

# Exploring beach visitors' willingness to pay for protecting island beaches from erosion: The case of Marmari beach in Kos, Greece

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**Abstract** This contribution aims at exploring beach visitors' perceptions regarding the impacts of beach erosion on their recreational activities and their willingness to pay in order to protect the beaches from erosion and preserve them in their current state. Towards this aim, a contingent valuation study was implemented, through the construction and distribution of a short and "user-friendly" questionnaire, among domestic and incoming tourist, residents and local businessmen in Marmari beach on the island of Kos (Greece). By presenting a scenario and asking respondents if they would voluntarily contribute a certain amount of money, the survey sought to understand their willingness to financially support the cause. Additionally, the questionnaire included questions about visit preferences, factors influencing their payment response, and socio-demographic information, allowing for the examination of correlations between willingness to pay and various factors. The results showed that 52% of the respondents are willing to pay for the protection of Marmari beach, and the average amount they are willing to contribute annually was estimated to be 33€. The data collected provide insights into the factors that influence beach users' willingness to financially support beach conservation and management efforts, which can inform decision-making regarding funding and resource allocation for these initiatives.

**Keywords:** Willingness to pay, Contingent valuation, Beach erosion, Island beach, Questionnaire

## 1. Introduction

Greece is renowned for its extensive coastline and numerous islands, making it a highly sought-after destination for summer holidays. The tourism sector in the country has experienced consistent growth since 1960, leading to the establishment of a significant number of small businesses related to tourism. This rapid development has led in an oversupply of accommodation, with a staggering 420,991 rooms available, resulting in Greece ranking 6th in Europe (Ćulibrk et al., 2021). Tourists are attracted to Greece by various environmental factors, including sunshine, temperature, water quality, beach morphology, and biodiversity. Given that 21% of the

Greek coastline corresponds to beaches and deltaic areas, changes that may be caused to these parameters by climate change and anthropogenic pressures may have negative effects on tourism (CCISC, 2014). Such changes could impact the "tourist euphoria" index, as climatic variations deviate from ideal and pleasant conditions for visitors. Especially beach erosion, caused by sea level rise and/or other factors, might have negative impacts on the carrying capacity of beaches for leisure activities, their aesthetics and the associated tourist infrastructures. All the above could result in a decline in tourist arrivals, spatial and temporal shifts in visitor patterns, shorter average stays, decreased average expenditure per trip, increased service costs, and the need for costly adaptation projects such as bioclimatic infrastructure and coastal protection works.

The comprehensive and accurate evaluation, comparison, and selection of measures for the protection of the coastal environment require their economic valuation, which includes the calculation of the costs and benefits of individual measures. The purpose of economic valuation is to estimate the contribution of ecosystems to the social and economic well-being of people and to assign monetary value to natural attributes for their equivalent comparison with proposed alternative adaptation actions. It arises from human dependence on environmental services and goods and provides critical information for decision-making, understanding user preferences, implementing protection policies, and proper capital allocation (Crocì et al., 2021). The economic valuation of the beaches poses a significant challenge since beaches are public goods and the services they provide usually lack market value (Costanza et al., 2014).

This contribution aims at exploring beach visitors' perceptions regarding the impacts of beach erosion on their recreational activities and their willingness to pay in order to protect the beaches from erosion and preserve them in their current state. Towards this aim, a contingent valuation study was implemented using as a case study Marmari beach on the island of Kos (Greece).

## 2. Methods

The contingent valuation method is a research technique that falls under stated preference methods and is perhaps the most widely used method for assessing the coastal environment in the last 50 years, with over 7,500 studies conducted using this approach in scientific journals, conferences, books, dissertations, and technical reports (Carson, 2011). The contingent valuation method offers several key advantages, among them is the inclusion of intangible and non-market values associated with environmental goods. This allows for the consideration of aspects such as aesthetic value, cultural significance, ecological importance, and biodiversity conservation, which may not have a direct market price but hold significant value to individuals and society (e.g. Marzetti et al., 2016).

