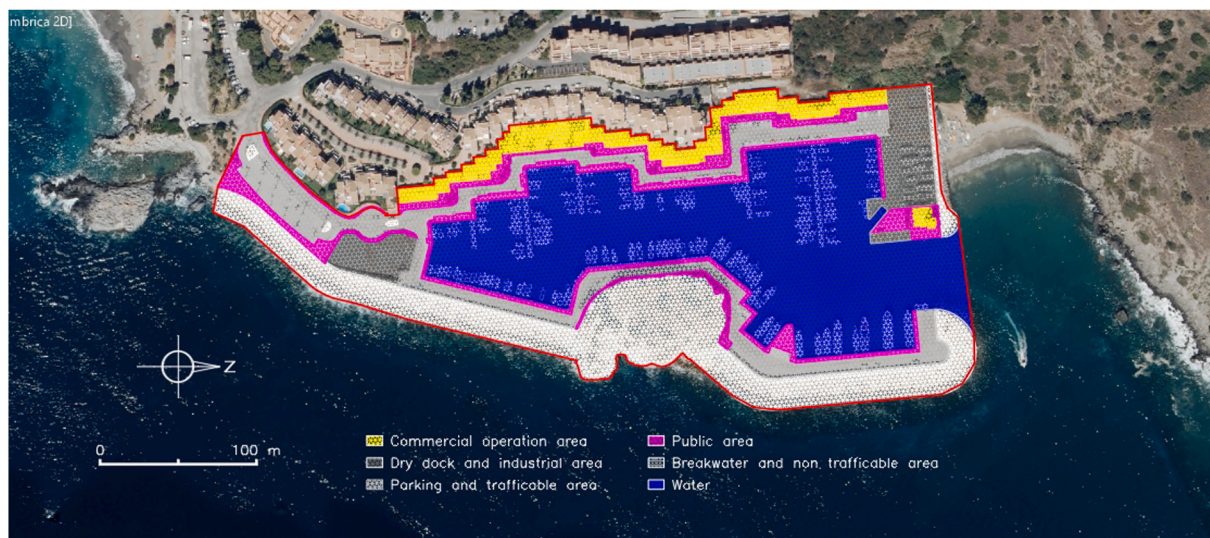


Fig. 2. Marina del Este considered areas.

Table 2
Total surfaces in the marina.

Uses	Surfaces (m ²)
LAND	37,849.02
Commercial operation area	9,722.43
Ground floor	4297.07
First floor	1957.00
Second floor	2980.00
Terraces	175.56
Harbour master's office	312.80
Dry dock and industrial area	3972.50
Parking and trafficable areas	9948.26
Public areas	5403.32
Breakwater and no trafficable area	14,048.91
WATER	25,954.65
TOTAL	63,803.67

obtained by applying an expression resulting from the application of the HPM. For this purpose, the data corresponding to the entire locality was used. Once this expression is obtained, applying it to that module of dwellings close to the marina is possible, thus obtaining the market value in the adjacent area. HPM presents a limitation in the interpretation of the variables. It allowed to obtain the partial effect of an amenity while the others remained constant. Therefore, the results estimate the importance of each considered characteristic but not the contribution of a set of attributes.

In order to determine the intrinsic value, the data that could be consulted in the General Directorate of Cadaster was used as a starting point. This set of data included the cadastral value and the reference value. The cadastral value is an administrative value established for each real estate property. It results from the application of various criteria, such as its location, urban circumstances affecting the land, the cost of material execution, the builder's profits, the taxes levied on the construction, the use, quality, and age, as well as the circumstances and value of the land. It is updated by law, and it is protected data. Its revision is carried out within the framework of collective valuation procedures. On the other hand, the reference value is obtained as a result of the analysis of the prices of all real estate sales and purchases made before a public notary, based on the data of each property, as recorded in the Real Estate Cadaster. It is determined annually based on the average value modules applicable in the area it is located, taking into account, among others, the differences in categories, age, and state of conservation between this property and the representative real estate product to

which the module refers. The cadastral value will always equal or lower than the reference value. For this case, we considered the reference value of the marina as an intrinsic value, which includes structural and location characteristics.

