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Beach quality assessment and management in the Sotavento (Eastern) Algarve, Portugal

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RESUME

O objectivo deste trabalho foi efectuar uma avaliação da qualidade de cinco praias do Sotavento Algarvio, com base nas preferências e prioridades dos banhistas durante a sua estadia na praia. O Algarve é das regiões de Portugal mais conhecidas internacionalmente e é reconhecida como destino turístico de eleição. Devido ao aumento do número de turistas, é necessário realizar avaliações de qualidade das praias, de forma a tentar resolver os problemas resultantes do excesso de turistas, nomeadamente, o lixo excessivo, a diminuição da qualidade da água e consequente redução do seu valor sócio-económico.
O principal método para a avaliação da qualidade das praias, usado neste estudo, foi o Registo da Área de Banhos e o Quadro de Avaliação. São reconhecidos cinco tipos de praias (rurais, remotas, resort, urbanas e de aldeia) através das cinco principais questões prioritárias no ponto de vista dos banhistas (qualidade da água, vista, lixo, segurança e infraestruturas) e avalia a qualidade da praia, desde 1(baixo) até 5(alto) estrelas. Após a avaliação da qualidade das praias, Quarteira-Vilamoura, Ilha do Farol, Ilha Deserta, Ilha da Armona receberam uma classificação de 3 estrelas e Quinta do Lago recebeu a classificação de 1 estrela. A informação quantitativa para as preferências e prioridades dos banhistas foi recolhida através de questionários, tendo sido efectuados 50 por cada uma das praias. Os resultados mostraram que os utilizadores de todas as praias gostariam de ver melhorias ao nível da limpeza, segurança e das infraestruturas.
A metodologia BARE em conjunto com a realização de inquéritos permitiu identificar as questões prioritárias de gestão necessárias para melhorar a qualidade individual das praias e desta forma aumentar as receitas provenientes do turismo.

Palavra-chaves: Algarve, Qualidade de praias, modelo BARE, usuarios da praia, gestao de praia

ABSTRACT

The purpose of this study on beach quality assessment and management was to evaluate the quality of five beaches in the Algarve Sotavento region of Portugal and to identify beach users' preferences and priorities regarding their visit to a beach. The Algarve is one of the country's most internationally known regions and it is generally perceived as a major tourist destination. Because of the increasing level of tourists, there is a specific need to address beach quality, as overcrowding can result in excessive litter, reduce water quality and consequently reduce the socio-economic value of the area. The main methodology for the evaluation of the beach quality in this pilot project was the Bathing Area Registration and Evaluation framework (BARE), which recognizes five beach types (rural, remote, resort, urban and village) through five main priority issues of concern to beach users (water quality, scenery, litter, safety, facilities) and evaluates the beach quality, ranging from one (low) to five (high) stars. After overall bathing area classification, Quarteira-Vilamoura, Ilha do Farol, Ilha Deserta and Ilha da Armona received three-star rating and Quinta do Lago site obtained a one-star rating. The quantitative research data on beach users' preferences and priorities was obtained through administration of 50 questionnaires per beach and showed that beach users at all sites expressed the need for improved cleanliness, safety and facilities on the beach. The BARE framework, together with the questionnaire surveys, allowed the identification of management priorities required to improve the quality of individual beaches and therefore increase income from tourism.

Key words: Algarve, beach quality, BARE framework, beach user, beach management

CONTENTS

ACRONYMS USED

BARE	Bathing Area Registration and Evaluation
GDP	Gross Domestic Product
INE	Instituto Nacional de Estatistica de Portugal
MCS	Marine Conservation Society
NALG	National Aquatic Litter Group
NGO	Non - Governmental Organization
NHBC	National Healthy Beaches Campaign
TBG	Tidy Britain Group
UNWTO	World Tourism Organisation

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CHAPTER 1

INTRODUCTION

This thesis is in partial fulfillment of the academic requirements of the Erasmus Mundus Master in Water and Coastal Management. The topic chosen is appropriate because identification of management priorities is needed to improve the quality of individual beaches and therefore to increase income from tourism and enhance the image of Portugal abroad. The approach used is innovative and has been applied in several parts of the world, e.g. UK, Turkey, Malta, Croatia, but not in Portugal.

The World Tourism Organization (WTTC, 2010 (a)) identifies tourism as one of the fastest growing economic sectors in the world and beaches are considered to be one of its main factors. Tourism has become one of the major players in international commerce and one of the main income sources for many countries worldwide (WTTC, 2010(a)). For many people, the presence and good quality of the beach is one of the most attractive and important factor for choosing the holiday destination (Bojanic, 1992). Due to the increasing popularity of beach tourism, coastal regions have become the main destinations for a growing number of tourists. Therefore, there are a lot of new coastal destinations, and competition between them is increasing (Blanke and Chiesa, 2009). However, with more people located on the coast, there is an evident negative influence on the beach, caused by human activity. Beaches represent very valuable and productive ecosystems, providing favorable outdoor opportunities, and in the same time, they are natural environments, which are sensitive to anthropogenic loads (Roca and Villares, 2008). The contribution of tourism to the economy of coastal regions highly

depends on natural environmental conditions of the area and quality of services provided. To improve beach quality, protecting its natural heritage and providing better facilities, beach management is needed. Therefore, successful beach management should achieve the optimal balance between the physical, biological and human parameters of bathing areas (Williams and Morgan, 1995; Cagilaba and Rennie, 2005). It is also very important to include beach users' preferences and priorities to management plans, because it allows development of more specific policy recommendation for different types of beaches, and guarantee tourists' satisfaction (Williams and Micallef, 2009).

On Portugal's southern coast, the Algarve is one of the country's most internationally known regions, and one that is generally perceived as a major tourist's destination (Aicep Portugal Global, 2010(a)). The Algarve is one of the regions that accounted for most of the hotel nights in Portugal by tourists (35, 5%) with the highest percentage of foreigners (71, 8%), (INE, 2009(a)). Situated by Atlantic Ocean, the Algarve is characterised by the pleasant Mediterranean climate. Because of the increasing amount of people coming to Algarve's beaches, there is a specific need to address beach quality assessments, as overcrowding can induce excessive litter, reduce water quality and consequently reduce the social-economic value of the area.

This pilot project of beach quality assessment and management was held on five beaches within the borders of Sotavento (Eastern) Algarve region of Portugal. The aim of this project is to evaluate the quality of five different types of beaches, using the Bathing Area Registration and Evaluation (BARE) system framework and identify beach users' preferences and priorities, using the method of questionnaire surveys at

each of the five sites and finally provide management guidelines for improving individual's beach quality. Therefore, the main objectives of this study are:

- To evaluate the quality of five different types of beaches in the Sotavento Algarve region through the quality of the five main parameters, recognized with the BARE framework: safety, water quality, litter, scenery and facilities;
- To identify beach users' profile and motivation for visiting the beach;
- To identify the most disliked parameters on the beach by users;
- To identify the users' perception of the visual appearance and state of the beach regarding the litter pollution;
- To identify beach users' preferences and satisfaction with facilities and safety parameters at the beach.

This project consists of six chapters, inclusive of this introductory chapter. Chapter 2 will include a background on Portugal in general and five surveyed beaches within the Eastern Algarve region of Portugal, the study areas. Chapter 3 consists of review on relevant information about the tourism, beach quality and role of beach management. Chapter 4 describes the methodology of beach registration and evaluation system. Chapter 5 is results and a general discussion, and chapter 6 consists of final recommendations and conclusions.

CHAPTER 2

STUDY AREA

The Republic of Portugal is located on the west coast of Europe, in the Iberian Peninsula and covers an area of 92,094 sq Km^2 with 2 732 km of coastline (INE, 2009 (b)). The Portugal's mainland is bordered by Spain on the North and East, and the Atlantic Ocean on the West and South (Figure 2.1). Additionally, two autonomous Atlantic Regions, which are the Azores and Madeira archipelagos, belong to Portugal. Portugal's boundaries have not been changed since the 19th century and it is one of the oldest nation states in the world (Aicep Portugal Global, 2010 (b)).

Figure 2.1 The Iberian Peninsula (with Portugal in the south-western part), (source: Google maps)

Portugal's climate is characterized by mild winters and pleasant summers. Because of westerly winds and the Gulf Stream's effect, the climate changes from the cool, damp Atlantic type in the north to a warmer and drier Mediterranean type in the Algarve (Aicep Portugal Global, 2010 (a)). The rainiest months in the Algarve are November and December, with the normal values of daily precipitation of 70-100 mm, while the driest months are between May and September, with the values of daily precipitation less than 30 mm (Instituto de Meteorologia (IM), 2009). An average temperature in winter is 14°C and 24°C in summer, rarely going below 12°C during winter and reaching as high as 40°C in July and August with more than 120 days of sunshine per year (IM, 2009). The average sea surface temperature is 15–16 °C in January rising to 22–23 °C in August (Turismo do Algarve, www.rtalgarve.pt). The Algarve's geographical position makes it favorite destination for tourist worldwide.

Portugal has a population of about 10.638 million and more than half is economically active (INE, 2009(b)). The demographic concentration is the highest nearer the coast: Lisbon and Porto have particularly higher densities (INAG and ARH Algarve, 2009; Aicep Portugal Global, 2010 (a)). Portugal is divided into 18 districts including Algarve region with an area of 4,996Km^2 (INE, 2009 (b)) and a resident population of 434,023 inhabitants (INE, 2009(b)). Spread throughout 16 municipalities, the Algarve is located in the south of Portugal. It has an average population density of 86, 1 inhabitants per Km^2 and an entirely Atlantic coastline, which is about 320 km in length (INE, 2009 (b)) and most of the region's economic activity is concentrated at the coastal areas. The population of the Algarve triples during the summer season because of the influx of tourists (INAG and ARH Algarve, 2009). In terms of landscape, the Algarve coast is very diversified, varying between abrupt and jagged coastlines, extensive sandy

beaches, inlets formed by lagoons, marshland areas and various formations of sand dunes (INAG and ARH Algarve, 2009). In Algarve there are different kinds of beaches: coves, cliffs, caves, rocky beaches and long sandy beaches (Turismo do Algarve, www.rtalgarve.pt). Already 241 beaches in Portugal have been awarded «Blue Flag» criteria, of which 69 belong to the Algarve region (15 more than in 2009; Blue Flag, 2010).

This study is concentrated within the borders of the Sotavento (Eastern Algarve) region. Sotavento includes eight municipalities: Alcoutim, Castro Marim, Faro, Loulé, Olhão, São Brás de Alportel, Tavira, Vila Real de Santo António (CIA, 2010) ((Figure 2.2). Faro is the capital of Sotavento and Algarve region, it has a public university (Universidade do Algarve), an international airport, a seaport, a marina, a railroad station and bus services. Faro town is located by the Ria Formosa Lagoon, a nature reserve of over 170 km_2, a home for variety of life forms and a stopping place for hundreds of different birds during the migratory seasons. The protected area of the Ria Formosa Natural Park covers 60 km of Algarve's coastline. The lagoon has several channels and an extensive intertidal area, which is about 50% of the total area, mostly formed by sand, muddy sand-flats and salt marshes. Ria Formosa represents the system of barrier islands that communicates with the sea through six inlets (Arnaud-Fassetta et al., 2006). According to Instituto Hidrográfico Marinha Portugal (2009) the tides for the Faro and Olhao islands reach a maximum of 4 meters height. The sandy beaches of the isles of Faro, Barreta, Culatra, Armona and Tavira with its expanses of sand dunes are well known among the tourists.

Figure 2.2 The Algarve region showing Sotavento and Barlavento regions (source: www.wikipedia.org)

This pilot project of beach quality assessment and management has been carried out in the five different types of beaches: Quinta do Lago (resort), Quarteira-Vilamoura (urban), Ilha do Farol (village), Ilha da Armona (rural) and Ilha Deserta (remote). The surveyed beaches are marked on the map bellow (Figure2.3) and a summary with the characteristics of each beach is presented in the Table1.

Figure 2.3 Surveyed beaches in Sotavento Algarve (source: Google maps).

Table 1 Summary of characteristics of five different types of beaches in Sotavento Algarve (source: RTA, 2007).

Observed beach	Environment	Accessibility	Habitation/Accommodation	Facilities/safety
Quarteira-Vilamoura (urban beach)	It is an urban sandy beach located in Quarteira town, which is the cosmopolitan tourist center, and belongs to the municipality of Loule. The area includes schools, shops, religious centres, cafes, post office, banks, central business district, marina, fishing and boating activity.	The beach is accessible by both public and private transport from different Algarve's regions. Is open for the public, no entry payment fee. There is an easy access to the beach from the main promenade along the coastal area.	Different kinds of apartments and hotels line the sea front of Quarteira-Vilamoura beach.	Numerous water sports: windsurfing, jet-skiing, paragliding, family pedalos and fishing for the fee Mattress covered sun loungers are available for the rent; Umbrellas are free of charge Bars and restaurants line the beach front. Parking along the seafront Toilet and showers facilities on the beach, Receptacles for used cigarettes, litter bins First aid post and lifeguards in the summer time. Windsurf, boats and motor boats for the rent
Quinta do Lago (resort beach)	This beach is located in front of the resort named Quinta do Lago, one of the well known and luxurious golf resorts of Algarve. The Quinta do Lago resort area, located in the Loule municipality.	Quinta do Lago beach is open for public and there is no entrance fee. The beach is accessible by private transport or by walking. The access to the beach from the resort area is by the wooden footbridge over the Ria Formosa Lagoon.	Quinta do Lago resort offers a large number of accommodation options, mainly apartments and villas, with one large luxury hotel. Villas are privately owned or for sale.	A restaurant at the beach Toilet facilities Chairs and mattress covered sun loungers for the rent; Sun shelters for free Receptacles for used cigarettes, litter bins Car parking spaces at the resort area Lifeguards, first aid post and public telephone at the resort area

Continued table

Ilha Deserta (remote beach)	This beach is situated at the isolated Deserta Island. The island is the southernmost point of Algarve.	No entrance fee to the beach. The island is accessible only by boat from Faro with the 40 minutes of journey. The access to the beach from the berth is by a wooden walkway.	None housing at the Island	Kayaks and pedal boats for the rent A wooden restaurant Shower and toilet facilities Mattress covered sun loungers for the rent; Sun shelters for free Litter bins Lifeguards
Ilha do Farol («Molhe Leste»), (village beach)	«Molhe Leste» is an isolated sandy beach, located on the Ilha do Farol Island, a small fishermen village in front of Faro.	The beach is accessible by ferry or boat from Faro and Olhão. No entrance fee to the beach.	On Ilha do Farol Island there are houses and bungalows privately owned by locals and there are also some available for the rent.	Diving, volleyball, children playground, beach tennis Bars/cafeterias on the beach and some at the Island Sun shelters and mattress covered sun loungers for the rent Litter bins, receptacles for used cigarettes Lifeguards
Ilha da Armona (rural beach)	Ilha da Armona beach is situated in the extreme west of the Armona Island.	The beach is accessible by water taxis or regular boat and ferry from Olhão and from Culatra, with the 30 minutes of journey. No entrance fee to the beach. Access to the bathing area from the berth is by the wooden walkway.	The island is populated with a large number of small beach houses owned or for the rent. There are camping and rental cabins.	A cafe on the beach Several cafes and bars are presented at the island Toilet facilities Litter bins lifeguards

Quarteira-Vilamoura beach is an urban sandy beach, located in Quarteira town in the municipality of Loule. The beach is free to the public and accessible by both public and private transport from different Algarve regions. In the past Quarteira was a small fishing village, but now it is a well developed cosmopolitan tourist centre with about three kilometers of «Blue flag» beaches (RTA, 2007). The area includes schools, shops, religious centres, cafes, post office, banks, central business district, marina, fishing and boating activity. Quarteira-Vilamoura beach is cut by series of breakwaters and usually is very crowded during summer (RTA, 2007) and has a theoretical carrying capacity of 4600 users (ICNB, 2002). The beach is equipped with all necessary facilities for recreation: shower and toilet facilities, numerous water sports, litter bins and receptacles for used cigarettes, sun shelters and sun loungers for rent, first aid post and lifeguards during the summer time. There is an easy access to the beach from the main promenade running along the seafront, offering all kinds of tourist amenities for pleasant vacations, such as numerous bars and restaurants, parking spaces, different types of apartments and hotels.

Quinta do Lago Beach is a one kilometer sand beach (ICNB, 2002), situated in one of the Algarve's most luxury tourist resorts, which borders on the nature reserve and lagoons of Ria Formosa. The beach is free for public use and can be reached only by private transport or walking from Faro beach. The Quinta do Lago resort offers a large number of accommodation options, mainly apartments and villas and one large luxury hotel. The resort belongs to the municipality of Loulé and is famous for its golf courses. The San Lorenzo golf course was ranked in 2009 by "World Golf UK" as 27th top course in Europe and was considered by Golf World Magazine in May 2007 to be the best in Portugal and one of the best in Europe (San Lorenzo Golf Club, 2010). The

Quinta do Lago resort is a home for the rare species of flora and fauna that inhabit the area, making it a good place for tourists, who prefer eco-tourism and the preservation of nature. Such birds as the mallard, coot, purple gallinules, flamingos and many others can be seen from close up. The dunes are well preserved and are characterized by the highly diversified flora. Besides the natural surroundings and golf courses, Quinta do Lago resort offers different support facilities for high-quality vacation, such as tennis courts, horse riding center, water-sports, parking spaces, first aid post and pubic telephone (Quinta do Lago, 2010). Quinta do Lago beach is accessible from the resort area by a 300 meter long wooden bridge over the Ria Formosa lagoon and equipped with a range of services. Sun shelters and sun loungers, boats and motor boats are available for the rent. Additionally, there is a small wooden restaurant, which includes toilet facilities. Quinta do Lago is a «Blue Flag» beach, supervised by lifeguards during the summer season, with the theoretical carrying capacity of 1184 users (ICNB, 2002).

Ilha Deserta (Ilha da Barreta) beach is an extensive sandy beach, roughly 0.6 kilometers in length (ICNB, 2002), situated at the Deserta Island, one of the most isolated islands of the Algarve and the southernmost point of the Portuguese mainland. It is a quiet beach, and is the only completely uninhabited island in the entire Natural Park of the Ria Formosa Lagoon. The stretch of dunes along the beach still preserves its natural vegetation, being a home for different species of flora and fauna, especially birds: plovers and different species of terns nest here (RTA, 2007). Besides the natural diversity, the beach is equipped with basic support amenities such as a restaurant, shower and toilet facilities, sunshades and sun loungers, kayaks and pedal boats for renting. The beach is monitored by the lifeguards during the summer season and is a «Blue Flag» beach with the theoretical carrying capacity of 470 users (ICNB, 2002).

Ilha do Farol also known as «Molhe Leste» Beach is situated at the southernmost island of Algarve and Ria Formosa Lagoon, near to a small fishermen village. The island is occupied with many beach houses, and a lighthouse in front, that names the Island (Farol literally means Lighthouse), (RTA, 2007). «Molhe Leste» is a 700 meters sand beach and one of several beaches that present great conditions for surfing (ICNB, 2002). It is a quiet beach, with long line of hot and dry sand dunes, which retains its primary vegetation and includes sites of newly created dunes. A range of facilities are present on the beach: sun shelters and sun loungers for rent, bars and cafeterias, volleyball, beach tennis, children playground, diving, lifeguards during the summer time. The large mole to the west of the island is used for lessons by diving schools as well as by numerous fishermen (RTA, 2007). The beach is awarded the «Blue Flag» symbol and its theoretical carrying capacity is 1450 users (ICNB, 2002). To get to Ilha do Farol Island and “Molhe Leste” beach, is possible by boat or ferry, leaving from Olhão or Faro with a journey of around 40 minutes.

Ilha da Armona beach is situated in the extreme west of the Armona Island, close to the Barra Grande and to a small fishing village. It is accessible by regular 20 minutes ferry or boat trip, or even quicker water taxis from the waterfront in Olhão town. Ilha da Armona beach is 1.2 kilometers in length, and up to 30 meters in width (ICNB, 2002). The sandy area of the beach is very extensive and wide, with the long line of sand dunes, which demonstrate rich flora and fauna. The beach is good for people who enjoy walking or have their own boat. The island is populated with a large number of small beach houses, a campsite, and different café-bars (RTA, 2007). Basic facilities for the recreation present on the beach: toilet facilities, café, lifeguards in summer time, easy access to the beach by the pedestrian starting from the berth. It is a «Blue Flag» beach, with the theoretical carrying capacity of 1550 users (ICNB, 2002).

CHAPTER 3

TOURISM AND BEACH QUALITY (LITERATURE REVIEW)

3.1 Tourism in the world industry

Tourism is defined by World Travel Organization (WTTC, 2010(a)) as an economic and social phenomenon, an activity, which happens in international terms, when people leave their home countries to other regions for the leisure or business purposes not less than for 24 hours and not longer than for one year. The present day tourist is a very experienced traveler, with the higher requirements for services and more informed of his rights than tourists of previous generations (McKenna, 2000).

Over decades, tourism has experienced continued growth, and now is a key driver for socio-economic progress. International tourism arrivals increased on 6.5%, growing from 25 million to 806 million travelers from 1950 to 2005 (WTTC, 2010(a)). Tourism has become one of the major players in international market, representing one of the main income sources for many developing countries (WTTC, 2010(a)). However, today "Travel and Tourism" worldwide is hopefully recovering from the worst economic crisis for the last 60 years. Global Travel & Tourism Economy GDP decreased by 4.8% in 2009, which caused the loss of 5.6 million jobs estimated to the end of 2010. In all regions was significant decline in visitor arrivals, Travel and Tourism Economy GDP, and Travel & Tourism investment decreased by over 12% (WTTC, 2010(a)).

Nevertheless, Travel and Tourism continues to be a leading employer. Even in such a depressed year for activity as 2009, Travel and Tourism still employed over 235 million people across the world – 8.2% of all employment and contributed 9.4% of global Gross

Domestic Product (GDP), (WTTC (2010a). The Travel and Tourism Economy will grow by 4.4% per annum in real terms between 2010 and 2020, providing 300 million jobs by 2020, which is 9.2% of total employment and 9.6% of world GDP (WTTC, 2010(a)). These numbers confirm that Travel and Tourism will continue to be the world's highest-priority sectors and employers. WTTC, 2010(a) forecasts a growth in international tourist arrivals of between 3% and 4% in 2010 and expected international arrivals of 1.5 billion people by 2020. Overall, it is certain that the importance of Travel and Tourism will continue to grow, representing the world's highest-priority sectors and employers (WTTC, 2010(a))

Nowadays beaches are the main focus for global holiday markets, and the symbol of contemporary tourism (Holden, 2000). Interactions with the sea represent a significant value for Europe. Europe is the most frequently visited region in the world, with 500 million arrivals, which represent a value of US$ 434 million receipts (UNWTO, 2009). The greatest average length of visitor stays in the European Union, are the maritime regions (European Commission, 2010). They either have extensive coastlines or are islands and therefore encircled by the sea. The European Union (EU) is surrounded by four seas: the Mediterranean, the Baltic, the North and the Black Sea and by one Atlantic Ocean. Regarding the numbers of overnight stays in the regions of Europe, the focus of European tourism is in the Mediterranean, with more than 10 million overnight stays in Portugal (European Commission, 2010). As a consequences of this, Mediterranean beaches have been transferred themselves into the main motors for local economies providing the high percentage of region incomes (Roca et al., 2008).

3.2 Tourism in Portugal

Portugal provides perfect tourism conditions, mostly due to its mild Mediterranean climate and extensive coastline with various high quality beaches. Beaches represent the main drivers of the Portuguese tourism industry (Vaz et al., 2009). Natural conditions, historic and cultural heritage, plus the kindness of Portuguese people strengthen tourism development of the country. Tourism sector is one of the most important in the Portuguese economy because of several reasons. Firstly, it is a significant monetary contributor to the national GDP, generator of most country's incomes and a creator of the employment. Secondly, it is a positive factor in enhancing of the positive Portugal's image abroad (Aicep Portugal Global, 2010 (a)).

Portugal ranks on the 17th position in the «Tourism competitiveness Index» at the global level among 133 countries covered and is on the 12th position in Europe, situated ahead of such countries as Ireland, Norway, Cyprus, Belgium, Greece, etc. (Blanke and Chiesa, 2009). Within the European Union, Portugal appears on the 10th position for the economic value of tourism activity and the 6th highest in terms of tourism as a share of GDP (Blanke and Chiesa, 2009; Aicep Portugal Global, 2010 (a)). Portuguese "Travel and Tourism" economy GDP equals to 24, 2 bln Euros and supports 943, 000 jobs across the country (WTTC, 2010(b)).

Portugal ranks among the top 10 countries in terms of receiving the most foreign tourists at European level, and is among the top 25 on a world scale (Blanke and Chiesa, 2009). The hotel establishments in Portugal accommodated 12.9 million guests and recorded 36.5 million overnight stays (-3.9% and -7.1% respectively comparing with

2008). The Algarve was still the main destination of tourists (35.5%), followed by Lisbon (21.7%) and Madeira (15.1%), (INE, 2009(a)). Algarve appears among the 25 regions in Europe with a tourism intensity of more than 10 000 overnight stays per 1 000 inhabitants (European Commission, 2010).

Most tourists who visit Portugal come from Europe, primarily from the European Union. However, travelers from Brazil and United States were also registered among the top ten countries of origin. In 2009, the breakdown of hotel nights spent in Portugal by foreigners shows that the United Kingdom formed the highest number (5, 7 mil.), followed by Germany (3, 3 mil.), Spain (3, 2 mil.), the Netherlands (1, 8 mil.), France (1, 6 mil.), US (1, 5 mil.), Ireland (0, 8 mil.), Italia (0, 8 mil.), Brazil (0, 6mil.) and Belgium (0, 5mil.), (INE, 2010).

The Algarve is marked as highly dependent on Travel and Tourism, which represents about 67% of the total GDP and is expected to increase up to 71% in 2013; it also accounts for 60 % of total employment, and this is expected to grow up to 64% by 2013 (WTTC, 2003). The tourism sector in Algarve plays a primary role in the wealth and employment across the region, as well as stimulating growth in areas of retailing and construction (WTTC, 2003). The residential tourism market is considered a strategic economic sector by the Portuguese authorities and also ranks in the top-ten priorities for the property and hotel industries (Roca et al, 2009).

The Algarve first became popular in the 1960s, when it started to be considered an upmarket alternative to the Mediterranean (WTTC, 2003). Also, in the same time, it became a favoured place of retirement and secondary homes for British and other northern Europeans (Roca et al., 2009). Today, the Algarve is one of the principal tourist destinations in Portugal, offering many diversified and quality attractions and

activities, primarily focused on sun, sea, sandy beaches and golf. However, the Algarve faces increasing competition in seaside tourism, unlike in the recent past not only from Turkey and Morocco, but now also from lower-cost emerging destinations such as Croatia and Bulgaria, and from neighbouring Spain. The main issue for the Algarve is achieving higher competitiveness in terms of the quality of its products and services (WTTC, 2003). Among the guidelines suggested by UNWTO for making the Algarve more competitive country in world tourism market, was the placing of high priority on improvement of human recourses, need for better education and training, long-term tourism planning, enhancing of safety and security, development of tourism promotion. It is very important, that the region should maximize its association between the golf/sun/sea and keep its high quality, as it is almost unique combination in Portugal amongst Mediterranean countries (WTTC, 2003).