It is applied through the development and distribution of targeted questionnaires, wherein respondents express their willingness to pay for an environmental good within hypothetical market scenarios. By quantifying the economic value directly from the respondents' expressed preferences, this method enables the assessment of the perceived worth of the environmental good. The questionnaire developed in the present study, was distributed to a diverse group of respondents, including domestic and incoming tourists, residents, and local businessmen. The questions were intentionally designed to be clear and easy to understand, avoiding complex phrases or overly scientific definitions. The questionnaire consisted of 23 questions, primarily in a multiple-choice or scaled format, and was divided into four sections:

**PART 1:** This section provides an overview of the issue of beach degradation caused by Climate Change and increasing human pressures. It highlights the main impact of coastal erosion and the necessity of implementing coastal measures.

**PART 2:** This section focuses on assessing respondents' knowledge and perception of the effects of Climate Change and the associated risks. It begins with a brief

description of the study area to provide context and also includes questions about visit preferences.

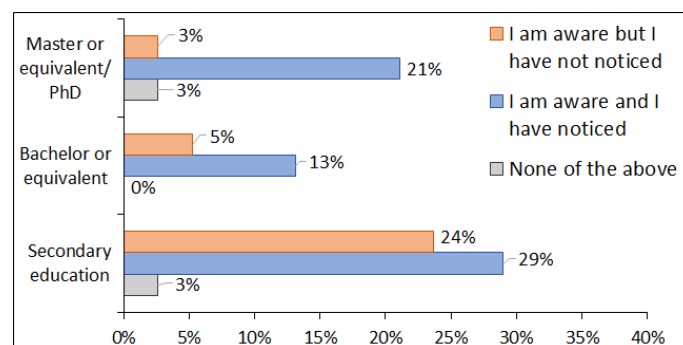
**PART 3:** This section includes questions specifically related to the willingness of residents and beach users to pay for beach protection and sustainable management. Respondents are presented with a hypothetical/future scenario and asked if they would be willing to voluntarily contribute a certain amount of money. The economic evaluation question is formulated as follows:

*"For the conservation, protection and management of the beach it is necessary to implement measures through which the economic and social prosperity (tourism) as well as the environmental sustainability will be assured. Are you willing to pay for such measures supporting a dedicated fund? If YES: How much would you be willing to pay per year?"*

**PART 4:** This section collects information on the social and demographic characteristics of respondents. It includes questions about gender, age, level of education, occupation, income, household size, and the presence of minors in the family. The purpose of this section is to examine the extent to which these factors influence respondents' willingness to pay.

### 3. Results

During the survey, participants were asked if they are aware of or have observed the impacts of Climate Change and coastal erosion specifically on Marmari Beach. Results showed that 63% of respondents were aware of and had observed coastal erosion on the beach, while 32% were aware but had not personally observed it, and 5% were unaware of the risks of coastal erosion. A correlation was observed between educational level and knowledge/observation of coastal erosion, with higher education levels corresponding to higher awareness and observation rates (Figure 1).



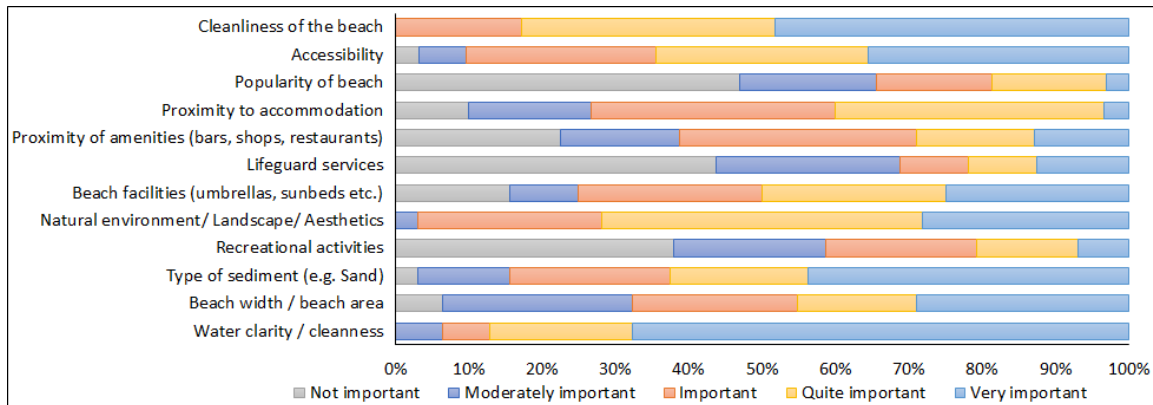
**Figure 1.** Perception of beach erosion impacts in relation to respondents' educational level

Figure 2 presents the reasons that attracted visitors to Marmari Beach and the importance of each reason. The main factors influencing their choice included water quality, beach cleanliness, and the presence of sand as the sediment type. Other significant factors were the width/area of the beach, easy access to the beach, and the aesthetic appeal of the landscape and natural environment.