Secondly, Spanish Act 2/2011 (art. 175) establishes that determining the value of the land and the water surface in ports is based on market criteria. Andalusian Regional Act 21/2007 delves deep into this concept. It establishes that the value of the land depends on the port category, applying coefficients according to the area occupied, the uses, and the proximity to the urban center. The land value of the port is calculated based on the valuation of the land in the area surrounding the port, the municipal district in which it is located being considered as such, and from which the average cadastral values of urban land will be taken (art. 63.IV.1). It will be weighted with coefficients that take into account the uses and proximity to the urban core. About the uses, a distinction is made between those susceptible to commercial exploitation (0.89), shelter infrastructures, roads and open spaces (0.0), parking (0.71), and dry docks (0.45). Concerning proximity, distances of less than 100 m (0.89), between 100 and 500 m (0.53), and superior than 500 m (0.27) are taken as reference. The valuation of the sheet of water is based on the value of nearby land, weighted by coefficients that take into account the shelter, depth, and distance from the shore (art. 63.IV.2). In the first case, a distinction will be made between sheltered (0.71) and unsheltered (0.18) waters. In the second case, the depth may be less than 1.5 m (0.18), between 1.5 and 3.0 m (0.71), between 3.0 and 6.0 (0.53) or greater than 6.0 m (0.27). In the third case, the distance criteria are the same as those described for proximity to the urban core.

3.2.1. Data acquisition

The composition of real estate prices involves a wide variety of factors. One of the principal ones remains to determine the elements to consider according to the study area and the time considered (Castro Noblejas et al., 2022). The Spanish Land Registry contains information on real estate transactions, the mortgage financing of such transactions, and registry and owner data. Nevertheless, this dataset only provides other characteristics relevant to this study. For this reason, we chose other sources. Finally, we compiled data on the characteristics and sale prices of second-hand properties in La Herradura from real estate agencies in the area. They provided a closer and more realistic knowledge of the characteristics of the local real estate market. Also, the use of recent data eliminated temporal variability. The total of agencies identified was 11.

The first step consisted of determining the main attributes of the

properties. Due to the need to assess complex problems involving stakeholders' subjective judgments, multicriteria decision-making techniques were adopted (Navarro et al., 2019). To this end, an online survey was prepared with a list of amenities to be valued through the Delphi method. It was sent to all the local real estate agencies, and they were invited to participate. It included an explanation of the survey and the goals to achieve. Nevertheless, the number of participants who responded needed to be increased to consider the results representative.

The second option was to obtain the information through websites, together with the knowledge of the area. Only the information for apartments and commercial premises was selected among the various available properties since they were the existing typologies in the marina. Other options were discarded, such as villas, townhouses, and detached apartments. The information collected corresponded to both properties for sale. The characteristics, detailed descriptions, and photographs were analyzed for all the properties listed on the websites to determine the tangible and intangible amenities. From the list of attributes, the most important physical characteristics of the house were obtained. The detailed description was read carefully, extracting additional information and highlighting intangible amenities. Phrases such as "cozy environment," "quiet place," or "privileged views," together with the existing knowledge of the area, served to specify this question. The analysis of the photographs corroborated previously described information, such as the property's condition, the size of the terrace or the views. With the direct knowledge of the area, it was also possible to obtain its location. It allowed corroboration of the property's built surface and its distance to various points. For this purpose, we used the map viewer of the General Directorate of Cadaster, which is part of the Ministry of Finance and Public Function of the Government of Spain.

The data were collected during October and December 2023. According to the information from real estate agents, Spring and Autumn are the usual periods for sale transactions. The total apartments considered were 97, distributed throughout the locality (Fig. 3), and the commercial premises were 4. Due to the limited number of data relating to commercial premises, we focus only on apartments.

Table 3 shows the list of the main amenities considered and the statistics obtained. Within the set of physical characteristics, some considerations must be made. At coastal apartments, the size of the terrace is essential (TERR). A mild climate on the coast means that this part can be used as an additional room for dining or living. One of the consequences of climate change is the increase of extreme phenomena, such as the number of heat episodes. It makes air conditioning (AA) a relevant element. In a tourist area with limited public space in summer periods, the possession of a parking space is essential (CARPARK). Other neighborhood characteristics to consider were the swimming pool (SP), green areas (LANDSC), and common spaces (SCOMMON), which provide greater amplitude and space near the property. Floor height has not been considered as a determining attribute. Real estate agents considered that the views from the apartment were more important than the

floor on which it was located.

Regarding intangible amenities, marinas' landscape values (Martín and Yepes, 2023) were taken as reference. The landscape values were compared with the set of attributes that could be deduced from the descriptions. A total of nine variables were selected to characterize the intangibles of the landscape. Distance to the beach (DBEACH) encompasses recreational values. Distance to the city center (DCENTER) includes social values such as catering, shopping, or leisure. Plaza de la Independencia was taken as the city center. In both cases, we considered the entrance to the property as a starting point, and the itinerary was chosen by adopting the pedestrian route. Beauty and scenery were reflected in the views from the apartment. We considered four variables characterizing natural landscape views, depending on whether they are confined (P) or broad (F), and considering mountain (MTN) and sea (SEA) views. Quietness was related to the distance to the main roads (DNOISE), as they were home to the leading stores and road traffic. Exclusivity (EXCL) was associated with the environmental characteristics that made it different from other locations. Security (SEC) was established by the set of additional measures that the urbanization may have, such as fences or gates. Other landscape values were not considered because they were expected for all properties due to their coastal location (intrinsic or future values) or because they were not applied (cultural or economic values).

