

## Article

# Economic Valuation of Landscape in Marinas: Application to a Marina in Spanish Southern Mediterranean Coast (Granada, Spain)

Ricardo Martín \*  and Víctor Yepes 

Institute of Concrete Science and Technology (ICITECH), Department of Civil Engineering, Universitat Politècnica de València, 46022 Valencia, Spain

\* Correspondence: rimarpo@doctor.upv.es

**Abstract:** Assigning a monetary value to a landscape improves its importance. It helps to realize the magnitude of the benefits that can be obtained and represents the basis for applying protection and improvement policies. As a case study, we considered Marina del Este, located on the Spanish Southern Mediterranean coast, characterized by the presence of protected natural areas of great value and a rugged coastline beautiful to sailors. This study applies the analytic multicriteria valuation method (AMUVAN) to estimate the landscape's economic contribution. This method combines the analytic hierarchy process and discounted cash flow analysis. A total of 16 participants were considered, all with knowledge about the marina, which included areas of the marina management, management organizations with competencies in the marina environment, commercial operation, and university professors. They weighted the importance of landscape concerning the rest of the marina activities, use versus non-use values, and the components of the total economic value (TEV) of the landscape within marinas as a natural asset. Results expressed that the landscape may reach a value of around 16.3 million euros. It represents more than 3000% of the value of the marina's profit and loss account. A detailed analysis of the components of the TEV makes it possible to propose strategies to improve the economic value of the landscape.

**Keywords:** landscape; marinas; AHP; AMUVAN; economic value; management



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## 1. Introduction

This study contributes to landscape management through a methodology for economic valuation of the landscape in marinas. Marinas are complex infrastructures that offer the broadest range of services in nautical tourism [1–4]. The variety of facilities and amenities offered represents a focus of attraction in the coastal areas, with influence on social and economic development but also on the environment [5,6]. It is important to note that all of these conditions—both positive and negative, directly or indirectly—affect the landscape. The definition given in the European Landscape Convention reflects the idea of its dynamism, both in time and as a result of the interaction between natural forces and human beings and the perception by people of its meaning [7]. In this sense, the landscape represents the environmental asset most influenced by human sensitivity and spirit [8].

On the other hand, the landscape is an element to be considered in marinas' management. Firstly, marinas are singular elements within the coastline, offering a diversity of landscapes, aesthetic attributes, and leisure potential [5]. Secondly, marinas are focused on pleasant functions and hospitality [9,10]. The environmental quality and scenic views have a significant bearing on the success of economic and social initiatives, representing an option for economic benefits [11]. Identity and distinctiveness also improve business [12]. This influence on their surroundings may help promote the development of the concerned area. Hence, the landscape can potentially increase social and economic benefits within an area as it provides social, economic, and environmental values [13].

The management of the landscape in marinas has varied from a purely aesthetic approach [14–16] to a determination of the elements that make it up [17–19], and its valuation [5]. Marina managers have an intuition of the importance of the landscape, but a lack of landscape training or the absence of tools for its treatment means that the perception remains in the physical aspects [3]. Monetizing the landscape is a general measurement unit to express the benefit provided to people [20]. It also may incorporate some uncertainty as it does not cover all possible impacts and damages that may occur in the environment [21]. Nevertheless, it represents the best way to realize the importance of an environmental asset [22]. Moreover, determining the magnitude of the benefit of a natural asset supports effective decision-making [23]. Thus, landscape monetization encourages better landscape management.

Focusing on the way to realize this economic gain, the economic valuation of an environmental resource is an attempt to assign a quantitative value to the goods and services provided [24]. The fundamental problem with the valuation of environmental assets is that society cannot quantify this asset concerning other economic services and products because they are based on subjectively selected criteria [25]. Assigning a monetary value to this asset not solely improves its importance because it helps to realize the magnitude of the benefits that can be obtained. However, it also represents the basis that justifies applying protection and improvement policies [26,27]. Although it is possible to relate several papers referring to the landscape valuation of specific environments [28–31], there is scarce research on landscapes in marinas. As a first approximation to this valuation, they are subject to the same risks that are attributable to coastal real estate developments [9]. An indirect way of addressing port landscape values is through those attributable to urban waterfronts. The port–city relationship in regeneration and revitalization projects of obsolete port spaces is a topic widely addressed in the literature [5]. This option is not only a source for the study but also for justifying the location of marinas in these areas as a recreational offer.

