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Influence of Weather on the Behaviour of Tourists in a Beach Destination

Diego R.-Toubes [1,*], Noelia Araújo-Vila [2] and José Antonio Fraiz-Brea [3]

1 Department of Business Organization, Business Administration and Tourism School, University of Vigo, 32004 Ourense, Spain
2 Financial Economics and Accounting Department, University of Vigo, 32004 Ourense, Spain; naraujo@uvigo.es
3 Department of Marketing, Business Administration and Tourism School, University of Vigo, 32004 Ourense, Spain; jafraiz@uvigo.es
* Correspondence: drtoubes@uvigo.es; Tel.: +34-988-368-747

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Abstract: In sun-and-beach destinations, weather has a decisive influence on the variability of the daily flow of tourists. Uncertainty in demand flows directly affects businesses and employment. This work aims to improve understanding of the behaviour of tourists in response to changes in weather conditions. The analysis is carried out in the Rías Baixas, a sun-and-beach destination in north-west Spain. The paper analyses the relationship of weather conditions with daily flows during the high season at the main tourist beaches in the area, also considering two beach typologies. The density of beach use is measured three times a day through the analysis of webcam images in combination with real-time weather, and an online survey is conducted among tourists who have visited these beaches. The results show that the hours of sunshine are the most influential weather factor. Weather forecast greatly or totally influenced the decision to go to the beach for almost 70% of respondents and about 80% of the respondents checked on the weather before visiting a beach.

Keywords: climate; seasonality; sun-and-beach tourism; tourist behaviour; weather; webcam

1. Introduction

Climate is an important factor in destination choice and the trip preparation process [1–3]. In sun-and-beach destinations, good weather triggers the arrival of more visitors. Many sun-and-beach destinations are seasonal, but they present daily variability in tourist flow even within the peak season due to institutional factors such as work requirements (public holiday or workday) or school holidays. Other natural factors, including climatic ones (e.g., hours of sunshine, air temperature or rainfall), decisively influence the variability of the daily flow of tourists [4].

Different studies have analysed how weather affects tourist performance, but these have usually focused on long periods, e.g., a month or entire seasons [5–7]. The difficulty of obtaining reliable data on daily tourist movements is one of the main obstacles to developing this type of research for very short periods. On the other hand, how tourists respond to the weather conditions they encounter and their behavioural responses to weather variability and the consequent changes in tourism demand constitute a field that is still developing and not sufficiently understood [8–10].

Uncertainties in the prediction of tourist flows are high, as many variables can affect the behaviour of tourists [11]. Temperature is usually the main variable used in destination demand studies, but this factor alone is not enough to represent tourists' preferences concerning destination climate [2,11–13]. For example, taking into account changing weather patterns, it appears that storms and rain will have a greater influence than temperature on tourism [14]. Gössling and Hall [11] criticise some models to predict travel flows using simplistic individual climate variables, such as temperature, instead of considering complex variables. For example, in addition to using other weather parameters such as rain, wind, or hours of sunshine, databases used for modelling should consider other parameters that reflect the complexity of travel behaviour, such as the role of information in decision-making, the purpose of the visit, and the activities performed in the destination.

This work explores the impact of weather on tourists and its possible influence on the tourism industry [3]. One assumption of this study is that uncertainty about daily demand flows directly affects tourism business and employment. Tourism businesses located in coastal areas where sun and beach tourism is predominant have a logical economic interest in the quality and accuracy of climate information [1], which facilitates more accurate forecasts of the daily demand they are likely to receive. Other non-climatic variables, such as travel motivation, age, sex, length of stay, or distance travelled related to tourism behaviour [15–17] can affect tourism demand and make accurate forecasting more complex.

Uncertainty is greater in businesses that operate without reservations—as in the case of many restaurants and leisure activities—because they have less knowledge of the decision that the traveller will ultimately make, and therefore less capacity to make accurate forecasts of daily demand. The consequences of poor forecasting include over- or under-budgeting expenses, excess labour, or customer dissatisfaction with limited service, waste of material and financial resources, economic losses, unemployment, and price inflation, among others [18]. For example, a business may make temporary contracts and acquire merchandise to meet the expectations of peak demand because they are expecting a few days of good weather, but no one ensures that this will actually happen. A better understanding of daily demand flows can moderate economic damages by entailing a downward alteration of these forecasts due to changes in weather.

The research is carried out in the Rías Baixas, a sun-and-beach destination located in north-west Spain. It is a destination with high climatic variability and strong seasonality in tourism. The aim of this study is twofold: first, to improve the understanding of tourist behaviour in response to changes in meteorological factors; and second, to provide evidence on the relationship between demand and weather that is useful to public and private tourism entities for making more accurate forecasts of tourist flows. Those responsible for tourism businesses will thus be able to improve customer service, hire staff with greater judgment, and save on costs [3].

2. Tourism, Climate, Weather, and Seasonality

The success or failure of a tourist destination depends, among other factors, on the existence and characteristics of its resources, and tourism is one of the most relevant [3,19]. Broadly speaking, the effects of climate on tourism at the destination level include two aspects: the direct impact on tourists, e.g., comfort conditions and weather conditions suitable for certain activities, and the contextual effects, e.g., species present, quality, and condition of ecosystems and the environment in general [20].

In the last ten years, research has increasingly aimed at identifying the ideal or preferred weather conditions for different tourist activities, such as visiting the zoo [21–23]; travelling to ski and mountain environments [24–26]; camping [12,27]; visiting parks [28]; and tourism in urban destinations [29]. The relationship between climate and tourism is particularly close in the case of beach tourism, where climate has repeatedly been identified as a critical pull factor [30–32].

