Geojournal of Tourism and Geosites
ISSN 2065-0817, E-ISSN 2065-1198

Year XVII, vol. 53, no. 2, 2024, p.706-712
DOI 10.30892/gtg.53234-1246

WEATHER-DRIVEN FLUCTUATIONS IN DAILY BEACH TOURISM: INSIGHTS FROM COASTAL DESTINATION DYNAMICS IN SPAIN

Diego R. TOUBES*
Faculty of Business and Tourism, University of Vigo, Ourense, Spain, e-mail: drtoubes@uvigo.es

Noelia ARAÚJO VILA
Faculty of Business and Tourism, University of Vigo, Ourense, Spain, e-mail: naraujo@uvigo.es

Lucília CARDOSO
CiTUR – Center for Tourism Research, Development and Innovation, Polytechnic University of Leiria, Leiria, Portugal, e-mail: lucilia.a.cardoso@ipleiria.pt

Luís LIMA SANTOS
CiTUR – Center for Tourism Research, Development and Innovation, Polytechnic University of Leiria, Leiria, Portugal, e-mail: llsantos@ipleiria.pt

Citation: Toubes, D.R., Araújo Vila, N., Cardoso, L., & Lima Santos, L. (2024). WEATHER-DRIVEN FLUCTUATIONS IN DAILY BEACH TOURISM: INSIGHTS FROM COASTAL DESTINATION DYNAMICS IN SPAIN. *Geojournal of Tourism and Geosites*, 53(2), 706–712. https://doi.org/10.30892/gtg.53234-1246

Abstract: Tourism dynamics are profoundly influenced by weather conditions, particularly in regions celebrated for their climatic appeal. The Rías Baixas, a renowned coastal destination in northwest Spain, presents an exemplary case for examining this interplay. This study aims to enhance comprehension of how tourists alter their daily activities in response to weather changes, providing valuable insights for improved planning and management in the tourism sector. Faced with the methodological challenge of accurately measuring daily tourist flows, especially in areas such as beaches without entry registers, this study innovatively uses daily vehicle traffic intensity data in access areas to quantify tourist behavior patterns. Positive correlations are observed between the arrival of vehicles and sunshine. For tourism businesses, short-term weather forecast information, as well as a better understanding of travelers' behavior, is crucial for decision making and operational planning.

Keywords: coastal tourism destination, tourism behavior, tourism planning, meteorology, daily vehicle traffic

* * * * * *

INTRODUCTION

Seasonality in tourism is a widely recognized phenomenon that significantly influences the dynamics of tourist destinations. This phenomenon is characterized by the succession of temporal changes that impact the flow of tourists throughout the year. While in many destinations this seasonality is clearly manifested in distinctive seasonal patterns, such as the division between spring-summer and autumn-winter, it is also influenced by a series of additional factors that generate shorter cycles and overlap with climatic seasons (Butler, 2001). Among the various factors that influence seasonality, climatic events play a crucial role. Previous studies indicate that climatic events directly affect tourists' decisions regarding the destination to visit and the trip planning process. This influence varies depending on the type of tourist activities, with outdoor activities being the most sensitive to climatic variations (Moreno, 2010).

In addition to the climate, other factors such as work holiday periods, the succession of days of the week and institutional and natural variables also contribute to seasonality in tourism. It is important to highlight that the climate not only influences the tourist's decision about the destination to visit, but also determines the environmental context in which the tourist activities will take place (Butler, 2001). Tourist satisfaction during their vacation can be significantly affected by the weather conditions of the destination, especially when these differ from previous expectations. However, the understanding of how personal and sociodemographic characteristics influence meteorological preferences and thresholds is still limited in the field of tourism (Esteban-Talaya et al., 2005). Through this research, we seek to better understand how the daily variability of institutional and climatic factors affects tourist flows during the high season in destinations characterized by high seasonality, as is the case of sun and beach areas. This knowledge is essential for companies and authorities in the efficient planning and management of their tourist operations and services.

To do this, first a theoretical review of the effects of climate on tourism is carried out, especially in the planning and choice of tourist destination, and then, as an empirical part of the study, a review of daily tourist flows is carried out. in an area where there is no entry registration to the beaches, in Sanxenxo (Rías Baixas, Galicia, Spain), using the reports from the General Directorate of Traffic on the average intensity of vehicle traffic as an innovative methodology.

* Corresponding author

LITERATURE REVIEW

Seasonality is common to many tourist destinations and is due to the succession of temporary changes that affect the flow of tourists. In many tourist destinations, the temporal and geographical distribution of tourists throughout the year is markedly defined by seasonal patterns (spring-summer and autumn-winter), but seasonality is also produced by other factors and presents shorter cycles that overlap with those of the climatic station. For example, there are institutional factors, such as work holiday periods; calendar, such as the succession of the days of the week; or natural factors, such as the variability in tourist flow produced by climatic variables (Butler, 2001). More recent studies, including those by Zhang and Kulendran (2017) and Senbeto and Hon (2019), advocate for a multifactorial approach to elucidate the determinants of tourist responses to seasonality. The tourism sector is very sensitive to climate events since these events directly affect the tourist's decision-making about the destination to visit and the trip preparation process (Michailidou et al., 2016, Ridderstaat et al., 2014; Scott and Lemieux, 2010; Bigano et al., 2006; De Freitas, 2003). The influence of climatic factors varies significantly depending on the type of activities that tourists carry out at the destination, with activities practiced outdoors, in general, being more sensitive to climatic variations than those practiced indoors. Furthermore, the influence of individual factors on tourist flows varies by destination. According to Hadwen et al. (2011), climate is the primary driver of seasonal visitation patterns in equatorial and tropical regions. However, Charles-Edwards and Bell (2015) suggest that a better understanding of the variables affecting tourism seasonality in other areas is needed.