There are several methods for establishing the monetary valuation of environmental assets. Stated preference (SP) methods obtain estimates of economic value by using survey responses. Their usefulness lies in allowing the simulation of a hypothetical market to obtain an environmental asset's economic value [32]. A common approach is a discrete choice experiment (CE) where respondents choose their preference among several multi-attribute alternatives. Another standard is discrete choice contingent valuation (CV). It is a leading tool for estimating the monetary value of non-market environmental assets [33], although some researchers have pointed out some weaknesses and doubts [34,35]. In this method, respondents are asked about their willingness for proposed change at a given cost. For instance, the most common variant is the maximum willingness-to-pay (WTP) method, which involves surveying people to elicit respondents' willingness to pay for a good or to prevent its loss [20,36,37]. The travel cost method (TCM) investigates people's willingness to pay to reach a particular recreational activity [38,39]. The hedonic pricing method (HPM) infers the price contribution of an environmental asset from data from a real parallel market [40]. The production function method studies the relationship between changes in an environmental asset and the profitability of a production process associated with it [41]. The total economic valuation (TEV) method is valued by preferences, trying to adopt entirely marginal values for environmental actives [42].

The main goal of this study is to evaluate the landscape in marinas using the analytic multicriteria valuation method (AMUVAN) [26,43]. In contrast to other methods of landscape valuation, this one values the landscape indirectly, comparing the relative degrees of importance given to different components of the value, using the AHP method, and applying the discounted cash flow (DCF). This technique has been used for the economic valuations of several natural environments [22,23,44–46]. In the case of marinas, the landscape is not the only one responsible for the activities developed. Within the profit and loss account, the contribution originated by the landscape represents a percentage of the total activities carried out in the marina. The novelty of this study is providing an alternative AMUVAN methodology to be applied in cases where it is impossible to

establish the economic value of the exploitation of the environmental asset. This valuation represents an effort to improve the marina's management by providing tools that allow marina managers: (1) to establish the importance of landscape within port management and (2) to quantify the marina landscape as a reflection of its social value. The assumption that the landscape represents an essential asset for the port can be translated into an economic quantification. It embodies a tangible input into management decision-making. It is up to the decision-makers to be aware of the totality of the objectives and the constraint of valuation.

The following sections present the case study (Marina del Este, located in La Herradura, Granada, Spain), the theoretical framework, and the methodology used for the valuation. It also includes how to identify valuable elements of the marina landscape. The results obtained are analyzed. Finally, the discussion and conclusion examine the components of landscape providing guidelines to improve its economic value. For a better understanding, Appendix A displays research data not shown to make the study concise and easier to read.

## 2. Materials and Methods

### 2.1. Study Location

The Marina del Este marina is taken as a case study. It is located on the Spanish Southern Mediterranean coast, specifically in the locality of La Herradura, in the municipality of Almuñécar, Granada, Spain (Figure 1).



**Figure 1.** Location map.

The coastal stretch where this marina is located is characterized by the proximity of the foothills of the Penibetic mountain range—a young, high, compact, rugged, and unstable relief—to the sea. It gives rise to a series of mountain ranges along the coast, forming an irregular and abrupt coastline. The river basins are steeply sloping, small, and irregular. This means that the deposits generated after a storm are coarse. The morphology conditions coastal transport, usually formed by small coves, inlets, and bays. The compartmentalization of the coast through rocky outcrops, the size of the sediments, and the existing depths that act as sinks mean that net transport is minimal. The orientation of the coast means that it is protected from the prevailing (west) and prevailing (east) swell. The effect of the tides is negligible, with tidal currents of around forty centimeters.

As it sinks into the sea, the abrupt orography forms abundant rocky outcrops, caves, rocky reefs, and steep bottoms, which favor the presence of both plant species and rich marine fauna seeking refuge in these areas from the pollution that threatens other parts of the coastline. In the marine environment—characterized by its richness and diversity—there are extensive meadows of phanerogams in the steepest areas, sheltered by corals, sponges, and a wide variety of fish and mollusks. In the terrestrial part, there are plant communities of great interest, with the presence of endemic species. This richness has led to the creation

of the Acantilados de Maro-Cerro Gordo (ES6170002) and Acantilados y fondos marinos Punta de la Mona (ES6140016) protected natural areas. In addition to being classified as natural sites, they are integrated into Natura 2000 network as Specially Protected Area and Special Protection Area under the Birds Directive. Acantilados de Maro-Cerro Gordo also has the status of UN's Specially Protected Areas of Mediterranean importance. This faunal biodiversity, both terrestrial and marine biota, represents an excellent attraction to the environment.

The set of coastal mountain ranges has historically acted as an obstacle to an adequate internal connection with the rest of the region. Road infrastructures run parallel to the coast. The N-340 road, with a layout with numerous curves, connects the various population centers. Later, the A-7 motorway was built with a more distant and rectilinear design. It adapts to the terrain employing numerous tunnels and viaducts. The population settled in the meadows created by the mouths of the rivers, with a decreasing number of settlements towards the interior of the mountains. This means that communications are developed along the axis of the coast, connecting with Malaga (to the west) and Almeria (to the east).