At the same time, the number of studies aimed at assessing optimal or unacceptable climatic conditions in the field of tourism has increased, such as Mieczkowski [33], who applied the findings about comfort conditions (thermal comfort) in specific activities related to leisure and tourism and devised a Tourism Climate Index (TCI) composed of five sub-indices: daytime comfort, composed of maximum daily temperature and minimum daily relative humidity; daily comfort, composed of mean daily temperature and mean daily relative humidity; precipitation; hours of sunshine; and wind speed. The TCI has been subject to substantial critiques, and different authors address the deficiencies by devising methods that integrate the several aspects of climate into a single index. De Freitas, Scott and McBoyle [13] develop the Climate Index for Tourism (CTI), which specifically rates the climate resource for sun and beach tourism, a highly weather sensitive activity. Scott, Rutty, Amelung and Mantao [34] develop the Holiday Climate Index (HCI) to assess the climatic suitability of destinations for leisure tourism. The main advance of the HCI is that its rating scales and component weighting system reflect recent literature on the climate preferences expressed by tourists and takes into consideration varying climatic requirements of different destination types with design specifications developed for two major tourism segments—urban and beach [34]. Attempts to optimize these indices continue, for example in the case of the holiday climate index-beach [35,36]. Despite the widespread use of these Climate indices and others applied in the field of tourism, such as the Universal Thermal Climate Index (UTCI) [37], these indicators present a series of limitations including the imprecise spatial definition and temporal, the use of subjective weighting and rating scales and the lack of empirical validation [35].

The temporal and geographical distribution of tourists throughout the year is defined markedly in seasonal patterns that show how the tourism sector is very sensitive to climatic events, as these phenomena directly affect tourists' decision-making on destinations to visit [3,38–40]. The influence of climatic factors varies significantly depending on the types of activities tourists engage in at the destination; for example, the practice of outdoor activities is generally more sensitive to climatic variations than that of indoor activities [19]. The credibility perception of climate information providers, whether by media or public entities, also determines the decision of the tourist or traveller [1,41].

Seasonality is common to many tourist destinations and is usually owed to a succession of temporary changes in both natural (e.g., climatic variables) and institutional factors (e.g., school holidays) [42]. Hadwen et al. [43] analyse on a large scale and in various locations the relative weight of the different individual factors that affect tourism. They conclude that climate is the main driving force behind seasonal visiting patterns in equatorial, tropical, desert, and grassland areas.

Visitors' satisfaction with their holidays can be seriously affected by weather conditions at the destination, in particular when the climate expectations, i.e., the expected or normal conditions in that area, are different from the actual weather, i.e., the meteorological conditions encountered [44]. On this point, this work differentiates the term "climate" from the terms "weather" or "meteorology". The climate in a location is defined as the average value of the meteorological variables during a given period (30 years being the time set by the World Meteorological Organization) [45]. The study of climate includes mean values, seasonal fluctuations, and maximum and minimum values of location variables. On the other hand, we refer to meteorology or weather as "the set of short-term variations experienced by temperature, cloudiness, precipitation, and winds in the atmosphere" [45] (p. 101).

This study explores the interrelationships of climatic attributes with daily flows within the context of beach tourism. Different methodologies aimed at measuring tourist movements and spatial behaviours have collected data on daily tourist flows using various systems, such as time-lapse video recording systems [46] or mobile positioning [47]. Image capturing through webcams has also been a method used in several studies. Kammler and Schernewski [48] present one of the first studies using webcams to assess the spatial and temporary variation of beach users in northern Germany. They focus on the implications for tourism management without performing a specific analysis concerning weather. Moreno et al. [49] also use webcams to evaluate the density of tourists on a beach in The Netherlands; they find that high temperature results in increased visits to beaches and precipitation has an overriding effect over other weather variables. Martinez Ibarra [50] proposed a series of suitable weather types for sun and beach tourism in Benidorm (Spain) based on a combination of thresholds of the physiological equivalent temperature (PET), solar radiation, wind speed and precipitation. Gómez-Martín and Martínez-Ibarra [51] show that the density of use of Spanish beaches is related to solar radiation as well as the maximum temperature and the PET. These and other studies show how atmospheric conditions have an effect on the behaviour of sun and beach tourists. The analysis of webcam images is an accessible medium that allows for measuring beach use density. This study uses this method on two different types of beaches—urban and rural—not so much for determining the optimal thresholds of the meteorological variables for the practice of beach tourism, but rather for focusing on the effect of these variables on short-term demand flows, specifically daily movements.

For a more complete knowledge of tourist behaviour and the influence of climate factors on lifestyles, we must consider how personal characteristics and socio-demographics are interrelated with weather preferences and behavioural thresholds [8,25,27,52]. These elements of tourist behaviour include the choice of destination, travel motivations, the type of activity developed, length of stay, and aspects of mobility, such as the distance travelled [15–17]. Seeking to achieve a better understanding of the motivations and associated aspects influencing the behaviour of travellers and the daily demand movements, our study complements direct observation with other non-climatic parameters collected through an online survey—specified in detail in the Methodology Section—completed by travellers to the area under study.

3. Methodology

3.1. Study Site and Data

Research was conducted on two popular beaches in the Rías Baixas: Silgar and A Lanzada. Silgar is a Blue Flag beach located in the village of Sanxenxo. It is 750 metres long, and its width varies between 50 m and 80 m depending on the tide [53]. It is an urban beach according to the classification of Williams [54], and has no enabled car park. The beach and marina are the main attractions of numerous restaurants hotels, tourist apartments, and flats for rent located on the beach promenade. Most of the users go to the beach on foot from their accommodation, but every day a significant number of visitors staying outside the village also arrive by car or bus.

The beach of A Lanzada belongs to the municipality of O Grove. It is a windy, rural-type Blue Flag beach, in addition to being classified as a Special Conservation Area for its dune ecosystem and being home to a bird reserve. The beach is 2400 m long and 40 m to 70 m wide depending on the tide [53], and it has two car parks for more than 1000 vehicles. There are houses and tourist accommodations in the vicinity of the southern beach area, but the northern area is more isolated, with most users travelling there by private vehicles (Figure 1).

Figure 1. A Lanzada Beach. Licensed by F. Azumendi.