The climate also determines the environmental context in which the activities in which tourists participate will take place. Thus, the effects of climate on tourism at the destination level include two aspects: the direct effects on tourists, for example, comfort conditions and ideal weather conditions for the practice of certain activities, and the effect contextual, for example, species present, quality and state of ecosystems and the environment in general (Moreno, 2010). In turn, in the medium and long term, the tourism industry produces effects on the climate through the emission of greenhouse gases (GHG).

Regarding the direct effects of the climate on tourists, visitor satisfaction with their vacations can be significantly influenced by the meteorological conditions at the destination (Vojtko et al., 2022), especially when there is a discrepancy between the expected climate—normal conditions for that area—and the actual weather encountered (Esteban-Talaya et al., 2005). Research aimed at understanding how personal and sociodemographic characteristics influence meteorological preferences and thresholds, as well as climate-based decisions, is still scarce in the field of tourism. Mieczkowski (1985) was one of the first researchers to apply the findings about comfort conditions in specific activities related to leisure and tourism. Mieczkowski devised a Tourism Climate Index composed of five sub-indices: hours of light - daytime thermal comfort, temperature - daily thermal comfort, precipitation, hours of sunshine and wind speed. Recently there have been researchers who have worked in this area in different contexts, such as mountain tourism (Steiger et al, 2016), ski tourism (Rutty et al., 2015) and beach tourism (Rutty et al., 2020; Rutty and Scott, 2016; Martínez-Ibarra and Gómez Martin, 2012).

Destination demand studies have faced criticism for their reliance on simplistic individual climate variables, rather than accounting for the complex variables that truly drive demand dynamics (Gössling and Hall, 2006). It has been established that factors determining international tourist flows are predominantly linked to demand factors in the originating region and supply factors in the destination areas (Gidebo, 2021). Research employing the gravity model approach has identified the standard negative distance effect and the tourism climate index as key indicators of tourism flow volume (Eryiğit et al., 2010). While temperature is commonly the primary variable in these studies, it alone does not adequately capture tourists' climatic preferences at a destination (Hamilton and Lau, 2006). Climate information also plays an important role during the trip preparation process, and travelers use different types of information depending on the planning phase they are in. Moreno (2010) differentiates the phases of Trip Preparation, where travelers consult the destination's average weather to choose when and where to travel, using guidebooks and previous experience; Pre-Trip: with the date approaching, weather forecasts are reviewed to define activities and luggage, crucial for short-notice trips; and During and Post-Trip: the weather experienced at the destination drives daily activities and, once back home, impacts satisfaction and memories of the trip. The perception of credibility of climate information providers, whether media or institutions, also determines the decision-making of the tourist or traveler (Dong et al., 2018). Many sun and beach destinations are seasonal destinations, with the high season -during summer- and low season -in winter and autumn- occurring during the year. However, even within the high season there is daily variability in the tourist flow that depends largely on the succession of working days and holidays - weekends - and the weather. A study by Toubes et al. (2020) carried out in the most touristic area of the Rías Baixas, in Galicia, finds that the climatic variables with the greatest influence on tourists' decisions to travel to the bathing area They are the maximum temperature and insolation - hours of sunshine -, above the "no rain" variable. Between these two, sunshine is the climatic parameter with the greatest influence on the level of occupancy of the beaches. These results are in line with other works carried out in Spain, such as that of Gómez-Martín and Martínez-Ibarra (2012), which show that the density of beach use is controlled mainly by solar radiation.

One of the main intuitions of the study by Toubes et al. (2020) is that in trip planning there seems to be a period of adaptation to climate changes. Users experience some inertia in their behavior, such as a brief adaptation period due to changes in planned plans. The weather conditions may be optimal for going to the beach, but there is a short "adaptation period." For example, after a few days of bad weather, even if the forecasts are good for sun and beach tourism, tourists will not immediately approach the tourist area. That day there may be ideal conditions for practicing leisure activities on the beach, but as it has been preceded by days of bad weather, mobility to the tourist area has been much lower. 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 is mitigated by this inertia. The information provided by the weather forecast service

is frequently updated and is increasingly accurate and accessible to users, so weather misinformation does not seem to be the reason for this delay in adaptation.

The unpredictability of tourist flow affects businesses in areas where daily demand can vary substantially. The elements of this behavior include the choice of destination, the type of activity carried out and mobility. Uncertainty in demand flows directly affects companies and employment. Tourism companies that operate without reservation - as is the case with many restaurants and leisure activities - do not have the capacity to make an accurate forecast of daily demand.