3.3 Challenges and needs for the beach management

Roca and Villares (2009, p. 314) defined beaches as “multidimensional systems, where human and biophysical subsystems are in continuous, dynamic and complex relationship”. Beaches have not always attracted visitors in a way they do today: in a far past many cultures perceived them with fear. Over the years, attitudes to beaches have completely changed, and now they are popular and favorable recreational areas (McKenna et al., 2000). Nowadays beaches have become a symbol of holiday tourism and a focus of global tourism market (James, 2000; Roca et al., 2009; Phillips and House, 2009), and it represents a big business (Houston, 2002). Beaches are important recreational and leisure areas for the economics of coastal countries, attracting an increasingly larger number of users worldwide (Vaz et al., 2009). Beaches and near shore waters give opportunities for sunbathing, relaxing and numerous activities, such

as swimming, surfing, yachting, fishing, jet skiing and birdwatching. But equally to being an attractive and enjoyable resource for large number of people, beaches are also one of the most complexes, dynamic and sensitive landforms of coastal environments (Dahm, 2003; Hansom, 2001). Beaches constantly change due to the natural processes occurring in the coastal zone such as waves, tides and storms as well as due to the anthropogenic loads (Williams and Micallef, 2009). As example of how intensive storm can affect the coastal zone, the case of the winter disaster at Ilha do Farol beach in Algarve is demonstrated below (Figure 3.1). The area of the beach was completely washed out by the huge storm and all the cafes and bars were also destroyed. People on the island could hardly leave their houses.

Figure 3.1 View of Ilha do Farol beach and café before (left) and after (right) the winter storm of 2010 (source: www.facebook.com («Ilha do Farol» group).

Unfortunately, it is impossible to control the forces of natural disasters. However in order to skip the hardest consequences of the nature disasters, firstly it is very important to inform the population about possible dangers and to prevent all beach users from being at risk from the hazards. Risk management is a very important discipline, as beaches vary in their usage and physical characteristics and the possibility of hazards to occur is very high. Rip currents, large wave heights, rock areas and rock falls, dangerous marine species in some areas, can require urgent medical attention (Williams and Micallef, 2009).

Almost all beaches in Algarve are well equipped with a range of facilities and safety parameters needed for enjoyable and relaxing holidays. However, tragic accidents take place, as the recent accident in Algarve (21.08.2009) at «Maria Luisa» beach in Albufeira, when a rockfall happened and five people died. In fact, rock slides on the cliffs of Portugal's Atlantic Ocean beaches are common and every summer there are reports about injuries, especially during the busy August holiday month. However, deaths are rare in such incidents and the accident in Albufeira has claimed the highest number of victims for several years. The rockslide raised a debate on radio and television about safety standards at Portugal's beaches. The cliff side, which collapsed, had a sign «Danger Zone», but access to the beach was not closed (Figure 3.2). After removing all rocks and debris, the beach was opened for daily use, and the Blue Flag raised again (ABC News International, 21/08/09). This accident points to the need of the proper beach management and high quality planning.

Figure 3.2 Rock fall at Albufeira, on 21/08/2009 (source: http://abcnews.go.com/)

Beaches with cliffs have a potential danger associated with rock-falls. Beach users sit close to cliffs, providing a backrest and hiding from winds. Different indicating signs of danger are usually placed near the cliffs, but often beach users do not perceive them. The layout of warning signs is important, and a red colour with a white frame was confirmed by international standards (Williams and Micallef, 2009). Besides the nature

disasters and accidents, caused not by human fault, there are many problems, caused by anthropogenic loads on beaches worldwide.

An increasing popularity of beach tourism together with the exploding growth of population in coastal areas has led to escalating stress on the word's beaches (Williams and Micallef, 2009). Tourism negative impact on the coastal environments has considerably increased (Davenport and Davenport, 2006). Today many beaches are threatened by human activities, especially sand beaches, which are the most valuable resource for recreation (Dahm, 2003; Defeo et al., 2009; Cervantes and Espejel, 2008). The problem of environmental quality deterioration of coastal zones as a consequence of human activity has been recognized worldwide (Ariza et al., 2008). After reviewing the literature, it can be stated that among major challenges facing the coastal zone are the reduction of water quality, beach pollution, overcrowding, coastal erosion, deterioration of scenery, coastal dunes deformation, negative effects on wild life on beaches, and other threats.

Beach debris is one of the most visible negative impacts of human activity to coastal environments (Claereboudt, 2004; Bravo et al., 2009; Williams and Tudor, 2001), and beach litter leads to adversely effects on human health and wild life (Balas et al., 2004). Problem of anthropogenic marine debris associated with diverse human activities has been confirmed by a number of authors. In a litter survey by Claereboudt (2004) a total of 3939 identifiable items weighing a total of 59.46 kg were recovered from 2200 meters of 11 sampled beaches of the coast Gulf of Oman situated in the Middle East. It was found that most debris in terms of numbers, dominated by plastic, wood and other organic materials, and they were associated with beach recreation activities. Bravo et al.

(2009), reported about a ubiquitous problem of anthropogenic marine debris in South-Eastern Pacific beaches. From results of the study, carried on litter assessment by the group of volunteers in Chile, plastics were among the most common debris types on almost all surveyed beaches (Bravo et al., 2009). Santos et al. (2005) concluded that the litter input and impacts on the Brazilian coast due to quickly increasing recreational activity will continue to grow if no preventive action would be done.

Conflicting requirements of functions such as habitation or recreation affect the coastal scenery of beaches worldwide, destroying their natural beauty (Ergin et al., 2006). A carried study on scenery assessment in Turkey showed that coastal environmental problems have been experienced in the country during the last 30 years, due to rapid urbanization, growing population and over-use of natural resources (Ergin et al., 2010). Besides scenic deterioration, there are threats to the reduction of bathing water quality and deformation of dunes landforms in coastal region. Pond et al. (2005) has commented upon the danger of bathing in the waters of Caspian Sea in Turkmenistan and Iran because of the risk of gastrointestinal illness and pointed to the need of public awareness. The health-based monitoring has identified the increased levels of faecal pollution, caused by the density housing and industrial activities along the coastal areas. Coastal dunes systems around the world are also under huge pressure due to construction industry, golf courses and other activities (Williams et al., 2001). Natural dunes of New Jersey coastline were often eliminated in USA, in order to accommodate recreational uses (Nordstrom and Mitteger, 2001). Watson et al. (1996) reported about a threat to dune vegetation and breeding birds in South Africa, because of the vehicle activities in the coastal zone. Additionally, beaches are under significant threat of erosion worldwide (Phillips and Jones, 2006; Lambeiti and Zanuttigh, 2005). In

Morocco, the beach in the eastern part of Tangier Bay has been constantly eroded over the past 50 years as a direct result of the important harbour development (Chaibi and Sedrati, 2009). Roca et al. (2008) reported that aanalyses of beach occupancy in the Costa Brava, Spain, showed that most of urban beaches suffered from overcrowding and were threatened by erosion.

The signs of environmental degradation, mentioned above, affect both ecological status and the tourists' experiences of recreation and thereby decrease the economic value of beaches for host communities. Therefore, there is an increasing need for sustainable beach management, in order to prevent beaches from the degradation and increase the positive effects from using these ecosystems. A great effort and high accuracy is needed for creating successful strategies for managing the beaches (Roca et al., 2009). Nowadays, with increasing leisure time, opportunities and quality expectations, beach management has become a very important component of Integrated Coastal Zone Management (Micallef and Williams, 2002).

Beaches represent a variety of functions, such as coastal defense, recreation and conservation, and frequently a conflict of interests takes place. According to Williams and Micallef (2009, p.3), "beach management seeks to achieve optimal physical usage and development of beach resources that respect the natural physical elements of a beach environment while satisfying basic social needs within that environment". Besides, it should integrate all stakeholders acting in the area and policies affecting them, as the beaches are the places of natural and anthropogenic patterns interaction. The lack of understanding of this interaction leads to the pernicious changes in the natural environment of beaches (James, 2000). Williams and Micallef (2009) stated that

for successful beach management is very important to address special issues and demands for a variety of beach types, ranging from resort to remote and rural. Otherwise, if the specific characteristics of each beach are not considered in terms of natural diversity as well as social uses, there is a risk that the models applied may become homogeneous (Roca et al., 2009). Among the major issues that need to be taken into account by effective beach management schemes refer to the level to which individual beaches should be developed, acceptable level of disturbance, and identification of the requirements and preferences of beach users (Micallef and Williams, 2002).

In Portugal there is no specific bathing policy concerning management for all basic aspects of bathing activity. This fact leads to the lack of information about these aspects such as the use patterns of areas and the users' perception of beach quality, landscape and social importance. It is necessary to create a holistic approach to bathing area management, integrating environmental, economic and social aspects. The determination of beach users' perceptions and expectations is essential tool for beach managers for establishment of beach quality standards and consequent classification (Quintela et al., 2009).

3.4 Beach users' preferences and priorities and beach quality assessment

The «sun, sand and sea» tourism model is much demanded and it is needed to meet requirement of tourists in the beach holiday scenario (Roca et al., 2008). Beach user's perception is likely to play a central role for planning and policy consideration (Marin et al., 2009). Inclusion of beach users' preferences and priorities into tourism planning is of vital importance for communities and local planners, because of the contribution that

tourists make to the destination's economy (Oh et al., 2010; Vaz et al., 2009). Thus, one of the aims of beach management is to maximize the features, which are favoured by beach users and to minimize those, which are disliked (McKenna et al., 2000). It is very important to recognize both tourist's preferences and resident population's attitudes towards beach tourism. Providing management authorities with complex information of the preferences of different beach user groups helps to develop more effective policies and management plans (Oh et al., 2010). Additionally, the relationship between beach environment and population is very complex: beach users' behavior often effects on environmental quality of beaches, at the same time, beach users' behavior likely depends on individual's perceptions of environmental quality of the beach. Consequently, beach managers seek to better understand how beach users perceive the environmental quality of beaches and how accurate these perceptions are in reality (Pendleton et al., 2001; Martin and Pendleton, 2004). In order to establish priorities for beach management, it is necessary to assess what different groups prefer while visiting a particular beach (Phillips and House, 2009). The preferences and perceptions are not only influenced by the specific characteristics of each beach but also by the beach-user profile (Roca and Villares, 2008). People differ in many ways, and the range of factors influence on the person's perception and expectation regarding a beach quality. For example, socio - demographic factors and variety of physiological variables reflect on the individuals' needs, personal values, and personality (Galloway, 2002).

Some people are more strongly attracted to some areas than to others (Dahm, 2003). Users who usually visit developed beaches, place higher value on such parameters as facilities, safety, good access and parking close to the beach and expect them to be functional, comfortable, user-friendly and safe. For users of undeveloped beaches such special qualities of the sites as attractive scenery, peace and quietness represent a higher

importance than facilities. Overall, natural beaches with limited development and without intensive human-made constructions are valued much higher than overdeveloped and overcrowded beaches. Water quality and beach cleanliness are perceived as the most important characteristics of ideal beach, in contrast, vehicles and dogs on a beach are generally disliked by users (Dahm, 2003). Repeated surveys of beach users' preferences and priorities have shown that five factors are the most important for having a successful beach holiday are safety, water quality, facilities, scenery and litter (Micallef and Williams, 2004; Tudor and Williams, 2006; Marin et al., 2009; Williams and Micallef, 2009).

The use of questionnaires is the most common method for assessing beach users' views, perceptions and preferences. For the better understanding of beach users' behavior many questions and answers are needed. Following the guidelines provided in Williams and Micallef (2009), questions have to be seen in the context of the aims and objectives of any research proposal. Summarizing Dahm (2003), questions which should be included, are: who uses the beach and why; types of beach uses, frequentation, the social and environmental factors that influence the use and choice of different types of beaches, user preferences for facilities, perceptions and expectations regarding the beach quality, control of beach usage and activities. An understanding of these questions can help to match management policies to what the public want and balance conflict interest between all patterns of coastal zones (Dahm, 2003). The questionnaires for this project followed the suggested guidelines given in Appendix 1.

The collection of information from the public is a subject, which has been poorly addressed in the literature (Roca et al., 2009). However, several studies on beach users' perceptions, preferences and priorities through the questionnaire surveys have been

carried out in different coastal areas. Among some of those studies, Morgan (1999) investigated beach users' preferences and priorities for 50 beach aspects via questionnaire surveys at 23 beaches in Wales. Coman and Columbeanu (2002) examined beach user perceptions of the beach environment, particularly with regard to pollution problem at Mamaia Beach, Romania. Tudor and Williams (2006) identified the beach users' preferences with respect to beach selection on the coast of Wales, UK. Ergin and Williams (2007) assessed quality of beaches and identified beach users' preferences and priorities in Nador, Morocco. Roca et al. (2008) and Roca et al. (2009) examined beach users' perceptions for 46 parameters regarding environmental quality, facilities / services and beach users' in Costa Brava, Spain. Quintela et al. (2009) investigated beach users' perceptions regarding several aspects of bathing areas usage in Sao Miguel-Azores bathing areas of Portugal. Vaz et al. (2009) carried out questionnaire surveys regarding beach users' priorities about the most valued parameters on beaches in Portugal and Wales. Marin et al. (2009) conducted a questionnaire survey and identified beach user's profile and perceptions of the beaches, awareness and attitude about themes related to beach management in coastal areas of Italy. McKenna et al. (in press) carried out questionnaires surveys of beach visitors' motivation in Ireland, Wales, USA and Turkey.

Overall results of these studies show that different coastal environments attract visitors with different values. In order to fulfill a better beach management plans, applying «bottom-up» approach and basing on complete information about beach users' perceptions and preferences, and considering different types of beach environments, innovative and more effective models for assessing a beach quality are required (Roca and Villares, 2008). Furthermore, if the specific characteristics of the beach regarding natural diversity and social uses parameters are not taken in assessing of beach quality,

these models could become ineffective. In recent years, the range of management practices for assessing beach quality has broadened and rating schemes have been developed (Roca et al., 2009).

3.5 Beach Awards and Rating Systems

The primary aim of beach managers is to conserve the natural state of coastal scenic quality as far as is possible and, in the same time, to facilitate a bathing area with recreational activities in order to maximize its enjoyment by beach users in accordance with its primary aim. However, to keep this balance is a difficult task in practice, because usually there is a problem between developing recreation too far and conserving absolutely. Beach award schemes and rating systems helps beach managers achieve an optimal balance between recreation, tourism and conservation. It is very important that any beach award or quality system should cover physical, biological and human parameters (Williams and Morgan, 1995; Cagilaba and Rennie, 2005).

All award concepts are forms of eco-labels, which are usually perceived by authorities as a reward to achieve, and then to demonstrate the advantages of chosen area to potential beach users (Cagilaba and Rennie, 2005). Therefore, beach awards and rating systems represent an undoubtedly important factor of motivating beach managers to improve their services and facilities (McKenna et al., in press), attract more tourists, to enhance an area development and to bring needed revenue to local economies. The use of beach awards has become a key factor for successful development of beach tourism in an area (Nelson et al., 2000).

A number of studies have highlighted some necessarily parameters, which are essential for effectiveness of beach awards. It should demand careful consideration of possible impacts on the beach features which currently seem to attract visitors to these sites. Additionally, award schemes should recognize the preferences and priorities of beach users, and include the differentiations in evaluating various beach types. An understanding of different requirements for rural and more developed beaches is very important, as the attempts to standardize all beaches may lead to higher developing of rural areas in order to be eligible for certain award. Finally, some strategic effort should take place in order to streamline the various beach awards as at present the variety of award schemes cause a confusion among the visitors (Morgan, 1999; Nelson and Botterill, 2002; Cagilaba and Rennie, 2005; Williams and Micallef, 2009; McKenna et al., (in press)).

There exist many different beach rating systems and awards, which address various issues regarding beach management. Literature suggests several studies with review and comparison of a number of existing beach rating systems: Williams and Morgan (1995), Nelson et al. (2000), Cagilaba and Rennie (2005), Williams and Micallef (2009). Summarizing previous studies, and reviewing several beach rating systems and awards, the main characteristics of these concepts are discussed below and the set of descriptive criteria was modified from Williams and Morgan (1995) and Cagibala and Rennie (2005) and presented in Table 2.

The Blue Flag is probably the most internationally recognized beach award (Williams and Morgan, 1995; Cagilaba and Rennie, 2005; Williams and Micallef, 2009). The Blue Flag represents a voluntary eco-label and its has been awarded to over 3450 beaches

and marinas in 41 countries across Europe, Russia, South Africa, Morocco, Tunisia, New Zealand, Canada, Brazil and the Caribbean. The Blue Flag Programme was firstly launched in France in 1985 and owned by independent non-profit organization of Foundation for Environmental Education (FEE). The Blue Flag is awarded only for one season and is based on compliance with 32 criteria, promoting sustainable development of beaches and marinas through high standards in water quality, environmental education and information, environmental management, safety and other services (Blue Flag, 2010).

Costa Rica rating system is probably the oldest scheme of the modern era (Williams and Micallef, 2009). This system was developed by Chaverri in 1989 with the aim to identify beaches suitable for Governmental and Private Tourist development in Costa Rica under the authority of the Marine and Terrestrial Act. The Costa Rica award system included up to 113 factors, split into «positive» and «negative» categories. For each factor was addressed a score between zero and four with the final rating of the beach obtained by subtracting the sum of «negative» scores from the sum of «positive». The rated factors represented six groups, which were water, beach, sand, rock, general beach environment, and the surrounding area. Costa Rica beach did not take into account beach users' preferences and priorities beach users to any of the factors. Therefore, the dividing of factor on 'positive' and 'negative' did not provide reliable results (Williams and Morgan, 1995).

The Good Beach Guide is a book published annually by the Marine Conservation Society (MCS), and NGO based at Ross on the Wales/England border. The Guide consists of two main sections, with the first relating to water quality criteria and the

second providing information such as the beach descriptions, safety, litter, facilities, wildlife, seaside activities, accessibility and parking, public and tourist information. In order to pass, beaches have to achieve accordance with the EU Bathing Water Directive. The final scores for beaches represent the symbol of «dolphins», ranging in quantity from one to five dolphins. Only the beaches with a minimum grade of '3 dolphins' are included to the Guide Book, where they are described and recommended to public (Williams and Micallef, 2009; Marine Conservation Society, www.goodbeachguide.co.uk).

The National Healthy Beaches Campaign (NHBC) is an academically based beach certification programme, accepted by Florida National University, Miami. The programme was based on the beach rating survey, firstly developed by Professor Stephen Leatherman in 1996. The campaign's is aimed on maintaining high standards of beach management and ensuring that dependable sources of information are available to beach users (Cagilaba and Rennie, 2005). According to this rating system, beaches are evaluated against 60 environmental and service-based criteria in a scale from one «bad» to five «good». Among some aspect of rating criteria there are water quality, sand quality, dangerous water conditions, overall beach safety, environmental quality and management, services, participations in pro-active beach campaigns. Once beaches meet these criteria they become credited as recognized Healthy Beaches. The NHBC evaluates resort/ urban, rural/ park swimming public beaches in USA and applies different stringent of criteria for those beach types. Additionally, NHBC provides public with the information regarding safety and environmental friendly behavior on a beach (National Healthy Beaches Campaign, http://www.healthybeaches.org).

The Blue Wave of the Clean Beaches Council is America's first environmental certification for beaches, formed in 1998 in the US that recognizes rural and resort types of beaches. The Blue Wave Accreditation Programme promotes public awareness and volunteer participation in sustainability while ensuring a legacy of clean beaches for all generations to come. Blue wave certification is valid only for one year. The former includes 33 assessed criteria for resort beaches, and 27 criteria for rural. Standard parameters investigated include water quality, beach and intertidal conditions, hazards, services, habitat conservation, public information/education and erosion management (Cagilaba and Rennie, 2005).

Seaside Award is UK award scheme introduced in 1992 by the Tidy Britain Group (TBG) organisation. The award is valid for one year only and promotes beaches that well-managed, clean and relatively safe. The Seaside Award recognizes resort and rural types of beaches. The main difference between those types is that resort beaches should offer facilities such as toilets, café, close proximity to urban areas and supervision, while rural beaches are not expected to have the same level of services. Inclusion of the rural beach category helped many less developed beaches, which can not be recognized by Blue Flag Award, to qualify for this award. The award is promoted via leaflets, press releases, on-site notice boards and presence of award flags at awarded beaches (Nelson et al., 2000).

Green Coast Awards is a symbol of environmental excellence and has been established by the Wales Tourist Board and Welsh Water in 1996 and piloted in Wales in 1999. The Green Coast Awards beaches are associated with clean water and sound environmental management. The Green Coast Award is aimed to acknowledge, promote and protect the environment of rural beaches in Ireland, Northern Ireland and Wales. The award is

addressed to beaches, which meet European Community bathing water quality standards and in the same time represent natural and unspoiled by intensive infrastructure and management environments. The Green Coast Award takes into account the importance of community involvement in coastal management and sets up the “coast care groups” (Green Coast Award, www.cleancoastproject.org).

UK Environmental Agency provides rating of beaches according to its cleanliness. The base of the assessment is the concept of National Aquatic Litter Group (NALG), which evaluates beaches, depending of the amounts of litter found on a 100m stretch of beach from the tide line to the back of the beach (Figure 3.3). According to NALG, litter is divided on categories: sewage-related debris, gross litter, general litter, harmful litter, accumulations, oil and faeces (Williams and Micallef, 2009). Then the found litter is counted and the beach is obtained rates A-D for each category, where A is characterized by the minimum amount and D by the maximum amount of litter. The lowest grade, given for any litter category, represents the final grade for the beach (Williams and Micallef, 2009).

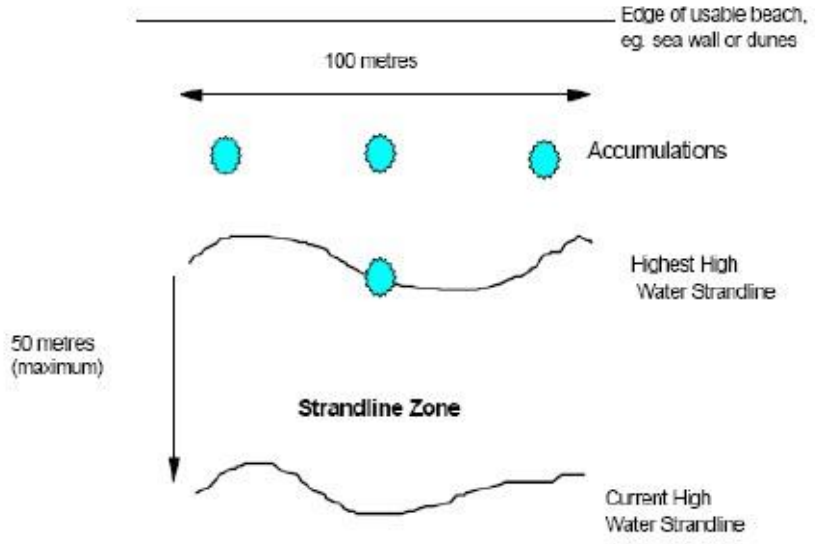


Figure 3.3 A typical beach survey, basing on the NALG protocol (source: Ergin and Williams, 2007).

Bathing Area Registration and Evaluation System (BARE) is an innovative beach rating scheme, first developed by Micallef and Williams (2004) for evaluating the quality of Maltese Islands. Later it was also applied in other studies, for example, it was used by Ergin and Williams (2007) for evaluating the beaches along the coast of Nador, Morocco. This innovative scheme evaluates the bathing area as a whole (a beach and an area within walking distance, which is visible from the beach, together with all serving the beach facilities) and classifies beaches from a user's perspective. The BARE system is based on evaluating five bathing area parameters: safety, water quality, facilities, scenery and litter (in order of priority), determined through the recent researches carried out in the Euro-Mediterranean region and the US on beach users preferences and priorities. The System recognizes five types of beaches: rural, remote, village, urban and resort, and assessed the quality of beaches according to beach type specific requirements (Williams and Micallef, 2009). The BARE framework definitions of five types of beaches are taken from Ergin and Williams (2007) and presented below:

Remote: A bathing area largely defined by its difficult access (by foot or boat) and not supported by public transport. A remote bathing area would have no public service facilities and very limited (0 – 5 if any) temporary summer housing. Safety-related facilities and "official" water quality monitoring are not expected on remote bathing areas. Still, water quality is evaluated using visual observation. Evaluation parameters rated for remote bathing areas, next to visually observed water quality, are limited to hinterland scenery and litter (from Ergin and Williams, 2007).

Rural: A bathing area located outside the urban environment and not readily accessible by public transport and usually having no public service facilities. However in the Mediterranean context, some resort facilities may be found in the summer months.

Housing at rural bathing areas may be limited in number (0 – 10), either of a temporary (summer) or permanent (year long) nature, but having no community focal centre such as local shops or cafes/bars. At such bathing areas, public service and safety-related facilities and “official” water quality monitoring are not expected. As with remote areas, rated parameters are limited to hinterland scenery, litter and visually observed water quality only (from Ergin and Williams, 2007).

Village: A village bathing area is one associated with a small but permanent population reflecting organized but small-scale community services (local shop/s, cafes/bars, bed/breakfast accommodation, toilets & litter bins) but located outside the main urban environment. Village bathing areas may be reached by public and private transport and would offer some basic safety-related facilities such as fixed safety equipment or safety related warning notices. Water quality monitoring would be expected at such bathing sites (from Ergin and Williams, 2007).

Urban: Urban bathing areas are sites within the immediate urban environment and may therefore serve large communities with well-established public services e.g. banks, post-office, hotel accommodation & restaurants. In the proximity of urban bathing areas, one may often find commercial activities such as fishing/boating harbours and marinas. Stringent safety-related facilities and water quality monitoring would be expected at urban bathing areas (from Ergin and Williams, 2007).

Resort: A resort bathing area is defined by its largely recreational orientation and usually, by an absence of any marine-based commercial activities. It is served by a wide variety of public service facilities such as large hotels, good camping grounds, restaurants, beach showers and beach-related recreational activities e.g. sport, wind-surfing, jet skiing, paragliding, etc. Resort bathing areas are managed by the resort and

are mainly opened for resident users. It may be open for public against payment. Stringent safety-related facilities and water quality monitoring are expected at resort bathing areas (from Ergin and Williams, 2007).

For each of the five parameters evaluated by the Bathing Area Evaluation rating system a score ranging from A to D is awarded depending on beach type requirements, and then by integrating those five scores, an overall rating scores that also recognises beach type sensitivity are defined, based on criteria awarding 1 – 5 Star classification. The main aim of the BARE technique is to improve beach quality through effective beach management by consideration of variety of beach types and beach quality. The technique provides local authorities with a tool to better asses the quality of their beaches, helps beach managers to develop more site-specific and therefore effective management plans and gives and opportunity to beach users to make a better-informed choice of bathing areas (Ergin and Williams, 2007; Williams and Micallef, 2009). The general scheme of BARE system is presented below (Figure 3.4).

