

Article

Assessing Fire Risk Perception in the Vale do Guadiana Natural Park, Portugal

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Abstract: This is an exploratory study aiming to assess the fire risk perception by operators of the Vale do Guadiana Natural Park (PNVG), southern Portugal. To maximize the sample size, a questionnaire survey was distributed among 35 entities with activities in tourism, hunting, and agriculture, as well as among members of PNVG's co-management commission. For data analysis and interpretation, quantitative and qualitative analyses were used. Survey responses revealed that the entities expressed concern about and made efforts toward the search for and improvement in mitigation strategies in the occurrence of fires. A total of 69.6% of the respondents have knowledge of the occurrence of fires in the region. The qualitative analysis highlights the concern with biodiversity, as well as with the maintenance and cleaning of the PNVG. This study verifies the degree of importance that the tourism sector should give to the impacts caused by fires. The impact of climate change favoring fires was recognized by the entities, as well as the fact that the loss of biodiversity due to fires may have a direct impact on the attractiveness of this tourist destination, indicating the importance of environmental conservation strategies for the region.



Citation: Andrade, N.; Couto, F.T.; Serra, J. Assessing Fire Risk Perception in the Vale do Guadiana Natural Park, Portugal. *Fire* **2023**, *6*, 243. <https://doi.org/10.3390/fire6060243>

Academic Editors: Xiaodong Liu, Mingyu Wang, Feng Chen and Jili Zhang

Received: 4 May 2023

Revised: 31 May 2023

Accepted: 13 June 2023

Published: 19 June 2023



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Keywords: risk perception; fires; rural tourism; natural parks

1. Introduction

Currently, the concept of “living with fire” requires inter- and transdisciplinary efforts to understand and mitigate the impact of fires [1], or even for the conservation of protected areas [2]. Tourism and natural sciences are two areas that, although they seem to be distant in terms of their object of study, are interconnected, the first being an activity that cuts across all the other scientific areas and is open to exogenous effects. Tourism can be very important for the implementation of strategies to improve environmental conservation. Improvement in the quality environment is currently a fundamental element for the success in the competitiveness of any tourist destination [3].

Fires are a phenomenon that worries any entity in charge of territory management and planning. Such a concern is justified by the high impacts caused by the fire events. The impact of extreme fires on the tourism sector is recognized on a global scale. For instance, Portugal is in the extreme southwest of Europe, and due to its geographical location and landscape diversity, the country presents motivations for the constant growth of the tourism industry. However, the impact of fires on tourism in Portugal was predicted for 2030 and 2050 and showed a reduction in tourism in the areas affected by fires, with domestic tourism suffering a 2% reduction by 2030 and possibly double this amount of reduction by 2050. In parallel, international tourism will suffer a decrease of 0.5% until 2030 and may reach 1% in 2050 [4].

An important research topic linking extreme fires and tourism development is risk perception for tourist destinations. Risk perception encompasses several areas in the context of fires, for example, fire evacuation decision making [5] and fire safety for heritage villages [6], among others. In the case of tourists, their perceptions of risk are the result of each person's feelings, so it is not possible to state that risk perception is something entirely concrete [7]. The challenge in defining risk perception is well recognized, namely that tourists' feelings, reactions, and opinions may fluctuate [8]. Then, it is important to discriminate the components of risk perception and perceived risk, as well as the changes in risk perception over time [9].

In general, natural disasters may cause the interruption of social activities or lead to huge socioeconomic losses. There are several types of disasters, and each one of them presents a perceived risk for tourists, and each tourist reacts to the same risk differently [10]. Fires are expected to increase in the next few decades with climate change influencing the fire season behavior [11–14]. The perception of how climate change may affect wildfires has been extensively explored in recent years from different points of view [15–19]. These events may have long-term impacts, not only on the landscape but also on the population's daily life, and fires continue to be events that haunt various touristic destinations.

Considering this context, the challenges of managing tourism operations in the Victorian Alps, Australia, were determined relative to the impacts of wildfires between 2006 and 2007 [20]. The impacts were assessed using qualitative methods, namely semi-structured face-to-face interviews with thirteen operators. The results of that study indicated that there was a negative impact not only on the cities but on the region that was still recovering from the events that occurred in 2003. Most operators reported a reduction in visitors, and some of them were forced to reduce the number of operating hours and, consequently, human resources. In the literature, the importance of knowing the relationship between perceived risk and the tourists' behavior in the context of specific events has also been highlighted [21]. The occurrence of a fire is related to moments before, during, and after the event that must be considered by both the authorities and the population. For instance, it is important to prevent fire occurrence; otherwise, there should be a way to notify, evacuate, and assist the population during the event. The preparation of a report to minimize damage in case of future events and the creation of recovery plans are important initiatives after the event [22].

It is noteworthy that tourism is one of the most vulnerable sectors and is subject to fluctuations in demand, given that security and protection affect demand behavior and influence the decision-making process [23]. The problem of fires in natural parks has also been studied since this type of event influences the decision making of tourists, as they affect the quality of visits to these destinations [24].

In Portugal, the natural park network of the Institute for Nature Conservation and Forests (ICNF) has a total of thirteen natural parks, of which the natural parks of "Peneda-Gerês", "Montesinho", "Douro Internacional", and "Vale do Guadiana" stand out due to the occurrence of fires, loss of infrastructure, and biodiversity [25–27]. However, it is noteworthy that the "Serra da Estrela" natural park, in central Portugal, was devastated by a mega-fire in August 2022, which burned an area of above 24,000 ha [28].

Portugal is a country that has suffered from several mega-fires in the last decade [29–31], with some of them directly or indirectly affecting the tourism sector. In 2016, Madeira Island suffered a large fire event, causing the total closure of the island given the uncertainty regarding the safety of using planes and boats to evacuate the population [32]. The lack of planning for the evacuation of a destination during a fire event is crucial to visitors' risk perception when choosing tourist destinations. In 2018, the fire in "Serra de Monchique", southern Portugal, forced the evacuation of several hotel establishments, given the fear of the flames getting too close. In 2019, the Vila de Rei fire [33] forced two municipalities to activate emergency plans to reduce the impacts of fire development [34].

Given the influence wildfires can exert on tourist activity, the motivation for this study is to provide more knowledge of regions most susceptible to fires in the Baixo Alentejo region, southern Portugal. This exploratory study was integrated into the FIREPOCTEP project (firepoctep.eu), and in the search for possible solutions, the main goal of the study is to determine the fire risk perception by the operators of the Vale do Guadiana Natural Park, as well as the possible fire impacts on the tourism activity. Five specific goals (SG) were also defined: (1) identify and assess the impact of fires on the PNVG, (2) identify strategies for a more balanced policy, (3) list the set of actions to mitigate the occurrence of fires, (4) identify strategies for territorial development, and (5) identify each operator of this natural park.