The paper aims to analyze how daily changes in institutional and weather factors impact tourist numbers in highly seasonal destinations. It seeks to enhance comprehension of tourist reactions to climatic shifts, addressing the challenge of demand unpredictability which significantly affects businesses and employment in the tourism sector. The goal is to enable more accurate forecasting and planning for tourism-related businesses and authorities. To do this, an analysis of the daily traffic of cars to a sun and beach destination in the Rías Baixas, in the northwest of Spain, is carried out. Specifically, the study is carried out in the Salnés peninsula, where one of the main tourist spots in Galicia, Sanxenxo and O Grove, is located.

METHODOLOGY

There is great difficulty in obtaining data on the daily tourist flow. Official organizations that offer data on tourist flows, such as the National Statistics Institute or the Galician Statistics Institute, provide monthly but not daily aggregate data, for example, the hotel occupancy survey. On the other hand, visitor records in tourist offices reflect only a part of the daily tourist movement since only a small percentage of visitors access these offices in search of information.

Some studies on the subject have tried to collect information on daily tourist flows through different methods and techniques, for example: time-lapse video recording systems (Brandenburg and Arnberger, 2001), mobile positioning (Järv et al., 2007) or image captures through webcams (Gómez-Martín and Martínez-Ibarra, 2012; Martínez Ibarra, 2011; Moreno et al., 2008; Kammler and Schernewski, 2004; Toubes et al., 2020).

Other tourism contexts with check-in, such as campgrounds, 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 to the beaches except for those that are saturated and where the authorities have decided to establish an entry control with a registry. This research explores new ways of measuring daily tourist flows in areas where there is no entry registration.

The General Directorate of Traffic provides reports on the average intensity of vehicle traffic, but this information offers average statistics and does not provide information on daily variability. Daily traffic information can be obtained using motor vehicle traffic intensity (MVTI) data in access areas. In this work, MVTI data are used in combination with daily meteorology data to obtain information on the daily and seasonal fluctuation of beach tourists.

The study methodology was structured in seven workflow steps:

1. Study area selection: municipalities of Sanxenxo and O Grove located on the Salnés peninsula in north-eastern Spain.
2. Population and tourist flow analysis: examination of the population data of Sanxenxo.
3. Transportation mode assessment: analysis of the primary transportation method used by visitors.
4. Data collection points: a) MVTI data collection at the motorway toll that gives road access to the tourist area; b) climatic data collection from the meteorological station in Sanxenxo.
5. Data parameters: sunshine percentage as the climatic parameter to account for seasonal daylight changes.
6. Data collection period: data was gathered from July 1 to August 31, 2019.
7. Data analysis: the data were analysed to understand the daily variability of tourist flows in response to climatic factors.

The study is carried out in the tourist area of Salnés, where the municipalities of Sanxenxo and O Grove are located. The main attraction of the Rías Baixas is concentrated on the coast, making it an area dependent on the favorable weather for swimming. Sanxenxo is the main town in the region and the most important tourist destination in the autonomous community of Galicia. It has an oceanic, temperate and humid climate that is very variable throughout the year. It is a well-defined sun and beach destination, with a high seasonality. The census population in Sanxenxo is 17,856 people in December 2021 (IGE, 2023). This population grows especially in the high season months, July and August. In the month of July, 191,011 tourists spent the night in hotels and campsites in Sanxenxo and 246,272 in August (Figure 1).

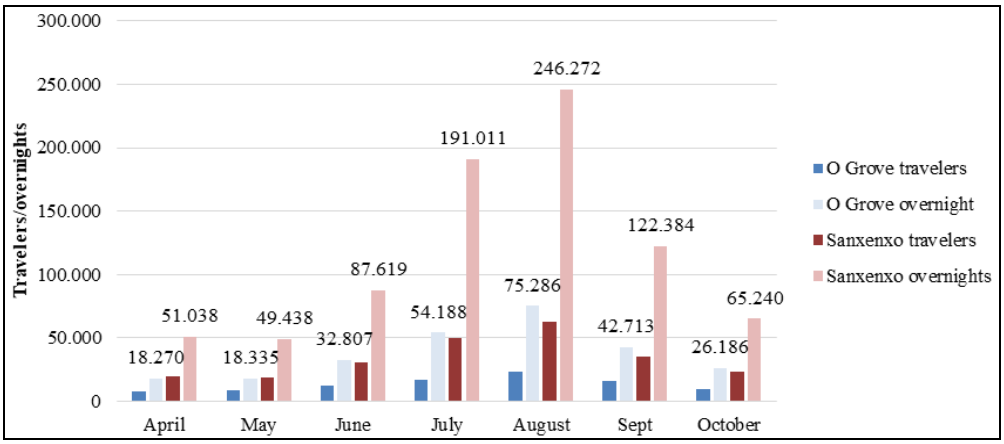

Figure 1. Travellers and overnight stays in Sanxenxo and O Grove in April-October 2019 (Data source: INE, 2020)

Sanxenxo is recognized as the Spanish municipality with the highest number of Blue Flag beaches, totaling 17. According to the category of Williams (2011), it has semi-urban rural and urban beaches, among the latter Silgar is the best known. O Grove has 15 beaches and coves, among the best-known tourist spots are A Lanzada beach and Illa de A Toxa. In this area there is a significant daily tourist flow and many users use their private car to access the area. The study carried out by Toubes et al. (2020) in the same tourist area shows that the car is the most used means of transportation, with 70.3% of visitors who access the area using it. The MVTI data were collected at the Curro toll station on the AP-9, km. 119,394, and were provided by the concessionaire company, Audasa (Autopistas del Atlántico Concesionaria Española S.A.). This toll links the AP-9 motorway with the VG-4.1 expressway that gives access to the beach area of the municipality of Sanxenxo and the Grove peninsula (Figure 2).