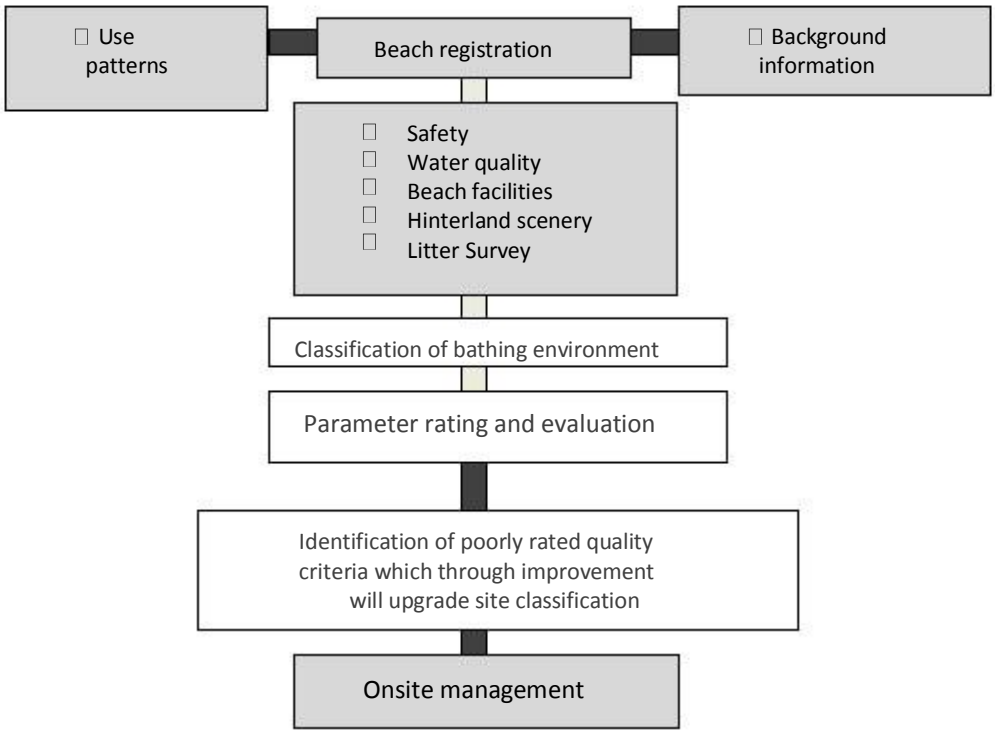


Figure 3.4 The BARE flow chart (source: Williams and Micallef, 2009).

After the review of some existing beach rating schemes and awards, and basing on previous analyses of awards, it can be concluded that most systems do not evaluate physical, biological and human parameters together, and assesses only one or few of those parameters and can not provide successful beach ratings (Williams and Morgan, 1995; Cagilaba and Rennie, 2005). In this context, the Bathing Area Registration and Evaluation System can be highlighted as the most reliable and practicable beach rating method, as according to Williams and Micallef (2009), it evaluates the bathing area as a whole, recognizes different beach types and bases on beach user preferences and priorities. The Bathing Area Registration and Evaluation system was used as a main method for evaluating the beaches for this project.

Table 2 Summary of criteria of reviewed Beach Awards and Rating Systems (source: Williams and Morgan,1995; Cagilaba and Rennie, 2005).

No	Bathing Awards/ Rating System	Difference between resort/undeveloped beaches	Water Quality	Environmental Education and Information	Environmental Management	Safety	Services and Facilities	Beach cleanliness/Litter	Scenery	Community participation/ involvement	Physical features of a beach	Biological Features of a beach	Human Features of a beach	Scoring based on Preferences and Priorities of beach users
1	The Blue Flag	□	□	□	□	□ □	□							
2	Costa Rica				□	□	□				□	□		
3	The Good beach Guide		□	□		□ □	□			□				
4	The National Healthy Campaign (NHBC)	□	□	□	□					□	□		□	
5	The Blue Wave of the Clean Beaches Council	□	□	□	□	□ □	□			□	□		□	
6	Seaside Award	□	□	□	□	□ □	□							
7	Green Coast Award		□				□			□				
8	UK Environmental Agency				□	□								
9	Bathing Area Registration and Evaluation System (BARE)	□	□	□	□	□ □	□	□	□	□	□	□	□	

CHAPTER 4

METHODOLOGY

4.1 Bathing Area Registration and Evaluation framework (BARE)

As mentioned previously, the main method for assessing beach quality, used in this project was the BARE framework, created by Micallef and Williams in 2004. Therefore, five different types of beaches were selected for the purpose of this project and classified according to the BARE scheme definitions of rural, remote, village, resort and urban beaches (given in the Chapter 3, part 3.6 of this project), and basing on the guidelines for determining these beach types, provided by Williams and Micallef (2009). The summary table of critical criteria for beach type definition according to the BARE, obtained from Williams and Micallef (2009) is presented in Table 3.

After the five different types of beaches had been determined within the study area of this project, Sotavento Algarve, the quality of each beach was assessed using the BARE scheme, described by Williams and Micallef (2009), during the summer fieldwork from July to September 2010. Through the BARE approach, a wide range of bathing area related data was collected via the BARE Registration Form, obtained from Williams and Micallef (2009), (Annex 1). This form is structured as follows:

- Section I includes background information for the surveyed bathing area.
- Section II represents five parameters of bathing area, which are the main issues of concern to beach users: water quality, litter, scenery, safety and facilities.
- Section III evaluates the registered data that provides parameter rating on a four-scale system (A–D).

- Section IV provides classification system for the determination of final ratings for the five issues, which provides 1–5 star classification for the surveyed bathing area.

Section I

The collected background information about beaches included the information about the beach type, size and shape; sea-floor sediment characteristics and shore type; backshore; local administration and responsibilities; access type to beach and bathing water, beach use orientation (Williams and Micallef, 2009). The information was obtained using the visual observations and sometimes from the discussions with beach managers of the areas (see Annex 1, Section I).

Section II

The information for the five main issues of concern of beach users was recorded using the BARE check-list approach, and visual observation, as described by Williams and Micallef (2009).

Safety-related parameters were recorded via a check-list, represented the information about the seven parameters, which refers to presence/absence of lifeguards, fixed safety equipment, first-aid posts, swimming safety warning notices, emergency phone facilities, bather / boat zonation marker buoys and a safe bathing environment (see Annex1, Table 2.1)

Water Quality evaluation was based on visual observations at all surveyed sites, which included an assessing presence/absence, amount and type of litter in water, such as floating debris, oil or sea-bottom debris (see Annex 1: Table 2.2).

Table 3 Critical Criteria for beach type definition according to the BARE framework (source: Williams and Micallef, 2009)

Beach type	Environment	Accessibility	Habitation/ Accommodation	Facilities/safety parameters
Urban	Urban areas serve large populations with well-established public services such as primary schools, religious centre(s), banks, post office(s), internet cafes and well-marked central business district. In the proximity of commercial activities such as fishing/boating harbors and marinas. Urban areas are located within the urban area on adjacent to it.	Accessible by both public and private transport. Generally freely open to the public but entrance fee may be encountered. Use of facilities e.g. sun beds/umbrellas is normally against payment.	Large-scale residential accommodation units place hotel/apartment complex accommodation for visitors.	Restaurants, public toilet, showers and litter bins, parking spaces and good access. A variety of safety measures (safe bathing environment, lifeguards, bather/boating zonation buoys, fixed safety equipment, first aid post(s), beach safety warning notices and emergency telephones.
Resort	A resort may be sited within any type of environment but as a rule has no nearby industrial activities.	Resort beaches are generally utilized by residents staying at beach-associated hotel/apartment complex/camping resort that manages the beach. May be open to the public against payment fee.	Associated hotel/apartment/camping complex.	Hotels, restaurants, good camping, grounds, beach showers, toilets, clean litter bins, adequate parking and good access, various beach-related recreational activities, widest possible range of safety measures (safe bathing environment, lifeguards, bather/boating zonation buoys, fixed safety equipment, first aid posts, beach safety warning notices and emergency vehicle access.
Remote	May be contiguous to/on the fringe of rural areas and an occasion to village environments but not with urban areas.	Remote beaches are found in a rural environment but accessible only on foot (a walk of 300-500) or by boat.	Uninhabited for a radius of at least 500m. May hare very limited (0-5 if any) temporary summer housing.	Facilities/safety equipment none expected.

Continued table

Rural	Located outside the urban/village environment, having an absence of a community focal centre (religious centres, primary school, shops, cafes, bars)	Not readily accessible by public transport. But accessible by private transport. No entry payment fee	Housing is limited (generally 0-10 but may be more depending on the size of the coastal stretch). May be of temporary (summer) or permanent (year long) nature.	None expected but many exceptions encountered. If present, consider by the type of environment.
Village	Located outside the main urban environment and is associated with a small but permanent population reflecting access to organized but small scale community services (such as a primary school(s0, religious centre(s), shop(s). The beach may be sited within or adjacent to the village.	Accessible by both public and private transport. No entry payment fee use of facilities e.g. sun beds/umbrellas are normally against payment	Small scale residential accommodation plus bed and breakfast for visitors. A village environment would also include “tourist villages”, mainly utilized in the summer months as well as “ribbon development” between urban and rural environments.	Facilities are expected to be limited to clean public showers and toilets, restaurants, adequate parking and good access, regularly cleaned litter bins, and bed and breakfast accommodation. Safety facilities expected include bather/boating zonation buoys, fixed safety-related warning notices and emergency telephones.

Facilities were also recorded using a check-list approach, which represent the presence/absence and reflect the quality of such parameters as toilet and shower facilities, litter bins, cigarette receptacles, restaurants/bars/cafes, accommodation, parking, water sports, sun beds and others (see Annex 1, Table 2.3).

Scenery evaluation is based upon a checklist that itemizes 26 parameters, consists of physical and human parameters. As a first step in quantifying scenery, each parameter was rated, basing on visual observations and literature survey, on a five-point scale, depending on the presence/absence or poor/outstanding quality (see Annex 1: Table 2.4). Further, the ratings were transferred into Excel Programme, subjected to fuzzy logic matrices approach, developed, described and applied by Ergin et al., 2003; Ergin et al. , 2004, Ergin et al., 2006; Ergin and Williams, 2007; Williams et al., 2007; Ergin et al., 2008; Ergin et al., 2010 and used for evaluating the worldwide beaches scenery. After analyses with fuzzy-logic method, the following results were obtained:

1. weighted averages, reflected the importance of the various parameters;
2. histograms of weighted averages for the various scenic attributes;
3. graphs for membership degrees of physical and human factors, reflected the overall result of scenic quality (Ergin et al., 2003);
4. Decision parameters D, which is the main value for obtaining the final rating (A-D) for a coastal scenery (Ergin et al., 2003).

Litter evaluation, used by the BARE framework, was based on recording and scoring in accordance with the EA/NALG (2000) Protocol (see Chapter 3, Fig. 3.3; Annex 1: Table 2.5).

Section III

The evaluation system of safety, facilities, water quality, litter and scenery was based on the recorded information regarding these parameters (Section I) and the ratings further determined to each of the five parameters using the Evaluation System Form. Final ratings represented scores of a scale (A–D) based on the presence/absence of the issue related parameters (Williams and Micallef, 2009), (see Annex 1: Tables 3.1a, 3.1b, 3.2, 3.3a, 3.3b, 3.3c, 3.4, 3.5).

Section IV

The final beach classification was based on an evaluation of the rating results obtained for each of the five main parameters. These results in an overall bathing area classification represent beach ratings ranging from 1 (low) to 5 (high) stars (Williams and Micallef, 2009), (see Annex 1: Tables 4.1, 4.2, 4.3).

4.2. Questionnaire surveys

The questionnaires were developed to assess the structure, preferences and priorities and activities of beach users and to address to beach managers possible improvements of the coastal environment and ways of developing the beach. The design of questionnaires followed the structure of the questionnaires, developed by Williams and Micallef (2009). The table, enabling evaluating of the importance of safety and facilities parameters presented at resort, urban and village beaches and beach users' satisfaction with the quality of these parameters, was added to the original questionnaires of Williams and Micallef (2009). Additionally, questionnaires were constructed on both English and Portuguese languages. The examples of questionnaires are presented in Appendix 2 of this project. The pilot surveys, 50 questionnaires per beach, were carried

out during the period July-September 2010 at urban, resort, remote, village and rural beaches in Eastern Algarve region, Portugal. The time taken to cover one questionnaire took about 15 minutes. Data was analyzed in Microsoft Office Excel 2003 and Statistical Package for the Social Sciences 17.0 (SPSS) and the graphs were ploted. The questionnaire included three following parts:

Part I: Beach user's profile.

This part incorporated variables on socio-economic and demographic profiles, such as age, gender, place of residence, information about the amount of people in group and presenting of children. Further this part included the information regarding beach users' habits using the particular beach, means of transport, length of stay, frequency of their visit, types of activities undertaken on the beach, purposes of choosing the particular beach, the percent of enjoyment the beach contributed to overall enjoyment of the holiday and the most frequently visited beach in Algarve by the user.

Part II: Beach quality evaluation.

In this section beach users were asked to rank the visual appearance of the beach, cleanliness of the beach, to specify the most disliked things on the beach, to report about the presence or absence of any litter accumulations on the beach, to rank the most offensive forms of beach/water pollution from the users' point of view. Additionally, beach users were asked to evaluate safety and facilities, provided on the beach, giving a mark to each item, starting from 1 to the last number of presented parameter, depending on the level of satisfaction they provided and its importance for the beach users (only for resort, urban and village beaches).

Part III: Beach management, motivations and suggestions.

This section included questions addressed to beach users with regard to the opportunity of bringing dogs to the beach during the summer season, the most important reasons for choosing the beach and the opportunity of the improvement of the beach. In order not to lead respondents and to allow being flexible in their answers, the open-ended question was included. The open questions were aimed to state reasons for selecting the beach, differing from the suggested in the list; to propose the possible ways of improvement of the beach; to leave any comments regarding the beach and surrounding coastal environment.

CHAPTER 5

RESULTS AND DISCUSSION

5.1 Evaluation of coastal scenery

Five beaches were observed and coastal scenery was evaluated for each site, using the fuzzy logic matrices approach, developed by Ergin et al. (2003), which is based on evaluation of 26 human and physical parameters on a five point scale (Table 2.4 in Annex 1), ranging from low to high attribute values (Ergin et al., 2003). Fuzzy logic analyses system, enabled the generation of membership degree figures, weighted averages, and assessment histograms (Appendix 2) and decision parameters D, which established the final classification of scenery for each site (Table 4). The highest class rating was recorded for Quinta do Lago beach, which is a resort area with high values for human and physical parameters. The lowest rating was addressed to the Quarteira-Vilamoura beach, an intensive urban area with poor physical and human parameters. Three categories of scenery were recognized within five surveyed sites, but no class 1 and 5 sites were found.

Table 2 Decision parameter D values and final classification of coastal scenery of investigated sites

Site	D value	Class
Quarteira-Vilamoura	0,01	4
Quinta do Lago	0,74	2
Ilha do Farol	0,41	3
Ilha Deserta	0,40	3
Ilha da Armona	0,57	3

Class 2 “Attractive natural site with high landscape value”

There was one only site within the study area, which met the criteria to be included into Class 2, Quinta do Lago resort beach (Figure 5.1). During visual observations, the seawater had a clear blue colour, the shoreline was almost clear from vegetation debris, and only few scattered items of seaweed were noticed. There was no evidence of noise disturbance, beach litter, sewage discharge, and utilities at the beach. The area is characterised by sensitive tourism built environment, attractive natural skyline and vegetation cover, presence of lagoon, fauna and well preserved foredunes. All these features indicated a high rating for coastal scenery of the bathing area. The scenic assessment histogram (Figure 1.2 (c) in Appendix 2) shows the scores for all scenic parameter. Weighted averages (Figure 1.2 (a) in Appendix 2) and membership degrees (Figure 1.2 (b) in Appendix 2) show mostly high rates for higher attributes values such as 3, 4 and 5 for both physical and human parameters, which according to Ergin et al. (2010) reflect the positive influencing impact of these parameters on the site, representing a good scenic quality with high values of decision parameter D.

Figure 5.1 Quinta do Lago beach and wooden bridge across Ria Formosa Lagoon connecting the resort area with the beach (photos by Semeoshenkova V., 2009)

Class 3 “Mainly natural with little outstanding landscape features”

Three of five sites fulfilled the necessary criteria to be included into Class 3: Ilha Deserta (Figure.5.2 (a)), Ilha do Farol (Figure 5.2(b)) and Ilha da Armona beaches. These beaches are characterised by low ratings of some physical parameters (cliff, rocky shore, valley, skyline landform, coastal landscape features, vegetation cover) and

high ratings of other physical parameters (beach face, dunes, tides, vistas, water colour and clarity, vegetation debris). Regarding the human factor, the ratings obtained were high for the most of parameters (See Figures 1.3(c), 1.4(c), and 1.5(c)) in Appendix 2). The lower ratings were obtained due to some single accumulations of seaweed presented on the Ilha da Armona beach and few scattered items of seaweed found at the Ilha Deserta beach. Additionally, few scattered items of litter were found at Ilha da Armona and Ilha Deserta beaches. Several utilities presented at the Ilha do Farol beach, such as a light house (Figure 5.2 (c)), groynes, a seawall and the remnants from the ship-wreck, which were visible in the water (Figure 5.2(d)). Weighted averages (Figures 1.3(a), 1.4(a) and 1.5(a) in Appendix 2)) of physical parameters on the Ilha Deserta, Ilha do Farol and Ilha da Armona sites showed high ratings for attributes 1, 3 and 4. Membership degrees (Figures 1.3(b), 1.4(b)) and 1.5(b) in Appendix 2) gave the high values for attributes 1, 4, 5 of overall scenic parameters. According to Ergin et al. (2010), such results represent an adverse impact of low rated physical and human parameters and a positive influencing impact of high rated parameters on the scenic quality of these sites. Within 3 Class sites, the Ilha da Armona beach had the highest rating of decision parameter, with a small insufficiency for being evaluated 2 Class Site.

a) 

b) 

c) 

d) 

Figure 5.2 a) View of Ilha Deserta beach and restaurant; b) Ilha da Armona beach c) Ilha do Farol beach and lighthouse d) Remnants from the ship-wreck on Ilha do Farol beach (photos by Semeoshenkova V., 2009).

Class 4 “Mainly unattractive urban sites”

There was only one site that fell into Class 4, Quarteira-Vilamoura urban beach (Figure 5.3). The beach obtained low values for the most of physical and human parameters (see Figure 1.1(c)). It was caused by the presence of only remnants of dunes and absence of the natural vegetation cover. Only few parameters obtained high values, such as beach face, vistas, water colour and clarity, vegetation debris, sewage discharge. The Quarteira – Vilamoura beach had a high density of tourists during the survey period. Heavy tourism built environment and noise disturbance were evident. Additionally, Quarteira-Vilamoura is formed by six beach sectors, separated by groynes, which decrease its scenic value. The skyline was very unattractive, due to the various kinds of buildings, such as hotels, parking spaces and urban objects, such as banks, post office and shops, which were visible from the main bathing area. However, the presence of a marina next to the beach enhances the visual appeal of the Quarteira-Vilamoura site. Figure 1.1(a) in Appendix 2 showed the highest weighted averages for the lowest attribute 1, followed by 4 with regards to physical parameters, and the high rates for lower attributes 2, followed by 4 with regards to human parameters. Figure 1.1(b) in Appendix 2 gave the overall result of scenic assessment over attributes and showed the highest membership degree for the lowest attribute 1. According to Ergin et al. (2010), such results reflect the overall adverse affect of physical and human parameters on Quarteira-Vilamoura site, representing poor scenic quality with the lowest grade of decision parameter D.

Figure 5.3 Quarteira-Vilamoura beach and parking spaces along the main Avenida (photos by Semeoshenkova V., 2009)

The results of this study are consistent with results obtained by Ergin et al. (2010); Ergin et al. (2004). Ergin et al. (2010), who evaluated 34 beaches in Turkey, from which seven were evaluated as Class 2 because of well-preserved vegetation cover, clear seawater without any discoloration and several coastal landscape features, which was also the case of Quinta do Lago in this project. Ergin et al. (2004) investigated bathing areas in UK, Turkey and Malta and evaluated Class 3 beaches because of the positive landscape features present. The sites included sensitive urban development in keeping with the surrounding natural environment and a wide golden sand beach with dunes. The same classification was obtained for Ilha Deserta, Ilha do Farol and Ilha da Armona, isles of the Ria Formosa Lagoon. Sites, which were evaluated as Class 4 in Ergin et al. (2010); Ergin et al. (2004); Ergin et al. (2003) had negative aspects, dominated by urbanization with its associated problems of utilities, litter, poor skyline quality, noise disturbance and a degeneration of natural features present. The same rating was addressed to Quarteira-Vilamoura because of these negative aspects.

The highest rating for coastal scenery, obtained for the observed sites, was Class 2, which belonged to Quinta do Lago beach. None of the sites fulfilled required criteria to be scored the top rating. In the studies of Ergin et al,(2010), Ergin et al.(2004) and Ergin et al.(2003) the Class 1 ratings were addressed to bathing areas with outstanding physical and human parameters, mostly with the presence of caves, waterfalls, reefs, rocky shore and well preserved vegetation cover. Following the Table 2.4 of the BARE Evaluation Form (Annex 1), the presence of these factors obviously indicates higher ratings for cliff and rocky shore characteristics. Ilha do Farol, Ilha Deserta, Ilha da Armona and Quinta do Lago are beautiful areas with good natural characteristics, and with many high valued physical parameters, obtained 3-5 ratings. Apparently, these

sites could obtain higher ratings for its scenery, if there were a rich vegetation cover, presence of cliff and rocky shore. According to Ergin et al. (2010), little can be done for the scenery of coastal areas with respect to physical site factors. However, very often lower ratings are scored due to human usage parameters, which can be changed. For example, coastal engineering activity has a negative impact on the coastal scenery. Reducing and improving of the coastal structures can increase the aesthetic quality of bathing areas (Ergin et al., 2010). Therefore, it is possible to enhance the scenic quality of observed beaches, but management actions are needed. The higher values of scenic quality can be achieved by a better cleaning of the beaches, and more sensitive design of coastal structures, respecting the natural environment of the sites. Additionally, the physical parameters can be also improved by planting some trees or by creation of new dunes. For example, a beach manager at Ilha do Farol site informed, that some new dunes have been already created on the beach several years ago.

5.2 Bathing Area Registration and Evaluation (BARE) results

Five sites were observed and beach quality was evaluated through the quality of five parameters (water, litter, scenery, safety, facilities), based on the A-D scale, reflecting presence/absence of issue-related parameters (Williams and Micallef, 2009). Based on the Bathing Area Classification Form (see Section IV in Annex1) the beaches were awarded 1-5 stars, representing the low-high quality (Williams and Micallef, 2009). Four of five observed beaches obtained a rating of three stars, and one beach was classified as one star (Table 5):

Table 5 Star ratings awarded to investigated sites

Parameter / Site	Water quality	Litter	Scenery	Safety	Facilities	Grade
Quarteira-Vilamoura	A	A	D	C	B	***
Quinta do Lago	A	A	B	C	D	*
Ilha do Farol	A	B	C	C	C	***
Ilha Deserta	A	B	C	not applicable	not applicable	***
Ilha da Armona	A	A	C	not applicable	not applicable	***

Quarteira-Vilamoura (urban beach)

Based on visual observations water quality obtained the highest rating, because no evidence of sewage or other floating debris was recorded, the sand sea-bottom was clear from debris, and no evidence of any pollution was noticed. The litter parameter obtained the highest rating as well. The coastline of Quarteira-Vilamoura beach was virtually free from litter, and only 2 items per sampling unit distance were recorded, representing plastic cup and food packaging (general litter). The scenic quality of the beach had the lowest grade, being an unattractive site with very low value of a decision parameter D (0,01). The safety parameter obtained a rating C, due to the absence of bather/boating zonation buoys. Quarteira-Vilamoura beach had all the required beach-related facilities, however the facilities parameter obtained a rating B, due to the lack of sport and shower facilities (Figure 5.4). Following the Table 4.2 in Annex 1, the Quarteira-Vilamoura beach was awarded a three star rating.

Figure 5.4 Quarteira-Vilamoura beach and toilet facilities (photos by Semeoshenkova V., 2009)

Quinta do Lago beach (resort beach)

Based on visual observations, water quality and litter obtained the highest rating. Quinta do Lago beach was defined as a natural attractive site with the high value of a decision parameter D (0, 74), which indicated a high overall grade B for the scenery parameter. The safety parameter obtained a rating C, because the emergency vehicle access and bather/boating zonation buoys were absent on the beach. The facilities parameter obtained the lowest rating, due to the absence of shower and the presence of toilet facilities only in the beach associated restaurant. However, the site had very good accommodation options, sports and other facilities (Figure 5.5). Following the Table 4.1 in Annex 1, the Quinta do Lago beach was awarded a one star rating.

Figure 5.5 A villa in the Quinta do Lago resort and the restaurant “GiGi” (photos by Semeoshenkova V., 2009)

Ilha do Farol or “Molhe Leste” (village beach)

Based on visual observations, water quality obtained the highest rating. The litter parameter obtained a rating B. Three items of general litter per sampling unit were recorded, which were 2 items of plastic and one food packaging (general category of litter), and also 3 faeces were noticed at the beach. The “Molhe Leste” beach was evaluated as mainly natural with little outstanding landscape features, with a D parameter equal to 0, 41, which indicated a rating C for the scenery parameter. The safety and facilities parameters obtained ratings C, due to the absence of bather/boating zonation and emergency vehicle access, and shower facilities. The nearest toilet facilities were situated in the lighthouse of the Ilha do Farol Island outside the main bathing area. Additionally, the majority of times the litter bins were clean, but several times during the survey, they were overfilled and litter was scattered around (Figure 5.6 (b)). However, there were a good quality of accommodation (Figure 5.6(a)), cafes and snack bars, sport related facilities, access to the beach, provision of sun shelters and mattresses, receptacles for used cigarettes. Following the Table 4.2 in Annex 1, the Ilha do Farol beach was awarded a three star rating.

Figure 5.6 (a) A beach house on Ilha do Farol and (b) litter bin on Ilha do Farol beach (photos by Semeoshenkova V., 2009)

Ilha Deserta (remote beach)

Based on visual observations, water quality obtained the highest rating. The litter parameter obtained a rating B , due to items of litter, found on the beach: five plastic bottles, 5 glass bottles, 7 papers, 5 food packages, 3 aluminum jars (general litter) and 3 items of broken glass (harmful litter), (Figure 5.7). Also there was the evidence of seaweed debris, scattered along the shoreline, sometimes it was formed into small accumulations. The Ilha Deserta bathing area was defined as mainly natural with little outstanding landscape features and a decision parameter D equal to 0,40, which indicated a rating C for the scenery parameter. During the survey period, the beach was not crowded with tourists, and beach occupancy rate was assumed to be less than 40 per cent of the total beach carrying capacity. According to the BARE system, on remote/rural beaches, the provision of facilities is not expected. Additionally, on remote/rural bathing areas, where the average bathing season occupancy rate is less than 40 percent of beach carrying capacity, safety-related provision also is not required (Williams and Micallef, 2009). Following the Table 4.3 in Annex 1, the Ilha Deserta beach was awarded a three star rating.