The manuscript is structured as follows: Section 2 presents the characterization of the PNVG and the tourism system that make up the park's co-management commission, as well as the methodology applied in the study. The results are presented in Section 3, which are discussed in Section 4, followed by the conclusions in Section 5.

2. Study Region and Methodology

2.1. The "Vale do Guadiana" Natural Park (PNVG)

The establishment of the "Vale do Guadiana" Natural Park was approved in 1995, and in 2005, an emergency plan was activated to safeguard the endemic ichthyofauna and the threat of the Guadiana watershed due to the drought in the 2004/2005 hydrological year. Two years later, the Vale do Guadiana Management Plan was developed aiming toward regional development in southwestern Europe.

Currently, the elements of the tourism system that make up the PNVG co-management commission are the "Câmara Municipal de Mértola", "Câmara Municipal de Serpa", "Instituto da Conservação da Natureza e das Florestas" (ICNF, I.P.), "Instituto Politécnico de Beja", CPADA, "Cooperativa Agrícola do Guadiana", "Rota do Guadiana—ADI", ALSUD, "Estação Biológica de Mértola", "Associação Montícola", and Portugal Wildscape. The PNVG has developed and put into practice several plans and projects to improve habitats for fauna and flora to preserve and recover species at risk of extinction in the region. For instance, the most distinguished species in recent years is the Iberian lynx. The territory consists of almost 70,000 ha covering the municipalities of Mértola and Serpa in the Baixo Alentejo region (Figure 1). Considering fauna, the presence of 173 species of birds, 44 types of mammals, 16 varieties of fish (11 are endemic), 19 types of reptiles, 12 varieties of amphibians, and 4 bivalves are known. The diversity of flora is equally vast, containing more than 300 different species.

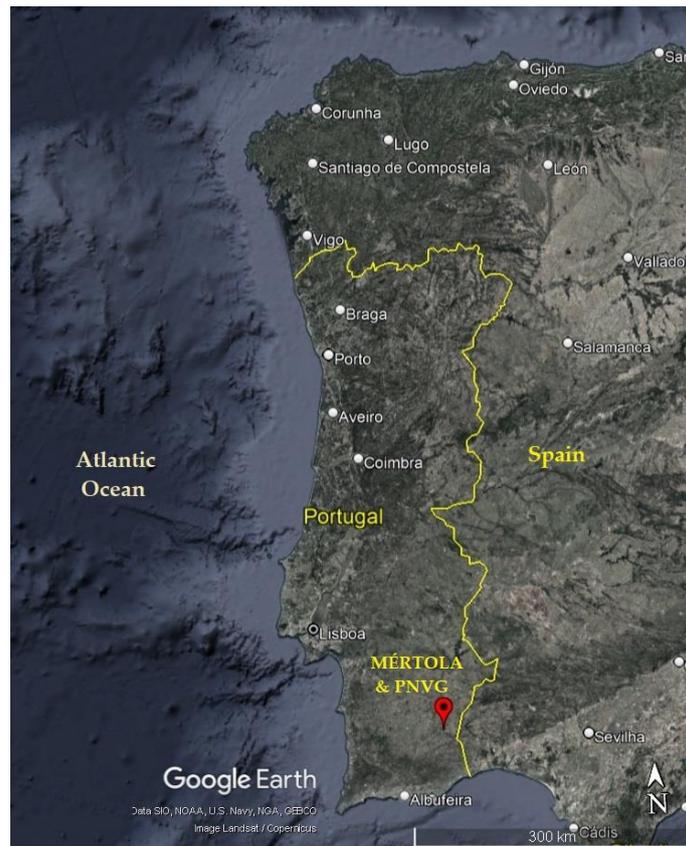


Figure 1. Location of Mértola municipality and PNVG. Source: [35].

The occurrence of fire is linked to several factors, such as meteorological conditions, topographical aspects, and fuel availability. The Baixo Alentejo is a region with a Mediterranean climate and the orography of the “Vale do Guadiana” Natural Park is quite homogeneous, with small areas with an elevation above 300 m. The highest point is the “Serra da Alcaria” with 370 m. The PNVG’s landcover and land use consist of agricultural areas (32.16%), agro-silvopastoral areas (26.24%), forest areas (18.34%), pastures (11.20%), bushes (9.14%), and other areas (2.92%) [36]. The forest areas essentially comprise holm oaks, pine (stone pine), eucalyptus, and cork oaks, with the undercover area occupied by rainfed arable crops, pastures, or fallow land, allowing for not only raising livestock but also hunting, because of the good conditions for game species. This activity has a very important economic impact on the region [36]. On the other hand, the southern region of the PNVG presents a higher fire risk. According to information provided by the ICNF, the occurrences of large fires in the “Vale do Guadiana” Natural Park date back to July 2007, with two fires burning an area of 609 ha and 447 ha.

In terms of tourism services, the PNVG has been strategically developed to continue environmental conservation [36]. The PNVG area is characterized as a destination with low tourist density, with Mértola being the village that concentrates the majority of visitors. This small village registered one overnight stay per square kilometer and five guests per resident in 2022. According to the latest tourism data provided by the National Institute of Statistics from Portugal, Mértola achieved 55,373 overnight stays in 2022, with 28.3% of them being international tourists and 77.7% national tourists [37]. The seasonality rate is 42.2%, indicating a concentration of overnight stays during the months of July, August, and September [38].

With a focus on rural tourism, the PNVG designed 11 pedestrian circuits extending for about 145 km and 92 km of routes that can be traveled by car to visit the southern region of the PNVG. From an educational perspective, it has the Iberian lynx observation and interpretation centers. Additionally, there is the Centre for the Conservation of Butterflies in

Portugal and the National Museum of Natural History and Science, as well as the Centre for Ecology, Evolution, and Environmental Changes, which manage two biodiversity stations. Given its diversity of flora and climate, the PNVG offers a unique landscape in all seasons.

In the sustainable regional development of this area, there is a focus on the production of regional products, namely sheep's cheese, tubers, bee products, and woolen blankets. In addition, the construction of rural tourism accommodation establishments helps the development of economic activities in the region.

Regarding tourist accommodation, according to Table 1, Portugal has a total of 6271 establishments. Alentejo represents 12% (744) of the national offer. The PNVG has 7% (53) of accommodation units, with 36% (19) of the PNVG units located in the municipality of Mértola.

Table 1. Tourist accommodation. Sources: [37,38].

