

The Impact of Golf Course Development on a Constantly Changing Mediterranean Landscape

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Abstract: Outdoor recreation and tourism have an impact on the landscape. Golf course development is one of the fastest growing tourist activities, changing significantly the Mediterranean landscape. This impact may be hardly noticeable or it may be firm and become parasitic. Thus tourism and outdoor recreation pose a paradox: they may provide opportunities, but they may also pose threats. The present article studies the impact of golf course development on a traditional Mediterranean landscape and discusses the relationship between cultural attitudes about the environment and social sustainability. We used the perception-based approach to estimate the scenic preferences of members of the public in order to reach a consensus. Future evolution of the present study is to use principal component analysis to find relationship between public preferences and biophysical characteristics of the golf course and surrounding landscape.

Key-words: Golf course, leisure, landscape change, sustainable development, tourism.

1 Introduction

Golf course development is one of the fastest growing tourist activities, changing significantly the Mediterranean landscape. Golf courses are often located in high scenic value areas. It is inevitable, that the visual impact of those projects receives considerable attention. However, in golf course design little research devoted to examine how visual impact assessment may improve their public acceptance.

In 2000, almost 700 million international tourist arrivals were counted worldwide [9] and leisure demand is continuously growing. The effects of the leisure industry globalization over the past decades had a profound effect on the traditional Mediterranean landscapes. The use and conversion of lands is essential to tourism. Worldwide, large areas are used to build tourist infrastructure like, for example, the Mediterranean coastal zones. Thus tourism and outdoor recreation pose a paradox: they may provide opportunities, but they may also pose threats.

The global environmental consequences of tourism can be divided into physical and psychological ones [9]. Their impact can be both direct and indirect. All changes initiated by tourism

occur locally, but contribute to global phenomena. From a global perspective, tourism contributes to:

1. Changes in land cover and land use.
2. Energy use.
3. Water use.
4. Extinction of wild species.
5. Dispersion of diseases.
6. Changes in the perception and understanding of the environment.

Human land use and land cover change have transformed 30–50% of the Earth's surface [20]. Land use change is defined as the alteration of the way humans use land, while land cover change is the alteration of the physical or biotic nature of a site [19].

Golf course spaces have important amenity values that include leisure opportunities and aesthetic enjoyment. Environmental concerns over the use of land for golf courses have grown over the past 50 years. Specific concerns include the amount of water and chemical pesticides and fertilizers used for maintenance, as well as the destruction of wetlands and other environmentally important areas during construction. Many people continue to oppose golf courses as they impede corridors for migrating animals and sanctuaries for birds and

other wildlife destroying biodiversity [1]. Although, recent studies [10] find in golf courses opportunities of sustainable biodiversity conservation.

From many authors it is mentioned a growing interest in the relationship between environment and the sustainability of human societies [8]. Frey and Stutzer [11] argue that happier people may be more likely to exhibit positive attitudes toward the environment.

The present article studies the impact of golf course development on a traditional Mediterranean landscape and discusses the relationship between cultural attitudes about the environment and social sustainability.

2 Golf course and landscape change

The origin of golf is open to debate as to being Chinese or Scottish but according to Stirk [15] it evolved from a Mediterranean game called "Paganica" played from Egyptians, Greeks and Romans since the 2600 BC. Golf is a sport taking part in open green areas where players are walking 4 km in around 4 hours. The Mediterranean region is considered privileged place for this sport due to favourable playing conditions. The region of Algarve (south Portugal) has dry summers and mild winters permitting this amenity all year around.

The progressive improvement in the lifestyle of inhabitants of Portugal, allows them to spend part of their free time in leisure activities. Golf has become one of the most popular of these sports in the last few years. Currently there are 31 golf courses in the Algarve region and last year there were plans to build another 25 (Figure 1).