Figure 5.7. Scattered litter on the Ilha Deserta beach (photos by Semeoshenkova V., 2009)

Ilha da Armona (rural beach)

Based on visual observations, water quality obtained the highest rating, however a few strands of seaweed was noticed in the near shore water. The litter parameter obtained a rating A, however, four scattered items of general litter were found (Figure 5.8 (b)).

The Ilha da Armona bathing area was defined as mainly natural with little outstanding landscape features, with a decision parameter D equal to 0,57, which indicated a rating C for the scenery parameter (Figure 5.8 (a)). During the survey period, this beach was also not crowded with tourists and beach occupancy rate was assumed to be less than 40 per cent of total beach carrying capacity. Therefore, according to the BARE system, the provision of safety and facilities is not expected for this site. Following the Table 4.3 in Annex 1, the Ilha da Armona beach was awarded a three star rating.

a) b)

Figure 5.8 (a) Wooden walkway to Ilha da Armona beach and (b) litter on the beach (photos by Semeoshenkova V., 2009)

The obtained results showed that a lower rating, addressed to the Quarteira-Vilamoura site, was caused by a poor scenic value of the site and absence of bather/boating zonation buoys. The improvement of the scenic quality of the beach to a rating C plus the placement of bather/boating zonation buoys would increase a rating of the beach up to four stars. Quinta do Lago resort beach, obtained a high rating for its scenic quality, but obtained the lowest rating for an overall quality of the bathing area, because of the

poor safety and facilities parameters. The placement of shower and toilet facilities on the beach would indicate a three star rating. Additionally, if the safety parameter will be improved up to a B rating, by creating a bather /boating zonation buoys and emergency vehicle access, with this improvement the beach would be awarded four star rating. Ilha do Farol village beach, would also be awarded four star rating, if to improve its safety and facilities parameters, particularly by placement of toilet and shower facilities on the beach, together with a bather/boating zonation buoys. The Ilha da Armona and Ilha Deserta beaches, obtained the three stars rating because of their scenery factor, scored as C. Improving of the scenery will indicate higher overall ratings of these bathing areas. Additionally, occurrence of litter was evident on the Ilha Deserta beach. A better cleaning of the beach will enhance its aesthetic appeal.

Obtained results are similar to the results of Ergin and Williams (2007), who showed, that many sites, evaluated along the coastal province of Nador, obtained low ratings due to the absence of bather/boating zonation buoys, which is the case of all beaches in this project. Additionally, according to the results of Ergin and Williams (2007), a problem of litter, indicated lower ratings for overall quality of bathing areas, were typical for many of observed sites in Nador, which is also the case of Ilha do Farol and Ilha Deserta beaches in this study.

Assessment of beach quality in the Sotavento Algarve region has already showed real results. The questionnaire surveys together with the visual observations of the area raised a high interest from beach managers. After the BARE methodology was explained to them, some extra information signs were placed at the Quinta do Lago beach (Figure 5.9). Additionally, beach managers at the Ilha do Farol beach informed about their future plans to organize toilet facilities on the beach.

Figure 5.9 Signs erected at Quinta do Lago beach, after the BARE survey (photo by Semeoshenkova V., 2009).

5.3 Beach user questionnaires' results

The number of collected questionnaires during the fieldwork, carried out on five beaches of the Sotavento Algarve region, was 50 respondents per beach. Results are presented in three main categories: 1) general profile of beach users; 2) the results according the beach quality, preferences and priorities of beach users; and 3) management of the beach.

Beach user profile (demographics)

Age and gender.

The respondents were divided into three age groups: 1) youth (beach users younger than 25 years); 2) middle aged (users between 26 and 50 years); and elderly (users older than 50 years). Normally the questionnaires were suggested to people over 18 years old, because proper filling of the questionnaire required basic understanding of coastal processes.

The highest percentage of respondents at all sites was formed by the "middle aged" group, which according to Vaz et al. (2009) reflects a greater interest of this age group in seaside tourism. The second highest percentage of respondents was formed by the

“youth” and the lowest by the “elders” at all sites, excluding Quinta do Lago. Only at Quinta do Lago the “elders” formed the second highest percentage of respondents, followed by the lowest percentage of “youth” age group (Table 6). Using the same approach, these results are consistent with the results of Vaz et al. (2009), which showed that the most participative age group in the beach user surveys in UK and Portugal was between 31 and 50 years old.

The percentage of respondents in the “middle age” group was 52% at Ilha da Armona, 46% at Ilha Deserta, 62% at Ilha do Farol, 54% at Quarteira-Vilamoura and 44% at Quinta do Lago. The “youth” formed 40% of all respondents at Ilha da Armona, 30% at Ilha Deserta, 22% at Ilha do Farol, 36% at Quarteira-Vilamoura and 20% at Quinta do Lago. The “elderly” formed 8% of all respondents at Ilha da Armona, 24% at Ilha Deserta, 16% at Ilha do Farol and 10% at Quarteira-Vilamoura and 36% at Quinta do Lago. Regarding the gender, males formed a higher percentage of respondents at each site (Table 6).

Occupations.

Students, professors/teachers, social workers, managers, administrators, designers, engineers, housewives and retired people represented the most common occupations of respondents (Figure 5.10). Students formed the highest percentage of respondents at Ilha da Armona (32%), Ilha Deserta (29%), Ilha do Farol (18%) and Quinta do Lago (20%). Social workers, teachers, professors, managers formed the second highest percentages of respondents at all sites. Retired people formed a high percentage of respondents (14%) at Quinta do Lago, which also supports observed results of the “elderly” being the second highest percentage of respondents at this site.

Table 6 Age – Gender distribution at investigated sites

	Site														
	Ilha da Armona			Ilha Deserta			Ilha do Farol			Quarteira-Vilamoura			Quinta do Lago		
Gender / Age Group	Female	Male	**Total**	Female	Male	**Total**	Female	Male	**Total**	Female	Male	**Total**	Female	Male	**Total**
Youth (<25)	5 *(10%)*	15 *(30%)*	**20 *(40%)***	7 *(14%)*	8 *(16%)*	**15 *(30%)***	2 *(4%)*	9 *(18%)*	**11 *(22%)***	4 *(8%)*	14 *(28%)*	**18 *(36%)***	3 *(6%)*	7 *(14%)*	**10 *(20%)***
Middle Age (25-50)	7 *(14%)*	19 *(38%)*	**26 *(52%)***	7 *(14%)*	16 *(32%)*	**23 *(46%)***	16 *(32%)*	15 *(30%)*	**31 *(62%)***	11 *(22%)*	16 *(32%)*	**27 *(54%)***	5 *(10%)*	17 *(34%)*	**22 *(44%)***
Elderly (>50)	2 *(4%)*	2 *(4%)*	**4 *(8%)***	5 *(10%)*	7 *(14%)*	**12 *(24%)***	2 *(4%)*	6 *(12%)*	**8 *(16%)***	2 *(4%)*	3 *(6%)*	**5 *(10%)***	8 *(16%)*	10 *(20%)*	**18 *(36%)***
Total	**14 *(28%)***	**36 *(72%)***	**50 *(100%)***	**19 *(38%)***	**31 *(62%)***	**50 *(100%)***	**20 *(40%)***	**30 *(60%)***	**50 *(100%)***	**17 *(34%)***	**33 *(66%)***	**50 *(100%)***	**16 *(32%)***	**34 *(68%)***	**50 *(100%)***

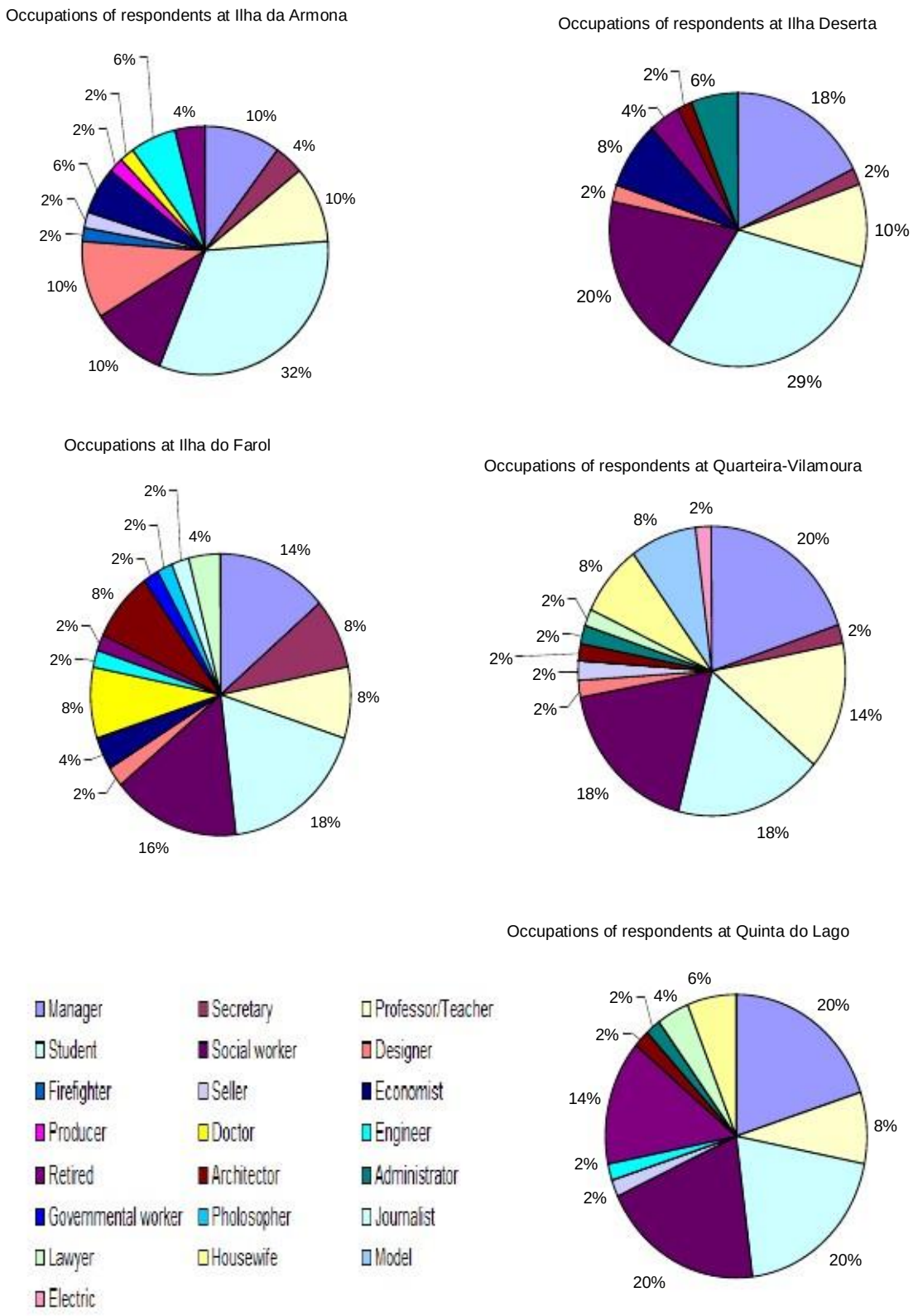


Figure 5.10 Distribution of respondent's occupations at investigated sites.

Number of people in groups

Respondents at all sites were divided into five categories with regards to the number of people in their group: single users, two people in the group, 3-5 people in the group, 5-10 people and more than 10 people in one group (Figure 5.11). Those, who stayed in a group of 3-5 people, formed the highest percentage of respondents at Ilha do Farol (62%), Ilha Deserta (50%) and Quinta do Lago (48%) and the second highest percentage at Quarteira-Vilamoura (36%) and Ilha da Armona (30%). Those, who stayed in the group of two people, formed the highest percentage of respondents at Quarteira-Vilamoura (48%) and Ilha da Armona (50%), and the second highest percentage at Ilha do Farol (34%), Ilha Deserta (40%) and Quinta do Lago (36%). Respondents within the category of 5-10 people in their group formed the highest percentage at Quarteira-Vilamoura (6%). Respondents within the category of more than 10 people in the group formed the highest percentage at Quinta do Lago (6%). Quarteira-Vilamoura and Quinta do Lago beaches attract big groups, due to numerous recreation facilities present. Respondents within the category of single users formed the highest percentage at Ilha da Armona (14%), which can be explained by the tranquillity of this beach, attracting single users or small groups, who want to spend a day in quietness and outside an urban area.

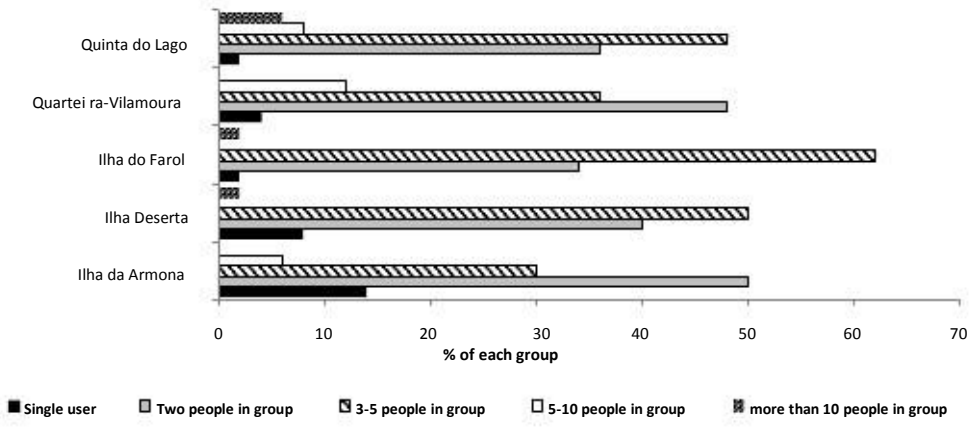


Figure 5.11 Group distribution of respondents at investigated sites

Children in the group.

Respondents with children in their group formed about two times higher percentage at all sites, with the highest (78%) at Ilha da Armona (Figure 5.12).

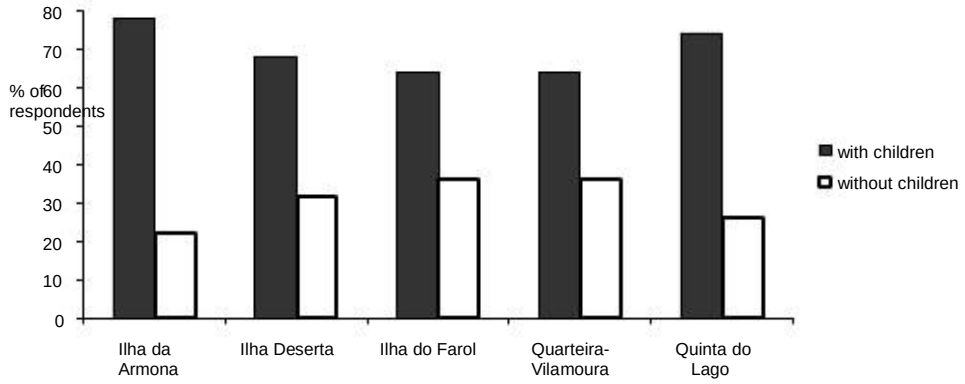


Figure 5.12 Respondents distribution with/without children in their group at investigated sites.

Children were divided into two age groups: under age of 10 years and between 10 - 18 years. Children under age of 10 years formed two times higher percentage (72%) at Ilha do Farol and about five times higher percentage (83%) at Ilha da Armona. In contrast, children in the age of 10 -18 years formed two times higher percentage at Quinta do Lago (68%). Children of both age groups formed nearly the same percentage at Ilha Deserta and Quarteira-Vilamoura (Figure 5.13).

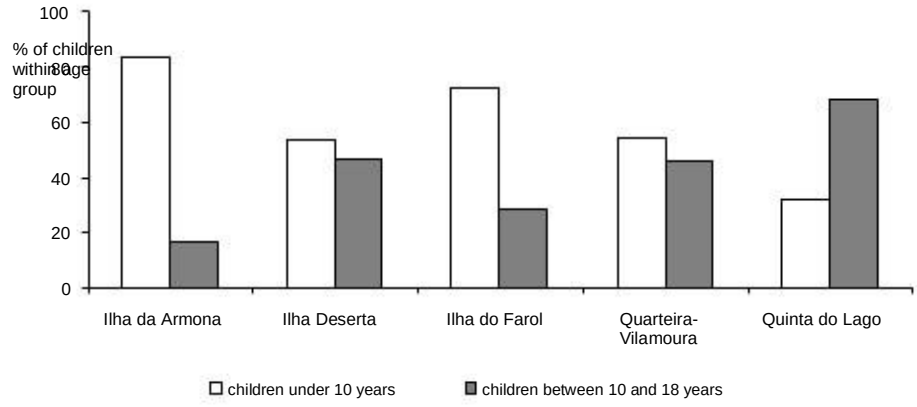


Figure 5.13 Age of children in beach users groups at investigated sites

Country of origin of beach users.

Respondents at all sites were divided into two groups: Portuguese tourists and International tourists. International tourists formed a higher percentage of respondents at Ilha da Armona (52%), Ilha Deserta (76%), Quarteira – Vilamoura (60%) and Quinta do Lago (70%). Portuguese tourists at Ilha do Farol formed a higher percentage of respondents (62%), (Figure 5.14).

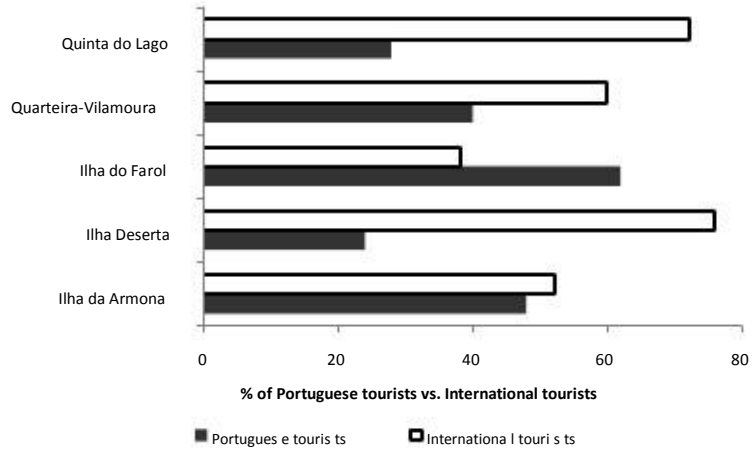


Figure 5.14 Portuguese tourists vs. International tourists at investigated sites

The majority of international respondents at all sites were from the United Kingdom, Germany, France, Spain, Holland, Belgium, Italy and Check Republic. British formed the highest percentage of international respondents at all sites: Ilha da Armona (22%), Ilha Deserta (16%), Ilha do Farol (16%), Quarteira-Vilamoura (38%) and Quinta do Lago (52%). The second highest percentage of international respondents was formed by German tourists at Ilha da Armona (10%), Ilha Deserta (12%) and Ilha do Farol (10%), by French tourists at Quarteira-Vilamoura (10%) and by tourists from Holland at Quinta do Lago (8%), (Figure 5.15).

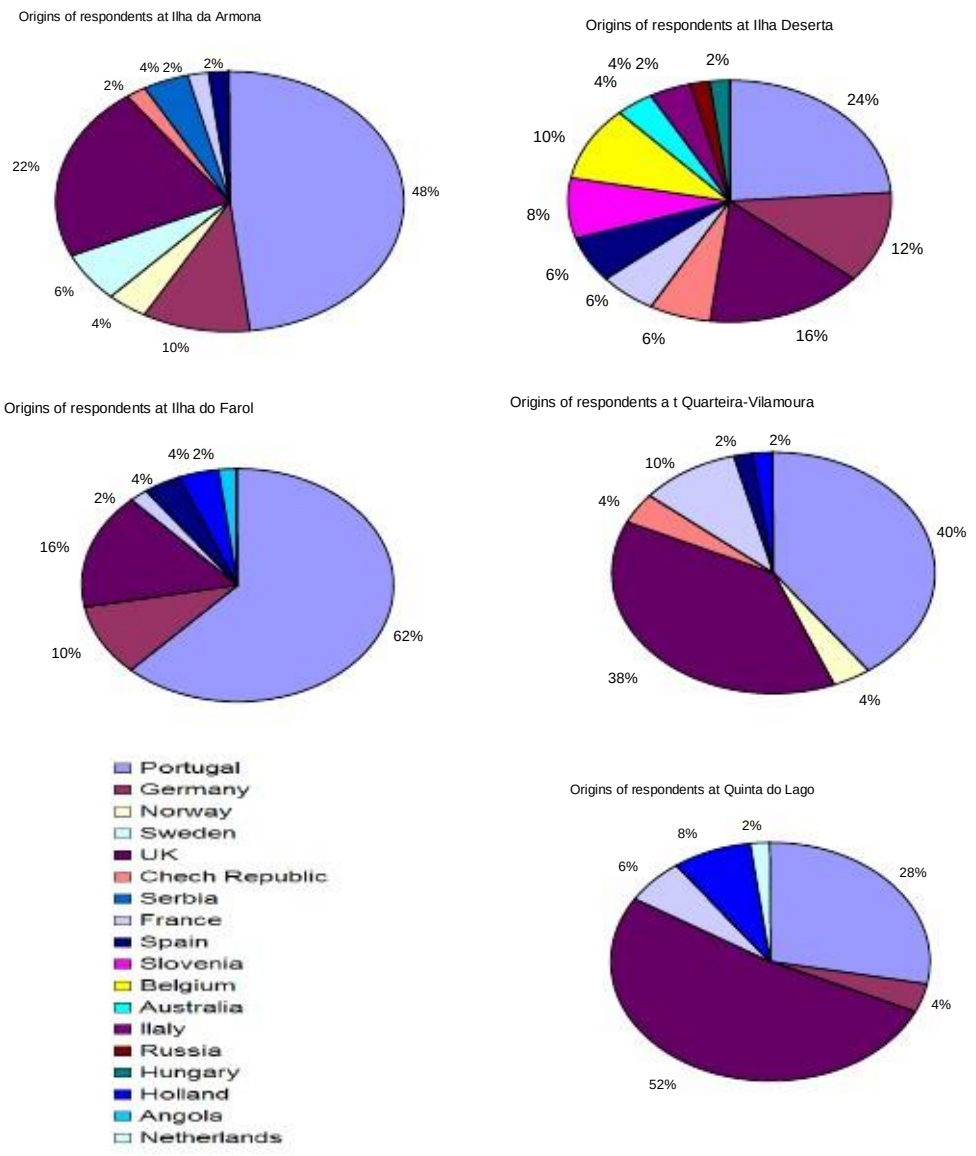


Figure 5.15 Distribution of interviewed beach users by country of origin at investigated sites

Frequency of staying on a beach.

The highest persentage of respondents at Ilha da Armona (44%) and Ilha do Farol (42%) was formed by those, who usually visit a beach “most days”, followed by those, who visit a beach “2-3 days per week” at Ilha da Armona (26%) and those, who come “every day” at Ilha do Farol (40%). The highest percentage of respondents at Ilha Deserta (48%) and Quarteira-Vilamoura (62%) was formed by those, who spend “every day” on a beach, followed by those, who spend “most days” (Ilha Deserta (36%) and Quarteira-Vilamoura (28%)). The majority of respondents (36%) at Quinta do Lago

were those, who visit a beach “about 2-3 days a week”, followed by 32% of respondents, who spend “every day” on a beach (Figure 5.16). Regarding the time, the highest percentage of respondents at Quinta do Lago (62%), Quarteira-Vilamoura (58%), Ilha Deserta (54%) and Ilha da Armona (70%) was formed by those, who usually spend “1-4 hours per day” on a beach, followed by those, who spend “4-8 hours per day”. Only at Ilha do Farol, the highest percentage of respondents (50%) was formed by those, who spend “4-8 hours per day”, followed by those, who usually spend “1-4 hours per day” (40%), (Figure 5. 17).

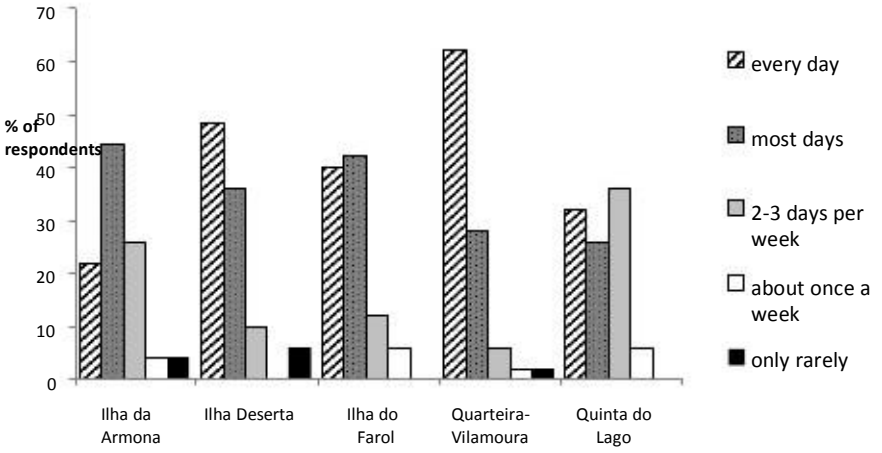


Figure 5.16 Frequency of beach visitation of respondents at investigated sites

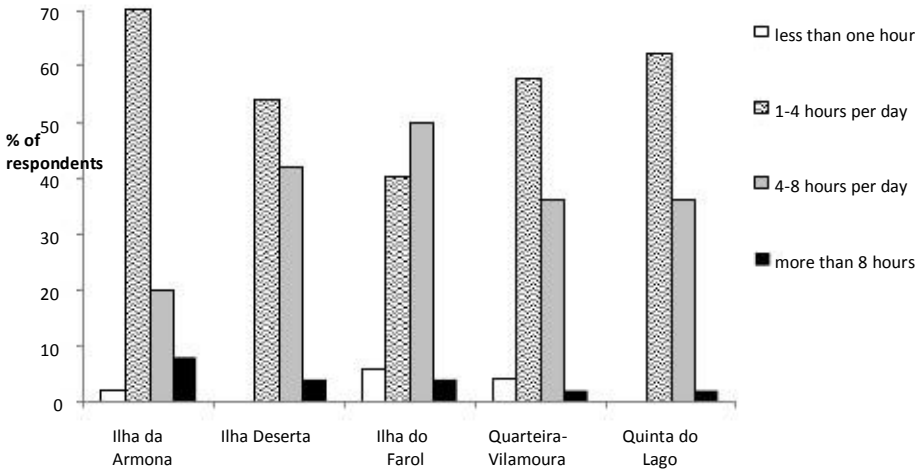


Figure 5.17 Time spent on a beach by respondents at investigated sites.

Purposes of visiting the beach.

Respondents at all sites were asked to choose three purposes for visiting the beach. The purpose “to enjoy views and fresh air” was marked by the highest percentage of respondents at each site: 92% at Quinta do Lago, 74% at Quarteira-Vilamoura, 84% at Ilha do Farol, 90 % at Ilha Deserta and 90% as well at Ilha da Armona. Swimming-related activity was marked by the second highest percentage of respondents at each site, followed by “nature and wildlife” at Ilha da Armona and Ilha Deserta, and “walking” at Quarteira-Vilamoura and Quinta do Lago (Figure 5.18).