The main attraction of the Rías Baixas is concentrated in the coastline, making it an area dependent on favourable weather for bathing. Sanxenxo is the main village in the region and the most important tourist destination in the autonomous community of Galicia. It has a highly variable oceanic, temperate and humid climate throughout the year. In 2018, the number of days on which rainfall was collected in the municipality reached 163 [55].

This is a well-defined sun-and-beach destination, with a high seasonality. Sanxenxo's census population increases from 17,400 to just over 32,000 people, i.e., 188.2%, in the summer months [56]. In addition to this increase in the census during the months of July to September, a much higher number of tourists and visitors stay in hotels, tourist apartments, campsites, and second homes, making Sanxenxo the third-largest town in Galicia, after Vigo and A Coruña [57].

Tourism figures in Sanxenxo show the main arrivals of national and foreign tourists in the months of July and August (Figure 2). According to these data, total overnight stays reached 241,571 people in August 2018, while only 21,886 were recorded in March. From November to February, the figures are even lower.

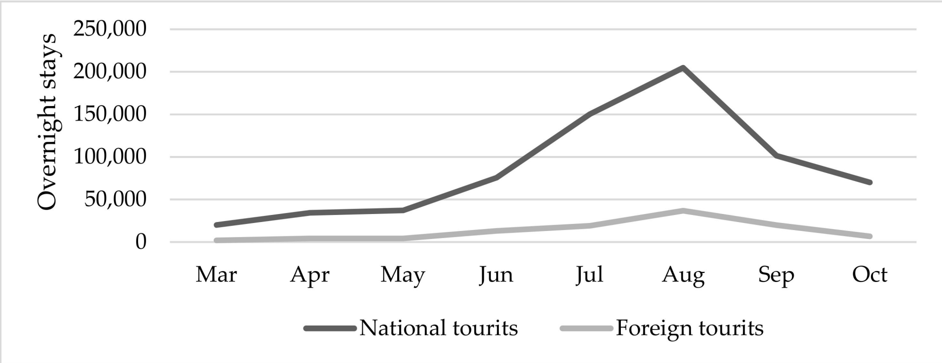


Figure 2. Overnight national and foreign tourists stays in Sanxenxo from March to October 2018. Source: [58].

This paper analyses the daily behaviour of tourists in the face of climatic variability in a sun-and-beach destination. However, it is rather difficult to obtain data on daily tourist flow. On the one hand, public statistical bodies usually provide aggregate weekly or monthly data on, for example, hotel occupancy; on the other hand, visitor registers at tourist offices account for only a part of daily tourist movement because only a small percentage of travellers access these information offices.

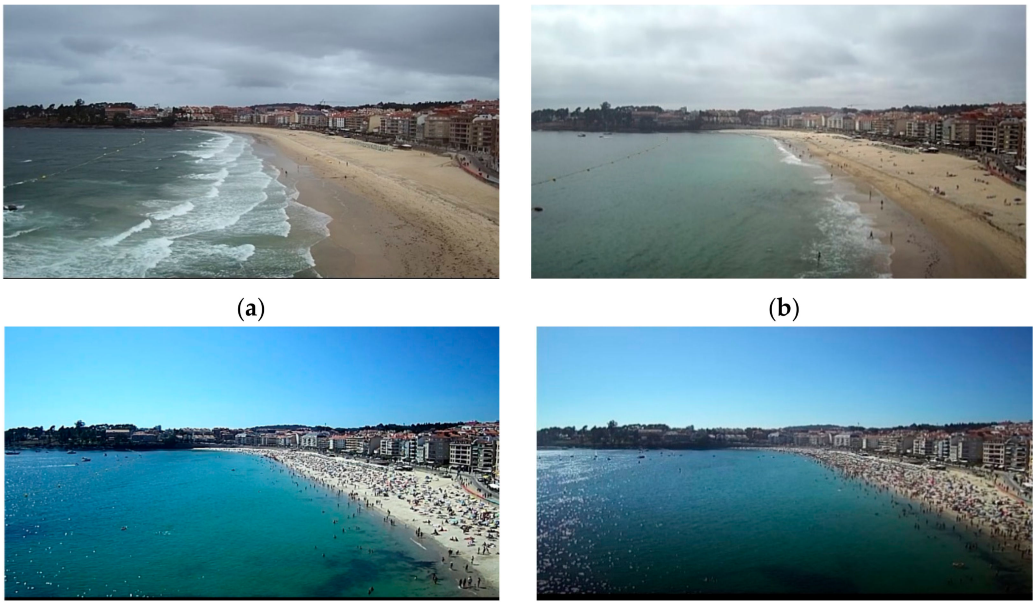
For analysis of the behaviour of beach users in relation to the weather, data were collected using two different techniques: first, by using webcams in combination with real-time weather to gain information about daily and seasonal fluctuation of beach tourists; and second, by conducting an online survey among tourists who have visited the beaches of the destination to gather information on their behaviours and the influence of the climate on their lifestyles.

Data on climatic variables were collected from the MeteoGalicia weather station located in Sanxenxo [59]. The station is located at 42.4 ° latitude and −8.8° longitude, 900 metres from Silgar and 7.9 km from A Lanzada, and it automatically provides data every ten minutes. Since the weather data have not been collected directly from the beach, some clarifications are made below. The station is only 250 metres from the coast and the differences between the weather data recorded and those perceived by tourists on the beach seem irrelevant, given the absence of significant orographic elements in the area, such as mountains or barriers, capable of causing substantial distinctions in the set of meteorological values of the environment. Data have been taken from another weather station near the beach of A Lanzada to analyse possible disparities. The resulting data proved very similar to the data collected at the Sanxenxo station, with a 0.96 correlation of temperatures and 0.99 of rainfall. Taking these small differences into account as well as the fact that the station next to A Lanzada beach provides no daily sunshine data, which is crucial to this study, we have decided to use the data from Sanxenxo station.