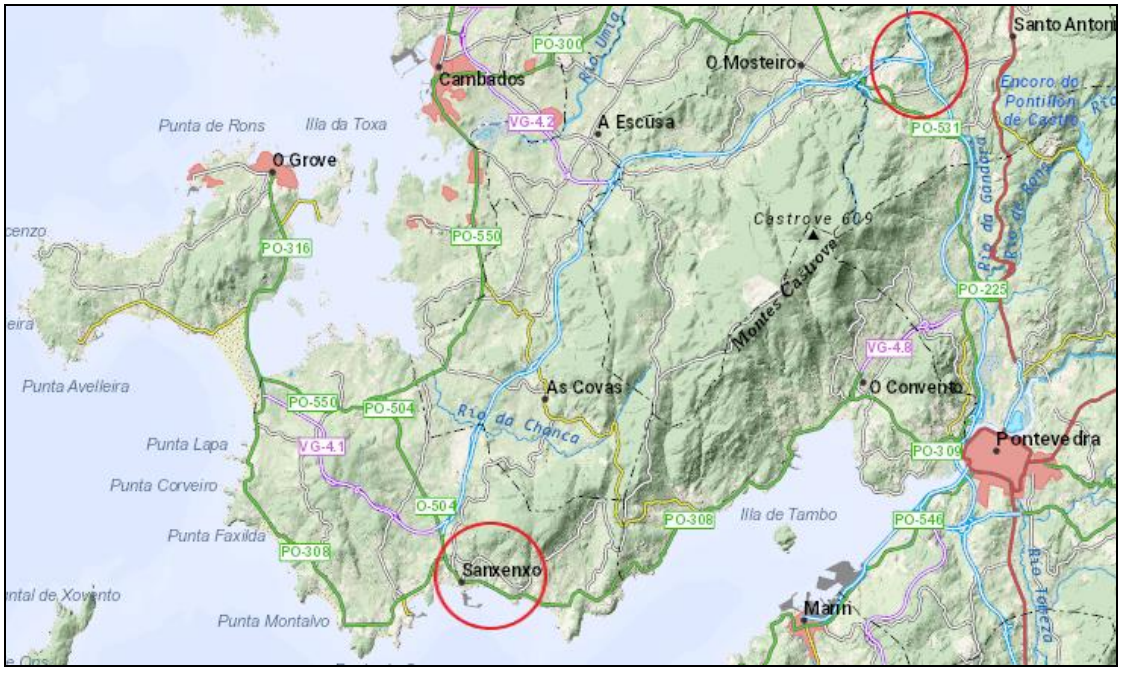

Figure 2. Map of the Salnés peninsula with the main road accesses * The red circles indicate (a) the connection of the AP-9 motorway with the VG-4.1 expressway and (b) the town of Sanxenxo (Source: Xunta de Galicia, Institute of Territory Studies)

The AP-9 highway connects the most important cities on the western coast of Galicia, from Ferrol to Vigo. There is another access road to Sanxenxo, the regional highway PO-308 that serves the coastal towns up to Pontevedra, but this road has been converted into a minor access road, with speeds limited to 40 km per hour and no section with a dashed line where you can overtake. In turn, data on climatic variables were collected from the MeteoGalicia (2022) meteorological station located in Sanxenxo. The station is located at 42.4º latitude and −8.8º longitude, 900 meters from Silgar and 7.9 km from A Lanzada, and provides data automatically every ten minutes. The climatic parameter of sunshine is used, measured in percentage of sunshine, instead of the hours of sunshine since due to the seasonal change the hours of daylight have been gradually decreasing since July 1. The data was collected between July 1 and August 31, 2019. This period is the high season for this area of the Rías Baixas. We note that this period is before the announcement of COVID-19 and, therefore, the impact of the pandemic has not influenced the data.

RESULTS AND DISCUSSION

The entry and exit data of the AP-9 provide us with information about the vehicles that access the tourist area (exit of the AP-9) or leave it to return to their places of origin (entrance of the AP-9). The data distinguishes between light vehicles (LV) and heavy vehicles (HV). The first analysis of the data reflects an evident influence of the day of the week on the flow of vehicles, and that this influence is opposite for each type of vehicle, LV or HV. Thus, it is observed that the highest outbound traffic of the LV is on holidays, with an average of 11,632 LV/day, compared to the average traffic of 7,687 LV/day from Monday to Friday, similar to that of Saturdays (7,898 LV/day). On the contrary, the flow of HV is higher on weekdays (480 HV/day) and lower on holidays (128 HV/day) and Saturdays (154 HV/day).