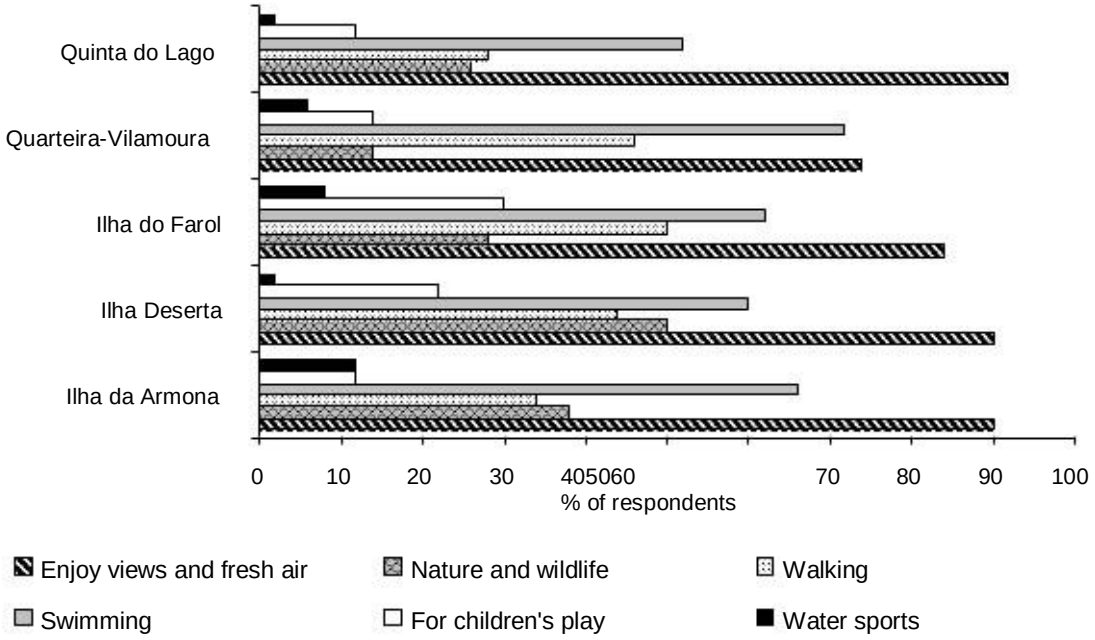


Figure 5.18 Main purposes for visiting the beach at investigated sites.

The enjoyment experienced at the beach.

Respondents at all sites were asked to estimate a percentage of their enjoyment, experienced at the beach, contributed to the overall enjoyment of their holidays. The average percentage of enjoyment at each site was calculated and varied between 63% and 77 % , being the highest at Quarteira-Vilamoura (76,82%), (Figure 5.19).

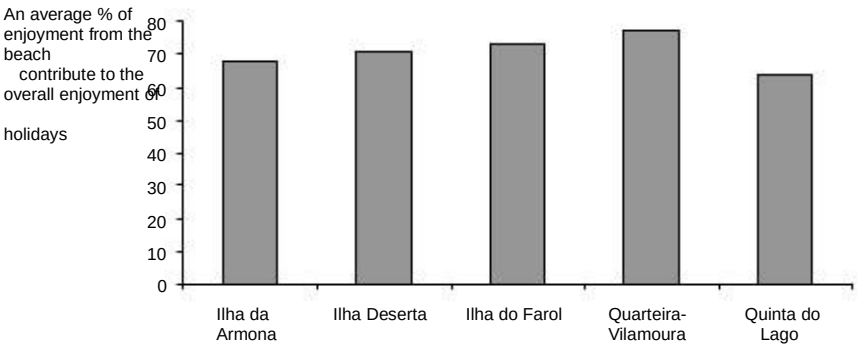


Figure 5.19 The enjoyment from the beach contributes to the overall enjoyment of holidays of respondents at investigated sites.

The most frequently visited beaches in the Algarve

Respondents at all sites were asked to specify which beach they visit in the Algarve most frequently. The majority of respondents identified the actual beach, where they were interviewed at, as the one they visit more frequently, being particularly high at resort and urban beaches: Quinta do Lago (90%), Quarteira-Vilamoura (80%), Ilha do Farol (64%), Ilha da Armona (64%) and Ilha Deserta (46%). These results reflect the general satisfaction of respondents with the quality of surveyed beaches. Among beaches which were marked as the most frequented by the respondents, were five beaches of concern of this project, and others, such as Praia do Faro, Albufeira, Ancão, Lagos, Terra Estreita, Praia Verde, Pedras del Rei and Praia da Fuzeta (Figure 5.20).

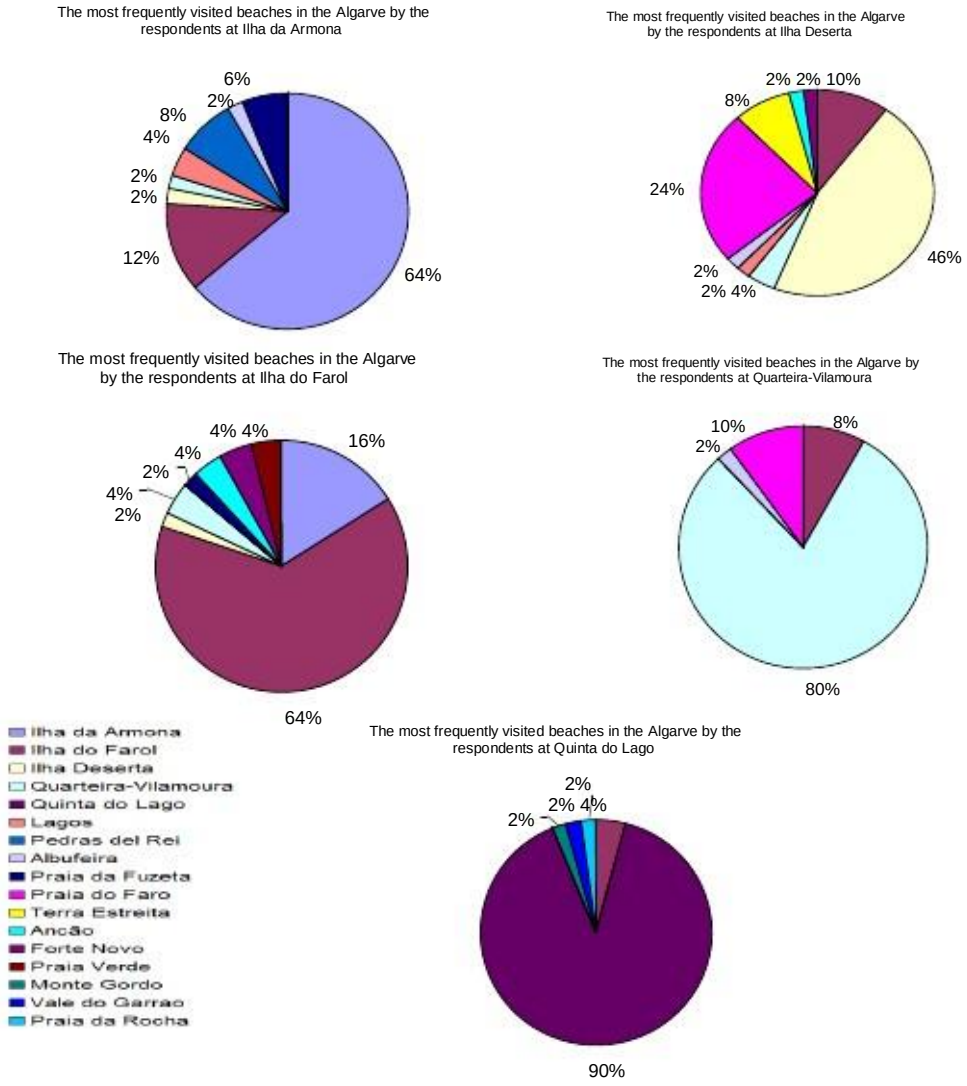


Figure 5.20 Distribution of the most frequently visited beaches in the Algarve region by respondents at investigated sites.

Beach quality, beach users' preferences and priorities

The state of the visual appearance of the beach.

Respondents at all sites were asked to evaluate the visual appearance of the beach, where they were interviewed at, choosing between "excellent", "good" , "fair", "poor" and "very bad". None of the respondents at all sites evaluated the visual appearance as "poor" or "very bad". The highest percentages of respondents at Ilha do Farol (64%) and Quinta do Lago (56%) evaluated the visual appearance as "excellent", followed by

those, who ranked it as “good” (Ilha do Farol (32%) and Quinta do Lago (40%)). The highest percentage of respondents at Ilha da Armona (60%), Ilha Deserta (48%) and Quarteira-Vilamoura (80%) evaluated the visual appearance of the beach as “good”, followed by those, who evaluated it as “excellent” (Ilha da Armona (38%), Ilha Deserta (44%), Quarteira-Vilamoura (16%)), (Figure 5.21).

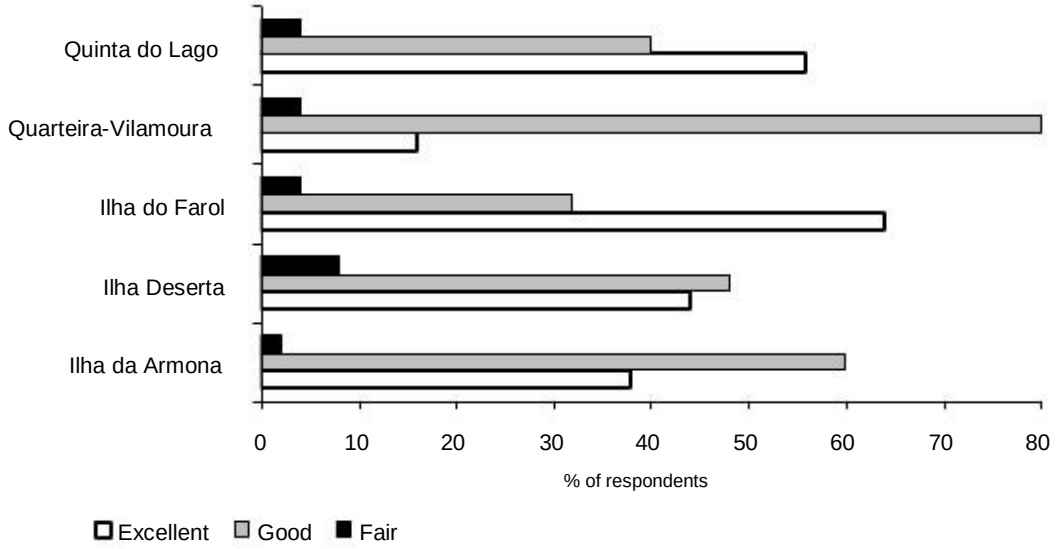


Figure 5.21 Visual appearance of the beach according to respondents’ evaluation at investigated sites.

Parameters on a beach, which are mostly disliked by beach users.

Respondents at all sites were asked to mark three characteristics, which they mostly dislike on any beach, choosing between: washed up litter and man-made debris; poor water quality; washed up sewage debris; excessive seaweed (algae); bad smells from industry; dog waste/excrement; noise from industry or vehicles; lack of sand; and difficult access and poor facilities. However, last four characteristics, mentioned above, were not marked by any respondent at all sites. The highest percentage of respondents at all sites marked “washed up litter and man-made debris” as one of the mostly disliked parameter, that was 64% at Ilha da Armona, 48% at Ilha Deserta, 60% at Ilha do Farol, 54% at Quarteira-Vilamoura and 52% at Quinta do Lago. Using the same approach, litter was also one of parameters, which were particularly disliked by beach users in the

survey of Vaz et al. (2009). “Poor water quality” was marked by the 40% of respondents at Ilha Deserta and 40% as well at Ilha do Farol. These results are also consistent with the results of Marin et al. (2009), when users’ perception analyses in Italy showed, that considering the disturbance factor, dirty sea and litter on the beach were indicated as the worse ones. Such characteristic as “excessive seaweed (algae)” was marked by the 34% of respondents at Ilha da Armona, 38% at Ilha Deserta and 46% at Quinta do Lago. “Dog waste/excrement” was marked by 42% at Ilha da Armona, 50% at Ilha do Farol and 46% at Quarteira-Vilamoura. Other characteristics, such as “bad smell from industry” was marked by 42% at Quarteira-Vilamoura and “washed up sewage debris” was marked by 42% at Quinta do Lago (Figure 5.22). Additionally, beach litter was recognized as the most offensive form of beach sea/sea pollution by the majority of respondents at all sites, coming after such parameter as oil in the sea/water.

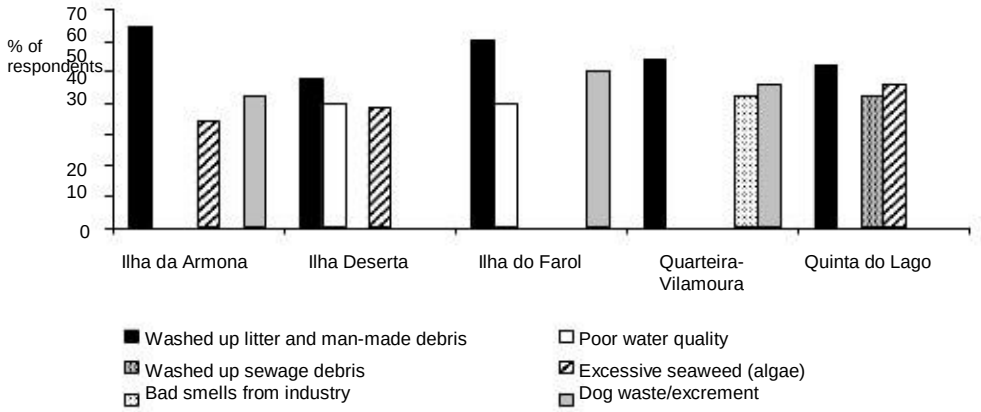


Figure 5.22 Three things most disliked on a beach by the respondents at investigated sites

Accumulation on the beach.

Those, who stated, that they had not noticed any accumulations of litter on the beach, formed a higher percentage of respondents at each site: Quinta do Lago (96%), Quarteira-Vilamoura (98%), Ilha do Farol (90%), Ilha Deserta (68%) and Ilha da Armona (84%), (Figure 5.23).

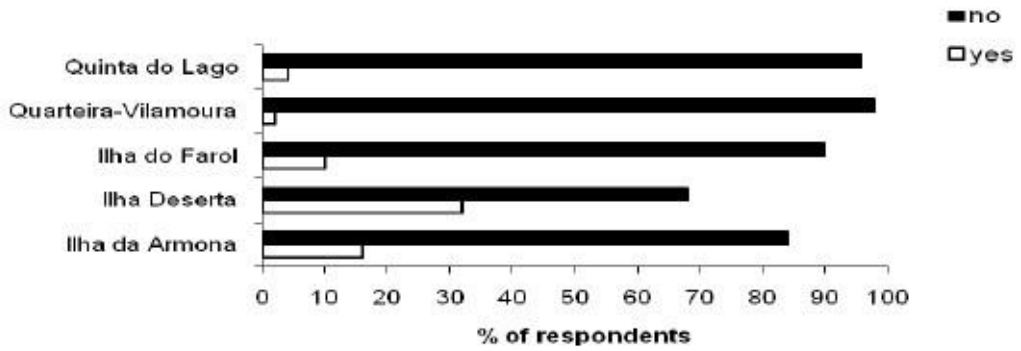


Figure 5.23 Distribution of respondents stating that they noticed/did not notice the accumulations of litter at investigated sites

The state of the beach with regards to litter pollution.

The respondents at all sites were asked to evaluate the state of the beach with regards to litter pollution, choosing between “very good”, “good”, “fair”, “poor”. The highest percentage of respondents at each site evaluated it as “good”, which was 64% at Ilha da Armona, 48% at Ilha Deserta, 44% at Ilha do Farol, 62% at Quarteira-Vilamoura and 48% at Quinta do Lago. The second highest percentage of respondents at all sites, excluding Quarteira-Vilamoura, evaluated the state of the beach as “very good”, which was 28% at Ilha da Armona, 28% at Ilha Deserta, 38% at Ilha do Farol and 48% at Quinta do Lago. The state of the Quarteira-Vilamoura beach with regards to litter pollution was evaluated by 24% of respondents as “fair” and only by 12% as “very good”. A small percentage of all respondents at all sites evaluated the state of the beach as “poor”, which was 4% at Ilha Deserta, 8% at Ilha do Farol and 2% at Quarteira-Vilamoura (Figure 5.24). These results showed that resort and rural areas obtained higher values for its cleanliness than urban, village and remote sites. These findings are contrary with the results of Roca and Villares (2008), who using the same approach,

identified, that urban areas had a higher rating for its quality with regards to litter pollution than semi-natural beaches.

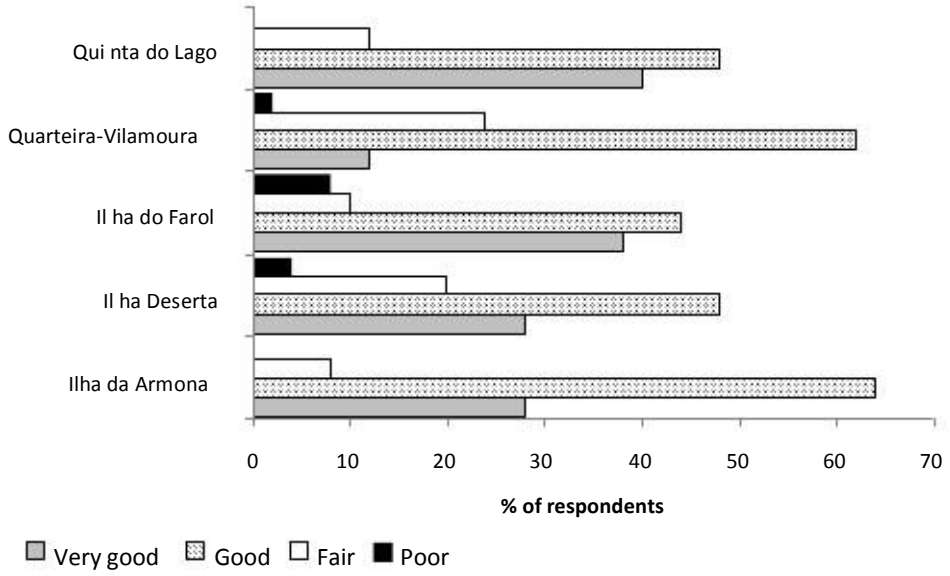


Figure 5.24 The state of investigated beaches with regards to litter pollution according to the respondents

Beach safety parameters and facilities.

The importance and quality of safety and facilities parameters were ranked by interviewed beach users at three sites: Ilha da Farol (village beach), Quarteira-Vilamoura (urban beach) and Quinta do Lago (resort beach). According to the BARE framework, rural and remote areas are not required to have the presence of safety and facilities parameters on a beach (Williams and Micallef, 2009).

Safety included five parameters to be ranked at each site and facilities included seven parameters at the village beach and nine parameters at resort and urban sites. The importance of each safety parameter and facilities had to be ranked from 1 being the most important for a beach user, followed by 2 less important, then 3 and further until the last parameter in the list of parameters. For ranking the quality of safety and facilities at the beaches, each parameter had to be ranked by interviewed beach users

from 1 being the worse quality to 5 being the best. Importance and quality of safety and facilities parameters are represented on the matrixes below (Figures 5.25, 5.26, 5.27).

To apply this matrixes, respondent values in a 5-point scale for the quality of safety and facilities parameters (from 1 to 5) were converted into another set of 5-points scale ranging from -2 to +2 with the neutral point 3 in the original data results converted to 0. After recording, values -2 to 2 represent the quality of parameters from the worse to the best and neutral quality in value 0.

The importance of safety parameters were recorded on a 5-point scale ranging from -2 to 2, where negative value represented low importance and positive values showed the highest importance, neutral importance was value 0. According to the importance of facilities, responded values in a 7-point scale at Ilha do Farol and in a 9-points scale at Quarteira-Vilamoura and Quinta do Lago were converted into another set of 7-points scale ranging from -3 to 3 on Ilha do Farol and 9-points scale ranging from -4 to 4 at Quarteira-Vilamoura and Quinta do Lago beaches. After recording, negative values represented the lowest importance and the positive values showed the highest importance of the parameters, 0 was the neutral importance. After all conversions, respective mean values were plotted with the importance in the y-axis and satisfaction in the x-axis, with results presented in four quadrants as presented below on Figure 5.28 (Slack, 1994).

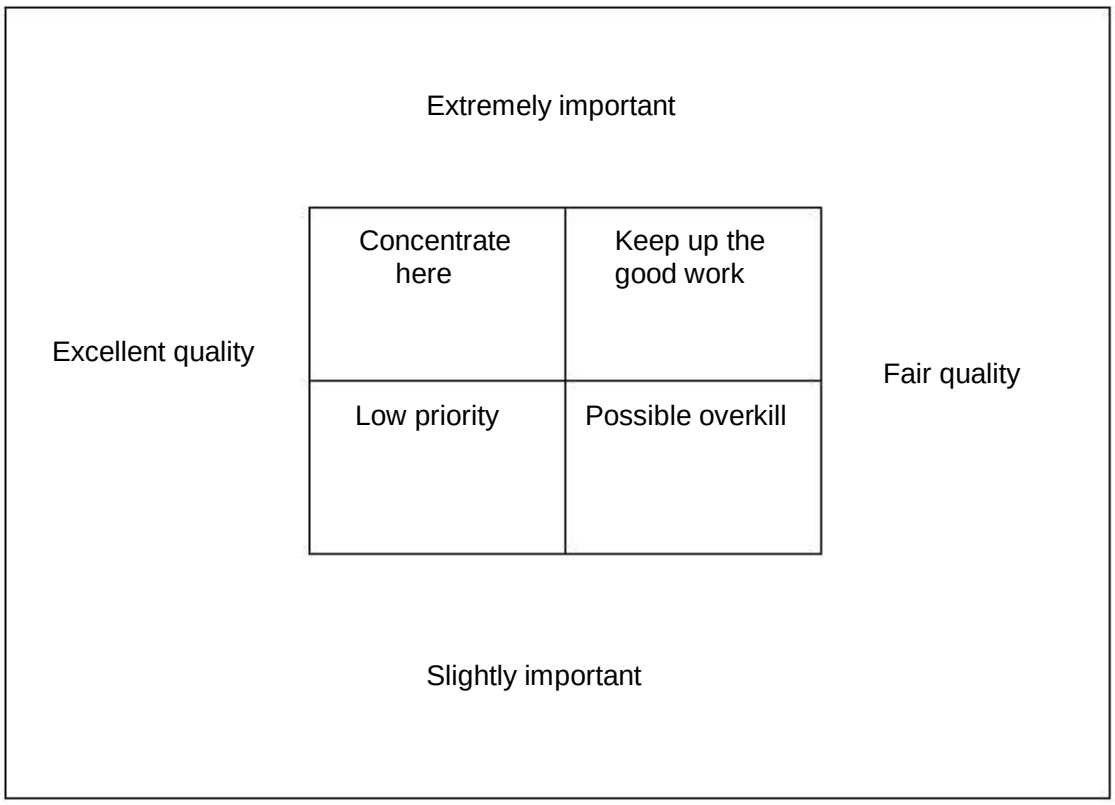


Figure 5.28 Importance-Quality Matrix (source: Slack, 1994)

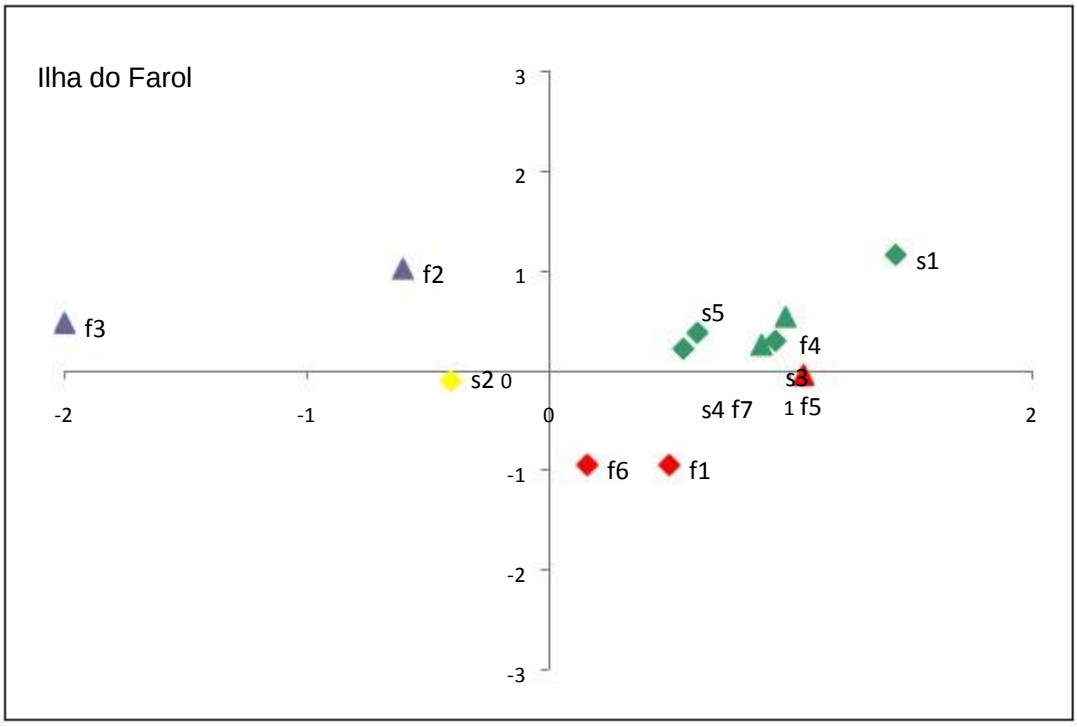
In this model, quadrant “concentrate here” represents high importance and low satisfaction; quadrant “keep up the good work” represents the best situation with high importance and satisfaction; quadrant “low priority” represents low importance and satisfaction, and quadrant “possible overkill” represents low importance and high satisfaction factor (Martilla and James, 1977; Hollenhorst et al., 1992; Slack, 1994; Kitcharoen, 2004). Using of the matrix allow managers who participated in the investigation to explore improvement priorities in their operations in an effective manner. One of the more significant activities in the operations strategy formulation process is derivation of a list of competitive factors which is prioritized in terms of the relative importance of each competitive factor (Hollenhorst et al., 1992).

Ilha do Farol (village) beach

Figure 5.25 shows that most parameters were rated as important at Ilha do Farol Beach and respondents were satisfied with most of the characteristics. For this situation “keep up the good work” line of action is related to lifeguards on the beach (importance=1.16; quality=1.44), beach safety warning (0.22; 0.56), beach safety information notices (0.38; 0.62), fixed safety equipment (0.3; 0.92), regularly emptied litter bins (.0.54; 0.98) and daily cleaning of the beach (0.26; 0.88).

Toilet facilities (0.96; - 0.5) and beach based shower facilities (0.48; -2) were related to «concentrate here» action line. The importance of these parameters was ranked by beach users as very high and quality as fair. Beach managers should concentrate on these factors and keep on improving these facilities. For example, the showers were absent on the beach. The nearest toilet facilities were quite far from the main bathing area.

The “low priority” line action was addressed to bather/boating zonation buoys (-0.12; -0.4). This parameter was ranked by interviewed people as the least important and its quality was fair. The “possible overkill” was addressed to bed and breakfast accommodation (-0.96; 0.5), restaurants, cafes and snack bars on the beach (-0.06, 1.06), as well as adequate parking facilities (-0.96; 0.16).



