

Scenic value of the Basque Country and Catalonia coasts (Spain): impacts of tourist occupation

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Abstract Coastal areas around the world are under threat basically because of the tourist industry of which scenery is an important component. This paper presents the result of scenic evaluation of 54 sites along the Basque and Catalonia coasts. The classification derives values from a checklist of 18 physical and 8 human parameters and permits calculation of a scenic evaluation index, which classifies coastal sites into five classes from Class I, usually natural areas of top scenic characteristics, to Class V, poor scenic natural areas with a greater impact of human interventions. Two Class I sites were found in the Basque area. Respectively for Basque and Catalonia, 3 and 1 Class II sites occurred; 8 and 8 Class III; 11 and 4 Class IV; 3 and 14 Class V. In the Basque Country, the presence of coastal mountainous areas positively affect many important natural parameters of classification, and the relative low level of human occupation, favoured good scores at several sites. Along the Catalonia coast, coastal mountainous areas were not so common but, at places, very attractive natural scenic features were recorded. Regrettably many of them were negatively impacted by human occupation related to the “3S” tourist

model. Such results provide local managers and planners a solid inventory on coastal scenic characteristics and baseline information for any envisaged subsequent management plan.

Keywords Coastal geomorphology · Landscape · Carrying capacity · Fuzzy logic · Tourism · Land use · Coastal erosion

Introduction

Ketchum (1972), in a classic book referring to the coastal zone, identified six major spheres of human activities, of which residency, recreation and tourism was one (agriculture, aquaculture, and fishing; conservation; military and strategic; industrial and commercial; waste disposal being the others), all frequently being in conflict with one another. Travel and tourism is the world's biggest industry (Klein et al. 2004; UNWTO 2017). On the world scale, tourist arrivals grew in 2016 by 3.9% to reach c. 1.23 billion (UNWTO 2017) with France, the United States, Spain and China continuing to top the rankings in both international arrivals and receipts; long term predictions forecast an international tourist worldwide increase by 3.3% per year to reach 1.8 billion in 2030 (UNWTO 2016). Europe and Spain respectively recorded a 2% and 9.9% growth in tourist arrivals in 2016, with Spain being number three on a world scale for both receipts (US\$ 77 billion) and arrivals (75.3 million, <http://www.minetad.gob.es>, accessed January 2017).

In Spain, 75% of international visitors are seemingly interested in beach related tourist activities (Arenas 2009). This was also observed at international level by Houston (2013), as beaches are considered to be a major player in tourist markets and hence worth billions of tourist dollars (Clark 1996). However, constant growth along with intense urban development has in many places resulted in destruction of the natural

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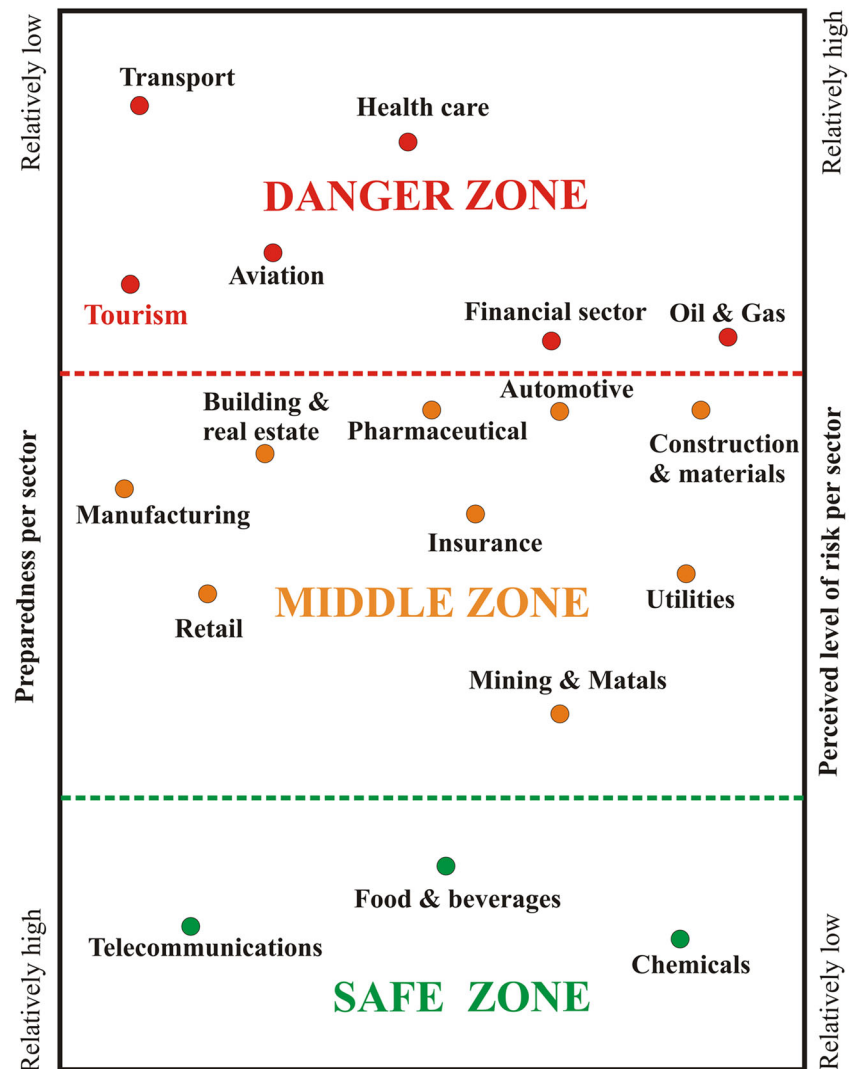
environment, e.g. the Costa del Sol, Spain. Additionally, the physical risk to coastal tourism, along with agriculture, finance, building and real estate appears to be the industries least prepared for climate change (KPMG 2009). The KPMG (2009) risk preparedness framework (Fig. 1) places tourism in the ‘danger zone’ and adds a note to the effect that the risk is underestimated. For example, The Australian A\$32 billion tourist industry is very climate dependant, with the Great Barrier Reef alone supporting a A\$1 billion industry (ABRoCC 2006). A 2–3 °C temperature increase could cause 97% reef bleaching, leading to a significant reduction in tourism revenue.

Coastal tourism takes a variety of forms and plays a vital role in the economy of many countries and to benefit from this dynamism, many tourism oriented countries, e.g. those bordering the Mediterranean Sea, have developed proactive growth policies along the coastal area (Benoit and Comeau 2005). Spain, France, Italy, Greece and, until recently, Turkey, account for ‘the most significant flow of

tourists... a sun, sea and sand (3S) market’ (Doods and Kelman 2008, p. 58).