	Establishments		Bedrooms		Bed Places	
	Number	%	Number	%	Number	%
Portugal	6271	100%	151,751	100%	404,857	100%
Alentejo	744	12%	10 855	7%	25,347	6%
PNVG	53	7%	705	6%	1652	7%
Mértola	19	36%	204	29%	425	26%

Regarding the number of bedrooms, the Alentejo region represents 7% (10,855) of the total number in Portugal (151,751), and the PNVG has 6% (705) of the total number in Alentejo. In turn, the Mértola municipality has 29% (204) of the bedrooms in the PNVG territory. The percentage of bed places is similar to that of the bedrooms, with Portugal having 404,857 beds, 6% of which (25,347) are in Alentejo. The PNVG represents 7% (1652) of bed places in Alentejo, with Mértola having 26% (425) of bed places in the PNVG.

2.2. Methodological Approach

2.2.1. Formulation of Research Hypotheses

The literature review was carried out using the following keywords: “rural tourism and impacts”, “risk perception”, and “forest fires”. In the Section 1, the main issues related to tourist destinations susceptible to wildfire occurrences, namely regarding the fire risk perception, and the importance of studies for the Portuguese natural parks were explained. The literature review also showed that different approaches may be applied to assess risk perception. One of them, for instance, is grouping the sample and thereby segmenting tourists by levels and thus working on the perceived risk instead of the real risk [23]. A questionnaire survey was used in [10] to assess the degree of risk perception that fire events exert on tourists, with thirteen variables, which were measured using a five-point Likert scale. Additionally, the authors considered several research hypotheses involving courageous behavior in risky situations while traveling, taking into account the motivational factors, sociodemographic factors, and psychographic variables of tourists [10]. Additionally, the Kruskal–Wallis H test was used in another study [39] to determine the differences in perceptions of firefighters about in-service training.

For this exploratory study, some factors associated with the impacts of fires on tourism were considered, namely the perception of risk, the loss of tourists, the safety of destinations, and climate change. For each factor, hypotheses were defined based on the literature review, aiming to assess the risk perception of fire events in the PNVG (Table 2).

Table 2. Research hypotheses related to impacts on PNVG tourism.

Factors	References	Hypothesis
Risk perception (H1)	[10]	H1.1: There is knowledge about fires in the PNVG and several entities were affected. H1.2: Those who operate in the PNVG are aware of the 2007 fires. H1.3: During the 2007 fires, several activities were affected. H1.4: In the PNVG, there are strategies and actions to mitigate the occurrence of fires. H1.5: Co-management entities contribute to the mitigation of fires in the PNVG.
Risk of losing tourists (H2)	[40]	H2.1: There is a high possibility of fire in the PNVG. H2.2: There is a loss of tourist attractiveness with the occurrence of fires. H2.3: There is a risk associated with the potential loss of tourists with the occurrence of fires.
Perception of safety (H3)	[23,41]	H3.1: Mértola is seen as a safe destination by social and digital media. H3.2: If a fire occurs, secondary hazards increase. H3.3: Mértola and the PNVG are both safe destinations for tourists.
Climate change (H4)	[42]	H4.1: Climate change may influence the occurrence of fires in the PNVG.

Subsequently, a survey was carried out on the impacts of fires (Table 3). The impacts justify the theme of the exploratory study, as well as the second part of the methodology, i.e., the application of questionnaires to operators who directly and indirectly have some relationship with the management and dynamization in the PNVG region.

Table 3. Direct impacts recognized from the studies analyzed.

Impacts	References
Burn of tourist areas Reduction in the number of visitors	[24]
The perception of risk in traveling to post-event tourist destinations	[10]
Perception of risk in traveling to cities with incidences of natural disasters	[43]
Burn of tourist areas Reduction in the number of visitors Difficulty in predicting recovery	[4]
Perception of risk by tourists, regarding travel safety	[23]
Change in consumer behavior Perception of travel risk	[21]
Impact of social and digital communication as a safe destination on security	[20]

2.2.2. Data Collection and Rationale

Methodologically, resorting to an exploratory and descriptive study means resorting to the mixed-method approach (quantitative and qualitative), using a sample for convenient data collection, which was considered in this study as the convenient proximity between the location of people or organizations [44]. In this sense, the operators who are part of the PNVG tourist system were the target audience in this study. This methodology, even in an exploratory way, would allow us to assess the fire risk perception in the PNVG.

Considering the PNVG extension and the geographic dispersion of the entities, a non-probabilistic sampling was chosen for convenience to speed up data collection in the proposed time. Therefore, a sample was chosen consisting of 35 entities that are part of the co-management of the PNVG, tourism companies, and operators with activities related to hunting and agriculture. Responses were obtained from 23 of the 35 entities (63.8%).

After defining the data collection methods, as well as the sampling technique, we needed to define the data collection instrument. To cover the different groups of entities,

it was decided to collect data using a questionnaire survey. Questionnaire surveys are one of the tools/instruments adopted when using non-probabilistic sampling [45]. The type of instrument chosen (questionnaire survey) involved a set of close-ended questions to process data in a quantitative way and a group of open-ended questions to allow respondents to express their opinions and ideas, which would be translated into the results of qualitative analysis.

The descriptive analysis was applied to the sample. This type of analysis characterizes the sample aiming to describe the intensity between variables [46]. Therefore, for sample characterization, the number of respondents was used as a tool for interpreting the trend of the responses obtained.

According to [45], there are two ways to apply surveys, which can be conducted online or sent via email. The authors considered the risk of leaving the survey open online since this method is appropriate for many responses, and sending it via email makes it easy for the inquired to directly respond to the questionnaire. Here, the survey was developed online through the Google Forms tool and distributed via telephone when needed.

The questionnaire was prepared to address the main problem, i.e., the occurrence of fires in the PNVG, in the first question. In the second question, respondents were asked whether they recalled any major fire events, such as the 2007 fires, and what their perception was of their impact. A third question considered was understanding whether there were fire mitigation strategies and what strategies were implemented. Finally, the issue of climate change was raised to understand the opinion of respondents. All the questions presented in the questionnaire are related to the risk perception of fires considering the different dimensions related to those who operate in the PNVG. The questions were defined based on the five specific goals presented in the introduction and based on the literature review (Table 4).

Table 4. Questionnaire distributed among PNVG's operators.