Key: Line of action keep up the good work; concentrate here; low priority; possible overkill Safety parameters:S1-lifeguards, s2-bather/boating zonation buoys, s3-fixed safety equipment, s4-beach safety related warning, s5-beach safety information notices;

Facilities:f1-bed and breakfast accommodation, f2-clean toilet facilities on the beach, f3-clean beach-based shower facilities, f4-regulary emptied litter bins, f5-restaurants and snack bars/cafes on the beach, f6-adequate parking and good access to the beach, f7-daily cleaning of the beach

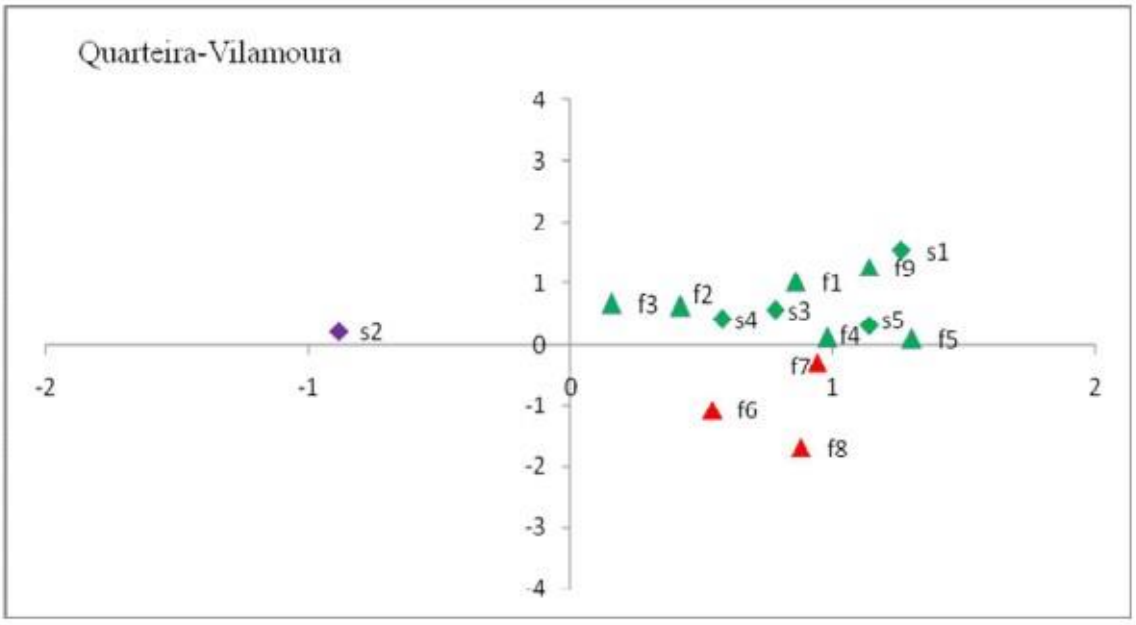
Figure 5.25 Importance-Quality matrix at Ilha do Farol beach

Quarteira-Vilamoura (urban) beach

Figure 5.26 shows that most safety and facilities parameters on Quarteira-Vilamoura beach obtained high importance and the quality was highly rated by interviewed beach users. The action line “keep on the good work” was addressed to lifeguards (importance=1.54; quality=1.26), fixed safety equipment (0.58; 0.78), beach safety information notices (0.32, 1.14), first aid posts (0.42; 0.58), good accommodation (1.02; 0.86), clean toilet facilities on the beach (0.64; 0.42), clean beach-based shower facilities (0.68; 0.16), regularly emptied litter bins (0.12; 0.98), restaurants/cafes/snack bars on the beach (0.1; 1.3) and daily cleaning of the beach (1.26; 1.14).

Bather/boating zonation markers fell into the “concentrate here” action line, the importance of this parameter was highly rated when quality was rated as fair (0.22; -0.88). None of parameters were related to “low priority” action line.

Sport-related facilities (-1.08; 0.54), parking spaces and good access to the beach (-0.3; 0.94), provision of matters covered sun-loungers and umbrellas on the beach (-1.68; 0.88) were rated as of low importance and high quality. These parameters were related to the “possible overkill” action line.



Key: Line of action ● keep up the good work; ● concentrate here; ● possible overkill

Safety parameters: S1-lifeguards, s2-bather/boating zonation markers, s3-fixed safety equipment, s4-first aid posts, s5-beach safety information notices;

Facilities: f1-good accommodation, f2-clean toilet facilities on the beach, f3-clean beach-based shower facilities, f4-regulary emptied litter bins, f5-restaurants and snack bars/cafes on the beach, f6-sport related facilities, f7-parking spaces and good access to the beach, f8-provision of matters covered sun-loungers and umbrellas on the beach, f9-daily cleaning of the beach

Figure 5.26 Importance-Quality matrix at Quarteira-Vilamoura beach

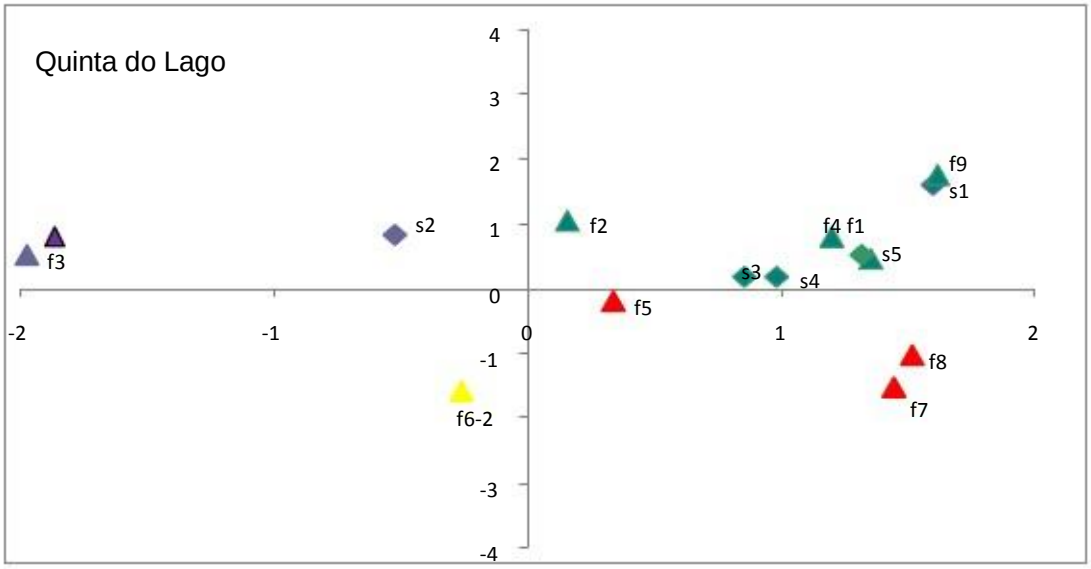
Quinta do Lago (resort) beach

From Figure 5.27 below it can be seen that lifeguards (1.58; 1.6), fixed safety equipment (0.18; 0.86), first aid posts (0.18; 0.98) and beach safety information notices (0.44; 1.36), good accommodation (0.5; 1.32), toilet facilities (1.04; 0.16), regularly emptied litter bins (0.8; 1.2), daily cleaning of the beach (1.76; 1.62) were ranked by interviewed users as the parameters of highest importance and respondents were satisfied with these parameters. “Keep on good work” line of action was related to those parameters.

Bather boating zonation (0.82; -0.52) and beach-based shower facilities (0.52; -2) were related to the “concentrate here” line of action and ranked by users as of high importance facility and low satisfaction with its quality. The lowest value for shower facilities is explained by there being no showers on Quinta do Lago beach.

Sport-related facilities (-1.6; -0.26) on Quinta do Lago beach were related to the “low priority” line of action, being the low ranked according to its importance and low quality.

Restaurants/cafes on the beach (-0.2; 0.34), parking spaces and good access to the beach (-1.52; 1.45), provision of matters covered sun-loungers and umbrellas on the beach (-1.04; 1.52) were related to the “possible overkill” line of action. Interviewed beach users were satisfied with the quality of those parameters and the importance of facilities was ranked as low.



Key: Line of action keep up the good work; concentrate here; low priority; possible overkill Safety parameters: S1-lifeguards, s2-bather/boating zonation markers, s3-fixed safety equipment, s4-first aid posts, s5-beach safety information notices;

Facilities:f1-bed and breakfast accommodation, f2-clean toilet facilities on the beach, f3-clean beach-based shower facilities, f4-regulary emptied litter bins, f5-restaurants and snack bars/cafes on the beach, f6-sport related facilities, f7-parking spaces and good access to the beach, f8-provision of matters covered sun-loungers and umbrellas on the beach, f9-daily cleaning of the beach

Figure 5.27 Importance-Quality matrix at Quinta do Lago beach

Beach management

Dogs on the beach during the summer season.

At all sites the highest percentage of respondents stated that dogs should not be allowed on the beach during the summer season, which was 56% at Ilha da Armona, 66% at Ilha Deserta, 74% at Ilha do Farol, 82% at Quarteira-Vilamoura and 86% at Quinta do Lago. Those, who stated that dogs should be allowed, formed 26% of respondents at Ilha da Armona, 14% at Ilha Deserta, 12% at Ilha do Farol, 8% at Quarteira-Vilamoura and 10% at Quinta do Lago. Other respondents were unsure if the dogs should be allowed (Figure 5.29).

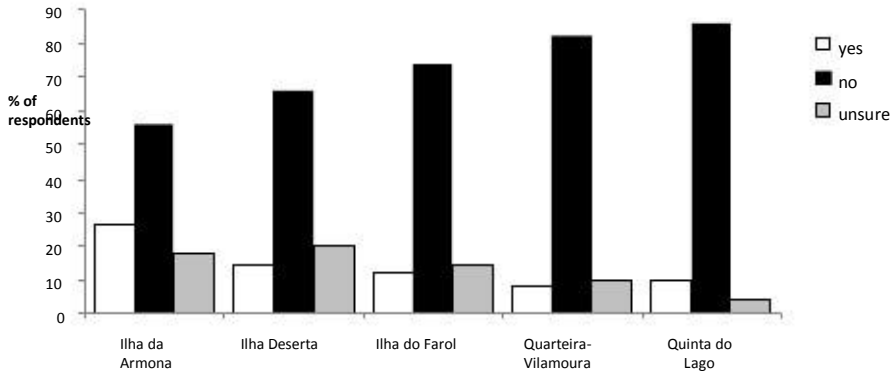


Figure 5.29 Distribution of respondents' answers on the question if the dogs should be allowed on the beach in the summer season (May-September)

The most important reasons for selecting the beach.

Respondents at all sites were asked to rank ten reasons from the list, according to the importance they represented for choosing the beach, they were interviewed at, being 1 the most important and followed by 2, than 3 and till the last parameter in the list. Further the respondents were divided into Portuguese and International tourists and the means for each reason were calculated within these two groups of respondents. Final lower values represented the more important reasons and higher values represented the less important reasons. From the Figure 5.30 it can be seen, that there is approximately similar distribution of importance of characteristics for all sites. For example, clean seawater, clean sand, views and landscapes represented the most important reasons for interviewed beach users at all sites, with the mean values, ranged from 2 to 5. Such reasons as distance to travel to the beach, safety, toilet facilities, beach award flag and accessibility represented lower importance for respondents at all sites (mean values circa 5-7). The reasons, which were equally the least important for respondents at all sites, included refreshment kiosk and parking (mean values circa 7-10). However, some differences between sites can be highlighted. At Ilha Deserta the importance of "Beach

Award Flag" was evaluated higher comparing with other sites, where a low importance was addressed to this parameter. At Quinta do Lago and Quarteira-Vilamoura, the importance of distance to travel to the beach, was evaluated higher than on other beaches, which can be explained by the proximity of situated tourist accommodations to the beach. With regards to priorities of residents and non-residents of Portugal, Figure 5.30 showed similar distribution of prior reasons for choosing the beach for Portuguese and International tourists. However, at all sites, excluding Quinta do Lago, the presence of beach award flag was higher rated by the Portuguese respondents than by International. Distance to travel to the beach represented higher importance to International tourists at all sites, excluding Quarteira-Vilamoura.

Obtained results are similar to the results of Roca and Villares (2008), who using the same approach, identified that clean sand and seawater, were the most desirable aspects for selecting the beach, followed by attractive views with landscapes and safety parameters. Parking and good facilities were also placed in the last position in Roca and Villares (2008), which is the case of beaches in this study. The results are also in consistent with the results, obtained by Vaz et al.(2009), when beach user questionnaire surveys in Portugal and Wales showed the highest importance of clean sand and water, followed by proximity and the least important reasons, which included safety, facilities and parking. With regards to the importance of beach award flag for choosing the specific bathing areas, the results of this study are consistent with the results of Quintela et al. (2009), when the surveys of bathing users perceptions and expectation at Azores in Portugal showed, that beach users seemed to be aware of the Blue Flag, however they did not include it in the main reasons for choosing bathing areas. The same findings regarding beach award flag were obtained by the latest study of McKenna et al. (in press), showing that beach awards play a insignificant role in beach visitor motivation.

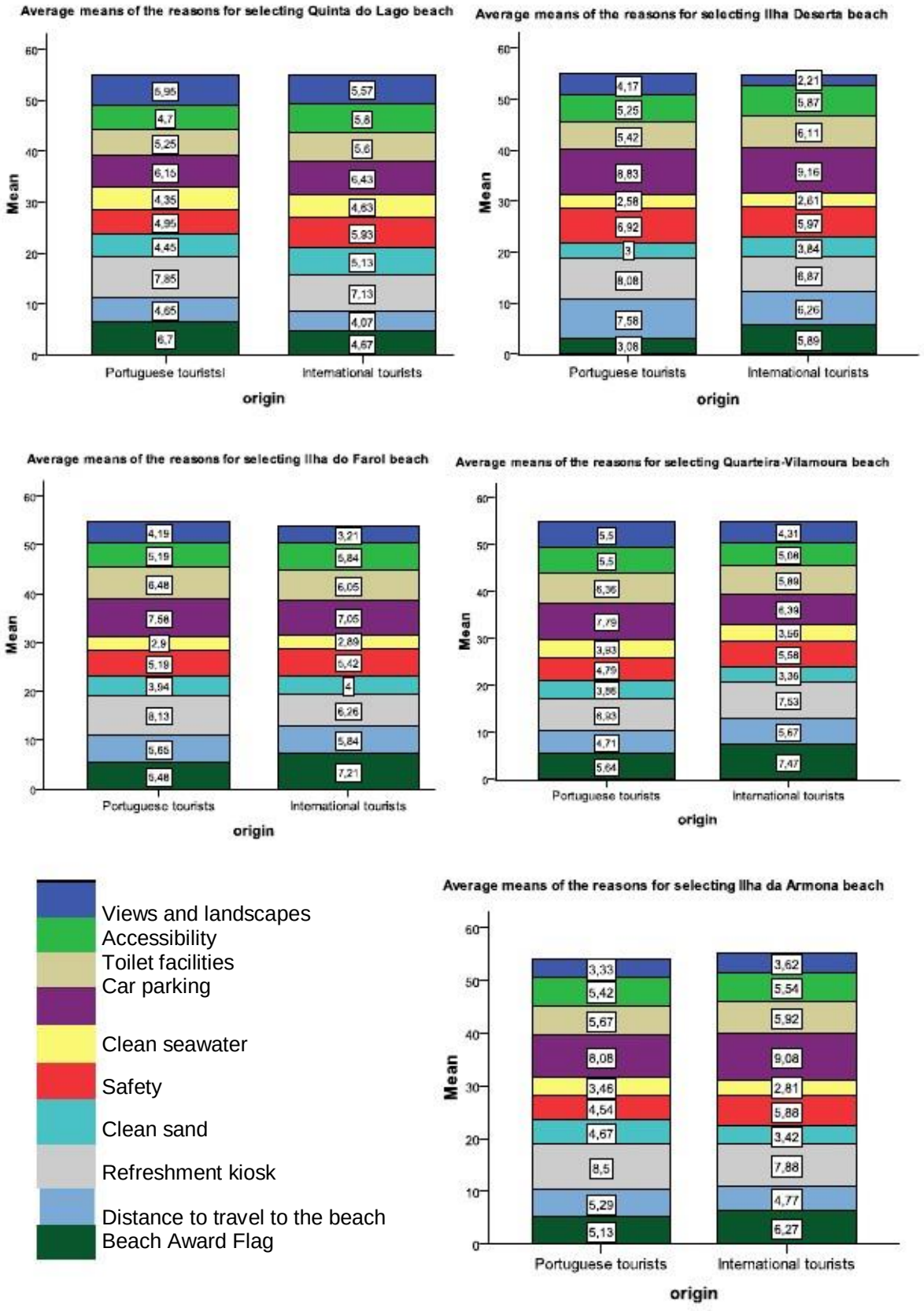


Figure 5.30 The main reasons for beach selection rated by Portuguese tourists and International tourists at each investigated site.

Improvement of the beach.

Respondents at all sites were asked if they would like to see the beach improved and had a choice between three answers: “yes”, “no”, “do not know”. The highest percentage of respondents at Ilha Deserta (48%), Ilha do Farol (54%) and Quarteira-Vilamoura (44%) stated, that they “want to see the beach improved”, followed by those, who gave the negative answer on this question. However, the respondents, who gave the negative answer and those, who was unsure, formed the same percentage at Quarteira-Vilamoura. Most of respondents at Ilha da Armona (44%) and Quinta do Lago (42%) were satisfied with the beach quality and did not want to see it improved, followed by those, who wanted to see the beach improved (Ilha da Armona (40%) and Quinta do Lago (38%)), (Figure 5.31). These results are similar to the results of Nelson et al. (2000), when analyses of beach user’s perceptions and preferences in UK showed, that many respondents did not want to see the beach improved. According to Nelson et al. (2000) such desires can be explained by the wishing to preserve a more pristine, as well as a fear that a development could lead to overcrowding, increasing of noise and reduction in enjoyment at the beach.

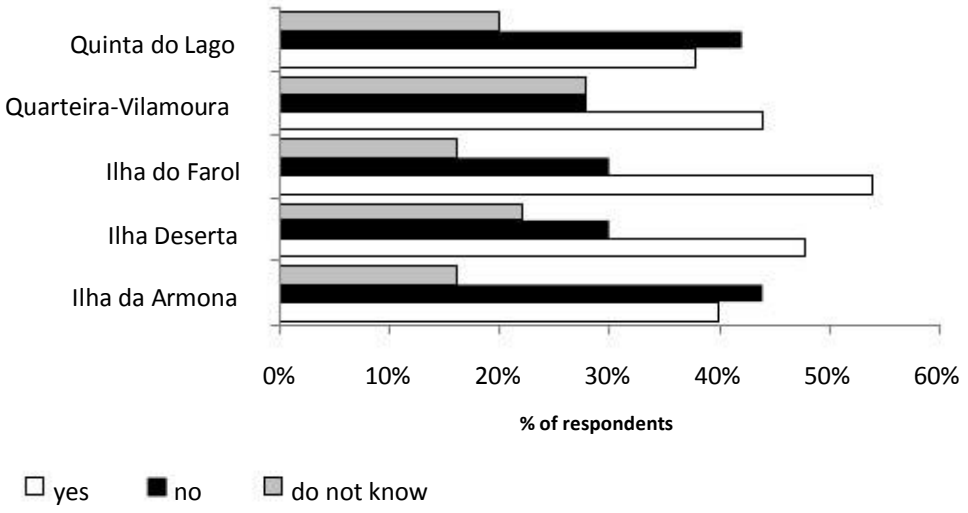


Figure 5.31 Distribution of respondents’ answers on the question if they want to see the beach improved.

Comments about the coastal environment.

Interviewed beach users at all investigated sites were free to write their comments about the bathing area. All respondents at Ilha da Armona concurred that the beach appeal should be improved, it should be less litter on the beach, more litter bins and receptacles for used cigarettes should be placed, and the cleaning of the beach should be improved. Also all respondents highlighted a need for improving beach safety. All respondents at Ilha Deserta beach concurred in the need for modernization of the berth on the island, as well as improving of accessibility and safety, referring to the need for more lifeguards present on the beach. Additionally, all respondents commented on the need for better cleaning of the beach, by placing more litter bins on the beach and organizing groups of people, taking care about cleanliness of the bathing area. Beach users at Ilha do Farol concurred, that there is a need for placing shower and toilet facilities on the beach, as well as improving of cleanliness of the area, its safety and accessibility. Additionally, all respondents commented on the need for placing more litter bins on the beach, organizing more lifeguards and placing more information notices about the beach. There were respondents, who pointed on the need for provision of police on the beach. Respondents at Quarteira-Vilamoura beach stated that there is need for increasing a number of sport activities, placing more showers, ashtrays, and improving of the quality of toilet facilities on the beach. Some respondents at Quarteira-Vilamoura also commented on the need of police provision on the beach. Beach users at Quinta do Lago concurred, that there is a need for placing more restaurants and cafes on the beach, shower and toilet facilities. Additionally, respondents commented on the importance of keeping up a good work with regards to dune preservation. Also it is very important, that respondents at all sites stated, that mentality and education of beach users should be improved.

CHAPTER 6

CONCLUSIONS AND RECCOMENDATIONS

The aim of this thesis was to evaluate the quality of five different types of beaches in the Sotavento Algarve region, using the Bathing Area Registration and Evaluation Framework and examine beach users' preferences and priorities in order to identify the management priorities required to improve the quality of individual beaches. This was done for the purpose of increasing the beach tourism sector and therefore income of the region.

Five different beaches (rural, remote, village, resort and urban) were observed and the beach quality for each site was evaluated through the five main parameters: safety, water quality, availability of facilities, scenery and litter. After final evaluation of the beach quality, Quarteira-Vilamoura (urban), Ilha do Farol (village), Ilha Deserta (remote) and Ilha da Armona (rural) beaches were rated as three star beaches and Quinta do Lago (resort) beach obtained one star rating.

- With regards to water quality, all five beaches received the highest ratings. The colour of water was clear blue and there was no evidence of floating debris, sea-bottom debris or oil. The results above were recorded after the visual observations were made.
- The highest ratings for cleanliness were addressed to Quarteira-Vilamoura, Quinta do Lago and Ilha da Armona beaches; the remaining two sites were also in a good quality with regards to litter pollution. However, some scattered items of litter, mostly plastic, were noticed on these beaches.
- The Quinta do Lago beach, which is situated in the popular golf resort and is characterized by high valued coastal landscape features, received the highest rating for

the scenery. The Quarteira-Vilamoura beach, obtained the lowest rating for scenery because of its high build environment and unattractive skyline.

- Urban, resort and village beaches were rated as safe bathing environments. However, emergency vehicle access was absent at Ilha do Farol and Quinta do Lago beaches. Bather/boating zonation buoys were absent on all beaches.
- With regards to required facilities at urban, resort and village areas, a higher rating was addressed to Quarteira-Vilamoura (urban) beach. All required facilities presented on this beach, however, there was a lack of showers and sport activities. Quinta do Lago and Ilha do Farol received lower ratings for its facilities due to the absence of showers and poorly managed toilet facilities.

Beach users' preferences and priorities were identified using the questionnaires and direct interviews during the summer season 2009. The total amount of questionnaires was 250 exemplars (50 per beach), received data was analyzed in SPSS and Microsoft Excel, and results were presented.

- The majority of interviewed beach users at all sites were between 25 and 50 years old, followed by the youth of 18 - 25 years old. Males formed the highest percentage of respondents at each site. Professors/teachers, social workers, managers, administrators, designers, engineers, housewives and retired people were the most common occupations of interviewed beach users at all sites. Most respondents at all sites stated that they went to a beach every/most days a week and stayed there for 1-4 hours, excluding Ilha do Farol, where it was 4-8 hours.
- The percentage of International tourists was higher than the percentage of Portuguese tourists at Ilha Deserta, Ilha da Armona, Quarteira-Vilamoura and Quinta do

Lago. Portuguese tourists on the Ilha do Farol beach formed the highest percentage of respondents. Among most common home countries of international tourists were United Kingdom, Germany, France, Spain, Holland, Belgium, Italy and Check Republic. The highest percentage of international tourists at all surveyed sites were from Great Britain, who formed 22% at Ilha da Armona, 16% at Ilha Deserta, 16% at Ilha do Farol, 38% at Quarteira-Vilamoura and 52% at Quinta do Lago.

- Most important reasons for selecting the beach by respondents at all sites were clean seawater, clean sand, scenery and landscapes. The main purpose for selecting the beach for beach users at all sites was to enjoy views and fresh air. The second highest percentage of respondents at all sites marked swimming as the main reason and the third highest percentage marked nature and wildlife as the most important reason at Ilha da Armona and Ilha Deserta, and walking at Quarteira-Vilamoura and Quinta do Lago.
- The highest percentage of votes at all sites for the characteristic, which users mostly dislike on a beach, was addressed to washed up litter and man-made debris. The second highest percentage was addressed to dog waste, poor water quality, excessive seaweed (algae), washed up sewage debris and bad smells from industry. The most offensive forms of beach/sea pollution, according to beach users were oil on the beach and in the sea, followed by beach litter.
- A visual appearance of the beach at all sites was evaluated by most beach users as excellent or good, and only a small percentage of interviewed people evaluated it as fair. None of the surveyed beaches was evaluated as poor or very bad for its appearance. A state of the beach with regards to litter pollution was evaluated as good by the highest percentage of beach users at all sites.
- Most of safety and facilities parameters at all sites were evaluated as important and respondents were satisfied with most characteristics. Parking facilities obtained the

lowest values for its importance at all sites; among other facilities with lower importance were provision of sun-loungers and umbrellas at Quinta do Lago and Quarteira-Vilamoura, restaurants at Quinta do Lago and bed/breakfast accommodation at Ilha do Farol. With regards to quality of facilities, toilet and shower facilities received the lowest ratings in contrary to high ratings, obtained for its importance at Ilha do Farol and Quinta do Lago beaches. Additionally, bather/boating buoys zonation was addressed to “low priority” line action at Ilha do Farol and “concentrate here” at Quinta do Lago and Quarteira-Vilamoura beaches.

Some actions of beach management should be done at each site in order to improve beach quality and therefore to increase beach users’ satisfaction with the bathing environments:

- Toilet and shower facilities should be placed at Ilha do Farol beach, as its presence is very important factor for all beach users; showers should be placed and toilet facilities should be improved at Quinta do Lago beach.
- Daily cleaning of all beaches and frequency of cleaning the litter bins should be improved, which will also indicate higher scenic quality of the areas. Additionally, creation of new dunes and reducing of coastal construction activity will enhance a better appearance of all beaches.
- It is very important to place bather/boating zonation buoys at all sites, as well as more information and warning notices should be placed at all beaches, it can help to improve the beach users’ behaviour and mentality, and increase safety during the staying on a beach.

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ANNEX 1

Bathing Area Registration and Evaluation Form

Obtained from Williams and Micallef (2009)

SECTION I BACKGROUND INFORMATION

Name of bathing area:.....**Current classification:**.....