For Spain, tourist sector receipts have been growing greatly in past years accounting for 5% of the Gross Domestic Product (GDP) in 2005, 10.9% in 2014 and 11.1% in 2015 (<http://www.exceltur.org/perspectivas-turisticas/>, accessed March 2017). International tourist arrivals in Spain recorded an annual increase of c. 6% after the most critical years (i.e. 2009–2010) of the recent economic depression (Fig. 2). The most recent increment, observed also at other Mediterranean destinations, is partially related to the political instability of Northern Africa countries, which in 2015 experienced a drop of 11.7% in the number of visitors (UNWTO 2016). Within the Spanish market, Catalonia was the most important destination in 2016 with 17.4 millions of international visitors, i.e. an increase of 3.8% respect to 2015. Other important destinations were Balearic Islands (12.9 millions, +12%), Canary Islands (12 millions, +12.7%) and the Basque Country (1.3 millions, −11.4%, <http://www.minetad.gob.es>, accessed

Fig. 1 Risk preparedness framework (after KPMG 2009)



January 2017). Interest in coastal areas is also reflected by coastal population density; it is four times the density recorded in the hinterland and increases three fold during summer months.

Despite the importance of the beach market, Wilson and Liu (2008, p. 130), observed that beach recreation “got inordinate attention in the economic literature” and Ergin et al. (2004) and Williams (2011) showed that five parameters are of the greatest importance to coastal visitors: safety, facilities, water quality, no litter and scenery, and the latter is the focus of this investigation. Specifically, this study provides a scenic assessment of 54 sites along the Basque Country (27 sites) and the Catalonia Region (27 sites) coastlines (Spain, Fig. 3, Table 1).

Scenic evaluation constitutes an extremely important tool for coastal preservation, protection and development, as this provides a sound scientific basis for any envisaged management plan. Information gathered for this paper was cross referenced with the geological and topographic setting of the investigated areas, as well as with existing data on tourist development distribution and typologies in order to prevent further environmental degradation and also to suggest measures to improve the present scenic value of tourist destinations.

Study area

Fifty four beaches, distributed along the Basque Country and Catalonia coasts (Spain, Fig. 3) were investigated from a scenic viewpoint.

The Basque Country coastal area administratively belongs to the Provinces of Bizkaia and Gipuzkoa. It is a 250 km long meso-tidal environment facing the Atlantic Ocean; *c.* 30 km (12%) of the coast corresponds to sand sectors, 70 km (28%) to estuaries, salt marshes and urbanised areas and 150 km (60%) to cliff sectors consisting at places of more than 200 m height cliffs, which rapidly descends into the sea. The cliffs are composed of Cretaceous and Tertiary flysch, sequences of soft (clays and marlstones) and hard (sandstone) rocks (Pérez 2003; Torres and Viera 2012).

The climate is rainy (1200 mm/yr) with lower precipitations observed in July and August, which also show the higher average temperatures (20 °C), the annual average being 14 °C. According to Köppen classification, Basque Country is categorised as Cfb (Temperate oceanic climate). Predominant winds blow from the West and secondarily from North and South. Annual average significant wave height is 2 m and usually is associated with swell waves (Galparsoro et al. 2008).

The Catalonia coast administratively belongs to three Provinces, i.e. Girona, Barcelona and Tarragona. It is a *c.* 560 km long micro-tidal environment facing the Mediterranean Sea and essentially has sand sectors (i.e. 44%, 246 km). Deltas, coastal lagoons and urbanised areas constitute 20% (*c.* 112 km), cliff sectors represent 36% of coastline (*c.* 202 km), which are related to the mountainous chain running parallel to coast and composed of Palaeozoic formations (www.atlesnacional.cat/icc/atles-nacional, accessed January 2016).

Climate conditions are clearly Mediterranean, rainfall is limited (*c.* 600 mm/yr) and concentrated in autumn. Average temperature in July and August is 27 °C and the annual one is