In Europe alone there are about 5000 golf courses covering 200,000 ha of land and worldwide their number totals 30,000 [12]. It is estimated that an 18-hole golf course requires approximately 60 ha of land. Assuming an average size of 45 ha per 9-hole golf course, the 30,000 golf courses in the world may cover an area of 13,500 km².

Land alteration is the most important driver of change in biodiversity, which interacts with other important components of global change such as global warming [15, 19]. According to Gossling estimate [9], tourism contributes with 0.5% to the alteration of biologically productive lands. Land alteration may have detrimental consequences for biodiversity and reduce the capacity of ecosystems to provide services essential to humankind. However, the consequences of land alterations may differ qualitatively in different geographical settings. With respect to biodiversity, tourist infrastructure development may have the greatest impact on places

where species are endemic and vulnerable to environmental change [5].

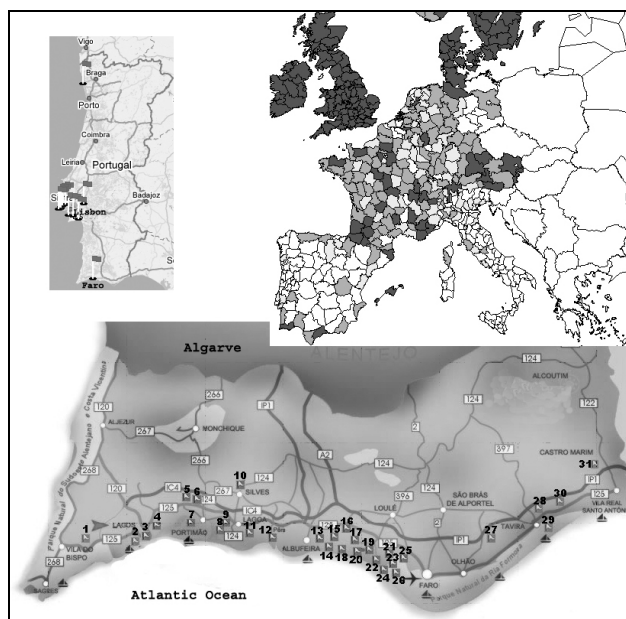


Figure 1- Golf courses in Algarve (currently 31), in Portugal (67) and golf density per population in Europe (darker colour indicates higher density).

3 Landscape quality assessments

Numerous techniques of landscape evaluation have been devised in recent years which may be subdivided by several ways [17]. The expert approach technique has dominated in environmental management practice and the perception-based approach has dominated in research [6]. For the present study three methodologies were used to estimate the aesthetic quality of the landscape: the perception-based approach, the expert based approach and the psychophysical preference modelling.

In the perception-based approach the scenic preferences of members of the public are valued for landscapes or components of the landscape in order to reach a consensus [3]. In the design expert approach, landscape evaluated and inspected with respect to a combination of abstract design parameters considered relevant to landscape aesthetics (forms, lines, colours, textures and their interrelationships). The relationships between these elements used to classify each area in terms of variety, unity, integrity or other complex formal characteristics. The method is applied by an expert, usually a landscape architect, due to the formal training required [7]. The psychophysical preference modelling is one of the quantitative holistic techniques of landscape evaluation which mix subjective and objective methods. In this approach

public preference surveys and landscape features inventories are combined and weighted. The method uses a statistical technique to establish a mathematical relationship, between landscape components and scenic preferences of observers [18].

Other methods of landscape aesthetic evaluation are the indirect methods which are used mainly from environmental economists and the most important are the hedonic price method, the travel cost calculation, the contingent valuation technique and the choice modelling [14].

4. The visual impact of Vale da Pinta and Gramacho golf courses.

The primary tasks of the visual impact assessment were to identify landscape elements and key viewpoints from which the golf course will be visible; to evaluate the quality and visual absorption capacity of those critical viewpoints; to assess the impact of visibility; and to modify the golf course design in such a way as to reduce potential impact to a minimum.