The Marina del Este marina is located in La Herradura, a district of Almuñécar (Granada), bordering the province of Málaga. This locality is situated in a small bay with a beach bottom, flanked by two rocky promontories, Cerro Gordo and Punta de la Mona, to the west and east. Although this structure gives it the character of a natural anchorage, unexpected changes in the direction of the wind drag the boats, which can become stranded on the beach or crash against the rocks. Los Berengueles is the eastern part of Punta de la Mona. This place has appeared on nautical charts since the Modern Age. However, references allude to its use as a place of refuge from westerly winds [47]. The marina was built in the 1980s, incorporating the Peñón de Las Caballas (Figure 2). It currently has 227 berths, with a maximum length of 35 m. It covers an area of about 2 ha, with a maximum draught of 6.5 m and an entrance draught of 3.7 m.



**Figure 2.** Location map and general view of Marina del Este.

The Blue Flag for Marinas has been awarded the marina in successive years. The Blue Flag program is an environmental quality award. It is necessary to make a special effort in terms of local environmental management and nature to obtain it. The marina has to meet several requirements to gain the Blue Flag: environmental education and information, environmental management, services and safety, and water quality. The Blue Flag works towards sustainable development that gives tourists a reliable guarantee regarding the environmental quality of the marina [48].

## 2.2. Methodology Approach

The landscape is a non-use value, an intangible element, but it contributes to human well-being [7]. The value of this kind of good is related to its impact on human welfare

in monetary terms [32]. SP methods are handy for estimating values derived directly from an environmental component that has already happened [49]. They are suitable for determining non-use values as long as they are directly related to existing markets. The fact that the landscape in the marina pertains to its management implies the validity of using the SP method to measure this non-use value.

For the valuation of the landscape in the marina, the AMUVAN method was used. It involves two techniques: (1) analytic hierarchy process (AHP), and (2) discount cash flow analysis (DCF). The first one is implemented to achieve the relative weights of the TEV components through the comparison by pairs. The second one is utilized to establish the economic values of the services related to DUV.

### 2.2.1. Definition of the TEV Components

The goods, services, and attributes associated with the landscape in marinas were grounded on the landscape and management elements related to marinas [5,11]. The distinction between the social and physical nature of the elements that make up the landscape serves as the basis for defining part TEV components. These are grouped into use values and non-use values. The first represents the direct profit from the landscape, providing tangible benefits [20]. The second refers to the sense of enjoyment that an individual can experience from the mere knowledge that a particular environment exists in a healthy state [50]. The use values consist of direct use values (DUV), indirect use values (IUV), and option values (OP). The non-use values are formed from existence values (EV) and bequest values (BV).

#### Direct Use Value (DUV)

These economic values can be derived directly from exploiting the environmental asset. Various authors have valued these uses according to the yield of the activities carried out there [22,23,26,44–46]. In the case of the landscape in marinas, the aim is to establish those tangible elements directly associated with port operations. According to Martín and Yepes [3], elements related to management can be classified from a landscape viewpoint, such as views of the surface of the water and its surroundings, architectural aesthetics, and the urban environment. From a management perspective, it is composed of views of boats at berths and the slipway, complementary uses (cafeterias, restaurants, shops, etc.), green areas, and regulated car parks, among others.

It is not easy to establish which benefits of a marina are attributable to this landscape. An indirect method is used for its valuation. First of all, the balance sheet of the port operation is obtained. This includes the income derived from the rental of facilities, port taxes, and other services, the expenses derived from the operation, the staff, and the concession fee. Subsequently, a weighting of its importance within port management is carried out to establish what percentage of this balance can be attributed to the landscape.

Martín and Yepes [11] point out four fundamental issues in the management of marinas: (a) services provided, (b) financial viability, (c) environmental management, and (d) maintenance. The aim is to compare the importance of the landscape with the previous ones. For this purpose, the AHP method was applied in the questionnaire below to obtain the weighting for this concept.

Thus, starting from the economic balance and applying the social discount rate, the weighting corresponding to the landscape as an element of the marina management is applied to obtain its direct use value.

#### Indirect Use Value (IUV)

It is the set of economic functions performed by the environmental asset and not detected by the market. It comprises other tangible elements not directly associated with the port operation but influencing it by being attractive to users. Those connected with the landscape include the beaches adjacent to the port, the promenades, and the existence of maritime flora and fauna in the seaport (breakwater and inland waters) and the vicinity.

Related to management, the holding of exhibitions or fairs and the awarding of quality labels are considered.

Tourism is associated with recreation activities such as nautical excursions to nearby protected areas, scuba diving, or fishing activities. However, they are not considered direct uses, as it is assumed that they exist because of the attractiveness of the environment itself, not only because of the presence of the marina.

#### Option Value (OV)

The option value is the value consumers are willing to pay to preserve the opportunity to use the environmental asset in the future [51,52]. These are essential functions of the environmental asset that are currently unknown. It is the value of the asset's tangible elements in the future. On the one hand, an attractive landscape is an opportunity for increased commercial and tourist activities in the harbor and property development. On the other hand, the maintenance and improvement of the environmental quality is an indispensable requirement for suitable compatibility with the surrounding natural areas.