Fig. 2 International arrivals in Spain during the 2005–2016 period

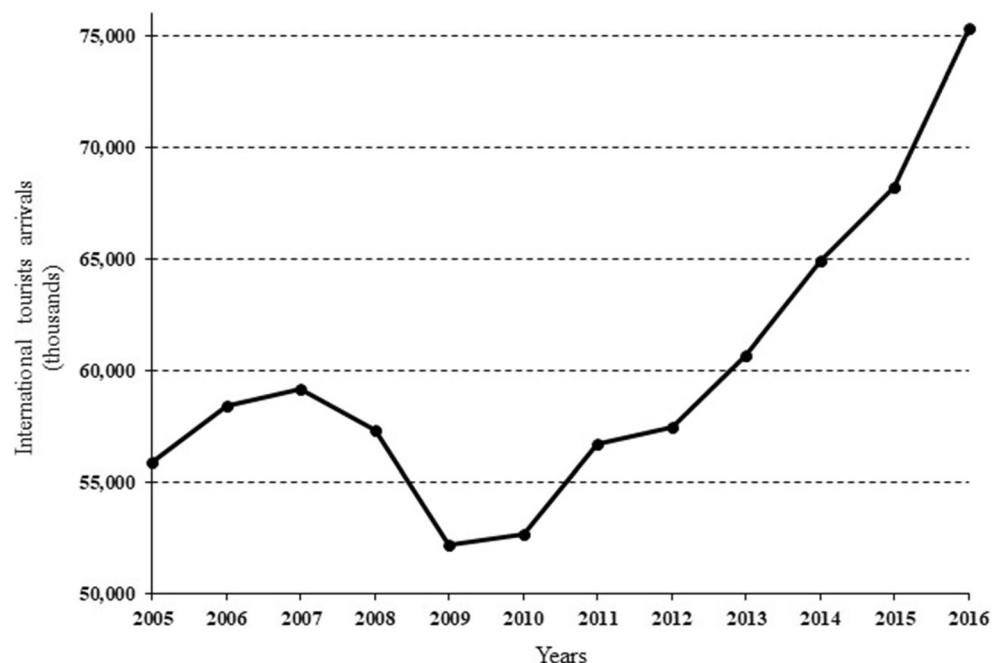


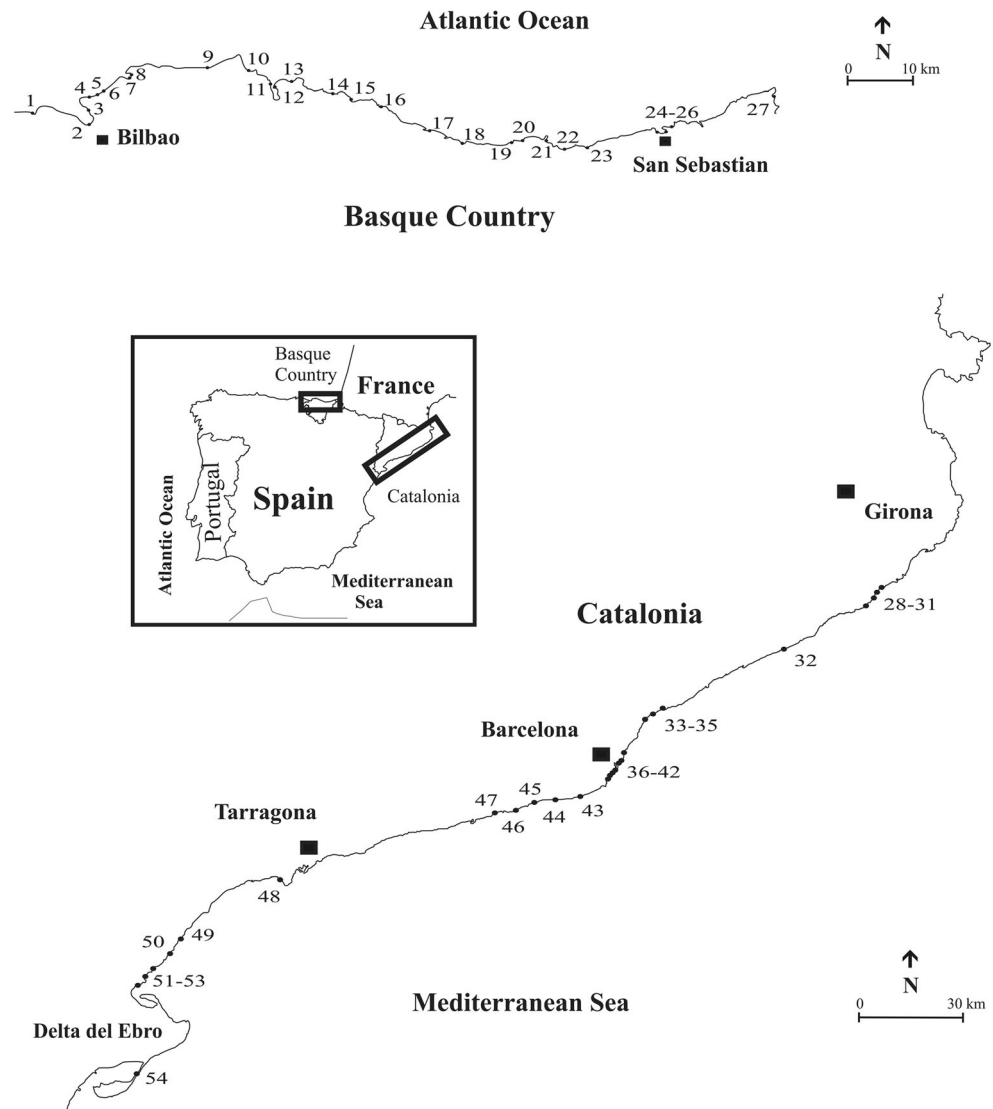
Table 1 Location and main characteristics of investigated sites (name, setting, “D” value and class)

Map number	Site	Province	Region	“D” value	Type	Class	Blue flag 2016
1	La Arena	Bizkaia	Basque country	0.47	Rural	III	Yes
2	Las Arenas	Bizkaia		−0.73	Urban	V	
3	Arrigunaga	Bizkaia		0.15	Urban	IV	
4	Gorrondatxe	Bizkaia		0.76	Remote	II	
5	Barinatxe	Bizkaia		0.85	Rural	I	Yes
6	Atxabiribil	Bizkaia		0.58	Rural	III	
7	Plentzia	Bizkaia		0.2	Village	IV	
8	Gorliz	Bizkaia		0.51	Rural	III	
9	Bakio	Bizkaia		0.15	Village	IV	
10	Aritzatxu	Bizkaia		0.13	Rural	IV	
11	Laidatxu	Bizkaia		−0.41	Village	V	
12	Laida	Bizkaia		0.54	Rural	III	
13	Laga	Bizkaia		0.96	Rural	I	
14	Ea	Bizkaia		−0.13	Village	V	
15	Ogeia	Bizkaia	Catalonia	0.54	Remote	III	Yes
16	Karraspio	Bizkaia		0.68	Village	II	
17	Saturraran	Gipuzkoa		0.71	Rural	II	
18	Deba	Gipuzkoa		0.31	Village	IV	
19	Itzurun	Gipuzkoa		0.52	Village	III	Yes
20	Santiago	Gipuzkoa		0.54	Rural	III	
21	Malkorbe	Gipuzkoa		0.05	Village	IV	
22	Zarautz	Gipuzkoa		0.07	Village	IV	
23	Antilla	Gipuzkoa		0.42	Village	III	
24	Ondarreta	Gipuzkoa		0.22	Urban	IV	
25	La Concha	Gipuzkoa		0.27	Urban	IV	
26	Zurriola	Gipuzkoa		0	Urban	IV	
27	Hondarribia	Gipuzkoa		0.13	Village	IV	
28	Platja Canyerets	Girona		0.56	Rural	III	Yes
29	Cala Salionç	Girona		0.1	Village	IV	
30	Cala Giverola	Girona		0.52	Rural	III	
31	Tossa	Girona		0.11	Village	IV	
32	Cala Roca Grossa	Barcelona	Catalonia	0.5	Rural	III	Yes
33	Pla de l'ós	Barcelona		−0.5	Urban	V	
34	Ocata	Barcelona		−0.6	Urban	V	
35	Montgat	Barcelona		−0.37	Village	V	
36	Mar Bella	Barcelona		−0.52	Urban	V	Yes
37	Bogatell	Barcelona		−0.57	Urban	V	
38	Nova Icària	Barcelona		−0.58	Urban	V	
39	Somorrostro	Barcelona		−0.61	Urban	V	
40	La Barceloneta	Barcelona		−0.62	Urban	V	Yes
41	Sant Miquel	Barcelona		−0.62	Urban	V	
42	San Sebastià	Barcelona		−0.62	Urban	V	
43	Platges de Gavà	Barcelona		0.28	Village	IV	
44	Castelldefels	Barcelona		−0.24	Village	V	Yes
45	Port giesta	Barcelona		−0.38	Village	V	
46	Cala Vallcarca	Barcelona		−0.34	Village	V	
47	Sitges	Barcelona		−0.4	Village	V	
48	Platja dels Capellans	Tarragona	Catalonia	0.5	Village	III	Yes
49	Cala Vidre	Tarragona		0.4	Rural	III	
50	L'atmella	Tarragona		0.48	Village	III	
51	Terme del Perelló	Tarragona		0.53	Rural	III	
52	Cap Roig	Tarragona		0.52	Rural	III	Yes
53	L'ampolla	Tarragona		0.1	Village	IV	
54	Platja Trabucador	Tarragona		0.79	Remote	II	

17 °C. According to Köppen classification, Barcelona and Tarragona coastal areas are categorised as Csa (Mediterranean climate) and Girona as Cfa (Humid subtropical climate). Predominant winds and associated waves approach the coast from SW with annual average significant wave height of 0.9 m.

Methodology

The coastal scenic evaluation method used in this paper is the result of several years of investigations (Williams 1986; Williams and Lavallo 1990; Morgan and Williams 1995;

Fig. 3 Location map of investigated areas

Unal and Williams 1999; British Council Report 2003; Ergin et al. 2002, 2004, 2006). An initial step consisted in interviewing more than 1000 bathing area users chosen by random number tables in Turkey, Malta and UK. They were asked: ‘what are the essential parameters that make up a beautiful coastal scene?’ and the converse, ‘coastal ugliness’ (Ergin et al. 2004). Several parameters were mentioned and the amount of times each parameter was cited summed. A clear break point was found at 26 parameters - 18 physical and 8 human (Table 2). In a second step, a value ranging from a low (1) to high rating (5) was attributed to each one of the 26 parameters. Then, by means of additional beach surveys ($n = >500$), they were ranked from most to least important, enabling a weighting parameter to be added to the computer algorithm. So, differing from most previous investigations, the method used weighted parameters since parameters are NOT equal in value, as some are more important than others. Since there is a likelihood of the

assessor marking the wrong attribute box, Fuzzy Logic Assessment (FLA; Patel 2001) was applied to the programme as it eliminates this possibility. In fact, a jump of two attributes is extremely unlikely, e.g. checking an attribute 4 rather than 2 (Table 2). A detailed description of this methodology can be found in Ergin et al. (2004).