Of particular interest were the responses regarding willingness to voluntarily contribute financially to the implementation of protective measures for the beach's preservation, protection, and sustainable management. Among the respondents, 52% expressed their willingness to contribute, while 48% declined. Local businessmen exhibited the highest willingness to pay (69%), followed

by domestic tourists (67%), and incoming tourists (46%), whereas residents showed no willingness to pay (Figure 3a). Positive respondents were further asked about the monetary range they were willing to contribute, as

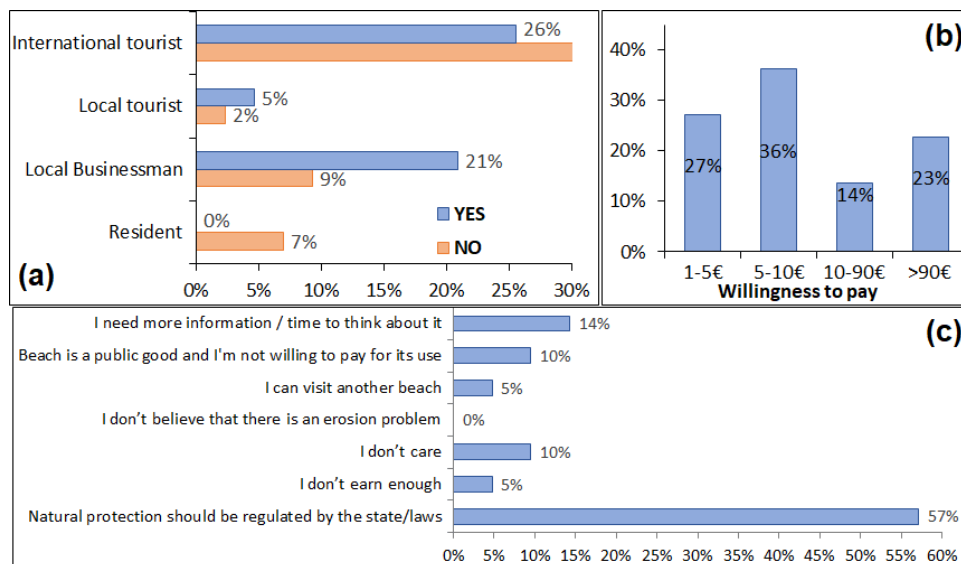
indicated in Figure 3b. The breakdown of responses showed that 36% were willing to pay €5-10, 27% were willing to pay €1-5, 14% were willing to pay €10-90, and 23% were willing to pay >€90.



**Figure 2.** Reasons to choose to visit Marmari Beach.

When examining the reasons behind respondents' refusal to contribute financially, the data revealed several key factors. Among those who declined to pay any monetary amount, 57% believed that the responsibility for beach protection should lie with the government or be regulated by laws. Additionally, 14% indicated that they needed more information or additional time to consider their decision. Furthermore, 10% expressed their unwillingness to contribute to a public good in general. Financial

constraints were also a factor, as 5% of respondents stated that they did not earn enough money to allocate for this purpose. Interestingly, 10% responded with "I don't care," while 5% expressed the sentiment that they could simply visit another beach instead. These results are depicted in Figure 3c, providing insights into the diverse motivations behind respondents' decision to decline financial contributions.