3.2. Study Design

The daily visits to the two beaches throughout the high season were analysed first. Images provided by webcams were used to assess population density and establish occupancy levels. Analysis of these images can provide information on the daily fluctuation of beach tourists [60]. The daily variation of the tourist flow was then related to those climatic variables shown to influence tourist behaviour, such as maximum ambient temperature, precipitation, wind speed, and hours of sunshine [33,49–51].

Images of the Silgar beach were captured from 1 July to 15 August 2019 using a Hispacam webcam, which updates every three seconds, whereas images of the A Lanzada beach on the north and south sides were captured with a Camaramar online webcam. Images were collected three times a day, at 12:00, 17:00 and 20:00. The images were stored in a repository to determine at the end of the period the levels of occupancy of the beaches. For this purpose, four categories of user density were established: zero (0), low (1), medium (2), and high (3) (Figure 3). The classification of the density of use or occupancy of the beach was based on visual evaluation by the researchers.



(**a**) (**b**)
(**c**) (**d**)

Figure 3. Categories for Occupancy Density. Analysis at Silgar beach: (**a**) Zero (0); (**b**) Low (1); (**c**) Medium (2); (**d**) High (3). Licensed by Himalia Tecnologías.

Seeking to improve the robustness of the results, two researchers conducted image classification independently. In the evaluations, the researchers considered the different perceptions of beach occupancy levels according to the states of the tide, since the practicable space during low tide increases significantly. The two classifications were then compared, and the level of agreement between the researchers was calculated (Cohen's kappa coefficient (κ)). The resulting value of $\kappa = 0.81$ indicated that the level of agreement was very high.

The second part of the research is aimed at determining the influence of weather on visitors' behaviour to beaches located in the study area. To obtain specific information on visitor behaviour, we decided to collect primary data through a structured questionnaire [61]. The survey presented consists of a total of 19 questions and is structured in three sections:

1. Section I (questions 2 to 9): purpose of the visit to the destination and the beach, as well as activities that take place and consumption habits (overnight stays, mobility, etc.).
2. Section II (questions 9 to 14): influence of the weather on the decision to visit a beach.
3. Section III (questions 15 to 19): sociodemographic profile.

To deepen the analysis of a weather forecast's influence on beach visits, Section II proposes a construct consisting of five items valued on a 5 point Likert scale (1 being the lowest value). Cronbach's alpha has been used to evaluate the unidimensionality of scale item set. This statistic measures internal consistency with respect to all the indicators of the construct by analysing the average correlation of each of the variables with the rest of the scale.

The target population of this study includes those individuals who visited some beach of the Rías Baixas on year to date. To reach this population, a non-probability snowball-sampling technique was used. Selecting an initial group of respondents who meet this requirement, the first question in the questionnaire was the filter question, "Have you visited any beach in the Rías Baixas on year to date?" They were asked to identify others who belong to the target population. Through this technique, a total of 162 valid questionnaires were collected between 20 June and 30 October 2019.

4. Results

Analysis of the images of beaches monitored by the three webcams during the 46 days in the three different moments of the day shows the daily variations of beach tourism intensity and how they depend on different characteristics. The influence of weather conditions and differences between working/festive days were predominantly analysed.

As expected, the results show a lower overall occupancy of the rural beach (A Lanzada) than the urban beach (Silgar). The monitoring of the images in the two spots of A Lanzada (north and south) reflect differences due to the existence of housing and community services in the south, which do not exist in the northern zone. The northern part of the beach is more isolated (see Figure 1), with a dune system on one side and the sea on the other. These characteristics fit more correctly with the rural beach typology, so we used the images of the northern area for a more in-depth analysis and comparison with the urban type of beach.

Figure 4 shows the occupancy level of the two beaches according to the time of day. In the beach of A Lanzada, low occupancy predominates in the three hours analysed (more than 50% of the cases) and only showed high occupancy in 8% of the cases. Five p.m. presents more cases of medium and high occupation. On Silgar beach, the average occupancy level predominates (44% of the cases), and high occupancy reaches 28% of the cases.

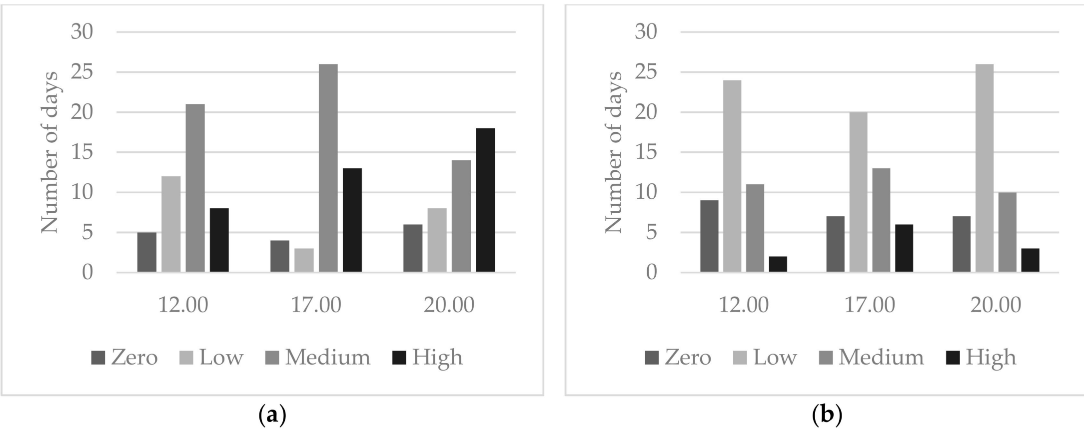


Figure 4. Occupancy by time of day on urban and rural beaches: (**a**) Silgar beach (urban): (**b**) A Lanzada beach (rural).