For this paper, beach surveys were carried out in June–September 2014 and other information also gathered regarding site location in natural areas, beach awards status and tourist development typologies and distribution (Williams and Micallef 2009; Williams 2011; Anfuso et al. 2014).

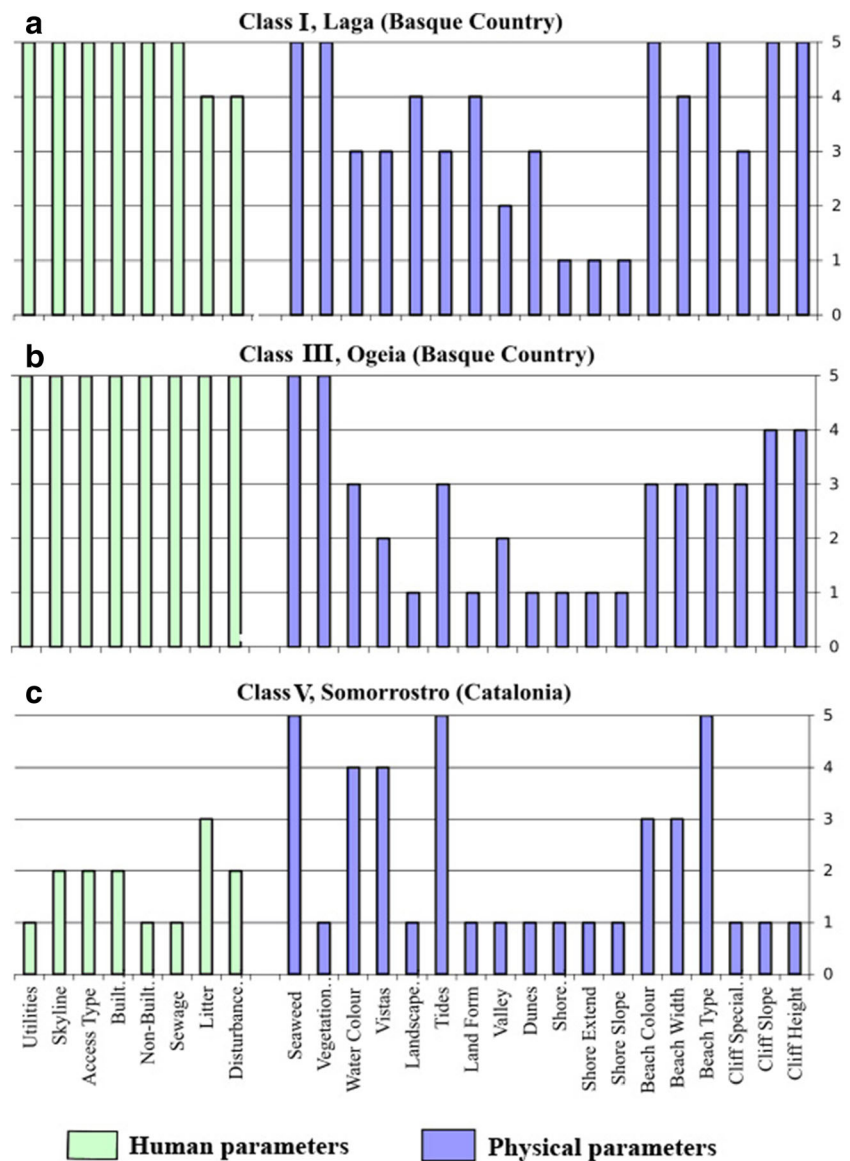
Assessment matrices were calculated for all sites and presented as histograms (Fig. 4), weighted average of attributes (Fig. 5) and membership degree of attributes (Fig. 6). Histograms provided visual summaries for all 26 parameters (Fig. 4) and are very useful for immediate assessment of high and low rated attributes. Similarly, weighted averages delineated the relative comparisons of physical and human

Table 2 Coastal scenic evaluation system. Physical and human parameters

No:	Physical parameters	Rating				
		1	2	3	4	5
1	Cliff	Height (m) Slope (°) Special features*	5–30 m >45° 1	31–60 m circa 60° 2	61–90 m circa 75° 3	>90 m circa vertical Many (>3)
2		Absent				
3		Absent				
4	Beach face	Type	Mud	Cobble/Boulder	Pebble/Gravel	Sand
5		Width (m)	≤5 > 100	>5 ≤ 25	>25 ≤ 50	>50 ≤ 100
6		Colour	Dark	Dark tan	Light tan/bleached	White/gold
7		Slope (°)	<5°	5°–10°	10°–20°	20°–45°
8	Rocky shore	Extent (m)	<5 m	5–10 m	10–20 m	>20 m
9		Roughness	Distinctly jagged	Deeply pitted and/or irregular	Shallow pitted	Smooth
10	Dunes		Remnants	Fore-dune	Secondary ridge	Several
11	Valley		Dry valley	(< 1 m) Stream	(1–4 m) Stream	River/limestone gorge
12	Skyline landform		Flat	Undulating	Highly undulating	Mountainous
13	Tides	Not visible				Micro (<2 m)
14	Coastal landscape features**	Macro (> 4 m) None	1	Meso (2–4 m) 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 (marram/gorse, bramble, etc.)	Wetlands/meadow	Coppices, maquis (±mature trees)	Variety of mature trees/ mature natural cover
18	Vegetation debris	Continuous (>50 cm high)	Full strand line	Single accumulation	Few scattered items	None
Human parameters						
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		Same evidence (1–3 items)		No evidence of sewage
22	Non_built environment	None		Hedgerow/terracing/monoculture		Field mixed cultivation ± trees/natural
23	Built environment***	Heavy Industry	Heavy tourism and/or urban	Light tourism and/or urban and/or sensitive	Sensitive tourism and/or urban ban	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		Sensitively designed high/low	Very sensitively designed coastal area	Natural/historic features
26	Utilities****	>3	3	2	1	None

*Cliff Special Features: indentation, banding, folding, screens, irregular profile; **Coastal Landscape Features: Peninsulas, rock ridges, irregular headlands, arches, windows, caves, waterfalls, deltas, lagoons, islands, stacks, estuaries, reefs, fauna, embayment, tombola, etc. ***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, groins, seawalls, revetments

Fig. 4 Scenic evaluation rating histograms for Laga (Basque Country, Class I), Ogeia (Basque Country, Class III) and Somorrostro (Catalonia, Class V)



parameters (Fig. 5). The membership degree, produced by plotting membership degrees versus the attributes from 1 to 5 (Fig. 6), presented an overall scenic assessment where curve interpretation is based on the skew.