**Figure 3.** (a) Percentage of positive and negative responses regarding the willingness to pay for the 4 respondents' groups; (b) ranges of the amount of money respondents are willing to pay; (c) Percentage distribution of responses regarding the reasons for refusing to pay

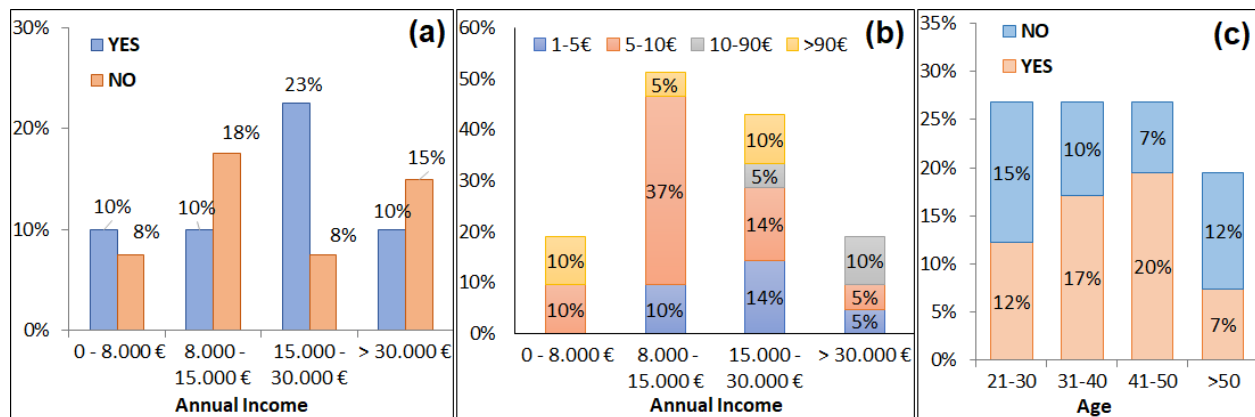
The study also explored the potential influence of respondents' annual income on their willingness to pay for beach protection. However, no significant correlation was observed (Figure 4a). Positive responses varied across income categories, with 57% for the 0-8000 € category, 36% for 8000-15000 €, 75% for 15000-30000 €, and 40% for incomes exceeding €30000. This lack of correlation

could be attributed to the heterogeneity of the sample, as respondents belonged to different categories and held different perspectives regarding the significance of beach preservation based on their roles as tourists, residents, or business owners. Figure 4b provides a more detailed breakdown of the amounts respondents are willing to pay based on their income category.

Lastly, the study examined the relationship between respondents' age and their willingness to contribute financially. 73% of respondents in the 41-50 age group responded positively, followed by the 31-40 age group (64% positive responses), the 21-30 age group (45% positive responses), and the lowest positive response rate

was among respondents over 50 years old (38%) (Figure 4c).

Based on statistical analysis, the average amount, the 52% positive respondents are willing to contribute, was estimated to be 33 €.



**Figure 4.** Positive and negative responses regarding willingness to pay in relation to (a) annual income and (c) respondents' age; (b) the range of money respondents are willing to pay in relation to their annual income

#### 4. Conclusions

The primary objective of this survey was to assess the willingness of beach users to contribute financially towards the protection and sustainable management of the beach Marmari on the island of Kos. Through the presentation of a hypothetical scenario and the inquiry of respondents' voluntary payment preferences, the survey aimed to gauge their willingness to support the cause monetarily. Alongside this, the questionnaire encompassed inquiries about visit preferences, factors influencing their payment response, and socio-demographic details.

The results showed that 52% of the respondents are willing to pay for the protection of Marmari beach, and the average amount they are willing to contribute annually was estimated to be 33€. Those who are refusing to pay believe that natural protection should be regulated by the state/laws and it's not their responsibility.

It is worth emphasizing that there may be strategic distortions where respondents do not provide sincere answers regarding their willingness to pay (Lopez-Becerra and Alcon, 2021). Also the respondents' answers may have been influenced by the current economic situation of the country, with the continuous imposition of taxes, and could represent a form of protest against the prevailing economic regime. During the interviews many expressed a strong dissatisfaction towards the government mechanisms.

This comprehensive approach facilitated the examination of potential correlations between willingness to pay and various factors. The data collected from the survey provides valuable insights into the factors that influence beach users' propensity to financially contribute to beach conservation and management endeavors. These findings can be instrumental in guiding decision-making processes

concerning funding allocation and resource management for such initiatives.

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