Specific Goal	Number	Question	References
SG.1	Q1	Do you have knowledge about the occurrence of fires in the PNVG? If yes, was your organization directly affected by the fires? In which domains?	[3]
SG.1	Q2	Do you remember or are you aware of the fires that occurred in the PNVG in 2007?	[3,47]
SG.2	Q3	What kind of businesses were affected by the 2007 fires? If you don't remember, check "Not applicable"	[3]
SG.3	Q4	What strategies and actions does your organization develop to mitigate the occurrence of fires?	[3]
SG.4	Q5	If your entity belongs to the PNVG co-management commission, what contribution does your organization make to defining strategies/actions to mitigate the occurrence of fires?	[48]
SG.4	Q6	What is the degree of risk about the possible occurrence of fires in the PNVG?	[49]
SG.2	Q7	Do you consider that the occurrence of fires could cause the loss of attractiveness tourism in the PNVG? If "Yes", why?	[50–52]
SG.2	Q8	What is the degree of risk associated with the potential loss of tourists during a fire event?	[3]
SG.2	Q9	What degree of disclosure do you consider having Mértola as a safe destination in the social and digital media?	[53]
SG.2	Q10	What is the degree of perception of safety in relation to the secondary dangers resulting from the fire occurrence?	[3]
SG.2	Q11	Do you consider Mértola and PNVG safe destinations for tourists?	[53]
SG.2	Q12	What is the degree of influence that climate change can exert on the occurrence of fires in the PNVG?	[54]
SG.2	Q13	Other comments you consider relevant in relation to the risk of fire in the PNVG.	[55]
SG.5	Q14	Please indicate: the name of your organization; the area of activity; the year of incorporation.	[3]

3. Results

This section is divided into three parts showing the results obtained from the questionnaire survey.

3.1. Sample Characterization

As mentioned in Section 2.2.2, the sample comprised 35 entities with activities directly and indirectly related to the regional management of the PNVG, as well as entities related to tourism. In total, 23 of the entities answered the questionnaire, 5 were entities related to the PNVG co-management, representing 21.70%, 6 (26.10%) entities were involved in hunting and agriculture activities, and 12 (52.20%) operated in the field of tourism (Figure 2).

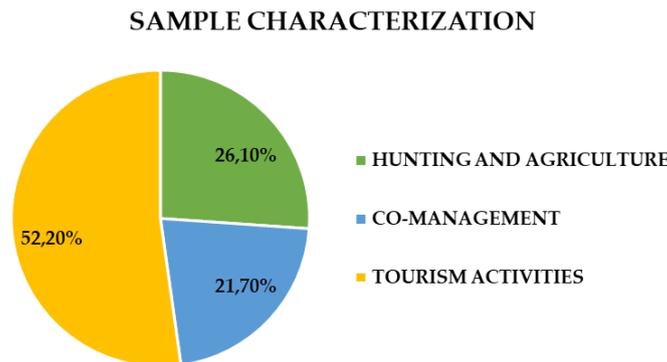


Figure 2. Sample characterization from a total of 23 entities that responded to the questionnaire.

3.2. Quantitative Data Analysis

This section presents the descriptive analysis of the close-ended questions.

The first question (Q1) “Do you have knowledge about the occurrence of fires in the PNVG? If yes, was your organization directly affected by the fires? In which domains?” was posed to assess the knowledge about the occurrence of fire and how they affected the operators. It is noteworthy that 16 of the 23 respondents were aware of the occurrence of fires in the PNVG, representing 69.60% of the sample (Figure 3a), demonstrating that this type of event is frequent and causes changes in the operators’ routines.

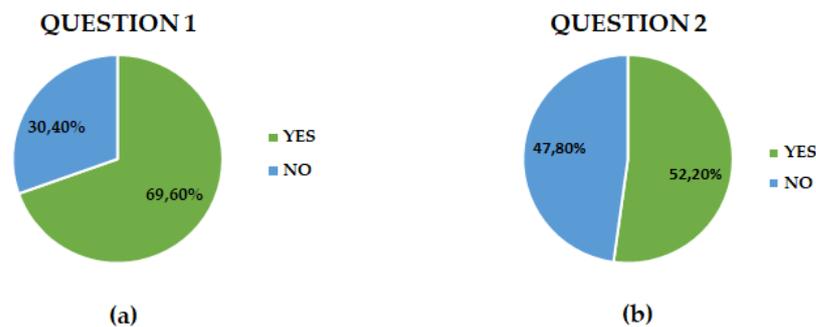


Figure 3. Questionnaire responses for (a) Question 1 and (b) Question 2.

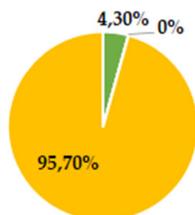
Regarding the second question (Q2), “Do you remember or are you aware of the fires that occurred in the PNVG in 2007?”, we sought to assess whether there was a memory of the fire events that occurred in the study area in 2007. The result is very interesting, with both responses (yes/no) very close to 50% (Figure 3b). Thus, 52.20% stated that they recalled these events, and 47.80% did not recall them.

The third question (Q3) “What kind of businesses were affected by the 2007 fires? If you don’t remember, check ‘Not applicable.’” was considered to assess the possible impact of the fire that occurred in 2007 on the local economy. In this sense, some close-ended questions were posed, as shown in Figure 4. According to the results, most tourist accommodation managers, restaurateurs, or tourist animators did not experience losses or breaks in income.

On the other hand, there was a high number of “Not applicable” responses, resulting from many operators having only started their activity in 2022. However, although not explicitly identified, respondents recognized that other services may have been negatively affected by the 2007 fires. This result is easily explained by the fact that, as one of the respondents indicated, the burned area was mostly wasteland, thus reducing any impact on the economy or services related to tourism.

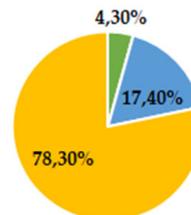
QUESTION 3

Were tourist accommodations affected by the 2007 fires?



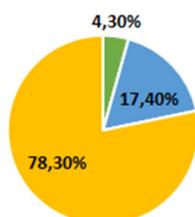
■ Yes ■ No ■ Not applicable

Were restaurants affected by the 2007 fires?



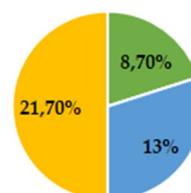
■ Yes ■ No ■ Not applicable

Was local businesses affected by the 2007 fires?



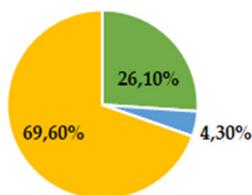
■ Yes ■ No ■ Not applicable

Were tourist entertainment companies affected by the 2007 fires?



■ Yes ■ No ■ Not applicable

Were other businesses affected by the 2007 fires?



■ Yes ■ No ■ Not applicable

Figure 4. Responses to Question 3.