In the case of access to the tourist area, the HV pattern is very similar, with higher average traffic during the week (529 HV/day) and lower average traffic on holidays (121 HV/day) and Saturdays (197 HV/day). The flow of HVs is governed by the work day, that is, on work days the traffic is much greater, dropping by more than 73% on holidays and Saturdays, both in entry and exit traffic. The majority of HV traffic does not seem to be governed by tourist leisure reasons, but rather by work reasons. The HVs may include buses that access the area for tourist reasons, but since these cannot be discriminated from the total, in this study we will dispense with the HVs for the analysis of the flow of tourist movement.

For LVs, the behavior pattern changes, since Fridays and Saturdays are the days with the highest traffic entering the tourist area (10,879 LV/day on Fridays and 10,114 LV/day on Saturdays). On the other hand, inbound traffic decreases from Monday to Thursday (8,356 LV/day) and on holidays (8,480 LV/day) (Figure 3).

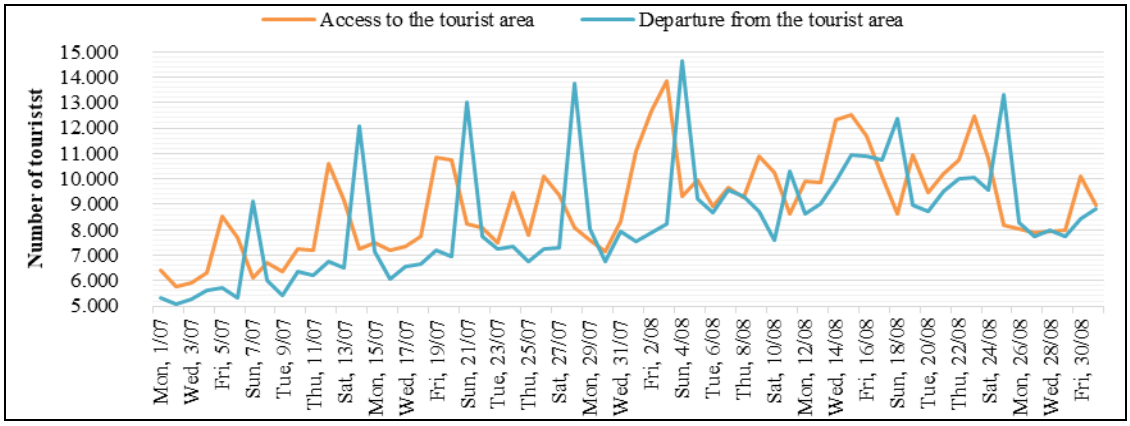

Figure 3. Number of daily LVs that enter or leave the tourist area (Data source: Audasa, 2020)

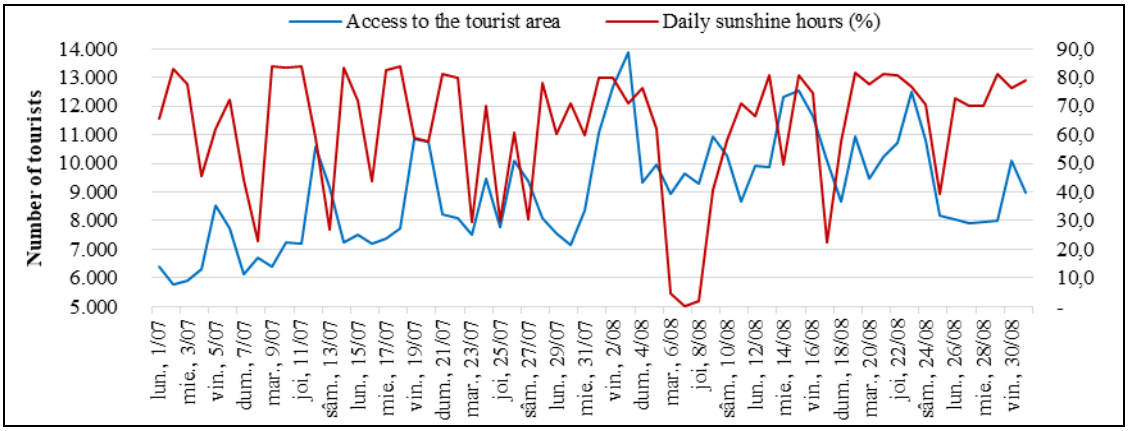

Figure 4. Daily data on the percentage of sunshine and the number of LVs that access the tourist area (Source: Audasa and MeteoGalicia)

Therefore, during the months of July and August, the greatest flow of passenger cars (LV) towards the tourist area occurs on Fridays and Saturdays and they leave it on Sunday, mainly in the final hours of the day. In these periods, the peaks occur, entry and exit; They are flows of "weekend visitors." This pattern is much clearer during the month of July, and from August 4 the MVTI decreases in intensity. On Sunday 4/08 there is outbound traffic of 14,637 LV and the following Sunday 11/08 it drops to 10,292 LV. This decrease in the middle of the high season may be due to the fact that tourists are more settled in the territory and therefore there is not as much vehicle movement. However, such a sharp decline only seems to happen that weekend, so the weather information for that week is analyzed below.