The level of occupancy is usually higher in the afternoons, and users extend their stay on the beach because, in this area and time of year, the sunset exceeds 22:00 [62]. Weighing the occupancy levels (0 = zero, 1 = low, 2 = medium 3 = high), we obtain an index of user density in each hour and for each beach. The results show that the highest density rate on the two beaches is reached at 17:00, although the difference with the occupancy rate at 20:00 is very small on the urban beach. Due to its greater weight and to simplify the presentation of the data, we will use the information collected at 17:00 to analyse the influence of weather and seasonal variables. Table 1 presents the occupancy level of the two beaches at that time.

Table 1. Level of occupancy of the urban and rural beach.

Beach	Zero	Low	Medium	High
Silgar (urban)	8.7%	6.5%	56.5%	28.3%
A Lanzada (rural)	15.2%	43.5%	28.3%	13.0%

Figure 5 shows the distribution of occupancy density by days throughout the analysis period together with the percentage of daily sunshine. The days on which some precipitation occurred are marked on the horizontal scale.

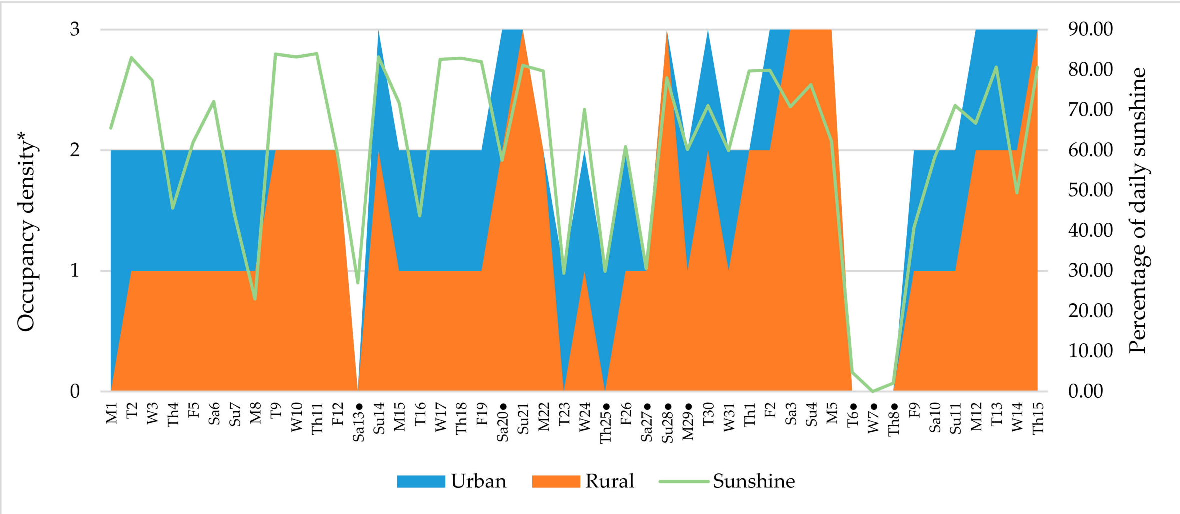


Figure 5. Occupancy density of the beaches of Silgar (urban) and A Lanzada (rural) at 5 p.m., from 1 July to 15 August 2019. (*) 0: zero, 1: low, 2: medium, 3: high. The symbol ● marks rainy days.

In relation to weather variables, wind speed ranged from 2.09 km/h on 12 July to 10.69 km/h on 8 August. There have been 9 days with small precipitations; in the 46 days of analysis, 54.6 L/m^2 were collected and concentrated on 7 and 8 August, when 35.2 L/m^2 were collected. On the urban beach, the days of zero occupancy (0) correspond to days when rainfall was collected—that is, on 13 July (3.6 L/m^2) and August 6 to 8 (1 L/m^2, 14.6 L/m^2 and 20.6 L/m^2, respectively).

The data on the percentage of hours of sunshine collected on those four days are more definitive (27%, 4.8%, 0.0% and 2.1%, respectively). On the urban beach, only three days have low occupancy density. More than rainfall, it is the percentage of sunshine that seems to have the greatest influence. Table 2 shows the weather data for the week of 22 to 28 July. This week it rains slightly on three days and the temperature remains between 22 °C and 24 °C every day, except Monday, when it reaches 27.8 °C.

Table 2. Weather and beach occupancy data, July 2019.

	Mon. 22	Tue. 23	Wed. 24	Thu. 25	Fri. 26	Sat. 27	Sun. 28
Max. temperature (°C)	27.8	22.9	24.1	22.0	22.7	22.9	22.5
Rainfall (L/m^2)	0.0	0.0	0.0	3.2	0.0	8.2	0.8
Wind speed (km/h)	2.3	3.64	4.5	5.15	4.54	5.36	4.73
Hours of sunshine (%)	79.7	29.4	70.1	29.9	60.9	30.6	78.0
Level of occupancy							
Silgar (urban)	Medium	Low	Medium	Low	Medium	Low	High
A Lanzada (rural)	Medium	Zero	Low	Zero	Low	Low	High

When the level of sunshine is low, the level of occupancy is also low. Within the weather, sunshine seems to be the parameter that most influences the level of occupancy. This pattern is repeated throughout the analysis period. The correlation coefficient between the beach occupancy density and sunshine matrices is +0.74 for the urban beach and +0.63 for the rural beach. Sunshine is presented in this study as the climate factor that best fits the density of beach occupancy, with a difference between rainfall (with negative correlation for the two beaches: −0.63 and −0.39, respectively) and temperature (+0.38 and +0.21). The wind speed shows a very small negative correlation (−0.17 and −0.26).

The extension of the correlation analysis to all data (at the three image-collection points and at three hours of the day) shows that the temperature and degree of sunshine correlate positively in all cases with the level of beach occupancy. Precipitation and wind speed show a negative correlation in all cases, as well as a very small correlation in the case of wind speed. In all cases, the percentage of sunshine is the variable with the highest correlation with the occupancy level.