The sixth question (Q6), “What is the degree of risk about the possible occurrence of fires in the PNVG?” was posed to measure the degree of risk perception of fires in the PNVG by each operator. A five-point Likert scale was applied, with 1 representing “Very low risk” and 5 indicating “Very high risk”. It was found that 69.6% of the respondents considered the territory of the PNVG quite susceptible to fires (Figure 5a, top).



Figure 5. Likert scale analysis for (a) Question 6 (top) and Question 8 (bottom), (b) Question 9, (c) Question 10, and (d) Question 12.

Question 8, “What is the degree of risk associated with the potential loss of tourists during a fire event?” focused on the perception of the impact of fires in terms of the loss of tourists in the PNVG. The results (Figure 5a, bottom) indicated that more than 50% of the respondents understood that there is a loss of tourists whenever there are fires, and their perception of this risk varied between “Moderate risk” and “High risk”. About 25% indicated there is no risk or considered the risk of losing tourists low.

Question 9 (Q9) involved the opinion of the entities on the degree of publicity regarding the image of Mértola and the PNVG in the media and digital media as a safe tourist destination. The responses showed a positive trend on this topic, with only 4.3% indicating there is little disclosure (Figure 5b).

Due to the existence of other risks and secondary dangers associated with fires, Question 10 (Q10) was posed as “What is the degree of perception of safety in relation to the secondary dangers resulting from the fire occurrence?”. Most of the answers revealed that the entities considered the risk of secondary dangers as “normal”. On the other hand, 34.7%

recognized that the region is safe in terms of secondary dangers due to fires. The remaining 13% believed that there is a risk of secondary dangers (Figure 5c).

In the course of the present study, we also sought to assess the opinion of respondents in relation to the safety of the PNVG and Mértola as tourist destinations. Considering Question 11 (Q11), “Do you consider Mértola and PNVG safe destinations for tourists?”, the answers left no doubt, with 100% responding “Yes” and indicating that the Mértola and the PNVG are safe destinations.

In Question 12 (Q12), “What is the degree of influence that climate change can exert on the occurrence of fires in the PNVG?”, an effort was made to address another theme that has been discussed at a global scale over the years, i.e., the impacts of climate change. The Likert scale was once again used, and based on the results, 82.6% believed that climate change can influence the occurrence of fires (Figure 5d).

3.3. Qualitative Data Analysis

The first question aimed to assess the knowledge of the occurrence of fires in the PNVG territory, as well as the affected domains. Regarding the knowledge of fire occurrences, the entities’ opinions were divided, but more than half answered that they have knowledge. It is noteworthy that only two entities were affected by these events, and both agreed that there was a significant loss of animals (Table S1).

To understand if there are strategies to mitigate fires, an open-ended question was posed (Question 4; Q4): “What strategies and actions does your organization develop to mitigate the occurrence of fires?”. The results obtained demonstrate that all the entities tried to do what they can to prevent fires (Table S2). A series of word cloud, elaborated in Portuguese and not shown here, revealed that the strategies and actions were diverse, and there was a great focus on “cleaning”, as well as on “maintenance” and “firebreaks”.

The questionnaire also collected more information about the PNVG co-management commission, namely the contribution of each entity to fire mitigation, in Question 5 (Q5): “If your entity belongs to the PNVG co-management commission, what contribution does your organization make to defining strategies/actions to mitigate the occurrence of fires?”. Of the five entities that agreed to respond, only two referred to raising awareness, the management of good environmental practices, and fire-fighting prevention (Table S3). The remaining three entities indicated that they did not or could not yet contribute in any way to the issue of fire mitigation.

After the analysis of the risk perception of fire occurrence, we sought to assess the impact of fire occurrence on the tourist activity of the PNVG, and thus Question 7 (Q7) was posed: “Do you consider that the occurrence of fires could cause the loss of attractiveness tourism in the PNVG? If ‘Yes’, why?”. In this open-ended question, the majority mentioned biodiversity losses as a factor impacting tourism attractiveness (Table S4). This result demonstrates that the respondents understood the importance of the existence and maintenance of nature in the territory.

Question 13 (Q13), “Other comments you consider relevant in relation to the risk of fire in the PNVG.” was asked to obtain more information on any other relevant matters the respondents wanted to indicate in the questionnaire (Table S5). This question was optional, but only five entities made some comments. From the analysis, the concern of the operators was confirmed to be the prevention of fires in the PNVG. In general, respondents agreed that land use planning is one of the most crucial points for mitigating fires.

4. Discussion

After analyzing the results and setting them against the study hypotheses provided in Table 2, verification was carried out. In short, the risk perception of fire occurrence among the operators, and the consequent impacts of fire events on the PNVG (Table 3), were explained by the hypotheses that totally or partially justified the operators’ risk perception, as well as the reasons that allowed us to confirm or refute the proposed hypotheses.

Concerning the first factor stated in Table 2 and the respective hypotheses, the results confirmed all the hypotheses and agreed with the literature considered [3,48]. For instance, the study confirmed that 69.6% of the respondents had knowledge about fires, with 52.2% of the operators recalling the 2007 fires. In this context, although more than 70% of answers were omitted, a minimum percentage of 4.3% positive answers in each of the presented options indicates some impact of the 2007 fires in different activities in the PNVG. On the other hand, although in different ways and different dimensions, all the respondents stated that they tried to collaborate in fire mitigation. This hypothesis basically agrees with what was stated in [3], i.e., the definition of strategies aims to reduce the number of occurrences. However, when considering only the co-management entities, just three of the five co-management entities assumed they had already contributed to this area.

In the second factor (risk of losing tourists, Table 2), the survey showed 69.6% of answers selecting “High risk” and “Very high risk” for the possibility of fire occurrence in the PNVG. The results also showed that a minority did not recognize these events as a threat to tourist attraction, in accordance with the results verified in [43]. However, with a percentage of 52.1% choosing a level above “Moderate risk”, the hypothesis related to the risk associated with the potential loss of tourists with the occurrence of fires is considered partially validated. The result of this question partially agrees with [3], who claimed that the growing trend of tourism (central region of mainland Portugal) was affected by fires.

The perception of safety (factor 3 in Table 2) was assessed in the questionnaire, and 65.2% considered Mértola to be promoted as a safe destination in social and digital media. This result agrees with [20,53], namely regarding the impacts that fire may have in the promotion of a tourist destination in media. It is noteworthy that only 13% believed that secondary dangers may affect the region in case of fire occurrence, which does not confirm Hypothesis 3.2. On the other hand, 100% of the respondents agreed that Mértola and the PNVG are both safe destinations for tourists.

Finally, the last factor, related to climate change, indicated that the respondents recognized the influence of this phenomenon on the occurrence of fires. This result assumes greater relevance in seasonality [54]. In summary, the results highlighted some lack of agreement between sectors of activity but at the same time confirmed all the theoretical hypotheses proposed, except for H3.2.