As explained in the theoretical development, in previous studies it has been found that sunshine (hours of sunshine) is the variable with the highest positive correlation with respect to the flow of visitors to the study area. The daily flow of LV that access the tourist area and the daily sunshine data during the months of July and August are shown in Figure 4.

The daily percentage of hours of sunshine varies greatly throughout the two months. Almost completely clear days follow one another (with 80% sunshine), with overcast days (20% sunshine). The longest period in which sunshine does not drop below 50% is from 07/29 to 08/06 (9 days). It is precisely in this period when the highest peak of LV that access the area is observed, specifically on Saturday 08/03 with 13,861 LV. From Monday 08/05 to Friday 08/09, the average sunshine level is 22%, the lowest of the entire analyzed period. The number of LVs that access the area drops drastically, with an average of 9,746 LV/day during that week, compared to the average of 11,526 LV/day the following week (18% more traffic), with an average insolation of 70 ,3%. Table 1 shows the daily data for the week of August 5 to 11.

Table 1. Meteorological conditions and movement of LV to the tourist area in the second week of August (Source: Audasa and MeteoGalicia)

Day	Access to the area	Leaving the area	Rain l/m ^{2}	Sunshine (%)
Monday, 08/05	9,941	9,205		62.2
Tuesday, 08/06	8,937	8,679	1.0	4.8
Wednesday 07/08	9,664	9,575	14.6	0
Thursday, 08/08	9,272	9,337	20.6	2.1
Friday, 08/09	10,915	8,735		40.7
Saturday, 08/10	10,269	7,609		58.1
Sunday, 08/11	8,649	10,292		71.1

Despite being in the middle of the high season and the weather forecast for Sunday, August 11, was ideal for sun and beach tourism, the access data to the tourist area on Friday and Saturday are among the lowest in the period analyzed. The reason may be that until Friday the weather conditions have not begun to improve (Table 1) and visitors need "adaptation time" to the new favorable conditions for outdoor activities. This latency or adaptation period was noted in other studies

and can be found here. Visitors have an inertia in their behavior and even if the weather forecast is good, the rain and overcast skies from previous days dissuade tourists from making the trip. This has repercussions on the planning and operations of businesses in the area: given the forecast of good weather on the weekend, they prepare by hiring staff and stockpiling merchandise, but the volume of visitors is lower than expected, with the consequent damage to the business.

Correlation test; In order to know if there is a relationship between the arrival of vehicles in the area and the hours of sunshine, and if applicable, if this relationship is established immediately or there is a latency period, we perform a correlation test. The weekly seasonality in vehicle arrival data is so high that an analysis of daily arrivals without this fact would distort the results. For this reason, we have separately analyzed the vehicle arrival data for each day of the week during the two months and its correlation with the sunshine data. Although positive correlations are observed between the arrival of vehicles and sunshine, the Pearson correlation test does not yield significant results for any of the days. Fridays, the day of the beginning of the weekend and when the highest MVTI are observed, show a positive correlation of 0.399 between MVTI and sunshine, however the correlation is not statistically significant at a 95% confidence interval (p-value = 0.2877). That is, although a certain influence of weather on the MVTI is observed, no statistical evidence has been found in this regard. Nor has statistical significance been found in the latency or good -time accommodation tests that have been carried out.

CONCLUSION

The seasonal behavior of weekend visitors follows a periodic pattern influenced by work and holidays that is known by the tourist businesses in the area, which prepare and plan accordingly. The weather also influences tourist flows to the area since the main tourism is sun and beach; however, the variability of climatic parameters complicates business planning. This study shows the weekly seasonality in the arrival of visitors to the tourist area, which is more pronounced during the month of July, and the influence of the sunshine factor on the flow of tourists in the area is analyzed. It can be observed graphically how "bad weather" (low percentage of sunshine) for the enjoyment of the sun and the beach affects tourist flows, reducing the number of vehicles that access the tourist area.

The results of the research point to the existence of a brief adaptation period on the part of visitors, that is, despite receiving an ideal weather forecast for the practice of activities typical of sun and beach tourism, it is possible that Visitors are reluctant to make the trip to the tourist area because the bad weather of the previous days weighs on their trip planning and decision. However, no statistical evidence has been found in this regard. In subsequent studies, it would be advisable to carry out an analysis of the true proportion of "last minute" visitors, those who decide to make the trip or transfer at the last minute (or cancel it) and assess the importance that the weather has in this decision. On the part of tourism businesses, it would be of interest to have information on the magnitude of losses due to unforeseen variations in the daily flow of visitors and their impact on tourism companies. Companies already consider long-term seasonality, the rebound in tourism in the summer season and the daily variability of tourist flow due to institutional factors (holiday or not) when planning their operations. However, the daily variability of tourist flows caused by climatic conditions is subject to greater uncertainty and is a field yet to be understood. Certainly, short-term weather forecast information is crucial for decision making and operational planning for these businesses.

One of the significant advantages of the methodology used in this study is the utilization of disaggregated data at a daily level and of high quality, as it displays data that has been effectively observed and recorded, rather than mere estimates. As a limitation, it should be noted that this is a cross-sectional study, and to identify long-term trends and patterns, it would be advisable to expand the research into a longitudinal study analyzing the same variables over successive periods. The advent of COVID-19 substantially altered tourist flows, making it challenging to perform homogeneous comparisons between the years 2019 to 2022.