On the other hand, according to the data of the General Directorate of Cadaster (General Directorate of Cadaster), the reference value for the marina in 2023 was 2070 €/m².

3.2.2. Statistical analysis

The HPM assumes that property values are based on its characteristics. The price of a property can be broken down, indicating the contribution of the attributes considered on the price that was paid. Thus, the house price is a dependent (Y) variable associated with a combination of quantitative and qualitative characteristics (X_i). The independent variables are heterogeneous, varying from positive to negative potential regarding the value of the total price. Each property has a unique value; little changes affect the total price. Therefore, it may differ from location to location and property to property. The value of the coefficients (b_i) measures the partial effect of the variable, keeping the other variables fixed. It measures the change in the independent variable by varying only one unit of the variable under consideration. Thus, it gives an idea of the importance of that variable. The theoretical basis needs to specify the form of the hedonic equation function (Fitch et al., 2023). In any case, multiple regression will be used as the price depends on various attributes. In the literature it is possible to identify various forms, such as linear regression (Aziz et al., 2023; Dahal et al., 2019), quadratic regression (Chen et al., 2023a,b), logarithmic regression (Chwiałkowski and Zydroń, 2022; Dai et al., 2023; Mutlu et al., 2023; Ke et al., 2023), double logarithmic regression (Liang, 2023; Sun et al., 2023; Tu et al., 2023; Zemo et al., 2019), Box-Cox transformation

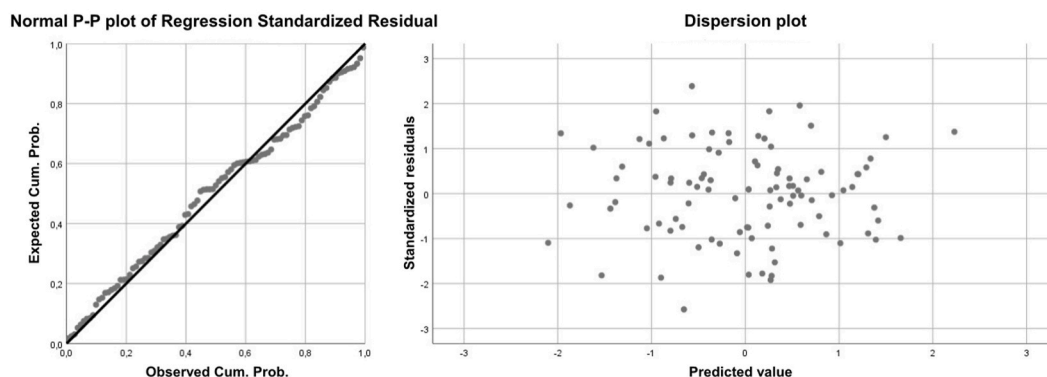


Fig. 3. Normality and homoscedasticity assumption. Normal P-P plot of regression standardized residual and dispersion plot (dependent variable PRICE).

Table 3
Definition and statistical summary of amenities included in HPM (N = 97).