To evaluate the influence of the two climatic variables in which we found the highest correlation (i.e., maximum temperature and hours of sunshine), we performed a one-way ANOVA test. At a level of significance $p < 0.01$ the results show that no statistically significant differences are found in the temperatures for the four density groups in the urban beach ($F = 2.603$, $p = 0.0645$). However, in the rural beach, the data are very close to the level of significance ($F = 3.909$, $p = 0.0150$). Most notably, statistically significant differences were found in the density of use in the case of the variable hours of sunshine for the two types of beach (urban beach: $F = 26.63$, $p < 0.01$; rural beach: $F = 16.726$, $p < 0.01$).

In the two types of beach, we find a significant relationship between beach occupancy and hours of sunshine. Throughout the period analysed, 11 July is the day with the highest percentage of sunshine (84%) and the highest overall irradiation (3.145 kJ/m^2). The average percentage of daily sunshine for the whole period under study was 60.6%. The results show that the urban beach presents an average daily sunshine of 72.1% for high occupancy, 66.4% for medium occupancy, 30% for low occupancy, and 8.4% in the case of zero occupancy. In the case of the remote beach, the daily average percentages of sunshine for high, medium, low, and zero occupancy were 74.8%, 73.7%, 61.1%, and 22.7% respectively. In this type of beach, the level of occupancy was low in the first week of July, even when average daily sunshine was 83%.

A high rate of sunshine and zero rainfall do not guarantee a high occupancy rate either, even on Sundays. This is the case for the period descriptively analysed between 7 and 12 August and whose data are shown in Table 3.

Table 3. Meteorological data and level of beach occupancy by type, August 2019.

	Wed 7	**Thu 8**	**Fri 9**	**Sat 10**	**Sun11**	**Mon 12**	**Tue 13**
Max. temperature (°C)	21.0	23.1	21.3	22.6	21.8	23.2	24.0
Rainfall (L/m^2)	14.6	20.6	0.0	0.0	0.0	0.0	0.0
Wind speed (km/h)	5.36	10.69	8.64	3.96	4.18	4.5	3.92
Hours of sunshine (%)	0.00	2.1	40.7	58.1	71.1	66.7	80.7
Level of occupancy							
Silgar (urban)	Low	Low	Med.	Med.	Med.	High	High
A Lanzada (rural)	Zero	Zero	Low	Low	Low	Med.	Med.

It is observed in the table that after a period of atmospheric instability and rains, although the good weather returns, high occupancy is not reached, even on the weekend. In this sense, to the trends present some inertia. The discussion section makes further comments on this aspect.

Survey Results

The survey of beach users in the area gave us a better understanding of behavioural habits in relation to climate. The profile of respondents (Section III of the questionnaire) presents balanced gender participation (48.8% women, 51.2% men). The majority age group is under 25 (35%), followed by those aged 26 and 35 (21.3%). The representation between 36 and 65 years is balanced in the three periods/decades (12% in each period); finally, those over 65 years old represent 6.3% of the sample. In terms of occupation, 62% of those surveyed were active workers, followed by students (24.1%).

The retired group represents 12%, and the unemployed represents only 2.5%. Spain is the country of origin for the majority of the sample (95%).

Section I delves into the type of tourism carried out in the Rías Baixas, as well as habits and behaviour when visiting the beach. As for the type of tourism consumed in the area of the Rías Baixas (possibility of multiple responses), the most repeated option is “sun and beach tourism”, either in combination with others (92.6% of the sample) or as the only type of tourism practiced (19.4%). The combinations “sun and beach”, “gastronomic tourism” (15.5%), “sun and beach”, “gastronomic tourism”, and “visiting friends and relatives” (6.8%) are the most frequent.

More than 41% stayed between one and three days at the destination: 16.9% only had a one-day visit and 24.4% had a 2–3 day stay. Moreover, approximately 11% of respondents stay longer, 10–15 days or 15–30 days. The main accommodation was the second residence (44.7%) and the house of friends and relatives (24.3%), followed by, in the case of regulated establishments, hotels (15.5%) and tourist apartments (12.6%). The high percentage of accommodation in owner-occupied housing is characteristic of the study area, and the supply of tourist housing is not high, for example, in summer 2018, only 772 tourist apartments were offered in the Rías Baixas [63].

The main company visiting the beach is the family (42.8%), followed by the partner (31.4%), and only 3.8% of the sample goes to the beach alone. The journey to the beach is made mainly by car (70.3% of the sample) and walking (25.9%). Public transport and cycling continue to be a minority in access to the beaches of the Rías Baixas. Finally, in terms of the specific purpose of visiting the beach, the preferred combination is sunbathing, relaxing, and walking (44.6% of the sample), followed by sunbathing, relaxing, and swimming (26.7%).

As for behaviour in relation to the weather conditions, the results show a high percentage of weather consultation before going to the beach (78.2%), probably motivated by the high variability of weather in the area and, as we have seen, by the specific type of activity done on the beach. The main sources of information are mobile applications (39.2% of the sample), the official weather website through the personal computer (PC) (26.7%) or both (19. 2%). Although the weather forecast has a strong or total influence on the decision to go to the beach for 69.5% of the sample, it is irrelevant to only 5.2%.

The most important weather condition, which determines the decision to go to the beach, is that it is sunny (43%) and that it does not rain (37.3%). Air temperature and the absence of wind show percentages below 12%. These results are consistent with those obtained in the analysis of images, and the percentage of sunshine provides a good approximation for the level of the day’s cloudiness, which is an indicator of interest because there may be days whose meteorological data show a day with high ambient temperature and zero precipitation but that is cloudy. Water temperature is a secondary factor, which is only important for 0.6% of respondents.

The reliability of the construct that analyses the weather forecast’s influence on beach visits presents an Alfa de Cronbach of 0.813, higher than 0.7, which is the lower limit of acceptability [64], so it is not necessary to eliminate any item. Analysis of the matrix of correlations between items reflects that the greatest correlations occur between items 1 and 2 (0.58), 2 and 4 (0.58), 3 and 2 (0.556), and 4 and 5 (0.56). All correlations are greater than 0.3 (Table 4).