#### Existence Value (EV)

It is the value of the environmental asset generated by simply knowing its existence. It is not associated with any production activity but is subject to understanding and appreciation [51]. In the case of the landscape in marinas, this value is made up of all the intangible elements of the landscape that cannot be enjoyed until you are in the marina. They include the existence of a pleasant environment, the maintenance of environmental quality so that it is also healthy, a safe environment, the cultural identity of the port understood as a place for meeting and exchange of experiences, or the character of the landscape as what makes it different other marinas. Any other tangible elements of the landscape, such as sights, are not part of this value as they can be appreciated in any image without having to be in the marina.

#### Bequest Value (BV)

It represents the value people are willing to pay to preserve natural resources for future generations [53]. It consists of the value that the asset can be enjoyed by future generations, i.e., the value of maintaining the landscape for future enjoyment and the value that intangible elements may have for the future. It is about valuing the legacy that the landscape represents for successive generations.

#### 2.2.2. AHP Survey

The AHP method is a general theory to solve multicriteria decision-making using judgments and understandings when involved intangibles values. It obtains the priorities or a set of alternatives by establishing ratings for each criterion and prioritizing them by pairwise comparing or preference. To this, a pairwise comparison matrix is obtained through the comparison of all the alternatives involved. A scale is used to indicate how much more important one element is over another concerning the criterion to which they are compared. The AHP method gets the proportionality of priority of each alternative considered through weights representing the relative strength of the compared option against another [54].

Academics widely adopt AHP in multiple studies related to port management [55–58]. Although there has been a lack of its use in marina management [59], some examples exist [3,11].

#### 2.2.3. Social Discount Rate

The updating of futures is completed through the discount rate. This is the preference for consumption in the present versus the future, so it is about the degree of sustainability of society's consumption of goods and services. A zero-discount rate indicates that society attaches equal importance to current and future consumption. A positive rate shows a

preference for current over future consumption, meaning that postponing consumption today is less attractive than postponing it in the future. It is the existence of a greater sensitivity to delays in the present than those that might occur in the future [43].

The choice of social discount rate is crucial in evaluating projects [60]. Nevertheless, there is no consensus on establishing and measuring this rate [61], as each proposal entails a different ethical conception of developing the intergenerational distribution of goods and services [43]. Various authors have compiled various discount rates applied by different countries [61–63]. There are three approaches to setting this rate. One of the most common ways is to consider a constant rate equivalent to the social preference rate. It is defined as the length of time society is willing to postpone today's consumption to exchange it for higher levels of future consumption [64]. It is a prescriptive approach, as the rate is set in terms of sustainability for future generations. The second approach considers the social opportunity cost. It reflects the social view of how future costs and benefits should be evaluated to the remaining ones, i.e., the lost profit concerning the best alternative project [63]. This approach is descriptive, as it deals with the return on capital invested in a set of alternative assets. The third approach combines the previous approaches, in which both current consumer preferences and forgone profits are considered.

In practice, the discount rate is determined by the benchmark values indicated in some manuals. The social discount rate varies between 3–7% in developed countries [65]. The European Commission [63] suggests using a rate of 5% for countries benefiting from the Cohesion Fund, applicable to states with a Gross National Product per capita of less than 90% of the community average, and 3% for the rest. The latter is the case for Spain.

As mentioned above, the TEV is the set of functions the environmental asset detectable by the market performs. The rent generated is proportional to the cash flow generated. Based on the assumption that the cash flow will remain relatively constant, the UDV can be approximated by the rent generated divided by the discount rate.

#### 2.2.4. AMUVAN

The methodology starts from the DUV as pivot value because it associates economic functions with market values. It is the tangible value obtained from the direct revenues from the resource exploitation. The DCF analysis assumes that the economic value of an asset corresponds to the present value of the sum of the future revenues derived from this asset.

$$V = \sum_{i=1}^n \frac{R}{(1-R)^i} = \frac{R}{(1-R)} + \frac{R}{(1-R)^2} + \frac{R}{(1-R)^3} + \dots + \frac{R}{(1-R)^n} = \frac{R}{r} \quad (1)$$

where

V = value of the environmental asset (DUV)

R = future income generated

r = update date (social discount rate)

Operating, the  $DUV_{value}$  results from the following expression:

$$DUV_{value} = \frac{DUV}{social\ discount\ rate} \quad (2)$$

Once the pivot rate is known, the rest of the TEV components are estimated using the AHP method's relative weights. They must be considered both individual TEV weights and relative weights between value and non-value components.

$$IUUV = \frac{DUV}{DUV_{weight}} \cdot IUUV_{weight} \quad (3)$$

$$OV = \frac{DUV}{DUV_{weight}} \cdot OV_{weight} \quad (4)$$

$$EV = \frac{DUV}{DUV_{weight}} \cdot EV_{weight} \quad (5)$$

$$BV = \frac{DUV}{DUV_{weight}} \cdot BV_{weight} \quad (6)$$

The TEV is achieved as the sum of the individual value of the components considered Equations (2)–(6):

$$TEV = DUV + IUV + OV + EV + BV \quad (7)$$

### 2.3. Selection of Participants

SP methods involve survey respondents being questioned to understand the valued assets from answers obtained. Information provided by respondents is crucial. The outputs' reliability will come from the proper selection of the participants [49,66]. Thus, the two determining factors in selecting respondents were: (a) knowledge about the marina and its environment; (b) varied and representative participation to avoid biased results.