Author Contributions: Conceptualization, D.R.T. and N.A.V.; methodology, D.R.T. and N.A.V.; validation, L.C. and L.L.S.; formal analysis, L.C. and L.L.S.; investigation, L.C. and L.L.S.; data curation, D.R.T. and N.A.V.; writing - original draft preparation, D.R.T. and N.A.V.; writing - review and editing, L.C. and L.L.S.; visualization, L.C. and L.L.S.; supervision, L.L.S; project administration, L.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research is funded by national funds through FCT – Foundation for Science and Technology, I.P. as a part of the project UIDB/04470/2020.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study may be obtained on request from the corresponding author.

Acknowledgments: The research undertaken was made possible by the equal scientific involvement of all the authors concerned.

Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

Audasa (2020). *Autopistas del Atlántico Concesionaria Española S.A. Traffic data*. July-August 2019: Curro Toll station[Excel data set]. AP-9, km. 119,394. Provided in January 2020.

Bigano, A., Hamilton, J.M., Maddison, D.J., & Tol, R.S.J. (2006). Predicting tourism flows under climate change: An editorial comment on Gössling and Hall (2006). *Climatic Change, 79*(3–4), 175–180. https://doi.org/10.1007/s10584-006-9190-7

Butler, R.W. (2001). Seasonality in tourism: Issues and implications. In T. Baum & S. Lundtorp (Eds.) *Seasonality in Tourism*, 5-21. Oxford, UK: Elsevier Science.

Brandenburg, C., & Arnberger, A. (2001). The influence of the weather upon recreation activities. In *Proceedings of the 1st Int. Workshop on Climate, Tourism and Recreation.* Int. Society of Biometeorology, Commission on Climate Tourism and Recreation. Porto Carras, Neos Marmaras, Halkidiki, Greece, 5 -10 October 2001, 123-132.

Charles-Edwards, E., & Bell, M. (2015). Seasonal flux in Australia's population geography: Linking space and time. *Population, Space and Place, 21*(2), 103-123. https://doi.org/10.1002/psp.1814

De Freitas, C.R. (2003). Tourism climatology: Evaluating environmental information for decision making and business planning in the recreation and tourism sector. *International Journal of Biometeorology, 48*(1), 45-54. https://doi.org/10.1007/s00484-003-0177-z

Dong, Y., Hu, S., & Zhu, J. (2018). From source credibility to risk perception: How and when climate information matters to action. *Resources, Conservation and Recycling, 136*, 410-417. https://doi.org/10.1016/j.resconrec.2018.05.012

Eryiğit, M., Kotil, E., & Eryiğit, R. (2010). Factors affecting international tourism flows to Turkey: A gravity model approach. *Tourism Economics 16*(3):585-595. https://doi.org/10.5367/000000010792278374

Esteban-Talaya, A., López-Palomeque, F., & Aguiló-Perez, E. (2005). Impactos sobre el sector turístico. In Moreno, J.M. (Ed.), *Evaluación preliminar de los impactos en España por efecto del cambio climático*, 653-690. Madrid: Ministerio de Medio Ambiente.

Gidebo, H.B. (2021). Factors determining international tourist flow to tourism destinations: A systematic review. *Journal of Hospitality Management and Tourism, 12*(1), 9-17. https://doi.org/10.5897/JHMT2019.0276

Gómez-Martín, M.B., & Martínez-Ibarra, E. (2012). Tourism demand and atmospheric parameters: non-intrusive observation techniques. *Climate Research, 51*(2), 135-145. https://doi.org/10.3354/cr01068

Gössling, S., & Hall, C.M. (2006). Uncertainties in predicting tourist flows under scenarios of climate change. *Climatic Change, 79*(3-4), 163-173. https://doi.org/10.1007/s10584-006-9081-y

Hadwen, W.L., Arthington, A.H., Boon, P.I., Taylor, B., & Fellows, C.S. (2011). Do Climatic or Institutional Factors Drive Seasonal Patterns of Tourism Visitation to Protected Areas across Diverse Climate Zones in Eastern Australia? *Tourism Geographies, 13*(2), 187–208. https://doi.org/10.1080/14616688.2011.569568

Hamilton, J.M., & Lau, M.A. (2006). The role of climate information in tourist destination choice decision making. In *Tourism and global environmental change*, 243-264. Routledge.

IGE (2023). Población de Galicia, Instituto Galego de Estatística. https://www.ige.gal/web/mostrar_actividade_estatistica.jsp?codigo=0201001002

INE (2020). Encuesta de Ocupación Hotelera. Viajeros y Pernoctaciones por Puntos Turísticos. Sanxenxo, Instituto Nacional de Estadística. https://ine.es/jaxiT3/Datos.htm?t=2078

Järv, O., Aasa, A., Ahas, R., & Saluveer, E. (2007). Weather dependence of tourist's spatial behaviour and destination choices: Case study with passive mobile positioning data in Estonia. *Developments in tourism climatology. Commission on climate, tourism and recreation*, 221-227.