Table 4. Influence of weather forecast on travelling and visiting a beach.

Items	Mean	St. D.
1. Before planning a trip, I check the weather forecast.	3.6	1.286
2. An unfavourable weather forecast can make me change the destination of my trip.	3.4	1.377
3. An unfavourable weather forecast can cause me to cancel a booked trip.	2.4	1.255
4. The weather can cause me to modify the activities scheduled on a trip.	3.7	1.158
5. Once on the beach, a change in weather conditions may cause me to leave earlier than expected.	3.4	1.330

Overall, the valuation of the items is high, with an average higher than three points, except in the case of cancellation with an unfavourable weather forecast, which reaches an average valuation of 2.4. Responses to item four show a strong willingness to modify planned activities in the face of changing weather conditions (3.7).

Differences in the valuations of the five items are checked according to the variables sex, age, and occupation. Women are more willing to change the destination of the trip when faced with unfavourable weather forecasts; this difference in behaviour is in line with other studies finding differences in stated thermal comfort of beach tourists by gender [65]. Regarding the age variable, we observed a similar general pattern in the valuations of the different items (Figure 6) with some differences in the various age groups.

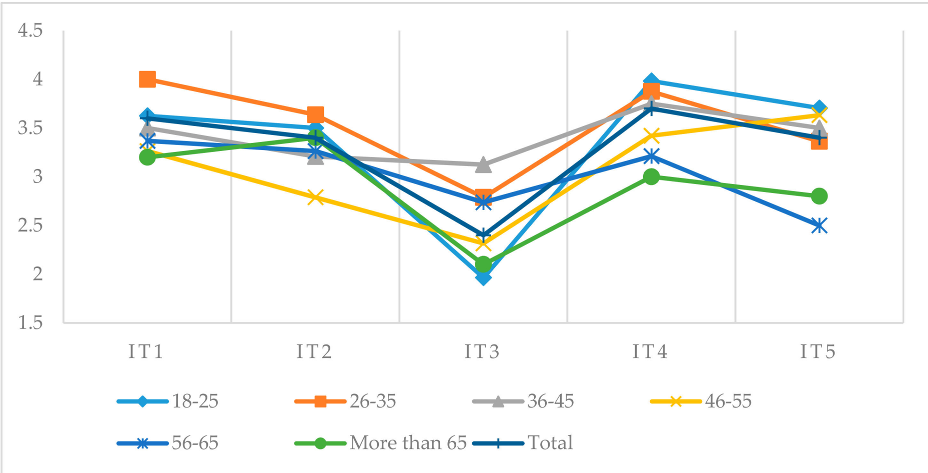


Figure 6. Evaluation of the five items (IT) according to age group.

In item one, "check the weather forecast before planning a trip", the group from 26 to 35 years shows the highest valuation. In item two, "change of destination due to unfavourable weather forecast", the interval from 46 to 55 years is less susceptible to change (2.7 points on average), and the interval from 26 to 35 years is the most susceptible (3.6). In item three, "cancellation of a booked trip due to unfavourable weather", young people aged 18 to 25 are the least affected (1.9 points on average). However, in item four, "modification of activities due to a change in the weather", the group of 18 to 25 years old is the most likely to change activities (3.9 points on average), and those older than 65 are the least likely to do so. Once on the beach, in item five, "decision to leave the beach due to a change in weather conditions", young people (18–25 years) again showed the highest average score (3.7), and the elderly group showed the lowest valuation.

5. Discussion

The response of tourists to climatic variables has been analysed in multiple ways. De Freitas [3] points out two types of methods for obtaining data: assessing conditional behaviour, for example, by using questionnaires to determine the reaction or perception of tourists, which includes assessing the influence of weather forecasts; and examining on-site experience. Our work combines both of these methods to explore the behavioural response of tourists.

An in-situ analysis (via webcam) provides us with reliable real-time information on sun and beach tourist movement on the same beach. An advantage of this methodology is that its measurement of weather sensitivity is not based on intentions or perceptions but rather direct observation of tourist flow using non-intrusive observation techniques [51]. However, this method does not capture the personal characteristics, or sociodemographic profile of the users that would help to better understand the motivations likely to influence traveller movement [8]. Thus, it uses a complementary questionnaire to collect the preferences expressed by visitors to the coastal area under study. The images obtained through the webcam provide us with sufficient data [60] even though they are subject to the continuous effectiveness of the system, and the absence of meteorological conditions that prevent the visualization of the images (i.e., fog). Perhaps the biggest drawback lies in the quantification of the density of beach use. The assessment made in our study is visual, like most of the studies in this field [49–51], and the classification depends on the researchers' criteria. Although this limitation has been addressed by various means, progress needs to be made on new and more precise methods. On the other hand, the snowball-sampling technique used to obtain the sample of respondents is a non-probabilistic sample in which tourists who have visited the area recruit new people from among their acquaintances. This may lead to a bias in the responses because it gives individuals with more connections greater capacity to select subjects in the sample.

This study finds that sunshine is the climatic parameter with the greatest influence on the level of beach occupancy. The univariate analysis comparing the means of four levels of occupancy finds significance for two beach typologies, urban and rural. Since the study is carried out in the peak season (bathing season in the study area), the data collected for 46-day peak season (from June 15 to 1 September) out of the total 77-day period seems enough to perform the ANOVA analysis. Our results are supported by those obtained in the survey, where 43% of the respondents state that the most important meteorological variable determining their decision to go to the beach is "sunny" (43%), above "no rain" (37.3%). These results fall in line with other works carried out in Spain, like that of Gómez-Martín and Martínez-Ibarra [51], showing that the density of beach use is controlled principally by solar radiation (our study performs the measurement in percentage of sunshine, directly related to solar radiation), and setting the optimal threshold for this weather variable of at least 50% solar radiation at 1:00 p.m. for going to the beach.