Based on the above summed parameter evaluations, a final value (“D”, Table 1, Fig. 7) was computed, which divided coastal scenery into five distinct classes: Class I scenery (extremely attractive natural sites) has $D \geq 0.85$; Class II, $0.85 < D \leq 0.65$; Class III, $0.65 < D \leq 0.4$; Class IV, $0.4 < D \leq 0$; Class V (very unattractive, intensively developed urban), $D < 0$. Since these pilot surveys were undertaken, scenic evaluations have been carried out in diverse countries, e.g. Spain, Portugal, Croatia, Morocco, New Zealand, Fiji, Australia, USA, Japan, China, Brazil, Cuba and Colombia, etc. (Ergin et al. 2006; Ullah et al. 2010; Williams et al. 2012; Rangel-Buitrago et al. 2013; Anfuso et al. 2014, 2017).

Results and discussion

Tourism typologies and developments

Coastal occupation along investigated regions takes place in many different ways, in fact the Basque Country and Catalonia have experienced different models of tourist occupation, expansion, and tourist demand.

Along the Basque Country, in the first decades of the 1900s, the coast was depopulated and only a very few famous tourist destinations, small fishing settlements and industrial activities existed (Cearreta et al. 2004). During the 1960s and 1970s the coast did not experience massive development, as observed in the Mediterranean coast of Spain (especially in Catalonia and Andalusia - Malvárez 2012; Garcia et al. 2013; Manno et al. 2016) and in other Mediterranean destinations (Anthony 1997; Pranzini et al. 2015).

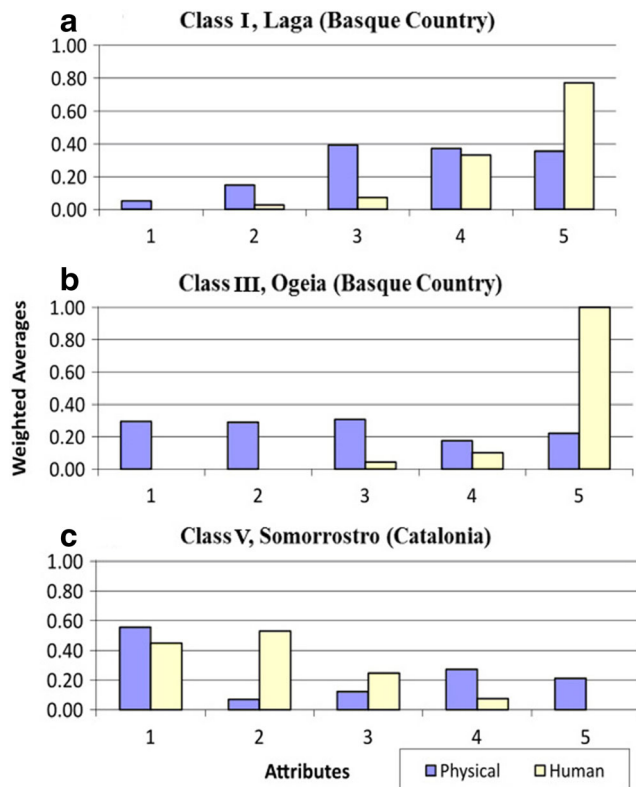


Fig. 5 Scenic histogram of weighted averages Laga (Basque Country, Class I), Ogeia (Basque Country, Class III) and Somorrostro (Catalonia, Class V)

Since the 1980s, coastal occupation and tourism development grew greatly (<http://www.observatoriosostenibilidad.com/2016/11/23/nota-de-prensa-del-informe-costa-16/>, accessed February 2017): from 1987 to 2011, coastal urbanized areas increased from 14.11% to 21.71% (considering construction along a strip 500 m in width) and actually tourist related activities represented 5.6% of the GDP. In 2015, tourist accommodation consisted only of c. 547 hotels and c. 400 rural ones. In 2016 tourist accommodation in hotels and rural houses almost reached 2.8 million visitors, the average period of permanence being 1.92 days (<http://www.eustat.eus>, accessed January 2017). The tourists were essentially national visitors belonging to the same region (22.4%), to Madrid (21.4%) and to the Catalonia regions (14.5%). International tourists arrived from France (15.2% - because of the vicinity), UK (5.4%), Germany (4.8%) and USA (4.7%). Despite the importance of tourism, it was not homogeneously distributed within the region. Only 23.4% of hotels are located along the coastal area, 41.4% being concentrated in the three main towns (Victoria, San Sebastian and Bilbao) and the rest are located near to the capitals and in the hinterland (<http://www.eustat.eus>, accessed January 2017).

Such data highlights that tourism is essentially related to cultural objectives and not to recreational and/or the “3S”

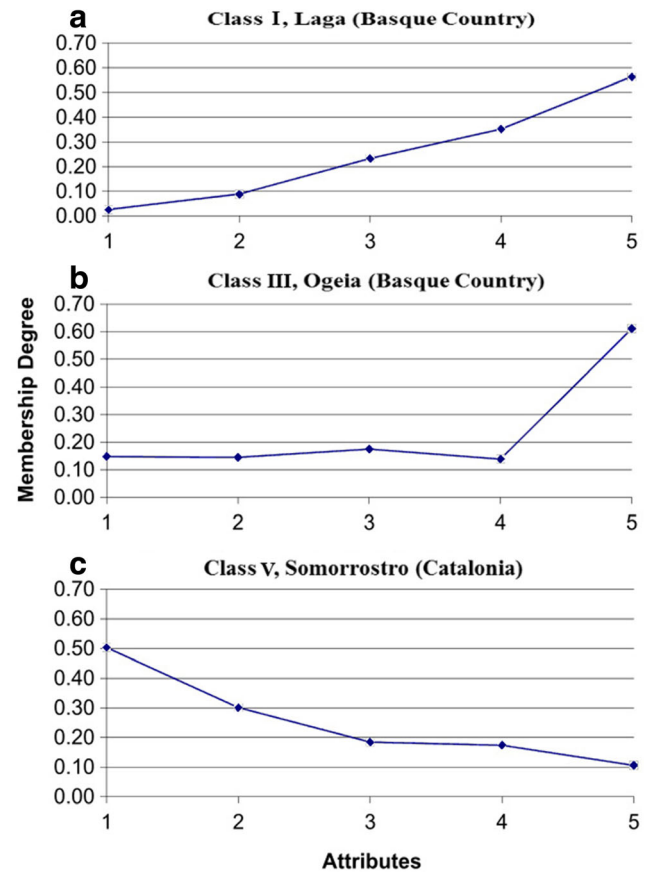


Fig. 6 Membership degree curve for Laga (Basque Country, Class I), Ogeia (Basque Country, Class III) and Somorrostro (Catalonia, Class V)

market, as in the Mediterranean coast of Spain (Doods and Kelman 2008). Lastly, a certain percentage of coastal tourism is related to wave surfing; surfers from all around the world are attracted by high energy wave conditions and this generates an annual income of c. 6 M€ (<http://gananzia.com/el-surf-genera-mas-de-6-millones-de-euros-anuales-en-euskadi>, accessed June 2016).

In Catalonia, important tourist development started in the 1960s (Jiménez and Prats 2006), and continued with high rates during the 1970s and 1980s and, at lower rates, during the 1990s and 2010s, i.e. the percentage of coastal urbanised areas increased from 39.18% (in 1987) to 44.25% (in 2011, considering a strip 500 m in width). Tourism development took place according to the “3S” model under an intense laissez-faire politico-economic trend together with sponsorship of construction projects, essentially marina developments and condominiums, hotels, restaurants, etc., which allowed huge commercial gains (Garcia et al. 2013). Little attention was paid to general environmental matters or specific coastal concerns (Pollard and Domínguez Rodríguez 1993) and the rapidity of coastal occupation brought destruction of natural environments and coastal urbanization and armouring broadly increased, as observed on the Andalusia coast (Manno et al.