Variables	Definition	Mean	SD	Type
PRICE	Housing price (€)	253,045.30	112,941.42	–
SURF	Total built size	112.42	40.61	Structural
NBDRM	Total number of bedrooms	2.42	0.08	Structural
NBTH	Total number of bathrooms	1.72	0.62	Structural
STERR ^a	Terrace between 0 and 15 m ² (1 for yes, and 0 for no)	0.53	0.50	Structural
MTERR ^a	Dummy variable. Terrace between 15 and 40 m ² (1 for yes, and 0 for no)	0.30	0.46	Structural
LTERR ^a	Terrace more than 40 m ² (1 for yes, and 0 for no)	0.12	0.33	Structural
AA ^a	Air condition installation (1 for yes, and 0 for no)	0.56	0.49	Structural
CARPARK ^a	Availability of car park (1 for yes, and 0 for no)	0.42	0.50	Structural
SP ^a	Availability of swimming pool (1 for yes, and 0 for no)	0.42	0.50	Structural
LANDSC ^a	Availability of gardens and green areas (1 for yes, and 0 for no)	0.37	0.49	Neighborhood
SCOMMON ^a	Availability of common areas (1 for yes, and 0 for no)	0.53	0.50	Structural
AGE	Apartment age, as difference between 2023 and construction year	25.15	9.65	Structural
CONSERV ^a	Apartment ready to live, no renovation needed (1 for yes, and 0 for no)	0.50	0.50	Structural
PMTN ^a	Availability of a confined mountain view (1 for yes, and 0 for no)	0.20	0.40	Neighborhood ^b
FMTN ^a	Availability of a broad mountain view (1 for yes, and 0 for no)	0.10	0.30	Neighborhood ^b
PSEA ^a	Availability of a confined sea view (1 for yes, and 0 for no)	0.43	0.50	Neighborhood ^b
FSEA ^a	Availability of a confined sea view (1 for yes, and 0 for no)	0.29	0.48	Neighborhood ^b
DBEACH	Distance to the nearest beach (m)	618.56	597.86	Location ^b
DCENTRE	Distance to the city center (m)	1393.00	1119.76	Location ^b
DNOISE	Distance to main road or street (m)	313.84	604.01	Location ^b
SEC ^a	Availability of additional security features (1 for yes, and 0 for no)	0.50	0.50	Neighborhood ^b
EXCL ^a	Different location and environment (1 for yes, and 0 for no)	0.46	0.50	Neighborhood ^b

^a Dummy variable.
^b Intangible amenity.

(Kim et al., 2023) or exponential regression (Di Ruocco et al., 2023; Maselli et al., 2022), among others.

However, simple, functional forms increase environmental coefficient reliability (Jim and Chen, 2010). In particular, logarithmic regression helps estimate the (implied) value of a landscape attribute when supply-demand relationships are complex (Dai et al., 2023) or when the variables are distance-based (Ke et al., 2023). In this study, we applied the semi-log functional form with a log-dependent variable and a linear combination of independent variables. The semi-log method is used when the sample is not significant (Jim and Chen, 2010; Lowicki and Piotrowska, 2015), allowing for the fit of the line of the regression function to the sample. Using logarithms reduces the range of the variables, making the estimates less sensitive to extreme values. We carried out the statistical analysis using SPSS®. The expression of the function was:

$$\ln PRICE = a + \ln \bullet SURF + b_2 \bullet NBDRM + b_3 \bullet NBTH + b_4 \bullet STERR + b_5 \bullet MTERR + b_6 \bullet LTERR + b_7 \bullet AA + b_8 \bullet CARPARK + b_9 \bullet LANDSC + b_{10} \bullet SCOMMON - b_{11} \bullet \ln AGE + b_{12} \bullet CONSERV + b_{13} \bullet PMTN + b_{145} \bullet FMTN + b_{15} \bullet PSEA + b_{16} \bullet FSEA + b_{17} \bullet \ln DBEACH + b_{18} \bullet \ln DCENTRE + b_{19} \bullet \ln DNOISE + b_{20} \bullet SEC + b_{21} \bullet EXCL + \epsilon_i \quad [1]$$

in which *a* is a constant (stochastic term), *b_i* are the regression coefficients, indicating the magnitude of the variance of each dependence variable/attribute on the dependent variable (effects of housing amenities). *ε* is the error term or residual, denoting the discrepancy between the actual price and the estimated value (accuracy indicator).

To ensure HPM model approximation validation, the hypotheses of independence, normality, homoscedasticity, and minimal multicollinearity must be met. The first condition was verified through the Durbin-Watson statistic, which must be between 1.5 and 2.5. The second and third hypotheses could be verified graphically: Firstly, the normality assumption was checked with a normal P-P plot, examining if the results appear arranged around a straight line. Deviations of the plot points from the diagonal were indications of deviations from normality. Secondly, verifying that there were no patterns of association in the relationship between the predicted values versus the standardized residuals. Finally, the no multicollinearity hypothesis was tested using the Variance inflation factor (VIF). Variables with a VIF greater than 10 were problematic. Failure to comply with any of the assumptions could affect the reliability of model predictions.

4. Results

The results of the hedonic pricing method are summarized in Table 4. With 97 observations, the model offered a representative profile of a housing transaction, explaining 83.8% of the price variation (R² = 0.838). The adequacy of the model and the variables was verified. In principle, the model fit was adequate (F-static = 17.364 and *p* < 0.05). Regarding validating the hypotheses, the errors had a relevant independence level (1.702 for Durbin-Watson static). The graphical representation (Fig. 3) validated the hypotheses of normality and homoscedasticity. The VIF for the variables was below the problematic threshold (10). From all the considered variables, NBTH, MTERR, LTERR, SCOMMON, FSEA, DBEACH, DNOISE, and EXCL were statistically significant (*p* < 0.05).