To meet the above two requirements, state-of-the-art establish a number of experts between 10 and 18 [67]. In this case, 16 people were selected with knowledge about the marina. Their backgrounds ensured a diversity of judgment by including areas of the marina management, management organizations with competencies in the marina environment, commercial operation, and university professors. Table 1 shows the type and origin of participants.

**Table 1.** Groups and participants considered.

Groups	Description	Number
Management	Technical manager	1
	Maintenance manager	1
	Customer services manager	1
Technical	Technical of the provincial delegation for the environment	3
	Technician of Andalusian Public Port Agency	2
	Technician of Diputación de Granada	1
Commercial	Owner of clothes businesses	1
	Owners of real estate businesses	2
Nautical	Nautical excursion business owner	1
	Diving school owners	2
Environmentalist	Professors of the University of Granada	2
Total		16

### 2.4. Questionnaire

A survey was prepared for the selected group of people. First, the assessment's reason and significance were explained, as well as how the AHP method works. Subsequently, the set of paired comparisons was presented, establishing the significance of one to the other and its quantification. This assessment was based on value judgments on a scale ranging from 1 to 5 (1—equal importance, 2—moderate importance of one concerning the other, 3—essential or great importance, 4—very great importance, 5—extreme importance).

The questionnaire consisted of two parts. In the first part, the landscape was weighted concerning the other activities of marina management. The second part dealt with the assessment of the landscape itself. Each participant had to make a comparison on two levels. Firstly, they had to compare the values of use versus non-use. Then, the TEV values were compared with each other. In both cases, when presenting a pairwise comparison, they were asked which of the two they considered more important for the marina in terms of landscape value. This value was then to be established on the scale given, considering their knowledge and experience. Attending to Mitchell and Carson [68], a sufficiently understandable and meaningful scenario is crucial for a CV. Respondents should be able to

provide valid and reliable value despite their lack of experience with the given scenario. In this sense, the survey incorporated examples to understand the TEV components better.

The survey was conducted between mid-February and March 2022. As related above, half of the surveys were carried out with people working at the marina. These surveys were run at the interviewees' places of work. The rest of the surveys were conducted via e-mail.

### 2.5. Data Analysis

For a given environmental asset, it is assumed that a given value of the components of TEV may help to obtain the value of the remaining components. To this, the results of an AHP method are used to obtain weighted values. Various components of the TEV integrated into this asset are delimited. These components are then weighted using the AHP method.

The core aim of the AHP methodology is to provide a tool to assist in the decision-making process by weighting the various options in a pairwise comparison manner. Saaty [54] initially established a 9-point scale. However, given the complexity of the elements to be addressed, relating to the tangible and intangible values of the landscape, the assessment of the pairwise comparisons was reduced to a 5-point scale. The comparison matrix is formed by elements representing a subjective judgment provided by the decision-maker of the relative importance of two elements. Once these matrices have been established, it is necessary to determine the consistency of the experts' judgments, avoiding contradictions or biases. The AHP method applies the consistency ratio (CR) to measure individual inconsistency. If CR is less than 0.10, the judgments are consistent and valid. In this case, the next step was to obtain the eigenvector. For this, the methodology was proposed by Aznar y Guijarro [26].

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (8)$$

The consistency ratio (CR) is obtained by comparing the CI with the random consistency index (RI), which depends on the size of the matrix considered:

$$CR = \frac{CI}{RI} \quad (9)$$

For  $n = 5$ , RI considered is 1.12.

### 3. Results

Each judgment matrix reflects the opinion of an expert, and the results may differ from each other. However, solely the consistency matrices are considered. Of 16 participants, 13 matrices were consistent with the management survey and 11 for the value survey. Criteria weights were obtained by applying the eigenvector method and ordered by importance. Average values of valued responses were obtained to find a unique vector of weights (Appendix A).

Based on the information provided by the marina manager of Marinas del Mediterráneo, data were taken for the 2019 financial year to avoid distortions generated by the effect of the COVID-19 pandemic. In that year, the income profit statement amounted to around EUR 468,000. Thus, the contribution of the landscape to this profit corresponds to EUR 107,074.80. After updating the calculated value derived from the landscape for a 3% tax, the estimated DUV was EUR 3,569,160.00. Table 2 shows the global value derived from AMUVAN analysis (3)–(7).