To evaluate the scenic preferences of members of the public during the perception-based approach it was created a questionnaire. To check the questionnaire for problems we pre-test it. This involved giving it to a small sample of respondents, then interviewing the respondents to get their impressions and to confirm that the questions accurately captured their opinions [13].

The landscape quality survey embraces the study of both biophysical interacting components: features of the environment and human perception/experience [2, 6]. As a result, numerical values were used to assign factors such as slope, relief, vegetation, colour, mystery, security and human activities in order to analyze, evaluate and characterize the landscape.

Regarding the size and generational composition of the participants, 20 had only elementary education, 20 finished high school and 20 had university degree. Ten were composed of families with children, 10 were couples less than 39 years of age, 10 were couples over 40 years of age, and 20 were single persons. In regard to the visits to golf courses, 55 participants were visiting golf courses frequently. Of the 60 responders, 42 were from Portugal and the other had different nationality, 5 live into a golf resort, 14 live close with view to golf course and 41 in residence without golf view. Forty-eight responders had come to golf courses by car, two had come by bicycle, and one on foot. The

average time spent for public preference photography survey was approximately 20 min.

Regarding the public opinion questioned on the importance of the golf activity in the sustainable development of the Algarve region, 6.5% answered that is not important, 21.5% thought is insignificant importance, 13% that is indifferent and 58% that is very important activity (figure 2). Fifty-two percent of the participating groups have the opinion the golf courses should increase in Algarve and 36% that should decrease while the rest where indifferent.

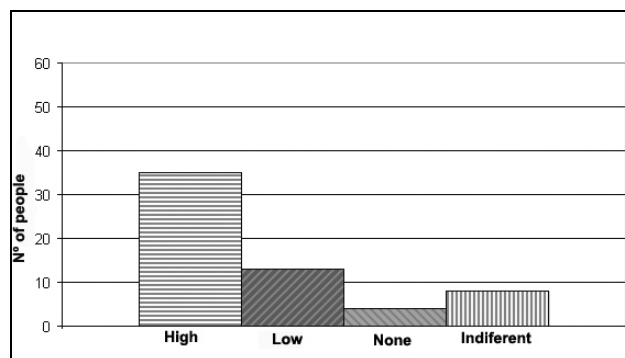


Figure 2- Importance of golf activity for the development of the Algarve region.

The results of the photo analysis found statistically significant differences ($P < 0.01$) on respondents' perceptions between the survey sites for 'relief', 'landscape degradation image', 'security', 'feeling of stress', 'mystery' and 'sensation of liberty'. In figure 3 it can be seen that most of the people with elementary education respond that golf course landscape provoke them some or no sense of mystery, respondents with high school education had higher sense of mystery from golf landscape, while respondents with university degree understood few or no mystery from golf landscape.

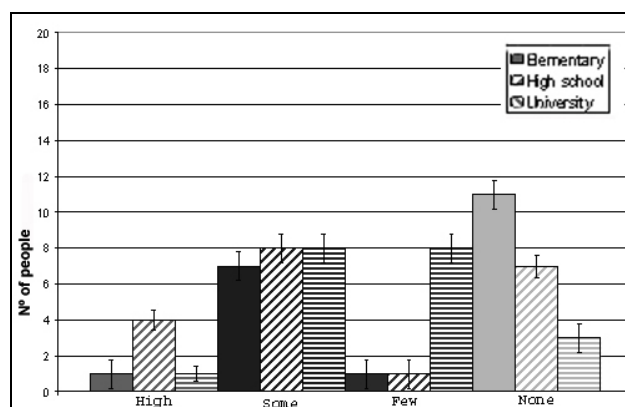


Figure 3- Sense of mystery in golf course landscape in comparison to traditional landscape of Algarve for different levels of education.