Kammler, M., & Schernewski, G. (2004). Spatial and temporal analysis of beach tourism using webcam and aerial photographs. *Coastline Reports, 2*, 121-128.

Martínez Ibarra, E. (2011). The use of webcam images to determine tourist–climate aptitude: favourable weather types for sun and beach tourism on the Alicante coast (Spain). *International Journal of Biometeorology, 55*(3), 373-385. https://doi.org/10.1007/s00484-010-0347-8

MeteoGalicia (2022). Rede Metereolóxica. Consellería de Medio Ambiente, Territorio e Vivienda. Xunta de Galicia. Available online: https://www.meteogalicia.gal/observacion/estacions/estacions.action?request_locale=gl#

Martínez-Ibarra, E., & Gómez Martín, M.B. (2012). Weather, climate and Tourist behaviour. The beach tourism of the Spanish Mediterranean coast as a case study. *European Journal of Tourism, Hospitality and Recreation, 3*, 77-96.

Michailidou, A.V., Vlachokostas, C., & Moussiopoulos, N. (2016). Interactions between climate change and the tourism sector: Multiple-criteria decision analysis to assess mitigation and adaptation options in tourism areas. *Tourism Management, 55*, 1-12. https://doi.org/10.1016/j.tourman.2016.01.010

Mieczkowski, Z. (1985). The Tourism Climate Index: a method of evaluating world climates for tourism. *The Canadian Geographer, 29*(3), 220-233. https://doi.org/10.1111/j.1541-0064.1985.tb00365.x

Moreno, A. (2010). *Turismo y Cambio Climático en España: Evaluación de la Vulnerabilidad del Turismo Interior frente a los Impactos del Cambio Climático.* International Centre for Integrated Assessment and Sustainable Development; Maastricht University: Maastricht, The Netherlands.

Moreno, A., Amelung, B., & Santamarta, L. (2008). Linking beach recreation to weather conditions: a case study in Zandvoort, Netherlands. *Tourism in Marine Environments, 5*(2-3), 111-119. https://doi.org/10.3727/154427308787716758

Ridderstaat, J., Oduber, M., Croes, R., Nijkamp, P., & Martens, P. (2014). Impacts of seasonal patterns of climate on recurrent fluctuations in tourism demand: Evidence from Aruba. *Tourism Management, 41*, 245–256. https://doi.org/10.1016/j.tourman.2013.09.005

Rutty, M., & Scott, D. (2015). Bioclimatic comfort and the thermal perceptions and preferences of beach tourists. *International Journal of Biometeorology, 59*(1), 37-45. doi:10.10076/s00484-014-0820-x

Rutty, M., & Scott, D. (2016). Comparison of climate preferences for domestic and international beach holidays: A case study of Canadian travelers. *Atmosphere, 7*(2), 30. https://doi.org/10.3390/atmos7020030

Rutty, M., Scott, D., Matthews, L., Burrowes, R., Trotman, A., Mahon, R., & Charles, A. (2020). An Inter-Comparison of the Holiday Climate Index (HCI: Beach) and the Tourism Climate Index (TCI) to Explain Canadian Tourism Arrivals to the Caribbean. *Atmosphere, 11*, 412. https://doi.org/10.3390/atmos11040412

Scott, D., & Lemieux, C. (2009). *Weather and climate information for tourism*. Geneva: White Paper, commissioned by the World Meteorological Organisation.

Scott, D., & Lemieux, C. (2010). Weather and climate information for tourism. Procedia *Environmental Sciences, 1*, 146-183. https://doi.org/10.1016/j.proenv.2010.09.011

Senbeto, D.L., & Hon, A.H. (2019). A dualistic model of tourism seasonality: Approach-avoidance and regulatory focus theories. *Journal of Hospitality & Tourism Research, 43*(5), 734-753. https://doi.org/10.1177/1096348019828446

Steiger, R., Abegg, B., & Jänicke, L. (2016). Rain, rain, go away, come again another day. Weather preferences of summer tourists in mountain environments. *Atmosphere, 7*: 63–74. https://doi.org/10.3390/atmos7050063

Toubes, D.R., Araújo-Vila, N., & Fraiz-Brea, J.A. (2020). Influence of Weather on the Behaviour of Tourists in a Beach Destination. *Atmosphere, 11*(1), 121. https://doi.org/10.3390/atmos11010121

Vojtko, V., Štumpf, P., Rašovská, I., McGrath, R., & Ryglová, K. (2022). Removing Uncontrollable Factors in Benchmarking Tourism Destination Satisfaction. *Journal of Travel Research, 61*(1), 136-149. https://doi.org/10.1177/0047287520971047

Williams, A. (2011). Definitions and typologies of coastal tourism beach destinations. In *Disappearing Destinations. Climate Change and Future Challenges for Coastal Tourism*, 47–65. Jones, A., Phillips, M., Eds.; CAB International: Wallingford, UK.

Zhang, H.Q., & Kulendran, N. (2017). The impact of climate variables on seasonal variation in Hong Kong inbound tourism demand. *Journal of Travel Research, 56*(1), 94-107. https://doi.org/10.1177/0047287515619692

Article history: Received: 13.03.2024 Revised: 02.05.2024 Accepted: 29.05.2024 Available online: 17.06.2024