The responding entities showed concern regarding the occurrence of fires and expressed their willingness to help in the mitigation of these events. It is important to mention that some operators took their own initiatives to prevent and fight fires. Mainly, hunting and agriculture entities recognized that not only those who have a responsibility in the management of the PNVG but also those who exploit the land should direct efforts toward fire prevention. Additionally, greater proximity between management and their companies may positively influence the mitigation of fires in the region. The knowledge of fire risk perception can help to identify opportunities and barriers to changes in wildfire governance to improve risk management programs and guide post-fire management and mitigation [56].

Concerning the fires in the PNVG in 2007, only half of the respondents remembered the event. Biodiversity, prevention, and cleanliness were the three themes that stood out in the respondents' answers. Biodiversity can be highly affected by wildfires [57–59], and the perception that biodiversity in the PNVG may be impacted by wildfires with a consequent impact on the tourism sector should be highlighted from the results. This result agrees with [60], in which it was revealed that fire may affect endemic species that draw visitors and therefore directly impact the tourism sector.

On the other hand, most of the respondents recognized the impact that climate change may have an impact on the occurrence of fires in the PNVG. A previous study [18] also revealed that most of the participants indicated that fire activity is influenced by climate change.

In general, the three groups of sectors responded in a very similar way, which reinforces the idea of working together to solve this problem. Although the tourist system

encompasses all those who operate in the PNVG, as well as residents and tourists who visit this natural park, this study was restricted only to those who operate in the territory, thus leaving open the possibility for other studies to complement the present study.

This exploratory study is interdisciplinary involving two different areas, one of which is related to social sciences and the other to natural sciences. The results obtained, and their analysis, show agreement with the theoretical framework; however, other issues and limitations emerged that future studies should consider.

5. Conclusions

The study aimed to assess the fire risk perception by entities that operate in the PNVG, either through territory management or through their direct participation in the exploitation of its resources, whether through agriculture, hunting, or tourism activities. Then, the sample not only consisted of those who directly work with tourism but the agents who directly and indirectly operate in the PNVG and the Mértola municipality.

After conducting the survey and processing the obtained data, the elements of the tourist system were identified, and it was concluded that 69.6% of the respondents had knowledge of the occurrence of fires in the region and presented a high degree of risk perception of losing tourists due to fire events. However, only about 52% of the respondents recalled the fires that occurred in 2007.

Concerning the impact of fires on the PNVG, the respondents showed the existence of other impacts in addition to landscape degradation, namely the influence of media, on the risk perception of fire occurrence in the Mértola municipality, and the possible loss of factors, such as safety and biodiversity, that motivate the decision making of tourists and thus increase the demand. The impacts of climate change influencing the occurrence of fires in the region were also recognized by the operators (82.6%).

All the respondents expressed willingness to collaborate in fire mitigation in the region. Therefore, without questioning the efforts of the entities, greater proximity between them is recommended, mainly to obtain more detailed data about the local biodiversity to maintain and increase environmental conservation strategies, since biodiversity was indicated as the main domain negatively affected by fires and the main factor impacting the tourist attractiveness of the region.

The limited number of publications in the databases considering the chosen keywords revealed the need to explore this theme further. Based on the literature review, the second limitation was related to the difficulty in obtaining responses from the respondents. This was perhaps one of the most complicated difficulties to overcome, as some representatives presented limitations in accessing the questionnaire via digital means (for example, via email), and some had advanced age. Another challenge was to learn more about the fires in 2007. This limitation was because some of the respondents did not remember the event, and consequently, the answers about it were quite reduced. No less important, and something that was not expected, was the number of short answers obtained in the open-ended questions. Therefore, this type of response created a limitation for analysis and results.

Finally, to improve the theme addressed here, some questions remain; for instance, what is the fire risk perception of those that visit the PNVG? Then, it is suggested that future studies consider other local factors, namely residents, as well as recreational and/or cultural associations. In addition to residents, the perspective of tourist demand (visitors) could also be integrated to complete the analysis of risk perception with all the elements of the tourism system involved in the PNVG. If the sample allows it, it would be interesting to perform cluster analysis to understand some trends by groups of respondents. Some effort was made on this subject but without significant results from the limited sample considered in the present study.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/fire6060243/s1>, Table S1: Transcription of responses from Question 1, Table S2: Transcription of responses from Question 4, Table S3: Transcription of responses from Question 5, Table S4: Transcription of responses from Question 7, Table S5: Transcription of responses from Question 13.

Author Contributions: Conceptualization, N.A., J.S. and F.T.C.; methodology, N.A. and J.S.; software, N.A. and J.S.; validation, N.A.; formal analysis, N.A.; investigation, N.A., J.S. and F.T.C.; resources, J.S. and F.T.C.; data curation, N.A. and J.S.; writing—original draft preparation, N.A.; writing—review and editing, F.T.C. and J.S.; visualization, N.A., J.S. and F.T.C.; supervision, F.T.C. and J.S.; project administration, F.T.C.; funding acquisition, F.T.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the European Union through the European Regional Development Fund in the framework of the Interreg V A Spain–Portugal Program (POCTEP) through the FIREPOCTEP project (0756-FIREPOCTEP-6-E); CILIFO project (Ref.: 0753-CILIFO-5-E); RH.VITA project (ALT20-05-3559-FSE-000074); and also by national funds through FCT Foundation for Science and Technology, I.P. under the PyroC.pt project (Refs. PCIF/MPG/0175/2019); ICT project (Refs. UIDB/04683/2020 and UIDP/04683/2020); CIDEHUS project funds, under the project UIDB/00057/2020.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: The authors are grateful to all entities that responded to the questionnaire, and the ICNF for providing data about the fire occurrences in the PNVG region. The authors also express their appreciation to their colleague João Rolha (Câmara Municipal de Mértola) for his support and contribution during the study.