**Table 2.** Partial and total values obtained from AMUVAN analysis.

TEV Components	Aggregated Weights	Value (€)
Direct Use Value	0.2190	3,569,160.00
Indirect Use Value	0.2038	3,321,398.75
Option Value	0.1499	2,426,196.20
Existence Value	0.2066	3,368,272.93
Bequest Value	0.2218	3,614,956.65
Global	1.000	16,299,984.53

As a general figure, it can be estimated that the value of the landscape in Marina del Este amounts to about EUR 16.3 million. The landscape represents an increased value of 3175.90% over the income statement profit.

#### 4. Discussion

In assigning a landscape value to an area, several authors start from the value of the activities carried out in the study area [22,69,70]. The linchpin of the AMUVAN method is the value of environmental goods and services obtained from the exploitation of resources in the study area. However, within a marina's profit and loss account, it is impossible to determine how much of this benefit is attributable to the landscape. This approach is, therefore, novel compared to other studies.

Related to management activities, marinas should be able to balance higher profit, which simultaneously means lower cost, with an appropriate and sustainable way to manage the demand for services [2,71,72]. However, in this case study, the natural environment is crucial. It is reflected in a higher weighting of the activities corresponding to "Environmental management" (0.2646) and "Landscape" (0.2288). Over the last decades, there has been an increasing concern for environmental protection, as well as the implementation of principles regarding sustainability. These two terms focus on environmental sustainability, which is important in the case of marinas. This is due to the location of these infrastructures in a sensitive environment such as the coast [73]. Sustainability research generally sees sustainability as an integrative concept in which environmental, social, and economic concerns are interrelated [74,75]. In the context of marinas, scholars have addressed sustainability accordingly in a twofold perspective [6]. In terms of environmental concerns, environmental management has been seen as promoting sustainability in marina operations. Regarding social and economic concerns, marina facilities have supported local welfare and economic activity. In addition, environmental aspects and sustainable development, together with economic development, enhance the social dimension of this type of maritime infrastructure [76–78]. Thus, the marina under study reflects the importance of the landscape and the environmental quality of the surroundings as key elements in port management. These aspects represent the identity of the marina and are the subject of tourism promotion advertising campaigns (Figure 3).

Concerning port maintenance, it is a critical point in the life cycle approach due to the marine environment's aggressiveness and the increase in damage due to climate change impacts [79]. Maintenance is strongly linked to the correct provision of services. Thus, good maintenance of the infrastructures results in an adequate perception of their quality [11]. In this case, the weighting assigned to maintenance (0.2083) may reflect the need to maintain existing environmental quality.



**Figure 3.** La Herradura tourist promotion advertising poster. Promoted by the Almuñécar Tourist Office, the poster reads “Let’s see more of each other” indicating the activities “shopping-restaurants-accommodation-real estate-sailing-diving-leisure”.

Based on the normalized values after applying the weighting coefficients of the values of use and non-use, it can be seen that the most critical value is the direct use value. It was no surprise, given that it represents the landscape’s most tangible and direct benefit (Figure 4). The physical elements are often the most valued as landscape issues within marinas. However, the importance of highlighting the intangible links with the environment should be pointed out beyond mere physical perception [3].



**Figure 4.** View of the marina basin.

Indirect use values are of great importance in this marina. Numerous activities enhance the knowledge of the landscape through scuba diving or nautical excursions. However, in addition to maintaining quality and satisfaction in these activities, it is necessary to promote other elements, such as the quality of the adjacent beaches, improving the promenades in the vicinity of the marina, and increasing the number of viewpoints within them [11]. Coordination with other administrations to improve the environmental quality of the surroundings means enhancing indirect use values.

The option value is highly uncertain because it relates to people’s expectations [35]. This value should influence whether or not to maintain the landscape because it satisfies the demand for future use. In another case, it may be an alternative use [52]. Applying stable governance and management policies for protected areas has implications for economic production and a balanced distribution of the resulting value flows [80]. Therefore, this value increases when future actions can be placed in predictable scenarios. In the case study, the fact that there is an environmental policy that establishes protected areas is an advantage for the landscape. However, there is uncertainty about the degree of urbanization of the environment. There is a link between marinas and the development of real estate projects [5,6].

On the other hand, a given space acquires the status of the landscape when we consider the interrelationships between people and their surroundings [3,81]. Through

observation and experiences, people associate a range of material and non-material values with landscape [82]. Dasgupta et al. [83] establish two attributes of intangible values of the landscape. Firstly, they are usually spatial and cannot be substituted externally. Secondly, they are not specific to any particular landscape, although they are spatially related. Thus, the intangible values of a landscape are associated with the sense of place that people acquire in a given space. This sense is made up of people's emotional relationships with that particular place and the symbolic meanings they assign to it [11,84]. In this sense, the weighting given to non-material values reflects the emotional attachment of marina users to the maritime infrastructure. From the results obtained, the existence of an emotional attachment to the marina in the study is not the most relevant issue, although this difference is slight (0.4733 for intangible values). However, this may be due to a lack of understanding of the terms of the survey.