Type: *Natural beach* ☐ *Nourished beach* ☐ *Rocky shore* ☐
Resort ☐ *Urban* ☐ *Village* ☐ *Rural* ☐ *Remote* ☐

Length: .....*(m)* **Width:**..... *(m)* **Shape:**..... **Slope:** .....(°)

Length is measured along the shoreline and width is measured from water's edge at low tide to back of beach.

Rough sketch/digital image of bathing area

Table 1.1 *Beach sediment characteristics**

Colour:		**Geological composition:**			
	% cover	**Size**		**% cover**	**Size**
Sand			*Cobble*		
Gravel			*Rocks*		
Pebble			*Other (e.g. concrete)*		

Sea floor: *Sand*.....% *Stones*.....% *Cobble/Pebble* .....% *Rock*.....%
Shore type:** *Sand beach* .....% *Gravel beach*.....% *Pebble beach* ..... %
Cobble beach .....% *Rocky shore*.....% *Concrete quay*..... %
Backshore type: *Wooded* ..... % *Cliff*..... % *Other* ..... %

* *beach sediment characteristics* refers to the beach itself that either forms a limited part of the shore (e.g. in a pocket beach environment having boulder or rocky shore edges) or is representative of the entire/large part of shore (as in the case of long linear beaches).
** *shore type* refers to the entire shore visible to the beach user which may include boulder shore, concrete piers, shore platforms etc.

Responsible authority: ..... **Municipality:** .....

Number. of staff engaged with beach management: ☐

Date of initial registration: **Date of field survey:**

Accessibility:
To site: Public beach: By road ☐ By walking ☐ Public transport ☐

Private beach: Ownership type ☐ Entrance fee ☐

... ***To water environment:*** Gentle/steep underwater slope ☐

Beach erosion:
Are there obvious signs of erosion/deposition ? Yes ☐ No ☐

Is there present or past monitoring of erosion? Yes ☐ No ☐

If so, by whom? .....

Are there known records or erosion maps available? Yes ☐ No ☐

If so, where? .....

Table 1.2 *Beach occupancy rates and carrying capacity*

Time of year	Number of bathers (11.00 hrs) ***	Number of bathers (16.00 hrs) ***	% beach occupancy
Whole bathing season			
Bathing season weekday			
Bathing season weekends			
Non-bathing season			

Note: *** beach users on beach and in water.

Method for calculation of beach carrying capacity:
It is recommended that beach carrying capacity assessments should never incorporate dunes where present, as they are very vulnerable sites. Dunes should be preserved and restored if possible.

1. Measure length and width of beach.
2. Calculate area (calculation of beach area for non-linear/pocket beaches may vary from simple width x length calculation).

3. For a beach less than 50m long, subtract the area allocated for emergency services access (i.e. a 3m wide strip across the width of the beach from the back shore to the water's edge). It is recommended that for a beach 50m long or more, one should consider two such access strips of 3m width each (with a third access strip for each second 50m in beach length (i.e. for a beach of 100m, one would consider three access strips from the backshore to the water's edge – one on each edge of the beach and one down the centre).

4. Subtract another area represented by a 3m wide strip along the length of the beach (i.e. along the water's edge) reserved for public access. This may change according to country specific legislation that may stipulate different distances from the water's edge where beach concession deck chairs and umbrellas may be placed. For beaches over 50m wide, these '*across the beach length access strips*' would need to be increased in number with a minimum of two such strips every 50m in beach width.

5. Estimate the carrying capacity of the concession by dividing the remaining area by 16 and multiplying the result by 2 (this assumes a 4m x 4m area per umbrella and two sun-loungers (i.e. 4 x 4m per two persons).

In the estimation of beach area per beach user, field trials and current literature citing acceptable beach area per beach user (Health Education Service, 1990; van der Salm and Unal, 2001; Pereira da Silva, 2003) were considered.

Estimated beach carrying capacity: ☐

Beach-use orientation:

Table 1.3 *Main usage*

Jet skiing		Sailing		Motor boating	
Fishing (shore/boat)		Kite flying		Wind surfing	
Walking		Diving		Surfing	
Sunbathing		Swimming		Picnicking	
Tourism yachting/day cruises		Other sporting activities			

	YES	NO
Resting place for waterfowl/mammals		
Breeding place for rare birds/mammals		
Sanctuary		
Conservation area		
Area having high biodiversity/ecologically sensitive area		
Archaeological sites		
Other kind of protected area., e.g. heritage sites		

SECTION II RATING OF PARAMETERS

Table 2.1 *Safety parameters*

Safe bathing environment including: • a bathing environment slope < 1:10; • wave height < 0.5m for at least 80% of the bathing season	
Lifeguards (inclusive of sea craft-based lifeguards).	
Bather/boating zonation markers	
Fixed safety equipment	
First aid posts	
Beach safety information notices (on safe code of conduct, presence of rip currents or any other, telephone number and location of nearest health centre, latest records for water quality monitoring, other). Provision of warning flag in case of unsafe bathing conditions	
Access for emergency vehicles	

Table 2.2 *Water quality*

National bathing season monitoring programme results (Year ..... report)						
Barcelona Convention criteria		**EU Bathing Water Directive (2000)**				
Passed		Blue Quality				
		Green Quality				
		Orange/Red Quality				
Failed		Black Quality				
Potential influences of poor water quality		Sewage outlet				
		Sewage pipes				
		River mouth				
		Harbour areas				
		Other, e.g. known absence of sewerage system				
Visual observations along 100m of shoreline (for rural/remote beaches where average bathing season occupancy rates < 40% of beach carrying capacity)			**A**	**B**	**C**	**D**
Floating debris	Sewage related		0	1–5	6–14	> 14
	Other, e.g. plastics, wood		0–10	11–20	21–30	> 30
Oil			0	1–5	6–14	> 14
Sea-bottom debris			0–10	11–20	21–30	> 30

Table 2.3 *Beach facilities (tick where present and indicate number where possible)*

Toilet facilities	Public		Clean		Apartment complexes	
	Restaurant		Poorly managed *		Camping grounds	
Shower facilities	Public		Clean		Highest hotel star rating	
	Restaurant		Poorly managed *			
Litter bins			Regularly emptied		Summer houses for rent	
			Poorly managed *			
Cigarette receptacles					Bed & Breakfast accommodation	
Restaurants			Snack bars			
Information notice			Security boxes		Freshwater tap	
Adequate parking facilities (see beach carrying capacity)			Wheelchair access		Tiki-huts/umbrellas	
Sun beds	Mattress		Legal/policy restrictions to water-based sport facilities		Speedboat towing activities (e.g. banana boat, tubing, skiing)	
	Nylon					
	Wood/ plastic					
Sail boating			Scuba-diving		Wind surfing	
Pedaloes			Para-sailing		Jet skiing	
Other						

Note: *Poorly managed facilities are facilities that are dirty, non-functioning, or not easily accessible.

Table 2.4 is for the evaluation of hinterland scenery within walking distance and generally visible from the beach. In the context of bathing area quality evaluation, scenery is the only parameter that takes cognizance of a wider range of aspects outside the bathing area. To this end, a coastal scenic evaluation technique is applied (Ergin et al, 2004).

Table 2.4 *Coastal scenic evaluation system*

Site Name :

No.	Physical Parameters		RATING				
			1	2	3	4	5
1	CLIFF	Height	Absent	5–30m	30–60m	60–90m	>90m
2		Slope	45°–55°	55°–65°	65°–75°	75°–85°	Circa vertical
3		Special features*	Absent	1	2	3	Many >3
4	BEACH FACE	Type	Absent	Mud	Cobble/ boulder	Pebble/gravel (±sand)	Sand
5		Width	Absent	<5m	5–25m	25–50m	50–100m
6		Colour	Absent	Dark	Dark tan	Light tan/ beached	White/gold
7	ROCKY SHORE	Slope	Absent	<5°	5–10°	10–20°	20–45°
8		Extent	Absent	<5m	5–10m	10–20m	>20m
9		Roughness	Absent	Distinctly jagged	Deeply pitted and/or irregular (uneven)	Shallow pitted	Smooth
10	DUNES		Absent	Remnants	Foredune	Secondary ridge	Several
11	VALLEY		Absent	Dry valley	(<1m) Stream	(1m–4m) Stream	River/ limestone gorge
12	SKYLINE LANDFORM		Not visible	Flat	Undulating	Highly undulating	Mountainous
13	TIDES		Micro (>4m)		Meso (2–4m)		Micro (<2m)
14	COASTAL LANDSCAPE FEATURES **		None	1	2	3	>3
15	VISTAS		Open on one side	Open on two sides		Open on three sides	Open on four sides
16	WATER COLOUR & CLARITY		Muddy brown/ grey	Milky blue/ green; opaque	Green/grey blue	Clear blue/ dark blue	Very clear turquoise
17	NATURAL VEGETATION COVER		Bare (< 10% vegetation only)	Scrub/garigue/ grass (marram/ gorse/ferns, bramble/ meadow etc.)	Bushes, coppices, maquis	Wetland ± mature trees	Variety of mature trees/ forest – a 'patchwork quilt'
18	VEGETATION DEBRIS		Continuous >50cm high	Full strand line	Single accumulation	Few scattered items	None
19	NOISE DISTURBANCE		Intolerable	Tolerable		Little	None
20	LITTER		Continuous accumulations	Full strand line	Single accumulation	Few scattered items	Virtually absent
21	SEWAGE DISCHARGE EVIDENCE		Sewage evidence		Some evidence (1–3 items)		No evidence of sewage
22	AGRICULTURE***		None, bare (>10% vegetation) greenhouses	Field crops (wheat, corn etc.) hedgerows, monoculture	Vineyards, terracing, tea, etc.	Shrub type plants – date palm, pineapples, etc.	Orchards – apples, cherries etc.
23	BUILT ENVIRONMENT****		Heavy industry	Heavy tourism and/or urban	Light tourism and/or urban and/or sensitive industry	Sensitive tourism and/ or urban	Historic and/ or none
24	ACCESS TYPE		No buffer zone/heavy traffic	No buffer zone/light traffic		Parking lot visible from coastal area	Parking lot not visible from coastal area
25	SKYLINE		Very unattractive	Unattractive	Sensitively designed high / low	Very sensitively designed	Natural/ historic features
26	UTILITIES *****		>3	3	2	1	None

Notes: * Cliff special features: indentation, banding, folding, scree, irregular profile, etc.

** Coastal landscape features: peninsulas, rock ridges, irregular headlands, arches, windows, caves, waterfalls, deltas, lagoons, islands, stacks, estuaries, reefs, fauna, embayment, tombolo, etc.

*** Agriculture: where no agriculture can be seen and the natural vegetation cover parameter has scored a 5, then the 5 box should be ticked in this line. If the Natural Vegetation Cover box ticked was a 2, 3, 4 then tick the 3 box here.

**** Built environment: caravans will come under tourism, Grading 2: large intensive caravan site, Grading 3: light, but still intensive caravan sites, Grading 4: sensitively designed caravan sites.

***** Utilities: Power lines, pipelines, street lamps, groynes, seawalls, revetments, etc.

Table 2.5 *Litter survey*

Tick appropriate box
(Rating is based on lowest score litter category)

Category	Type	A	B	C	D
Sewage-related debris	General	0	1–5	6–14	15+
	Cotton buds	0–9	10–49	50–99	100+
Gross litter		0	1–5	6–14	15+
General litter		0–49	50–499	500–999	1000+
Harmful litter	Broken glass	0	1–5	6–24	25+
	Other	0	1–4	5–9	10+
Accumulations	Number	0	1–4	5–9	10+
Oil		Absent	Trace	Nuisance	Objectionable
Faeces		0	1–5	6–24	25+

Note: See Appendix 2.
Source: Based on EA/NALG (2000)

SECTION III EVALUATION OF RATINGS FOR BEACH USER PRIORITY CONCERNS

Table 3.1a *Evaluation of safety-related parameters in resort/urban bathing areas*

Parameter	Rating	Safety Measure
Presence of all 7 parameters	Rating A	– Safe bathing environment – Lifeguards – Bather/boating zonation buoys – Fixed safety equipment** – First aid post** – Beach safety warning notices* – Emergency vehicle access
Presence of safe bathing environment, lifeguards, zonation buoys and emergency vehicle access	Rating B	
Absence of either safe bathing environment, lifeguards and/or zonation buoys	Rating C	
Absence of safe bathing environment, lifeguards and zonation buoys	Rating D	

Notes: * Beach safety warning notices are notices providing information on safe code of conduct, presence of rip currents, telephone numbers and location of nearest health centre, latest records for water quality monitoring and other information.
** The presence of lifeguards negates the requirement for fixed safety equipment and first aid post.

Table 3.1b *Evaluation of safety-related parameters in Village-associated bathing areas (and rural/remote beaches with average bathing season occupancy rate > 40 per cent of beach carrying capacity).*

Parameter	Rating	Safety Measure
Presence of all 5 parameters*	Rating A	– Safe bathing environment – Bather/boating zonation buoys – Fixed safety equipment – Beach safety warning notices – Emergency vehicle access
Presence of safe bathing environment, zonation buoys, warning notices and emergency vehicle access	Rating B	
Absence of either, safe bathing environment, zonation buoys and warning notices, or fixed safety equipment*	Rating C	
An unsafe bathing environment	Rating D	

Note: *The presence of lifeguards negates the requirement for fixed safety equipment.

Table 3.2 *Evaluation of bathing water quality*

For resort, urban and village bathing waters (and rural/remote beaches with average bathing season occupancy rate > 40% of beach carrying capacity)			For remote and rural bathing waters with average bathing season occupancy rate < 40% of beach carrying capacity
EU water quality directive (2000/60/EC)		Barcelona Convention criteria for bathing waters	Visual observation
Rating	**Classification**	**Classification**	**Classification**
A	*Blue quality*	*Passed*	See Annex 1, Table 2.2
B	*Green quality*	–	
C	*Red/orange quality*	–	
D	*Black quality*	*Failed*	

Table 3.3a *Evaluation of facilities on resort beaches*

A Rating	*B Rating*	*C Rating*	*D Rating*
5 star accommodation*	4 star accommodation*	3 star accommodation*	2 star accommodation*
Clean toilet facilities on the beach	Clean toilets limited to beach-associated restaurant/cafe/ adjacent hotel grounds**	Poorly managed toilet facilities on the beach	Poorly managed toilets in beach-associated restaurant/cafe/ adjacent hotel grounds** OR No toilets
Clean beach-based shower facilities every 50m or less	Clean beach-based shower facilities every 51–100m OR Clean shower facilities limited to beach-adjacent restaurant/cafe/ adjacent hotel grounds**	Poorly managed shower facilities and/or shower facilities > every 100m	Shower facilities limited to hotel* OR No showers
Restaurant on beach or within beach-adjacent hotel grounds** AND Snack bar/cafe on beach	Restaurant on beach or within beach-adjacent hotel grounds** No snack bar/cafe on beach.	Limited to snack bar/cafe on beach or within beach-adjacent hotel grounds**	No restaurant /snack bar/cafe on beach or beach-adjacent hotel grounds** OR Restaurant/snack bar/cafe limited to hotel building
Up to 6 water-based sport-related facilities***	4–5	2–3	< 2
Regularly emptied litter bins and provision of receptacles for used cigarettes	Regularly emptied litter bins and no used cigarette receptacles	Poorly managed litter bins and receptacles OR Poorly managed litter bins and no receptacles	No litter bins
Provision of well-spaced (approx. 6m) mattress covered sun-loungers and umbrellas on beach	Provision of (approx. 4–6m) spaced nylon-net, plastic/wood sun-loungers and umbrellas on beach	Poorly spaced (too close or no order) sun beds (any type) and umbrellas Absence of either umbrellas or sun beds on the beach	Provision of sun-loungers and umbrellas restricted to beach-adjacent hotel* grounds or absent

Notes: * Includes hotels, accommodation/camping complexes; ** refers to hotel, accommodation/camping complex involved in beach management; *** Jet skis, para-sailing, wind surfing, pedalces, canoes, speedboat towing activities (rings, banana boats, water skiing), boating, diving. Poorly managed facilities are facilities that are dirty, non-functioning or not easily accessible.

Table 3.3b *Evaluation of facilities on urban beaches*

A Rating	*B Rating*	*C Rating*	*D Rating*
Accommodation*# include 4 or 5 star facilities	The highest grade of accommodation is limited to 3 or 2 star facilities	The highest grade of accommodation is limited to 1 Star facilities	No accommodation *# is available
Clean toilets available on the beach	Clean toilets limited to restaurant/cafe in bathing area #	Poorly managed toilet facilities on the beach	Absence of or poorly managed toilet facilities in bathing area #
Clean beach-based shower facilities every 50–100m	Clean beach-based shower facilities > 100m apart	Poorly managed shower facilities	Shower facilities absent in bathing area #
Restaurant available on the beach	Snack bar available on the beach	Snack bar and/or restaurant not on beach but within bathing area	Absence of restaurant and snack bar within the bathing area
Up to 4 water based sport-related facilities**	3	2	< 2
Regularly emptied litter bins and provision of receptacles for used cigarettes	Regularly emptied litter bins and no used cigarette receptacles	Poorly managed litter bins	No litter bins
Provision of mattress covered sun-loungers and umbrellas on beach	Provision of nylon-net, plastic/wood sun-loungers and umbrellas on beach	Absence of either umbrellas or sun beds on the beach	Absence of umbrellas and sun beds on the beach

Notes: # Within walking distance of the beach. This has been shown to fall within a broad definition of 300–500m. * Includes hotels, accommodation complexes. ** Jet skis, para-sailing, wind surfing, pedaloes, speedboat towing activities (rings, banana boats, water skiing), boating, diving. This aspect is not considered if there is a deliberate policy against or legal restriction on water-based sport facilities. Poorly managed facilities are facilities that are dirty, non-functioning, or not easily accessible.

Table 3.3c *Evaluation of facilities on village-associated bathing areas*

A Rating	*B Rating*	*C Rating*	*D Rating*
Clean public shower facilities	Clean shower facilities limited to restaurants	Absence or poorly managed shower facilities	Total absence of facilities
Clean public toilet facilities	Clean restaurant-based toilet facilities	Poorly managed toilet facilities*	
Restaurant	Bar	–	
Adequate parking and good access**	Good access**	Poor access**	
Motel/B&B accommodation	Camping grounds	–	
Clean litter bins	Poorly managed litter bins	Insufficient litter bins	

Notes: * Facilities that are dirty, non-functioning, or not easily accessible. ** Facilities are easily visible, well signposted to beach access point and car park. Beach access should be well maintained to facilitate beach use by the elderly and less-able people.

Table 3.4 *Bathing area rating based on litter-related parameters*

Overall bathing area rating result for litter	

Note: See also Annex 1, Table 2.5.
Source: EA/NALG (2000)

Table 3.5 *Bathing area rating based on coastal scenic evaluation*

Coastal scenic classification	BARE equivalent for use in Bathing Area Classification Annex 1, Tables 4.1–4.3	Description
Class 1	A	Extremely attractive natural site with a very high landscape value, having a D value equal to or above 0.85
Class 2	B	Attractive natural site with high landscape value, having a D value between 0.65 and 0.85
Class 3	C	Mainly natural with little outstanding landscape features and a D value between 0.4 and 0.65, e.g. urban sites with exceptional scenic characteristics
Class 4	D	Mainly unattractive urban, with a low landscape value, and a D value between 0 and 0.4
Class 5	D	Very unattractive urban, intensive development with a low landscape value and a D value below 0

Note: See Annex 1, Table 2.4.

Table 4.1 *Bathing area classification system for resort bathing areas*

Site name:			**Bathing area type:**		
Parameter	Safety	Water quality	Facilities	Litter	Hinterland scenery
Parameter Rating					
Classification of bathing environment					
5 star	At least four parameter ratings awarded an 'A' rating for safety, water quality, facilities and either scenery or litter with the fifth parameter rating being not less than 'B'				
4 star	Where 'B' is the lowest score allocated to safety, water quality and facilities and where the lowest score for scenery and litter is not less than 'C'				
3 star	Where the lowest score awarded to safety, water quality, facilities and litter is 'C'				
2 star	Where 'C' is the lowest score awarded to safety, water quality and facilities and where scenery or litter awarded a 'D' score				
1 star	Where either safety, water quality or facilities parameter ratings awarded a 'D' score				

Table 4.2 *Bathing area classification system for urban and village bathing areas (and rural/remote beaches with average bathing season occupancy rate > 40 per cent of beach carrying capacity). For such beaches, rate facilities for Table 3.3c.*

Site name:			**Bathing area type:**		
Parameter	Safety	Water quality	Facilities	Litter	Hinterland scenery
Parameter Rating					
Classification of bathing environment					
5 star	At least four parameter ratings awarded an 'A' rating for safety, water quality, facilities and either scenery or litter with the fifth parameter rating being not less than 'B'				
4 star	Where 'B' is the lowest score allocated to safety, water quality and facilities and where the lowest score for scenery and litter is not less than 'C'				
3 star	Where the lowest score awarded to safety, water quality, facilities and litter awarded is 'C'				
2 star	Where 'C' is the lowest score awarded to safety, water quality and facilities and where litter awarded a 'D' score				
1 star	Where either, safety, water quality or facilities parameter ratings awarded a 'D' score				

Table 4.3 *Bathing area classification system for rural/remote bathing areas with average bathing season occupancy rate < 40 per cent of beach carrying capacity*

Site name:			**Bathing area type:**		
Parameter	Safety #	Water # quality*	Facilities	Litter	Hinterland scenery
Parameter Rating	*Not applicable*		*Not applicable*		
Classification of bathing environment					
5 star	'A' score rating awarded to water quality, scenery and litter				
4 star	'A' score rating awarded to water quality and litter and 'B' rating to scenery				
3 star	'B' is the lowest score rating awarded to water quality and litter and not less than 'C' class to scenery				
2 star	'C' score rating awarded to water quality, scenery and litter				
1 star	Where any parameter is awarded a 'D' score rating				

Notes: # Wherever possible strict adherence to national/international water quality monitoring and safety standards is highly recommended for all bathing areas. However, it is recognized that particularly in countries with extensive coastlines, water quality monitoring and provision of safety measures may not be feasible in all remote/rural bathing areas. A practical solution recommended by the BARE technique in deciding where such monitoring/provision of safety facilities becomes a justifiable requisite, would be to use an average bathing season occupancy rate of over 40 per cent of a beach's carrying capacity as a sign of sufficiently high numbers of bathers to justify adherence to strict water quality monitoring/safety requisites. Therefore, under such circumstances in rural or remote beaches, the water quality parameter is rated according to criteria set out in Annex 1, Table 3.2 (i.e. as for resort, urban and village beaches) while safety parameter is rated according to Annex 1, Table 3.1b (i.e. as for village beaches). Bathing area classification is then determined using Annex 1, Table 4.2 (as for urban and village bathing areas). * In the absence of such a justification, water quality rating is carried out through the visual observation method described in Annex 1, Tables 2.2 and 3.2.

APPENDIX 1

Beach user questionnaires

Modified from Williams and Micallef (2009)

Beach user questionnaire (English)

Beach User Questionnaire

Beach… ….

Date……..

We would appreciate your views regarding beach quality. Your opinions may help to improve the coastal environment. It will only take a few minutes.

PART 1 - PERSONAL DETAILS

1) Age ..... 2) Gender (male/female) .....

2) Occupation……..

3) How many adults are in the group? ……...

4) What are the ages of children in your group?

5) What is your home town and country? .....……

6) On average, how often do you go to the beach when on holiday?

every day	
most days	
2–3 days per week	
about once a week	
only rarely	

7) How long do you usually stay at the beach?

less than one hour	
1–4 hours	
4–8 hours	
more than 8 hours	

8) How did you travel to the beach today?

on foot	
by car/motorcycle	
by bicycle	
by taxi	
by train	
by bus	
by boat	

9) How long did it take you to get to this beach?.....

10) What is the purpose of your visit here today? (Please tick as many boxes as Necessary).

Enjoy views and fresh air	
Nature and wildlife	
Walking	
Swimming	
For children's play	
Water sports	

Other reason (please specify) ……...

11) How much does your enjoyment of the beach contribute to the overall enjoyment of your holiday?(estimate percentage) ……%

12) Which beach do you most frequently visit in Algarve?

……

PART 2 - BEACH QUALITY

1) How do you rate the visual appearance of this beach (please tick one box only)?

excellent	
good	
fair	
poor	
very bad	

2) What three things do you most dislike on a beach (in general)?

Washed up litter and man-made debris	
Poor water quality	
Washed up sewage debris	
Excessive seaweed (algae)	
Bad smells from industry	
Dog waste/excrement	
Noise from industry or vehicles	
Lack of sand	
Difficult access	
Poor facilities	
Others (state)	

3) Have you noticed any accumulations / piles of litter on this stretch of beach?

Yes	1
No	2

4) Do you enter the sea?

No	1
Yes, but only to paddle	2
Yes, swim	3

5) Please rank what you consider the most offensive forms of beach/sea pollution.
(1 being the most offensive followed by 2, then 3 etc).

Place a different number in each box

Discoloured Water	
Sewage-related Debris	
Beach Litter	
Unusual Smell	
Foam/Scum	
Floating Debris	
Oil (on the beach)	
Oil (in the sea)	

Any other? (please state) ……..…….…….……..

6) How would you describe the state of this beach with regards to litter pollution? (Tick one only)

Very Good	
Good	
Fair	
Poor	

BEACH SAFETY PARAMETERS AND FACILITIES

Please rank the safety parameters and facilities according what is the most important for you while staying on the beach and also we will be appreciate if you rank these parameters basing on their quality from your opinion.

Safety	Please, rank them in importance to YOU	Please, rank the safety and facilities for this beach, on a 1 (best) to 5 (poor) scale rate
Lifeguards		
Bather/boating zonation markers		
Fixed safety equipment		
First aid posts		
Beach safety information notices*		
Facilities Good accommodation		
Clean toilet facilities on the beach		
Clean beach-based shower facilities		
Regularly emptied litter bins		
Restaurants and snack bars/cafes on the beach		
Sport-related facilities (wind surfing, jet skiing, paragliding, diving, aqua parks, and so on)		
Parking spaces and good access to the beach		
Provisions of matters covered sun-loungers and umbrellas on the beach		
Daily cleaning of the beach		

*Beach safety information notices: on safe code of conduct, presence of trip currents or any other, telephone number and location of nearest health centre, latest records for water quality monitoring, provision of warning flag in case of unsafe bathing conditions and other

PART 3 – BEACH MANAGEMENT

1) In the summer season (May–September) do you think dogs should be allowed on the beach?

Yes	
No	
Unsure	

2) Please rank the most important reasons for selecting the beach to visit. (1 being the most important followed by 2, then 3 etc).

Place a different number in each box

Views and Landscape	
Accessibility	
Toilet facilities	
Car Parking	
Clean seawater	
Safety	
Clean sand	
Refreshment kiosk	
Distance to travel to beach	
Beach Award Flag	

Any other? (please state)
……..……

3) Would you like to see the beach improved?

Yes	
No	
Don't know	

If "Yes", in what way?.....
. .....

Comments

Are there any comments you would like to make about the coastal environment?

……
……
……

THANK YOU FOR YOUR TIME AND
EFFORT IN COMPLETING THIS
QUESTIONNAIRE

Beach user questionnaire (Portuguese)

Questionário sobre a Praia

Praia……

Data……

O presente questionário relaciona-se a sua percepção em relação a qualidade da praia. A sua opinião podera ajudar a melhorar o ambiente costeiro. Por favor responda a este questionario. Apenas tomaremos 5 minutos do seu tempo.