The standardized regression coefficients allowed the relative importance of each variable within the equation to be assessed. Both structural attributes, NBTH and LTERR, incurred significant positive effects. As mentioned above, the terrace can become an additional space in the flat. The existence of a large terrace (>40 m²) increases price by 51.1%. About the bathrooms, an increase in this number by one was associated with an increase in house prices of 18.9%. The need to shower

Table 4
Results of regression of the semi-logarithmic hedonic price model (dependent variable, ln PRICE).

Variables	Coefficients (b)	Standardized regression coefficients	Collinearity statics			
			t-Ratio	Sig	Tolerance	VIF
Constant	11.970		21.484	0.000		
(ln)SURF	0.075	0.057	0.842	0.403	0.481	2.079
NBDRM	0.072	0.128	1.672	0.099	0.372	2.686
NBTH	0.189	0.263	3.559	0.001	0.403	2.484
STERR	0.235	0.262	1.900	0.061	0.115	8.674
MTERR	0.338	0.345	2.570	0.012	0.121	8.240
LTERR	0.511	0.376	3.572	0.001	0.198	5.056
AA	0.112	0.124	1.691	0.095	0.409	2.448
CARPARK	0.093	0.103	1.824	0.072	0.694	1.442
SP	-0.021	-0.024	-0.285	0.776	0.320	3.128
LANDSC	-0.129	-0.139	-1.752	0.084	0.349	2.862
SCOMMON	0.141	0.157	2.137	0.036	0.407	2.456
(ln)AGE	0.047	0.037	0.534	0.595	0.455	2.197
CONSERV	0.013	0.014	0.239	0.812	0.603	1.659
PMTN	-0.086	-0.076	-1.343	0.183	0.683	1.465
FMTN	0.022	0.015	0.248	0.805	0.578	1.729
PSEA	0.088	0.097	1.469	0.146	0.499	2.003
FSEA	0.140	0.149	2.228	0.029	0.492	2.031
(ln)DBEACH	-0.207	-0.530	-6.534	0.000	0.333	3.005
(ln)DCENTRE	-0.036	-0.085	-0.762	0.448	0.177	5.658
(ln)DNOISE	0.039	0.158	2.349	0.021	0.484	2.065
SEC	0.083	0.093	0.958	0.341	0.232	4.306
EXCL	0.351	0.391	3.097	0.002	0.155	6.464

at hot periods and remove sea salt justifies the assessment of additional bathrooms if there are several residents.

However, the most decisive factor was DBEACH, which had a negative effect. The greater the distance, the lower the price of the apartment. A decrease in this distance by 1% increased house prices by 0.21%. This fact also conditioned other variables. The properties closest to the beach were built first. At the time, they did not have the comforts and services that are usually demanded today, such as air conditioning, swimming pools, communal spaces, or green areas. These attributes are usually found in more distant developments, which make up for the distance to the beach with other attractive features. It explains why variables such as AGE and CONSERV are not significant. Also, other variables, such as SP, LANDSC, or DCENTER, have negative values.

In addition to DBEACH, other amenities related to intangible of relative importance were FSEA, DNOISE, and EXCL. Firstly, having views of the sea is highly valued. This fact even supplants another attribute, such as the height of the floor, which is not considered within attributes. The existence of expansive sea views could increase apartment prices by 14.0%. Secondly, people seek peace and quietness and appreciate the high distance to noisy roads. An increment of 1% to a noisy road may raise the price by 3.9%. Finally, the distinction of the house from the others is a factor of preference for people in La Herradura. This fact improves housing prices by 35.1%.

To estimate the value of the land in the marina, we started from the data of nearby properties. For this purpose, the average prices and surface areas of the eight close real estate properties were established (Table 5). A value of 2247.87 €/m² was obtained by application of expression [1]. The difference of 2070 €/m² can be considered the contribution of intangibles (177,87 €/m²).

Following the criteria mentioned above, the effective area of the marina is calculated (Table 6). The valuation of the marina is determined as the sum of the value of the land and the value of the sheet of water.

Considering an effective area for valuation purposes of 13,418.43 m², 4726.02 m², and 8658.90 m² agree to land and water, respectively. Considering a value of 2.247.87 €/m², we obtain a valuation for the marina of €30,162,895.43. Of this amount, €2,386,736.87 would correspond to the landscape's intangibles, representing 7.91% of the total value of the marina.

Table 5
Average values of the characteristics of the properties adjacent to the marina.