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

References

1. Stoof, C.R.; Kettridge, N. Living with fire and the need for diversity. *Earth's Future* **2022**, *10*, e2021EF002528. [[CrossRef](#)]
2. Ebright, S.J.; Stan, A.B.; Sâm, H.V.; Fulé, P.Z. Protected Areas Conserved Forests from Fire and Deforestation in Vietnam's Central Highlands from 2001 to 2020. *Fire* **2023**, *6*, 164. [[CrossRef](#)]
3. Correia, A.; Homem, P.B. *Turismo no Centro de Portugal: Potencialidades e Tendências*, 1st ed.; Actual Editora: Lisboa, Portugal, 2018; p. 418.
4. Otrachshenko, V.; Nunes, L.C. Fire takes no vacation: Impact of fires on tourism. *Environ. Dev. Econ.* **2021**, *27*, 86–101. [[CrossRef](#)]
5. Xu, N.; Lovreglio, R.; Kuligowski, E.D.; Cova, T.J.; Nilsson, D.; Zhao, X. Predicting and Assessing Wildfire Evacuation Decision-Making Using Machine Learning: Findings from the 2019 Kincade Fire. *Fire Technol.* **2023**, *59*, 793–825. [[CrossRef](#)]
6. Wu, Y.; Chen, S.; Wang, D.; Zhang, Q. Fire Risk Assessment of Heritage Villages: A Case Study on Chengkan Village in China. *Fire* **2023**, *6*, 47. [[CrossRef](#)]
7. Roehl, W.S.; Fesenmaier, D.R. Risk Perceptions and Pleasure Travel: An Exploratory Analysis. *J. Travel Res.* **1992**, *30*, 17–26. [[CrossRef](#)]
8. Bauer, R.A. Consumer Behavior as Risk Taking. In *Risk Taking & Information Handling in Consumer Behavior*; Cox, D.F., Ed.; Harvard University Press: Cambridge/Boston, MA, USA, 1967; pp. 23–33.
9. Champ, P.A.; Brenkert-Smith, H. Is seeing believing Perceptions of wildfire risk over time. *Risk Analysis* **2016**, *36*, 816–830. [[CrossRef](#)]
10. Kovačić, S.; Mărgărint, M.C.; Ionce, R.; Miljković, Đ. What are the Factors affecting Tourist Behavior Based on the Perception of Risk? Romanian and Serbian Tourists' Perspective in the Aftermath of the recent Floods and Wildfires in Greece. *Sustainability* **2020**, *12*, 6310. [[CrossRef](#)]
11. Dong, C.; Williams, A.P.; Abatzoglou, J.T.; Lin, K.; Okin, G.S.; Gillespie, T.W.; Long, D.; Lin, Y.-H.; Hall, A.; MacDonald, G.M. The season for large fires in Southern California is projected to lengthen in a changing climate. *Commun. Earth Environ.* **2022**, *3*, 22. [[CrossRef](#)]
12. Dowdy, A.J. Climatological Variability of Fire Weather in Australia. *J. Appl. Meteorol. Clim.* **2018**, *57*, 221–234. [[CrossRef](#)]
13. Bowman, D.M.J.S.; Kolden, C.A.; Abatzoglou, J.T.; Johnston, F.H.; van der Werf, G.R.; Flannigan, M. Vegetation fires in the Anthropocene. *Nat. Rev. Earth Environ.* **2020**, *1*, 500–515. [[CrossRef](#)]
14. Ahmed, M.R.; Hassan, Q.K. Occurrence, Area Burned, and Seasonality Trends of Forest Fires in the Natural Subregions of Alberta over 1959–2021. *Fire* **2023**, *6*, 96. [[CrossRef](#)]