PARTE 1 - DETALHES PESSOAIS

1) Idade ..... 2) Sexo (masculino/feminino) .....

2) Ocupação……..

3) Quantos adultos estão no seu grupo? ……...

4) Quais sao as idades das criancas no seu grupo?

5) De que cidade e país provem? .....……

6) Em media, com que frequência visita a praia nas férias?

Todos os dias	
Muitos vezes	
2–3 dias por semana	
Uma vez por semana	
Raramente	

7) Quanto tempo em media permanece na praia?

Menos de uma hora	
1–4 horas	
4–8 horas	
Mais de 8 horas	

8) Que meio de transporte utilizou para chegar a praia hoje?

A pé	
De carro/ motorizada	
De bicicleta	
De taxi	
De comboio	
De autocaro	

9) Quanto tempo levou-lhe a chegar a praia?.....

10) Qual é o principal propósito da sua visita a praia hoje? (Por favor seleccione quantos rectangulos necessarios).

Disfrutar da paisagem e ar fresco	
Natureza e vida animal	
Andar na praia	
Nadar	
Passear as crianças	
Desportos náuticos	

Outro motivo (especifique) ……..……...

11) Ate que ponto o usufruto da praia contribui para a satisfacao das suas ferias? (estime uma percentagem) ……..…%

12) Que praia mais frequentemente visita em Algarve?

……..……

PARTE 2 - QUALIDADE DA PRAIA

1) Como classifica a aparencia visual desta praia (seleccione apenas um rectangulo)?

Excelente	
Boa	
Razoavel	
Fraca	
Muito fraca	

2) Que 3 coisas detesta mais nesta praia? (em geral)

Residuos ou destroços de origem humana	
Baixa qualidade da agua	
Detritos de esgotos	
Excessiva quantidade de algas	
Odores industriais	
Excrementos de cachorros	
Ruido industrial e de auomoveis	
Falta de areia	
Dificel acesso	
Fraca qualidade das infraestruturas	
Outros (apresente)	

3) Alguma vez notou alguma acumulacao/ pilhas de residuos nesta faixa da praia?

Sim	
Nao	

4) Costuma entrar para o mar?

Nao	
Sim, mas apenas para andar na agua	
Sim, para nadar	

5) Por favor classifique as mais ofensivas formas de poluicao da praia/ mar (sendo 1 para a forma mais ofensiva, 2 para a seguinte e assim sucessivamente)

Coloque um numero diferente em cada rectangulo

Agua discolorida	
Residuos de esgotos	
Lixo na praia	
Odores anormais	
Espuma/ Escoria	
Residuos flutuantes	
Oleo na praia	
Oleo na agua	

Outra opção? (especifique) ……..……..

6) Como descreveria o estado desta praia em relação aos residues (lixo na praia) (seleccione apenas uma opção)

Muito boa	
Boa	
Razoavel	
Pobre	

PARAMETROS DE SEGURANCA E INFRAESTRUTURAS NA PRAIA

Por favor, avalie os parametros de segurança e infraestruturas de acordo com o nivel de importancia para si estando na praia, bem como faça a avaliacao acerca da situação actual.

Segurança	Categorize tendo em conta a importancia pessoal	Avalie a situacao de cada parametro nesta praia (de 1 a 5 sendo 1 mau e 5 bom)
Nadadores salvadores		
Zoneamento (separação das actividades)		
Equipamento de segurança		
Posto de primeiros socorros		
Informação acerca do nível de segurança da praia*		
Infra-estruturas Boa acomodação		
Casas-de-banho limpas na praia		
Banheiros de praia limpos		
Restaurantes, cafés e bares na praia		
Infraestruturas desportivas (surf, ski, mergulho, parques aquáticos)		
Caixotes/ latas de lixo regularmente esvaziadas		
Parqueamento adequado (espaço) com boa acessibilidade à praia		
Provisão de esteiras de praia cobertas na praia		
Limpeza diária		

*Informação sobre a segurança da praia: codigos de conduta, presence de correntes de agua, telephone, localização dos centros de saude mais proximos, registos de qualidade de agua, bandeiras de qualidade em caso de condicoes inseguras para banhistas e outros

PARTE 3 – GESTAO DA PRAIA

4) Acha que se deve permitir cães/ cachorros na praia na época balnear (Maio–Setembro)?

Sim	
Não	
Não tenho certeza	

5) Por favor classifique as razões mais importantes para visitar uma praia? (sendo 1 a mais importante, seguida por 2, 3 etc).

Coloque um numero diferente en cada rectangulo

Vistas e Paisagem	
Accessibilidade	
Banheiros	
Parques de estacionamento	
Agua do mar limpa	
Seguranca	
Areia limpa	
Quiosques	
Distância de viagem para a praia	
Bandeira azul	

Outra opção? (especifique)
……..……

6) Gostaria de ver o ambiente da praia melhorado??

Sim	
Não	
Não sei	

Em caso afirmativo, de que maneira?.....
.....

COMENTARIOS

Existe algum comentario que gostaria de deixar por foram a melhorar o ambiente costeiro?

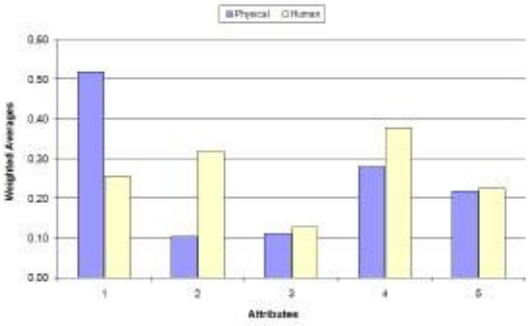
……
……
……

MUITO OBRIGADO PELO SEU TEMPO E ESFORÇO EM COMPLETAR ESTE QUESTIONÁRIO

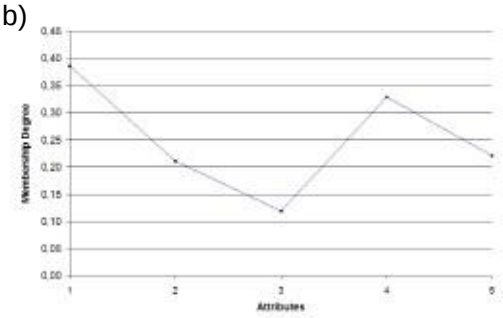
APPENDIX 2

Weighted averages, membership degrees and assessment histograms

a)



b)



c)

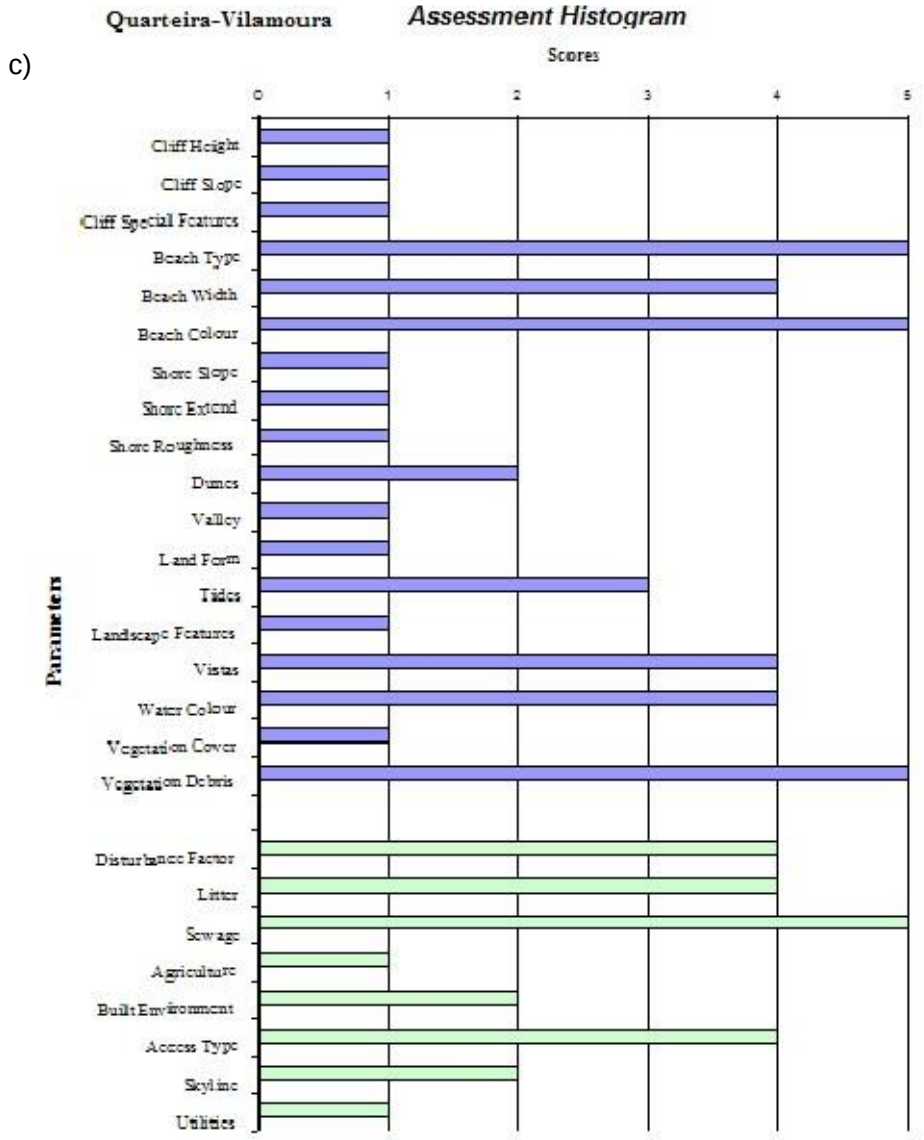
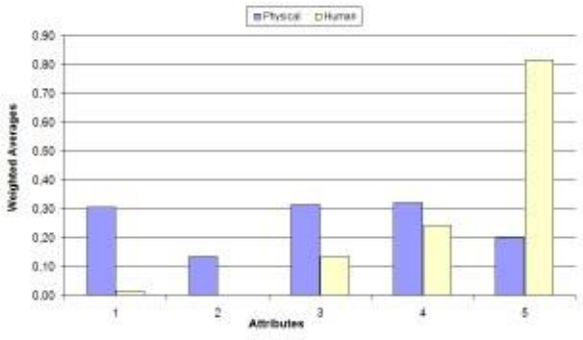
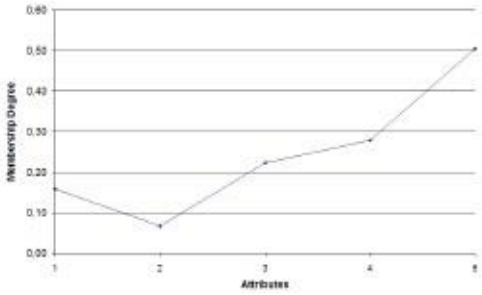


Figure 1.1 Quarteira-Vilamoura: Weighted averages (a), membership degrees (b) and assessment histogram (c)

a)



b)



c)

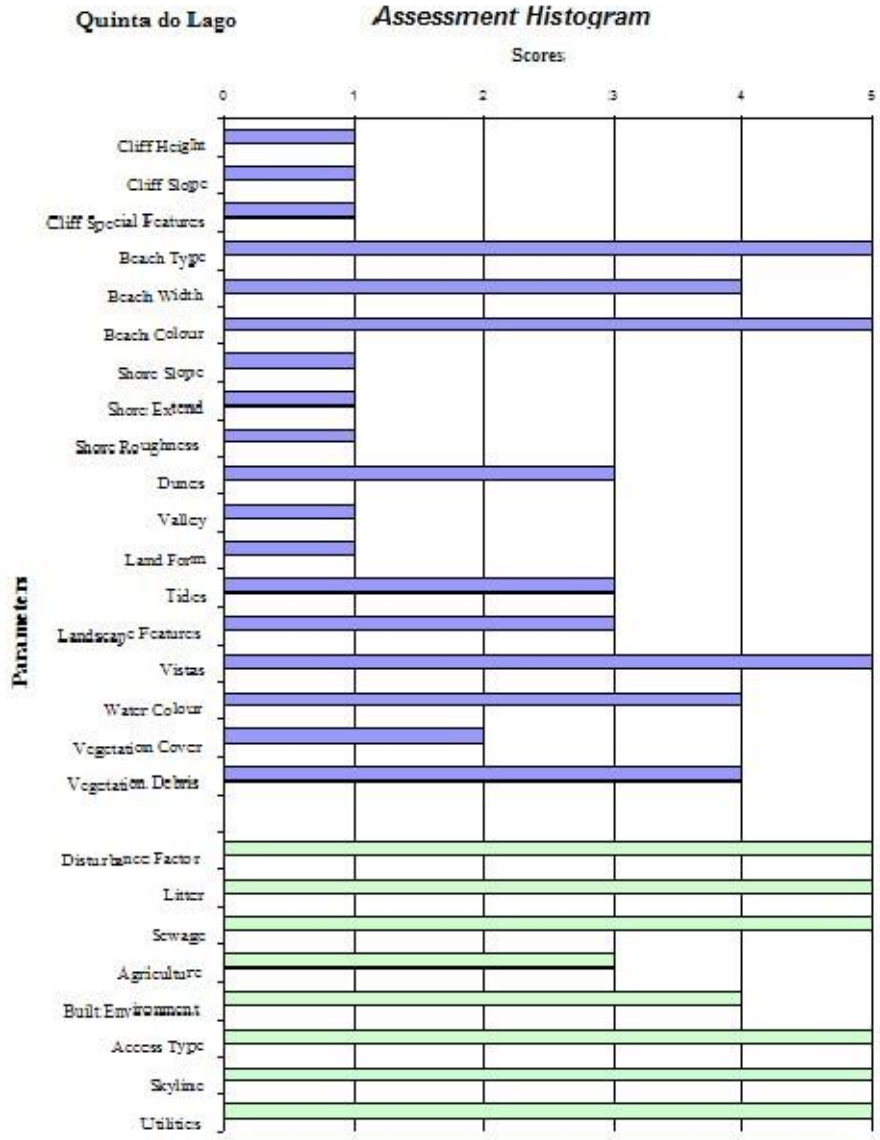
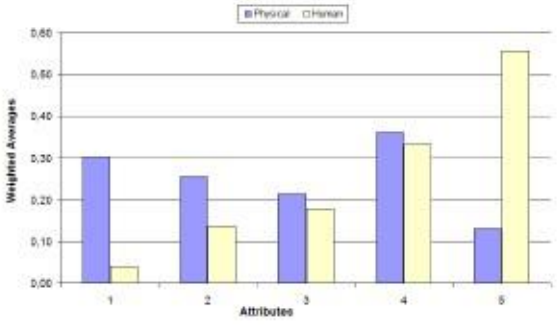
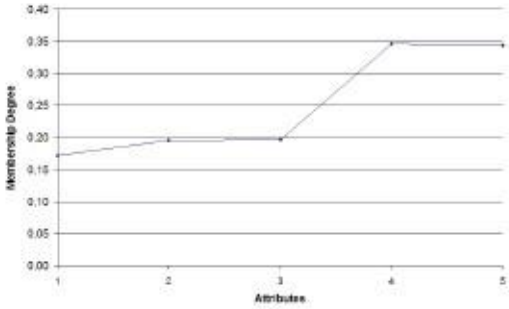


Figure 1.2 Quinta do Lago: Weighted averages (a), membership degrees (b) and assessment histogram(c)

a)



b)



c)

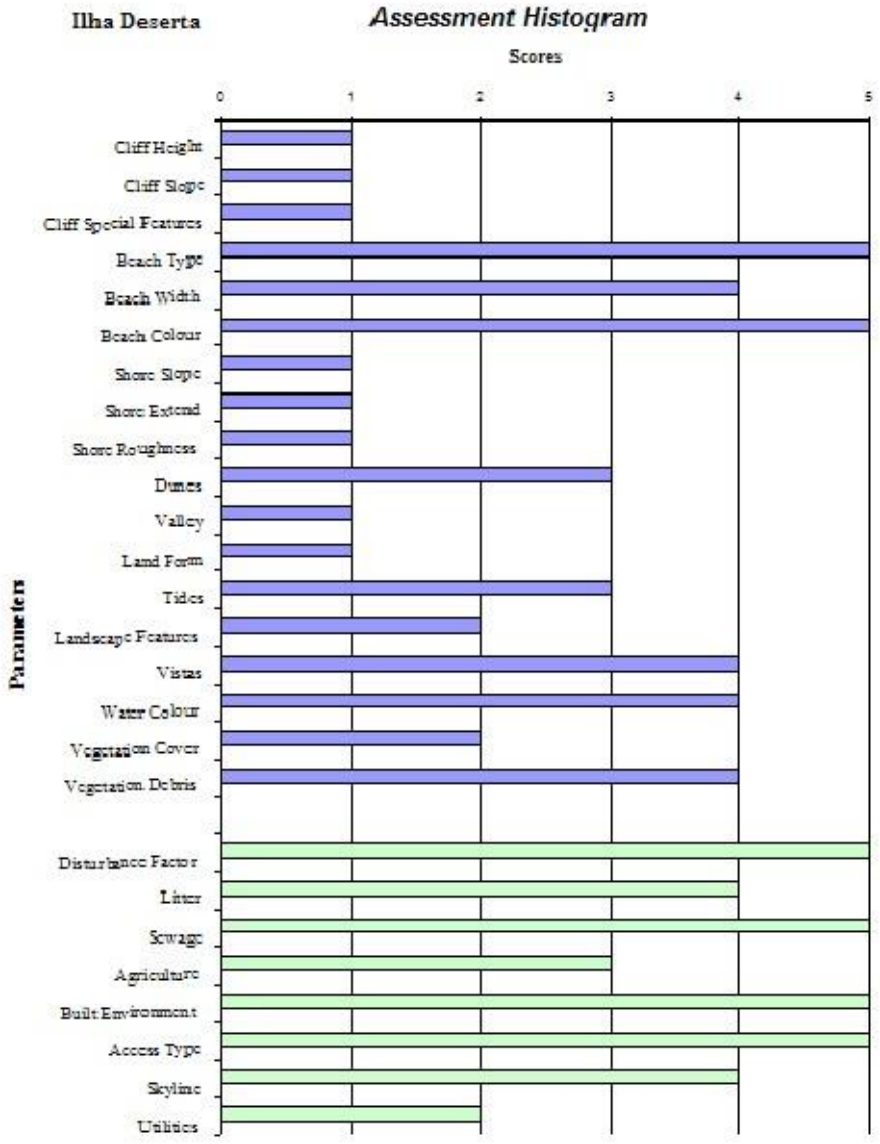
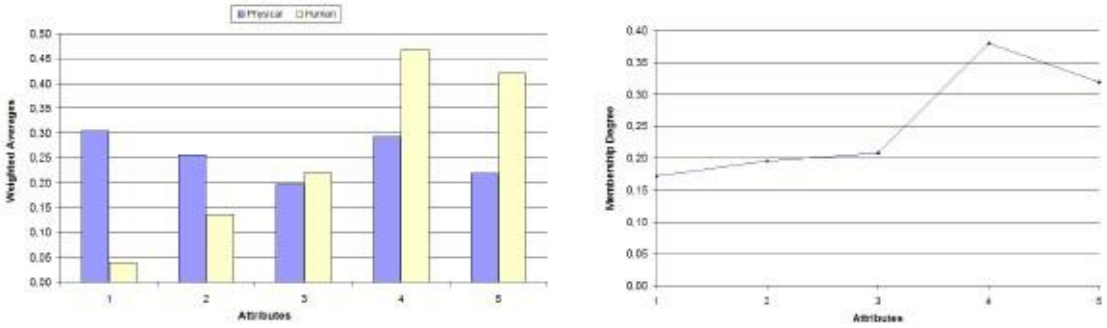


Figure 1.3 Ilha Deserta: Weighted averages (a), membership degrees (b) and assessment histogram (c)

a) b)



c)

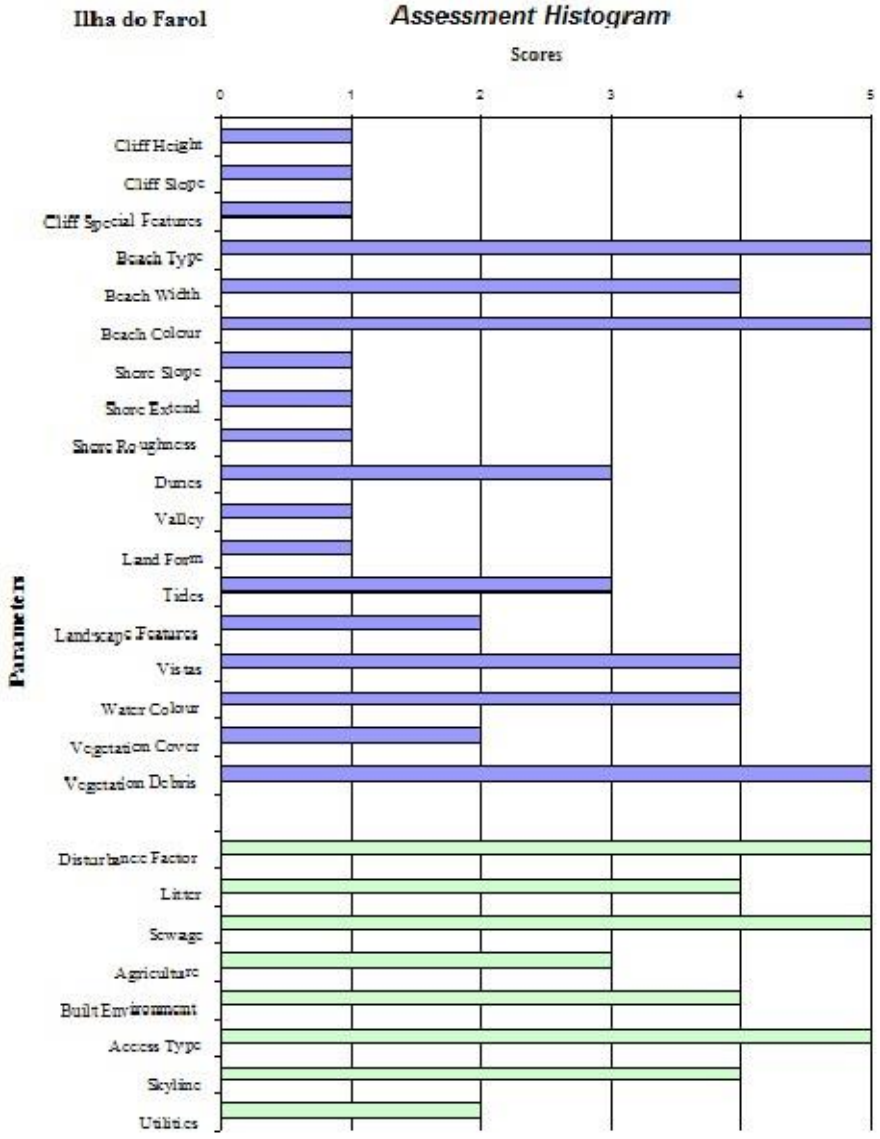
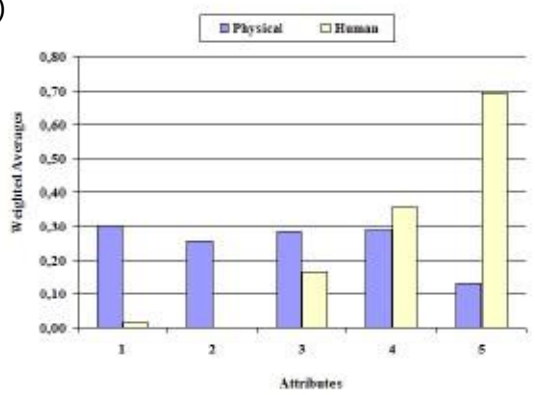
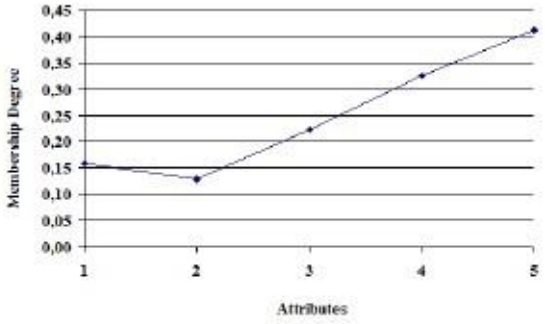


Figure 1.4 Ilha do Farol: Weighted averages (a), membership degrees (b) and assessment histogram (c)

a)



b)



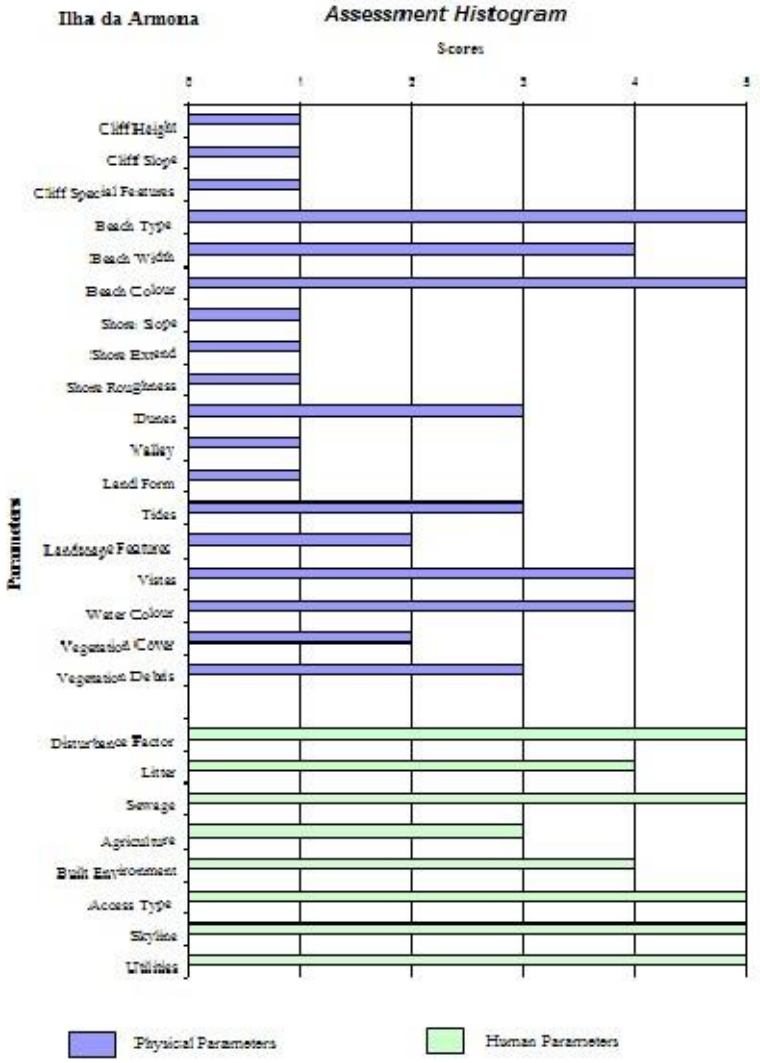


Figure 1.5 Ilha Da Armona: Weighted averages (a), membership degrees (b) and assessment histogram (c)