It is now widely accepted that weather preferences and thresholds vary according to the context and type of tourism [1,10,26]. These preferences and thresholds have even been found to vary within the different specific activities that can be performed in the same type of tourism [8,25]. Our study finds a significant relationship between the level of occupation and the percentage of sunshine and distinct average daily sunshine values for each category and type of beach, urban or rural. Even in the case of high levels of sunshine (73.7%), the remote beach has medium occupancy. Low occupancy has an average sunshine of 61.1%. Apart from different weather preferences of the users of each type of beach, this may also be due to the need to use a vehicle to access a remote beach and the generally longer journeys required to access remote beaches. Many users in this area use a private car to go to the beach (70.3% of those who answer the questionnaire), so this may represent an important factor that is reflected in the behaviour of individuals.

One of the main findings of this study concerning the behaviour of beach users is that a period of adaptation is perceived when confronting weather changes. Users experience some inertia in their behaviour, such as a short period of adaptation due to changes in expected plans. Weather conditions may be optimal for going to the beach, but a short period of accommodation is present. This period of adaptation occurs in both directions. After a period with good conditions for sun and beach tourism, the arrival of a day with unacceptable weather conditions is mitigated by this inertia. Likewise, if the weather has been bad for a few days, the recovery is not immediate, and the occupancy level is still medium or low—even on Sunday—in function of the type of beach. Age can be a factor influencing this inertia, for example, according to the information obtained by the survey (item 4, Section 2), the cohort of respondents over 65 years of age are the least likely to change the planned activities due to a change in weather conditions.

Two other aspects about this issue deserve attention. Weather misinformation does not seem to be the reason for this adaptation-lag. The information provided by the weather forecast service is updated frequently and is increasingly accurate and accessible for users. For example, 78.2% of respondents were informed of the weather before visiting a beach, and 85% of these respondents said they made the query via mobile or PC. The understanding of how weather information shapes user decision-making remains limited, despite the fact that weather services are increasingly available [1]. A second aspect is the particular circumstances expressed in the survey on home ownership. Nearly 70% of respondents stay at second homes or at the home of friends or family. However, sun and beach destinations with other characteristics, like a higher percentage of rented accommodation, could present a different trend. An individual staying in a hotel or camp site may be more likely to adjust to weather changes more quickly, and even go to the beach in bad weather because those are the only days he can enjoy it. Future lines of research may consolidate the findings of this work by making it extensive to other areas with different sociodemographic characteristics.

Businesses that usually operate without reservation, such as cruise ships, buses, taxies, restaurants, bars and pubs, and visitor attractions are among those likely to be affected by a daily variation in tourist flow. As stated by respondents in item 3 of the questionnaire, travellers with reservation are less likely to cancel a trip due to unfavourable weather forecasts, especially the youngest. The brief inertia in traveller behaviour can provide clues to tourism businesses that depend mostly on daily demand and are subject to high uncertainty. It seems interesting to pursue this aspect further in future research. The following two aspects could be explored:

1. Investigate how the unpredictability of the flow of tourists affects businesses in areas where daily demand may vary substantially. To this end, it would be interesting to have first-hand information on the magnitude of the losses due to unforeseen variations in daily visitor flow and its impact on tourist businesses. Businesses already consider long-term seasonality, the rebound of tourism in the summer season, and the daily variability of the tourist flow owed to institutional factors (holiday or non-holiday) when they plan their operations. However, the daily variability of tourist flows caused by weather conditions is subject to greater uncertainty and is a field yet to be understood. Certainly, short-term weather forecast information is crucial for the decision-making and operative planning of these businesses [1,3].
2. In the methodological field, new ways of measuring daily tourist flows in areas where there is no entry record may be explored. Other tourist contexts with records like camping areas, parks, zoos, or ski resorts can more accurately assess demand flows. An added difficulty in sun and beach tourism is that there are no entry records for beaches, except for those that are saturated, for which the authorities do keep a record. Quantifying the variation in flows more accurately would help to better determine the temporal dimension of inertia. This may be achieved using Daily Road Traffic data in access areas.

6. Conclusions

This work explores the influence of weather conditions on tourists and its possible influence on the tourism industry. The study focuses on improving the understanding of tourist behaviour in response to changes in weather conditions and provides useful evidence on the relationship between demand and weather variability for public and private tourism entities to make more accurate short-term tourist flow forecasts.

Tourist behaviour is subject to changes due to factors influencing the holiday plan and movements at the destination. Understanding and measuring this behaviour is complex because many factors come into play in the variation of tourist flows. This work overcomes the difficulty in obtaining reliable tourist flows data to a destination in short periods (i.e., as a day) by assessing the daily use density of the most frequented beaches with webcam images. The data obtained are compared with the daily information provided by the weather station in the tourist destination. These data have been complemented with the information obtained from an online survey of individuals who have visited the area and whose main motivation has been sun and beach tourism. The results show that the weather forecast greatly or totally influenced the decision to go to the beach for almost 70% of respondents and about 80% of the respondents checked on the weather before visiting a beach.

In this case study, we observed that the level of hours of sunshine is the most influential among the climatic factors (temperature, wind, precipitation, or sunshine) in tourist behaviour. The level of sunshine shows a statistically significant influence on the density of users on the beach, and it is the variable reaching the highest correlation coefficient with tourist flow.

Although weather is not the only factor influencing tourist demand, particularly daily tourist movement, this work highlights the importance of its impact. Changes in the weather variables not only alter traveller behaviour on the same day but can also affect the following days by inflicting a "discouragement effect" if the weather has been bad—that is, it is maintained when the decision is to not go to the beach, even if the weather improves the following day. Hence, a brief inertia is present in traveller behaviour with respect to weather. In some ways, users extend the holiday they had previously planned for, despite weather changes.

Businesses operating without reservations face greater uncertainty regarding short-term tourism flows. The availability of short-term weather forecast information and a better understanding of user response to changes in weather conditions can assist planning operations and moderate losses in these businesses.

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