The perceived reality of existence value is volatile and depends on knowledge and competence [51]. This value rises rapidly with the knowledge of its existence and the absence of substitutes. Therefore, the more the landscape is explained and disseminated, the higher the existence value will be. This transmission of knowledge must be continuous and varied to maintain interest and thus reduce its volatility. The fact that it is a marina with a unique landscape and that it is not comparable to other existing marinas in the vicinity also increases its value existence.

If the weighting coefficients for use and non-use values were not applied, the most important value would be the bequest value. Whenever more than one person uses a resource, the way it is used in the present conditions its future use and may increase or decrease its value [35]. The concept of sustainability is directly associated with the bequest value. Sustainability is a linchpin in marinas' management to ensure recreational activities and facilitate the development of future opportunities [2,6,11]. In this respect, several sustainable policies may be applied. Marinas use the seas and oceans as resources for their development. According to UN Sustainable Development Goal 14, the use of the oceans, seas, and marine resources should be grounded on conservation and sustainably [85]. Similarly, the concept of blue economy—which recognizes the importance of using the oceans and seas as drivers of the economy sustainably and profitably—includes coastal tourism and port activities [9,86]. Therefore, the more sustainability is integrated into the management plans, the greater the bequest value.

There is controversy over whether improving accessibility to a site enhances the value of its landscape. The potential environmental impacts are pitted against people's welfare and quality of life [87]. In the case of natural environments, the conservation of unique habitats and their proper use represents a potential tourist resource and a practice of environmental sustainability [88]. Furthermore, unmanaged and mass tourism negatively impacts the environment, landscape, and natural resources [89]. So, a balance must be sought between the number of visitors and the preservation of the environmental quality of the surroundings [90]. Environmental preservation is not solely a competence of the marina, but there must be coordination with the competent administrations. Once again, the need for collaboration to improve landscape management is clear. Breaking through the glass ceiling of independent operations and undertaking sufficient coordination between stakeholders is one of the challenges in managing the marina sector [91].

Despite dealing with a subjective concept such as landscape, there was a high degree of consistency in the responses (Appendix A). This shows that the importance of the marina environment and its landscape uniqueness is an issue assimilated by most of the respondents. However, the number of face-to-face interviews reflects the lack of willingness to participate. Moreover, the need to resolve doubts in these interviews shows the difficulty in understanding the concepts associated with landscape valuation. It confirms the need to organize specific training courses for the marina staff [92] and the stakeholders. This involvement of all the people working in the marina also represents an important fact in improving the landscape and its management [93]. Management implies a mutual commitment between various parties, including managers, stakeholders, and users [94].

Finally, the value obtained corresponds to the income statement for 2019. It would be necessary to perform a time series based on the results of several years. In this way, it is possible to estimate an average value and analyze the financial results with the decisions taken about the landscape.

## 5. Conclusions

Generally speaking, marina management includes the control and organizing of the marina. Dealing with landscape management, ELC encourages the identification and assessment of landscapes through field research professionals working with local inhabitants. In this sense, the first step for marina managers should be identifying the main landscape items within their marinas. This study provides a methodology to give an economic valuation of the landscape in marinas. For this purpose, it is used the AMUVAN methodology to address the issue of the economic valuation of the landscape in a marina as part of the TEV. The main contribution is to present a variant when it is not possible to directly determine the values resulting from the exploitation of the environmental asset. AMUVAN not only estimates TEV but also obtains the partial values of its components, thus allowing for a more detailed analysis.

Concerning its weaknesses, the main obstacles were a limitation in understanding the concept of landscape and, therefore, in the assimilation of the various components of the TEV. Respondents perceived the importance of landscape, although it was sometimes difficult to understand the multiple concepts. Furthermore, this understanding represents the basis for credible comparisons.

In this study, the method is applied to evaluate the landscape of Marina del Este, located on the southern Mediterranean coast of Spain (Granada). This marina is characterized by protected natural areas of great value and a rugged coastline, with coves and caves that are very attractive to sailors. It is reflected in the importance of the landscape compared to other aspects of port management. It is also evident in its valuation, estimated at EUR 16.3 million. It represents more than 3000% of the value of the marina's profit and loss account.

In order to increase the economic value of the landscape in marinas, specific management measures can be considered. The first step consists of improving the port's landscape aspects, promoting knowledge of the port's surroundings, and promoting knowledge of the port's immediate surroundings, favoring accessibility and environmental improvement. However, it is also necessary to act on other aspects to promote non-use values. Implementing environmental plans, incorporating sustainability criteria in marina management, applying stable environmental policies, and sustainable urban development plans are examples of how to increase this value. These actions should be integrated into the general port management, which, in each case, must incorporate monitoring and control measures to evaluate the effectiveness of the measures adopted.