2016) and in many Mediterranean countries, such as, Italy (Pranzini 2013) and France (Antony and Sabatier 2013), because of the economic boom.

At the end of the 1990s the Mediterranean coast hosted about 30% of world tourism (Garay Tamajón and Cànoves Valiente 2009), the most important flow of arrivals being from UK, Germany and France (Moreno Moreno Garrido 2007). Actually, Catalonia represents the principal tourist destination in Spain and the fifth destination at international level, such tourist flows being mostly concentrated along the coastal area (Balança Turística 2015). Coastal occupation, which greatly impacted natural environments (Jiménez and Prats 2006), has continued in the past two decades and, in 2015, *c.* 51,124 tourist establishments were recorded: they hosted about 22.2 millions of visitors, mostly foreigners (i.e. 15.5 millions) specifically from France, Russia and Northern European countries (Balança Turística 2015).

Beach characteristics and classification

Fifty four beaches were classified in the Basque Country and Catalonia Region (Table 1, Figs. 3 and 7). Analysis of the Scenic Evaluation Value (D) for the investigated sites gave the following results.

Class I Natural, very attractive beaches with a scenic value $D \geq 0.85$. Only two beaches (out of 54) belonged to this category, i.e. Laga and Barinatxe, both located in the Basque Country. For Laga beach, assessment matrices were presented as histograms, weighted average of attributes and membership degree of attributes (Figs. 4, 5 and 6). Histograms highlighted very high rated attributes of natural and human parameters (Fig. 4a). High weighted averages of attributes, such as 4 and 5, reproduced a high scenic (high rating) value (Fig. 5a). Similarly, the membership degree vs. attribute curve presented a right-hand sided curve (upward sloping), reflecting high

scenic value quality due to low scoring on attributes 1 and 2 and high attribute values, i.e. 4 and 5 (Fig. 6a).

Good scores at natural and human parameters were linked to very high intrinsic scenic characteristics and very low human influence. Specifically, Barinatxe is a rural and Laga is a remote site located in a Biosphere Protected Area.

Concerning natural parameters, scenic value was linked to the presence of mountainous landscape and to the geological setting that, as observed in other areas by Williams et al. (2012), Rangel-Buitrago et al. (2013) and Anfuso et al. (2014), favoured the formation of cliffed sectors and rocky shore platforms. In this case cliffs were usually high, almost vertical with evident stratification (i.e. high scores at points 1–3 of Table 2, e.g. at Laga, Fig. 8a). Rock shore platforms were also quite common (points 7–9) and special features, such as, headlands (e.g. at Laga, Fig. 8a) were frequently observed (point 14, Table 2).

Both sites belonging to this class presented wide sand beaches and dunes (points 4, 5 and 10). Sand colour was lighter at Laga than at Barinatxe, the latter achieving a lower score at point 6. Due to the rainy climate, luxuriant vegetation cover was often observed, essentially consisting of bushes, pine trees, oaks and eucalyptus.

Regarding human parameters, human occupation was almost null and no evidences of litter and sewage related items were observed. Absence of Class I beaches in Catalonia was partially related to the limited distribution of mountainous areas, cliffs and rocky coasts and, especially, to the greater impact of human settlements.

Class II Natural attractive areas generally had no special scenic features and low human pressure; $0.85 < D \leq 0.65$. Four sites belonged to this class (Table 2); three were located in the Basque Country and one in Catalonia. They included two remote areas, one rural and one village.

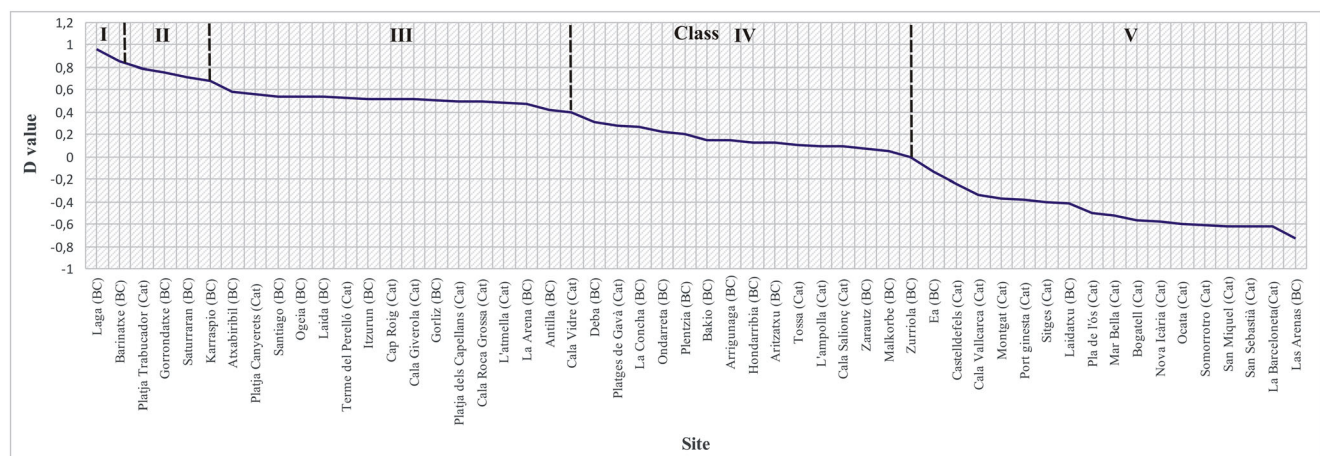


Fig. 7 Evaluation index curve for 54 sites (27 in each area) along the Basque Country and Catalonia coastlines

Good scenic value at Gorrondatxe was linked to the presence of rocky outcrops over 48 million years of age, which give rise to extended cliffed sectors and to one of the five stratotypes present in the Iberian Peninsula (Rekondo 2012). At places, e.g. Karraspio, the presence of small islands increased the scenic score (Fig. 8b). Trabucador beach, in Catalonia, is located at the Ebro delta in a protected area. It obtained exceptional scores for human parameters but only good ones for natural ones. Apart from the presence of well developed dunes, the site has no cliffs and coastal special features, vegetation cover is usually poor and skyline landform is flat to low undulating.

Class III D value ≥ 0.4 and < 0.65 . Sixteen sites belonged to this class, including 11 rural, 4 village and 1 remote site homogenously distributed in the Basque Country and the Catalonia coast (Table 1). Usually they showed little outstanding scenic features with an increase of human impact parameters.