Variables	Coefficients (b)	Average value
Constant	11.970	
(ln)SURF	0.075	140.80
NBDRM	0.072	2.70
NBTH	0.189	2.20
STERR	0.235	0.60
MTERR	0.338	0.40
LTERR	0.511	0.00
AA	0.112	0.90
CARPARK	0.093	0.10
SP	-0.021	0.10
LANDSC	-0.129	0.60
SCOMMON	0.141	0.00
(ln)AGE	0.047	31.90
CONSERV	0.013	1.00
PMTN	-0.086	0.00
FMTN	0.022	0.00
PSEA	0.088	0.30
FSEA	0.140	0.40
(ln)DBEACH	-0.207	334.50
(ln)DCENTRE	-0.036	2483.50
(ln)DNOISE	0.039	114.30
SEC	0.083	0.80
EXCL	0.351	1.00

5. Discussion

The study results reveal that proximity to the beach raises residential real estate prices in La Herradura. Nevertheless, the number of bathrooms and a medium terrace (between 15 and 40 m²) are structural attributes that also contribute to this raising. Even more, views of the sea, quietness, and exclusivity are highly appreciated. Based on the comparison with the values of the landscape in the marina, the attributes related to distance to the beach, sea views, quietness, and exclusivity can be considered intangible amenities.

Among the attributes related to location, the factors influencing housing prices are the relationship to the seaside, i.e., distance to the beach and sea views. For example, a beachfront location or beach access can increase a 23% the price of a hotel room to another not placed in that circumstance (Somphong et al., 2022). Distance to the beach is primarily one of the most significant estimated attributes, not only because of the

Table 6
Marina valuation areas.

Surface description	Area (m ²)					Effective area (m ²)
		Use	Distance	Shelter	Depth	
Commercial operation area	9722.43	0.89	0.27			2336.30
Dry dock and industrial area	3972.50	0.45	0.27			482.66
Parking and trafficable area	9948.26	0.71	0.27			1907.08
Public area	5403.32	0.00	0.27			0.00
Breakwater and no trafficable area	14,048.91	0.00	0.27			0.00
Water	25,954.65		0.89	0.71	0.53	8692.39
					Total	13,418.43

natural amenities but also due to the proximity of other associated services, including scenic views and opportunities for recreation, such as water sports, restaurants, and leisure (Belcher et al., 2019). Moreover, beaches can be perceived as an option to mitigate the burden periods of health restrictions (Cheung and Fernandez, 2021). Dahal et al. (2021) suggest a 2.9–4.0% estimated benefit in house value for each 1 km decrease in distance to a bay. Ling (2022) notes a decrease in apartment sale prices of 1.4% per minute, increasing the time to the nearest beach.

Climate change has adverse effects on the coast, causing sea level rise and extreme events, resulting in coastal flooding and erosion. In this sense, proximity to the shoreline can be a disadvantage if these risks are perceived. Warren-Myers et al. (2018) estimate a 0.27% loss in Australia's City of Port Phillips. Ilyasu et al. (2023) point out a 0.5% discount relative to a comparable unexposed property. Concerning flooding, Ayoola et al. (2022) note that proximity to the coastline may be undesirable in the absence of flood plans, and increased distance has a weak positive effect on rental prices (1%). The most crucial factors are flooding frequency, market memory (Chandra-Putra and Andrew, 2019; Nguyen et al., 2022), and risk reduction measures. In line with other research, Beck and Lin (2020) report a 7% discount for homes at flooding risk, which could even be as high as 8.4% for other authors (Lautrup et al., 2023). Moreover, the property value can be low by 15.6% if the flood risk is high or very high (Catma, 2021). Related to coastal erosion, the loss of beach width due to climate change will be perceived as a disadvantage, depending on the perceived percentage loss. The risk of coastal erosion is not steeped in property prices on wide beaches as on narrow ones (Brucal and Lynham, 2020; Sharaan et al., 2020). Landry et al. (2022) estimate the willing to pay by residents to be \$41 per foot of nourished beach. Sharaan et al. (2020) studied the daily lost revenues in coastal resorts related to sea level rise (loss of beaches), ranging from 6 to 55%, depending on the scenario.

Nevertheless, investment in natural infrastructure aimed at adapting to climate change or evacuation plans against natural hazards (storm-surge risk and coastal flooding) are the major drivers in housing prices in risk areas (e.g., Brucal and Lynham, 2020; Ilyasu et al., 2023; Lautrup et al., 2023; Morgan et al., 2023; Nguyen et al., 2022; Salvo et al., 2021). Considering other extreme events, nearness to the coast also significantly increases the exposure to wind damage (Awondo et al., 2023). Even so, the fortified design that enhances risk reduction and low insurance costs could have a significant price premium of 2–4% (Petrolia et al., 2023).