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## Appendix A

This appendix contains the results of AHP survey. Firstly, the landscape was weighted related to the management elements (services provided, financial feasibility, environmental management, and maintenance). Of 16 respondents, 13 obtained consistencies in their answers (81.25%). Table A1 shows the weighted values obtained and the ranks.

**Table A1.** Weighted coefficient related to the landscape and management activities.

	Services Provided	Financial Feasibility	Environmental Management	Maintenance	Landscape	CR (%)
Respondent 1 Rank	0.1065 4	0.0768 5	0.5278 1	0.1792 2	0.1096 3	6.2
Respondent 3 Rank	0.1074 4	0.0887 5	0.3954 1	0.1249 3	0.2835 2	2.1
Respondent 4 Rank	0.3151 1	0.3151 1	0.1417 3	0.1417 3	0.0864 5	1.6
Respondent 5 Rank	0.2566 1	0.1941 2	0.1609 5	0.1941 2	0.1941 2	3.4
Respondent 7 Rank	0.0547 4	0.0547 4	0.4284 1	0.1345 3	0.3276 2	8.9
Respondent 8 Rank	0.2689 1	0.1656 4	0.2167 3	0.2493 2	0.0995 5	1.7
Respondent 9 Rank	0.2590 2	0.1453 4	0.2054 3	0.3336 1	0.0567 5	9.8
Respondent 10 Rank	0.1599 4	0.0649 5	0.2989 2	0.1665 3	0.3097 1	9.3
Respondent 12 Rank	0.1705 4	0.0833 5	0.2002 3	0.2411 2	0.3048 1	9.2
Respondent 13 Rank	0.1138 4	0.2229 3	0.1014 5	0.1916 3	0.3703 1	7.0
Respondent 14 Rank	0.1061 4	0.0634 5	0.2768 1	0.2301 2	0.2143 3	6.8
Respondent 15 Rank	0.2459 3	0.0797 5	0.2301 1	0.2301 1	0.2143 4	0.9
Respondent 16 Rank	0.0756 5	0.0829 4	0.2557 3	0.2849 2	0.3009 1	4.1
Average Rank	0.1723 4	0.1260 5	0.2646 1	0.2083 3	0.2288 2	

Secondly, use and nonuse values are compared. They are listed in Table A2.

**Table A2.** Weighted coefficient related to use and nonuse value.

Respondent	Use	Nonuse
1	0.50	0.50
2	0.50	0.50
3	0.35	0.75

**Table A2.** *Cont.*

Respondent	Use	Nonuse
4	0.75	0.25
5	0.50	0.50
6	0.20	0.80
7	0.20	0.80
8	0.50	0.50
9	0.50	0.50
10	0.75	0.25
11	0.75	0.25
12	0.50	0.50
13	0.75	0.25
14	0.50	0.50
15	0.75	0.25
16	0.50	0.50
Average	0.5267	0.4733

Finally, the different TEV components were compared pairwise. In this case, 11 judgments matrices were consistent (68.75%). The results of the weighted values and the ranks are shown in Table A3.

**Table A3.** Weighted coefficient related to TEV components.

	DUV	IUV	OV	EV	BV	CR (%)
Respondent 1	0.0661	0.0647	0.1498	0.2344	0.4850	8.8
Rank	4	5	3	2	1	
Respondent 3	0.1211	0.2460	0.0530	0.1158	0.4641	4.8
Rank	3	2	5	4	1	
Respondent 4	0.3875	0.2308	0.1640	0.1240	0.0937	3.3
Rank	1	2	3	4	5	
Respondent 5	0.2000	0.2000	0.2000	0.2000	0.2000	0.0
Rank	1	1	1	1	1	
Respondent 6	0.0948	0.0780	0.1259	0.3222	0.3791	0.4
Rank	4	5	3	2	1	
Respondent 7	0.0910	0.2600	0.2004	0.2004	0.2401	0.2
Rank	5	1	3	3	2	
Respondent 10	0.1538	0.1333	0.1096	0.3108	0.2936	6.7
Rank	2	4	5	1	2	
Respondent 11	0.3628	0.1833	0.1156	0.2772	0.0610	7.6
Rank	1	3	4	2	5	
Respondent 12	0.3628	0.1833	0.1156	0.2772	0.0610	7.6
Rank	1	3	4	2	5	
Respondent 13	0.2497	0.3588	0.1280	0.1507	0.1128	0.7
Rank	2	1	4	3	5	
Respondent 16	0.2000	0.2000	0.2000	0.2000	0.2000	0.0
Rank	1	1	1	1	1	
Average	0.2089	0.1944	0.1420	0.2193	0.2354	
Rank	3	4	5	2	1	

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