In the Basque coast, Ogeia, a remote and natural area, showed very few anthropogenic influences, but low scenic characteristics (Fig. 4b); the beach was narrow and composed of pebbles, it had no dunes (point 10) and coastal landscape features (point 12). It was backed by a cliff and enclosed between two rocky headlands, as a result the skyline landform was not visible (point 14) and vistas (point 15) obtained poor scores. Weighted averages (Fig. 5b) and membership degrees (Fig. 6b) showed relatively good scores at high attribute values, i.e. 4 and 5, which reflects the positive influencing impact of the physical/human parameters (in this case especially human), and average values at lower attribute values (i.e. 1 and 2), which reflects the adverse impact of the physical/human parameters, in this case the low natural scenic characteristics. With respect to other natural beaches along the Basque Country, dunes are quite common and were observed at 4 out of 8 places. Attractive rocky outcrops belonging to the Cretaceous fliish can be observed at Itzurun (Torres and Viera 2012).

Along the Catalonia coast, rural beaches (e.g. Cala Giverola, Roca Grossa, etc.) were found in this class (Table 1), and these are essentially pocket beaches negatively affected by nearby villages (point 25, Table 2, e.g. Cala Giverola, Fig. 8c).

Class IV This class included village and urban unattractive sites having usually low natural landscape values; $0 \leq D < 0.4$. Fifteen beaches were attributed to this class, eleven in the Basque Country - the most represented class - and four in Catalonia.

With respect to the Basque Country, good scores of natural parameters were only observed for the skyline landform (point 12) because of the mountainous character of the coast. Dunes were observed only at three places. With respect to human



Fig. 8 a) Cliff and rocky headland at Laga, Basque Country; b) Special feature constituted by a small island at Karraspio, Basque Country; c) Excellent scenic characteristics at Cala Giverola (Catalonia) affected by human settlements and d) Influence of human constructions (high buildings, groins, etc.) at Somorrostro (Catalonia).

parameters, at many village and urban beaches negative scores were especially recorded at point 19 (“noise disturbance”, Table 2). This was due to the high number of beach visitors (close to the maximum carrying capacity) and the absence of a buffer zone between the beach and backing structures/activities (point 24).

At more urbanised areas, e.g. Arrigunaga, Zurriola, Hondarribia, etc. (Basque Country) and Gavà, L’Ampolla,

Tossa, etc. (Catalonia), high buildings made landforms not visible (point 12) and the skyline very unattractive (point 25) and the presence of defence structures, street lamps, etc., favoured negative scores at point 26 (utilities).

Class V Included very unattractive, urban or village sites with intensive development and poor landscape values, $D < 0$. Seventeen beaches belonged to this class, three in the Basque Country and fourteen in Catalonia, where human occupation was generally quite important and linked to the “3S” market (Doods and Kelman 2008), e.g. the presence of summer houses, restaurants, etc., close to the shoreline. Specifically, Class V beaches were equally distributed between Barcelona Province and Barcelona town (Table 2) and many of them fly the Blue Flag award (Table 1). As observed by Williams et al. (2012), Blue Flag is usually implemented in urban beaches, which show poor scenic value. Human impacts at places were related to the presence of hard protection structures, essentially groins, at all Barcelona urban beaches (e.g. Somorrostro, Fig. 8d) and at Montgat, Pla de l’òs, Sitges and Cala Vallcarca, and groins and revetments at ten beaches (e.g. Zurriola, Deba, Santiago, Arrigunagan, etc.) along the Catalonia coast. Low scores at both natural and human parameters were evident analyzing scenic evaluation rating histograms (Somorrostro, Fig. 4c). Low weighted averages of attributes, such as 1 or 2, produced a low scenic (low rating) value (Fig. 5c) and, similarly, the membership degree vs. attribute curve presented a left skewed curve (downward sloping), which reflects low scenic values (Fig. 6c).

Tourist impact and costal scenery improvement

Results of coastal scenery evaluation and observation provide a scientific basis for any envisaged management plan for coastal preservation, protection and development. In this paper, it was observed that the classification of investigated sites very much depended on the topographic, geological setting and degree and type of human occupation. Assessment of environmental natural and usage parameters makes possible recognition and characterization of the variables that may be managed in a more effective way in order to reduce tourist impact and improve scenic value. In most cases, coastal zone managers can do little (e.g. utilize beach nourishment to improve/make a beach) or nothing to improve the scenic impact of natural parameters, so emphasis should be given to the upgrading of human usage parameters (Williams 2011). At many places along the Basque Country and Catalonia, negative scores obtained at many human parameters listed in Table 2 can be improved by education and/or by taking other appropriate measures.

“Noise disturbance” (point 19) was recorded at several places at urban beaches in Barcelona (e.g. La Barceloneta, Mar Bella, Bogatell, Nova Icària, Somorrostro, Sant Miquel,



Fig. 9 a Great influence of beach visitors at Els Capellans, Catalonia coast (photo: E. Ariza); b) Implantation of Marram grass (*Ammophila arenaria*) and emplacement of fences at Deba (Basque Country).

Sant Sebastià) and San Sebastián (in the Basque Country, e.g. La Concha, Zurriola and Ondarreta), and linked to different causes. Quite often it was related to the great number of beach visitors: the ‘carrying’ capacity along the Catalonia coast is quite often exceeded (Ariza et al. 2008a), as observed at Els Capellans (Fig. 9a, Salou). As in other Mediterranean areas and the Caribbean, visitors come to the beach for swimming, sunbath, to listen to music and to have ‘fun’ (Botero et al. 2015). In this case, educational and maybe repressive measures can be taken to avoid loud music.

At places, noise was related to the presence of marinas and ports, quite abundant especially along the Northern and Mediterranean coast of Spain (Barragán Muñoz 2004). In the Basque Country, Santiago beach, a Class III site, had low scores because noise disturbance linked to the presence of a nearby marina (i.e. Urola). Respect of boat mandatory velocity limits would reduce noise disturbance and the beach would upgrade to a Class II. Las Arenas, located at the Bilbao Ría entrance, recorded similar problems due to the high traffic of leisure boats and ships. Similar situations were observed along the Catalonia coast, e.g. at Port Ginesta beach (Class V). Despite it showing attractive cliffs and a location in a protected area belonging to the Nature 2000 network, it was

very negatively affected by the nearby port. Construction and successive enlargement in 2007 of the port produced environmental damage and negatively influenced several scenic parameters. Noise was often linked to the absence of a buffer zone (“access type”, point 24) between beach and inland human activities/constructions. Heavy traffic was observed where railways, e.g. Laidatxu, Pla de l’Os, Montgat and Ocata, highways, coastal roads and promenades, e.g. Sant Miquel and Sant Sebastià, run closely parallel to coastline.

At many places such structures were directly emplaced on the wide back beach and bulldozed dune ridges (Guillén et al. 2014), interrupting the natural beach-dune sedimentary interchange (Manno et al. 2016), destroying important natural habitats (Gallego-Fernández et al. 2011) and an effective buffer zone between beach and backing human constructions, as observed at Varadero and other localities in Cuba (Anfuso et al. 2014, 2017).

Presently, along the Catalonia coast, dune systems have almost disappeared (Guillén et al. 2014; <http://www.observatoriosostenibilidad.com/2016/11/23/nota-de-prensa-del-informe-costa-16/>, accessed February 2017) and, in the Basque Country, were observed only in 9 out of 18 of dune fields existing 200 years ago (Gallego-Fernández et al. 2011), good examples of developed dune fields being at Gorliz, La Arena and Laga beaches (Pérez 2003). Dune reconstruction and stabilization by means of sand injection, construction of pathways, planting of native vegetation or emplacement of fences and educational initiatives would greatly reduce system susceptibility to erosion/flooding and improve coastal scenery value (Williams et al. 2012) and general beach ‘naturalness’ and environmental quality (Mir Gual et al. 2015) by incrementing points 10, 19, 22 and 24 (Table 2). When dune restoration will be completed at Deba (Fig. 9b), a Class IV beach, the site will upgrade to Class III. For Platja dels Canyets, a Class III beach, dune emplacement would upgrade the site to Class II.