Secondly, concerning sea views, real estate developments aim to increase the quality of life, focusing on exploring semi-natural spaces with low building density and, especially, with pleasant views (Villar, 2013). There is a preference for amenities such as open spaces of beaches (Cheung and Fernandez, 2021; Martín and Yepes, 2023). In this sense, properties with sea views increase substantially their prices. Cheung and Yio (2022) estimate a 12.4% higher premium for properties with significant sea views than those without. Ling (2022) points out that a one square meter increase in sea views should steam into a 0.4% increase in the selling prices of apartments. Castro Noblejas et al. (2022) estimate an increase of 18.1% in average price in dwellings with a larger high-quality visual basin.

Services accessibility is directly related to housing prices. In a study in Wuhan, China, Yu et al. (2023) point out accessibility to restaurants and bars as a driving factor affecting housing prices, albeit secondarily (0.334). This same behavior occurs in cities in Chile, positively influencing housing prices due to their proximity to restaurants and fast-food establishments (0.023 and 0.056, respectively) (Cortes and Iturro, 2019). Neighborhood services, such as cultural amenities, green spaces, or shopping malls, significantly affect housing prices (Li et al., 2021). Within this set, entertainment and cultural amenities positively relate to housing prices and green spaces are among the most valued (Dou et al., 2023). However, studies are focused on shopping malls (Villada-Medina, 2023; Zhang et al., 2020) rather than local shopping areas.

Nevertheless, structural features, neighborhood services, and location are not the only attributes influencing housing prices. A more significant concern is growing about social behaviors and the demand of homebuyers (Dou et al., 2023).

A welfare loss from noise pollution can lead to a substantial associated burden of disease related to physical and mental health affections (WHO, 2018). The primary source of noise pollution is transportation, especially road traffic related to the urban environment. Traffic noise negatively affects people's health in several ways, such as sleep disturbance, arterial hypertension, and psychological symptoms, inducing cardiovascular and metabolic effects (Taso and Lu, 2022). It also brings a loss of value in properties. Silva et al. (2020) collect the average drop in house prices per additional decibel, between 0.58% and 0.74% due to road traffic. On the contrary, apartments in quieter neighborhoods could increase their value by about 1.5%. In a study in Sweden, Lindgren (2021) estimates a rise in property prices by 10–12% with noise mitigation. The property price gain ratio to the program's investment funding was 1.4–1.7.

Other noise sources should be considered, such as other modes of transport (train and flights), wind turbines, or recreational noise. In this case, the last one is considered. Ottoz et al. (2023) studied the effect of recreational noise on residential properties, concluding that a lower market value for adverse environments. There was a price reduction of 2.7% for each commercial night activity between 51 and 75 m. It can be translated to a reduction of about 53 euros per square meter for night activity.

Security has become an urban policy issue. Although the value of housing depends on many structural neighborhood-specific and even market factors, urban security has increased the complexity of estimating the price of urban housing. In a study of the city of Ojo Lagos (Nigeria), the security status of the neighborhood influences housing rental prices. Factors such as neighborhood design, accessibility, and level of security significantly influence rental values, increasing home values by 1–5% (Aliu, 2023).

Opportunity is a convenient time or circumstance to buy a house because of the possibilities of revaluation. The real estate market is complex, with many variables conditioning its dynamic behavior, and may even show volatility in housing prices. However, the coastal environment presents the attractiveness of the coastline as a safe value. In this sense, it is essential to understand the key driving factors of demand in coastal areas and continuous and coherent territorial, environmental,

and urban planning. Housing prices rise with green investments, improved public services, and public transportation accessibility (e.g. Chen et al., 2023a,b; Chwiałkowski and Zydroń, 2022; Hu et al., 2022; Laszkiewicz et al., 2022; Liu et al., 2022). In this sense, the environmental quality of coastal areas is a significant predictor of tourism flows and revenues (Boto-García and Leioni, 2023). A pleasant coastline close will likely increase profitability (Valuation Office Service, 2017). On the contrary, the house must be owned longer at locations with lower housing prices to recoup the investment costs. It is also exposed to hazards for the same length of time, and adverse events are becoming more frequent due to the effects of climate change.

Nowadays, one of the opportunity attributes that coastal properties present is their availability for renting. In this sense, the property must have attractive structural, neighborhood, and location characteristics, the fundamental being the distance to the beach. It makes other characteristics, such as the apartment's age and state of conservation, less relevant. Buyers assume that renovations can be carried out to improve the property's condition. Likewise, the fact that there are other types of neighborhood amenities related to a more significant number of shared services may be interpreted by buyers as an indication that the property is intended to be more attractive than other properties closer to the beach and, therefore, that it is further away from the beach.