The statistical analysis did not find significant differences in 'traditional landscape quality', 'urbanization degree', 'presence of exotic species', 'water presence', 'colour diversity' and 'sensation of peace'. For example in figure 4 shows that there is no significant difference in the opinion of people about presence of exotic species except at the photograph with 75 % presence.

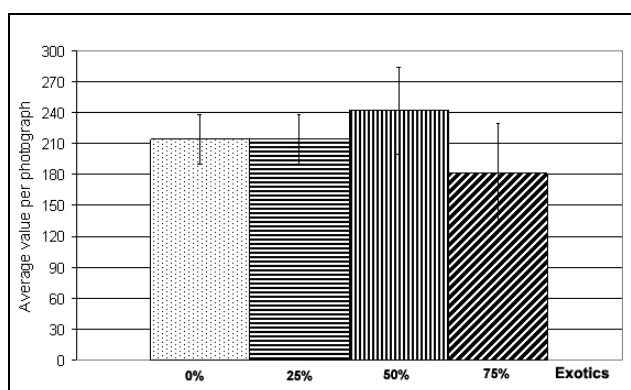


Figure 4- Average value of photographs with increasing presence of exotic species.

The four pictures had a gradually increasing degree of exotic species composition from 0% to 75% cover. The lower value of the photograph with 75% presence of exotics (figure 5), was due to a specific group of respondents with university degree and speciality environmental sciences, which resulted in an increase of the standard deviation.

The photograph of traditional landscape of the Algarve region without presence of exotic species (figure 6), was appreciated mainly from responders with higher education, young and single.



Figure 5- High presence of exotic species.



Figure 6- Landscape of the Algarve region without presence of exotic species.

The majority of respondents (83%), declare that the golf course was mainly 'organised' and 'formal' (Figure 7) while almost half of respondents thought that traditional Algarve landscape was 'random' (Figure 8). Although both sites were found as 'interesting' and 'attractive' by the majority of respondents (more than 70%), the golf course was considered to be more 'attractive' than traditional landscape.

However, more than 90% of respondents felt that golf site was 'comfortable' or 'safe'. Participants found both sites 'natural' except in photographs of golf course that introduced elements (houses, fences, exotics) had presence of more than 75%. The participants with lower and basic education seemed not to separate human influence and 'naturalness' and believed that even though the areas are highly 'managed' they are still 'natural'.



Figure 7- Aerial view of traditional Algarve landscape mixed with the golf courses of the study area.



Figure 8- The majority of questioned participants consider that golf course development increase landscape quality.

5. Final considerations

One of the ultimate goals of sustainable development is to foster responsible environmental behaviour. Walking in nature may foster environmental knowledge, but this will not necessarily lead to positive changes in attitudes, awareness and, ultimately, environmental behaviour. Tourism may rather reinforce the human notion of being separated from nature, which may prove to be detrimental to sustainable development. Obviously, these consequences of golf course development cannot be quantified.

In this paper we examine the relationship between well-being and attitudes towards landscape change and species loss. Ecological economics are concerned about the viability of implementing new policies to reduce environmental degradation [4]. Nevertheless, we found that people showing concern about positive environmental features (e.g. scenic landscapes, interaction with plants and wildlife) are positively connected with well-being, while the opposite is true for people showing concern about negative environmental features (e.g. pollution).

The aesthetic study helped to assess visual adverse impacts of golf course and to suggest mitigation measures and design alternatives. The presented landscape evaluation method could help planners, and other professionals involved in the design of sustainable landscapes with aesthetic and social value. It also could enrich the decision-making process and help governmental officials to take the appropriate decision: accept, reject or suggest aesthetical modifications in any proposed golf course project. The incorporation of aesthetic concepts may help to minimize visual impact of golf courses or other development projects in

Mediterranean landscapes, mainly now when government has an important role to play in the matters of providing aesthetic welfare and avoiding conflicts between public and golf courses. Future evolution of the present study is to use principal component analysis to find relationship between public preferences and biophysical characteristics of the golf course.

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