Negative scores were observed at “litter” and “sewage” discharge evidences (points 20 and 21) at many urban beaches of Barcelona, a common trend observed along other urban beaches of Catalan coast (Ariza et al. 2008b). Previous authors showed that litter quantity is generally larger than in other types of beaches (i.e. rural and village) and shows evident seasonal variations. Municipalities have to take into account that beach visitors are very worried about litter presence in beach and water (Williams 2011). Beach litter is a ubiquitous and increasing component along the world’s coasts, e.g. along UK beaches it has increased by some 140% since 1994 (MCS 2013). Litter negatively affects natural wildlife, human health and activities (Coe and Rogers 1997; UNEP 2011) and it is one of the five parameters (i.e. safety, facilities, water quality, no litter and scenery) that Williams and Micallef (2009) and Williams (2011) indicated as of the greatest importance to coastal visitors and the most important in resorts (Morgan

et al. 1995). Philipp (1993) and Tudor and Williams (2004) remarked upon the negative effects of beach litter, especially linked to the presence of potentially hazardous and unaesthetic items, such as sanitary and medical waste. Presence of litter greatly damages the local, national and international image of a destination, this resulting in loss of tourist days and associated leisure/tourism activities (Smith et al. 1997). Municipalities have to implement a recreationally oriented management strategy in which the beach is considered a product/service to be offered to users and visitors. Efforts have to be focused to the establishment of efficient waste management programmes and facilities aimed at prevention and recycling, imperative in such areas where tourism is the main economic input. As an example, the accumulation, during summer period, of small sized items (Ariza et al. 2008b), essentially cigarette stubs due to the low efficiency of mechanical cleaning procedures, could be partially solved by implementing periodic manual cleaning operations (Williams et al. 2016) or by placing cigarette stub holders by each beach sun bed, which does cut down numbers found on the beach.

An important critical issue for recreational beaches management is also the question of beach dimension (Ariza et al. 2008a). A healthy and wide beach constitutes a valuable natural protection for backing dunes and environments and/or human settlements (Anfuso et al. 2014) and plays an important role in the tourist market because it is associated with a valuable carrying capacity (Zielinski and Botero 2015). Further, the loss of beach sand affects beach width (point 5) and may also produce sediment coarsening (low score at point 4) and accumulation of dark deposits (i.e. heavy minerals, low score at point 6). At many urban beaches of Barcelona and at few beaches along the Basque Country coast, beach retreat was contrasted by the emplacement of groins and revetments, which negatively influenced point 26, “utilities”. Construction of groins, and in general of hard protection structures, was a quite common solution along European (EUROSION 2004) and, especially, Spanish coasts (Garcia et al. 2013) to counteract erosion processes (Pranzini and Williams 2013; Pranzini et al. 2015). Along Catalan coasts, 72% of beaches record erosion (BEACHMED 2011), with average retreat rates of 1.9 m/yr. (Jiménez et al. 2011). At many places erosion took place downdrift of ports and harbours as observed in many Mediterranean areas (Anfuso et al. 2012, 2013; Manno et al. 2016; Pranzini 2013; Pranzini et al. 2015). Example were in Catalonia, the ports of Renys de Mar, Premià de Mar, El Balis, El Masnou and Mataró, essentially emplaced in the 1970s and 1980s and enlarged numerous times in recent years. Several groins were constructed to combat coastal erosion: these structures interrupted alongshore SW sediment transport creating accretion updrift and erosion in downdrift areas (Guillén et al. 2014), which was counteracted by the progressive emplacement of new

structures according to the “domino” effect (Anfuso et al. 2012, 2013). Protection structures negatively affect beach areas by decreasing water quality, favouring litter accumulation in low energy areas, deterioration of flora and fauna and affect human welfare with decreased safety, comfort and aesthetic quality (Semeoshenkova and Newton 2016), all being important parameters for beach users (Williams and Micallef 2009). In order to reduce the negative impact of structures, these can be removed or lowered and beach nourishment programmes carried out (Pranzini 2009, 2013) to favour enlarging the dry beach area and improving carrying capacity, tourist use and emplacement of facilities (Botero et al. 2015). Sediment accumulated updrift of hard structures, often forms very wide beaches, which can be used for beach nourishment elsewhere (Anfuso et al. 2012).

Lastly, it must be highlighted that the improvement of coastal scenic values along the Catalonia and Basque Country and other coastal communities is an important and mandatory issue according to the Auken report (European Parliament 2009). Within this report the Parliament invited the Spanish Government to revise and improve environmental legislations to avoid excessive coastal urbanization and negative environmental and socio-economic effects and impacts of the 3S tourism.

Conclusions

The checklist methodology gave important and useful information on coastal scenic characteristics and tourist impact along the Basque Country and Catalonia coasts. Within the fifty four classified sites, two belonged to Class I, both located in the Basque Country and four to Class II, three in the Basque Country and one in Catalonia. Class III consisted in sixteen sites homogenously divided between the Basque Country and Catalonia. The fifteen Classes IV sites were essentially located in the Basque Country (i.e. 11 out of 15) and the seventeen Classes V sites were mostly observed along the Catalonia coast (i.e. 14 out of 17).

Results reflected the importance of natural and environmental characteristics and the great impact of tourist activities/settlements. In the Basque Country, the presence of high mountainous areas close to shoreline favoured good scores at many natural parameters, e.g. cliff, rocky shore, skyline, etc. Mountainous areas were not so common along the Catalonia coast and very attractive natural scenic features were only recorded at places. Coastal occupation along the Basque Country and the Catalonia coasts took place according to different modalities. In the Basque Country, tourists were essentially national visitors interested in cultural visits and, secondarily, in coastal areas and the hinterland. In Catalonia, since the 1960s, tourism occupation took place according to the “3S” model. Condominiums, hotels, restaurants, railways

and highways were emplaced close to the coastline on the back beach and dunes, as observed along many Mediterranean destinations. Coastal urbanization and armouring broadly increased in recent decades and produced the destruction of natural environments and an associated decrease of coastal scenic value.

Obtained results constitute valuable baseline information for any envisaged management plan. Coastal zone managers have to try upgrading the different anthropogenic usage parameters and to reverse the negative impact on natural ones. Efforts are needed to regulate future (and present) coastal development and occupation by respecting (or favouring the formation of) natural environments, such as, dunes and vegetated natural areas, which constitute an important buffer zone between the beach and urbanized environment. In eroding coastal sectors, especially observed along the Catalonia coast, beach maintenance is a priority to be achieved by nourishment projects versus the emplacement of hard defence structures. Beach and dune restoration increase the general beach naturalness and environmental quality, factors presently preferred by a smaller - but greatly growing, category of beach goers especially along the Basque Country.

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