Certification of sustainable certification is positive but insignificant (Bilbao-Terol and Bilbao-Terol, 2020). Considering the increasing competition in the sector and the growing demand for quality and sustainability in nautical tourism, a more significant commitment to obtaining and communicating this kind of certification is desirable (Spinelli and Benevolo, 2023). Lam-González et al. (2023) point out that implementing green policies, which improve the image of the marina, could increase the intention of sailors to visit a port.

Related to water valuation in marinas, Connelly et al. (2007) point out the relationship between the value of recreational boating and water levels. Deepwater, shelter, and direct access to open water with a regular shape are factors likely to increase the valuation of a marina (Valuation Office Service, 2017).

Port structures protect the shoreline during coastal high-energy events, reinforcing adjacent spaces' economic and tourism value (Paula et al., 2012). Nevertheless, coastal areas are vulnerable to climate change for two reasons: rising sea levels and severe weather events due to rising sea surface temperatures (Roy et al., 2023). In both cases, the consequence is an increased risk of flooding. Furthermore, the frequency of these adverse phenomena may exceed the protection capacity of port structures. Therefore, the influence of climate change should be studied in more detail, considering the local configuration and specific predictions for the study area.

The main limitation encountered in the development of the study was the effective participation of all stakeholders, both in the determination of the variables and in the acquisition of purchase and sale data. The existing workload in most real estate agencies and the suspicion caused by such sensitive data led to the choice of indirect methods of obtaining information. Improvements for future research will require more data. Increasing the sample size would also allow the search for those variables that are significant, as well as a tighter model (higher adjusted R^2 value).

As mentioned above, the valuation methodology has been applied to a marina in a specific location where landscape values had been previously studied. This same methodology could be used in other marinas or locations with similar or different landscape values. Its location in the Mediterranean Sea, one of the most important nautical tourism hubs in the world and possessing a common culture (Gómez et al., 2023; Kovačić and Silveira, 2018), means that both the values of the landscape and its importance in the valuation of the marina may differ from other areas, such as North America or Asia.

The validity of the various fitting functions would be assessed by comparing the R^2 value. Also, other valuation techniques could be used in cases where more information was available, such as the income or

the cost approach. In the first case, the contribution of landscape intangibles to the generation of incomes should be estimated. In the second case, it should be necessary to determine which replacement elements are associated with the maintenance of landscape intangibles.

6. Conclusions

Coastal areas offer a unique combination of recreation opportunities and aesthetic amenities that have historically attracted real estate and commercial development. Structural characteristics are among the most critical determinants of a dwelling house price. The real estate market cannot think exclusively about purely physical features. Attention to landscape intangibles can produce incomes in economic returns.

This study provides insights into the influence of landscape's intangibles in the valuation of a marina. Firstly, it allows determining the main characteristics that determine the prices of apartments in the coastal town of La Herradura (Granada, Spain), differentiating between structural and other amenities, including those related to landscape's intangibles. However, the methodology used only allows for estimating the influence of one of the attributes, considering that the others have no influence. Therefore, it is not possible to determine the influence of a set of attributes. Secondly, the difference between this value and the intrinsic value made it possible to estimate how much of this value is attributable to non-structural elements, including those associated with the intangibles of the landscape, and, therefore, how much it represented to the valuation of a marina and its environment.

The study on the attributes of the dwellings concluded that the most appreciated characteristics are related to location, which includes the distance to the beach and the views of the sea. The proximity of the shoreline and the expansive sights of the sea enhance housing prices. Structural attributes include the number of bathrooms and the size of the terrace. If we focus on the amenities associated with landscape values and location-related attributes, quietness and exclusivity are also important. The set of landscape intangibles can represent a value of €2,386,736.87, representing 7.91% of the property's intrinsic value. Results demonstrate that these intangibles are a significant added value in the valuation of marinas. Estimates on the monetary value of these amenities are also helpful for marina management to quantify the loss of value of the marina if they are not considered. Maintaining the landscape and its values in the marina is an effective way to preserve an attractive environment for users and visitors, and it can be an effective way to make the marina a lively destination that not only offers environmental benefits but also creates economic opportunities. For landscape policymakers, the findings allow for assessing landscape intangibles concerning its environment and, therefore, determining the economic impact of landscape policies.

CRedit authorship contribution statement

Ricardo Martín: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Víctor Yepes:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data will be made available on request.

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