15. Noonan-Wright, E.; Seielstad, C. Factors Influencing Risk during Wildfires: Contrasting Divergent Regions in the US. *Fire* **2022**, *5*, 131. [[CrossRef](#)]
16. Diakakis, M.; Skordoulis, M.; Savvidou, E. The Relationships between Public Risk Perceptions of Climate Change, Environmental Sensitivity and Experience of Extreme Weather-Related Disasters: Evidence from Greece. *Water* **2021**, *13*, 2842. [[CrossRef](#)]
17. Schneiderbauer, S.; Fontanella Pisa, P.; Delves, J.L.; Pedoth, L.; Rufat, S.; Erschbamer, M.; Thaler, T.; Carnelli, F.; Granados-Chahin, S. Risk perception of climate change and natural hazards in global mountain regions: A critical review. *Sci. Total Environ.* **2021**, *784*, 146957. [[CrossRef](#)]
18. Masri, S.; Shenoi, E.A.; Garfin, D.R.; Wu, J. Assessing Perception of Wildfires and Related Impacts among Adult Residents of Southern California. *Int. J. Environ. Res. Public Health* **2023**, *20*, 815. [[CrossRef](#)]
19. Angra, D.; Sapountzaki, K. Climate Change Affecting Forest Fire and Flood Risk—Facts, Predictions, and Perceptions in Central and South Greece. *Sustainability* **2022**, *14*, 13395. [[CrossRef](#)]
20. Sanders, D.; Laing, J. In the Line of Fire: The Challenges of Managing Tourism Operations in the Victorian Alps. *Tour. Rev. Int.* **2009**, *13*, 223–236. [[CrossRef](#)]
21. Thapa, B.; Cahyanto, I.; Holland, S.M.; Absher, J.D. Wildfires and tourist behaviors in Florida. *Tour. Manag.* **2013**, *36*, 284–292. [[CrossRef](#)]
22. Tedim, F.; Leone, V.; McCaffrey, S.; McGee, T.K.; Coughlan, M.; Correia, F.J.M.; Magalhães, C.G. Safety enhancement in extreme wildfire events. In *Extreme Wildfire Events and Disasters*; Elsevier: Amsterdam, The Netherlands, 2020; pp. 91–115. [[CrossRef](#)]
23. Seabra, C.; Dolnicar, S.; Abrantes, J.L.; Kastenholz, E. Heterogeneity in risk and safety perceptions of international tourists. *Tour. Manag.* **2013**, *36*, 502–510. [[CrossRef](#)]
24. Kim, M.-K.; Jakus, P.M. Wildfire, national park visitation, and changes in regional economic activity. *J. Outdoor Recreat. Tour.* **2019**, *26*, 34–42. [[CrossRef](#)]
25. Lusa 2017. Fogo no Parque do Douro Internacional Causa “Enormes Prejuízos” nas Culturas Agrícolas. Available online: <https://www.dn.pt/sociedade/incendios-fogo-no-parque-do-douro-internacional-causa-enormes-prejuizos-nas-culturas-agricolas-8730507.html> (accessed on 1 May 2023).
26. Couto, F.T.; Santos, F.L.M.; Campos, C.; Andrade, N.; Purificação, C.; Salgado, R. Is Portugal Starting to Burn All Year Long? The Transboundary Fire in January 2022. *Atmosphere* **2022**, *13*, 1677. [[CrossRef](#)]
27. Lusa 2022. Incêndios. Fogo Lavra no Parque da Peneda Gerês em Direção a Aldeias de Ponte da Barca, Diz Autarca. Available online: <https://observador.pt/2022/07/13/incendios-fogo-lavra-no-parque-da-peneda-geres-em-direcao-a-aldeias-de-ponte-da-barca-diz-autarca/> (accessed on 1 May 2023).
28. ICNF Report. 8º Relatório Provisório de Incêndios Rurais de 2022 (1 de Janeiro a 15 de Outubro); Instituto da Conservação da Natureza e das Florestas, I.P., Departamento de Gestão de Áreas Públicas e de Proteção Florestal: Lisbon, Portugal, 2022; p. 14. Available online: <https://www.icnf.pt/api/file/doc/4e8a66514175d0f7> (accessed on 1 May 2023).
29. Couto, F.T.; Iakunin, M.; Salgado, R.; Pinto, P.; Viegas, T.; Pinty, J.-P. Lightning modelling for the research of forest fire ignition in Portugal. *Atmos. Res.* **2020**, *242*, 104993. [[CrossRef](#)]
30. Couto, F.T.; Salgado, R.; Guiomar, N. Forest Fires in Madeira Island and the Fire Weather Created by Orographic Effects. *Atmosphere* **2021**, *12*, 827. [[CrossRef](#)]
31. Campos, C.; Couto, F.T.; Filippi, J.-B.; Baggio, R.; Salgado, R. Modelling pyro-convection phenomenon during a mega-fire event in Portugal. *Atmos. Res.* **2023**, *290*, 106776. [[CrossRef](#)]
32. Couto, F.T.; Andrade, N.; Salgado, R.; Serra, J. Wildfire Risk in Madeira Island and the Potential Impacts on Tourism. In Proceedings of the EGU General Assembly 2021, Online, 19–30 April 2021; p. EGU21-14575. [[CrossRef](#)]
33. Purificação, C.; Andrade, N.; Potes, M.; Salgueiro, V.; Couto, F.T.; Salgado, R. Modelling the Atmospheric Environment Associated with a Wind-Driven Fire Event in Portugal. *Atmosphere* **2022**, *13*, 1124. [[CrossRef](#)]
34. Mediatejo 2019. Incêndios | Mais de 10.000 Hectares Arderam em Vila de Rei, Mação e Sertã. Available online: <https://mediatejo.net/incendios-mais-de-10-000-hectares-arderam-em-vila-de-rei-macao-e-serta/> (accessed on 1 May 2023).
35. Google Earth. Available online: <https://earth.google.com/> (accessed on 1 May 2023).
36. Cardoso, A.C.; Faria, F.; Santos, G.; Fonseca, H.; Alves, J.; Farinha, J.C.; Madeira, J.; Fernandes, M.; Castro Henriques, P.; Espírito Santo, R. *Parque Natural do Vale do Guadiana, 25 Anos*; Instituto da Conservação da Natureza e das Florestas, I.P. & Parque Natural do Vale do Guadiana: Viseu, Portugal, 2020; p. 99. Available online: <https://www.icnf.pt/api/file/doc/27ddb2d2398e709> (accessed on 1 May 2023).
37. INE 2022. Instituto Nacional de Estatística: Statistics Portugal—Web Portal. Available online: www.ine.pt (accessed on 1 May 2023).
38. PISTA Digital 2022. Sazonalidade. PISTA Digital; Universidade de Évora/Observatório de Turismo Sustentável da Região Alentejo. Available online: <https://pista.decsis.cloud/indicadores/sazonalidade> (accessed on 2 May 2023).
39. Safak, I.; Okan, T.; Karademir, D. Perceptions of Turkish Forest Firefighters on In-Service Trainings. *Fire* **2023**, *6*, 38. [[CrossRef](#)]
40. Rech, Y.; Paget, E.; Dimanche, F. Uncertain tourism: Evolution of a French winter sports resort and network dynamics. *J. Destin. Mark. Manag.* **2019**, *12*, 95–104. [[CrossRef](#)]
41. Couto, F.T.; Andrade, N.; Salgado, R.; Serra, J. Understanding atmospheric factors related to historical wildfires in southern Portugal and the impacts on tourism. In Proceedings of the International Conference on Sustainable Technology and Development. International Conference on Sustainable Technology and Development, Shenzhen, China, 31 October–2 November 2021.

42. Amelung, B.; Nicholls, S.; Viner, D. Implications of Global Climate Change for Tourism Flows and Seasonality. *J. Travel Res.* **2007**, *45*, 285–296. [[CrossRef](#)]
43. Kovačić, S.; Jovanović, T.; Miljković, Đ.; Lukić, T.; Marković, S.B.; Vasiljević, D.A.; Vujičić, M.D.; Ivkov, M. Are Serbian tourists worried? The effect of psychological factors on tourists' behavior based on the perceived risk. *Open Geosci.* **2019**, *11*, 273–287. [[CrossRef](#)]
44. Veal, A.J. *Research Methods for Leisure and Tourism: A Practical Guide*, 3rd ed.; Financial Times Prentice Hall: London, UK, 2006; p. 421.
45. Bryman, A. *Social Research Methods*, 3rd ed.; Oxford University Press: New York, NY, USA, 2008; p. 748.
46. Marôco, J. *Análise Estatística com SPSS Statistics*, 6th ed.; Reportnumber, Lda: Pêro Pinheiro, Portugal, 2014; p. 990.
47. Cioccio, L.; Michael, E.J. Hazard or disaster: Tourism management for the inevitable in Northeast Victoria. *Tour. Manag.* **2007**, *28*, 1–11. [[CrossRef](#)]
48. ICNF 2022. ICNF—Instituto da Conservação da Natureza e das Florestas. 2022. Available online: <http://www2.icnf.pt/portal/icnf/resource/faqs/dfci> (accessed on 1 May 2023).
49. Dimuccio, L.A.; Ferreira, R.; Cunha, L.; Almeida, A.C. Susceptibilidade aos incêndios florestais na Região Centro de Portugal. Utilização de ferramentas SIG e de um Modelo de Redes Neurais para ponderar os factores condicionantes. *Cad. Geogr.* **2008**, *26–27*, 179–188. [[CrossRef](#)]
50. Eusébio, C.; Carneiro, M.J.; Kastenholz, E.; Figueiredo, E.; da Silva, D.S. Who is consuming the countryside? An activity-based segmentation analysis of the domestic rural tourism market in Portugal. *J. Hosp. Tour. Manag.* **2017**, *31*, 197–210. [[CrossRef](#)]
51. Molera, L.; Pilar Albaladejo, I. Profiling segments of tourists in rural areas of South-Eastern Spain. *Tour. Manag.* **2007**, *28*, 757–767. [[CrossRef](#)]
52. Rid, W.; Ezeuduji, I.O.; Pröbstl-Haider, U. Segmentation by motivation for rural tourism activities in The Gambia. *Tour. Manag.* **2014**, *40*, 102–116. [[CrossRef](#)]
53. Khazai, B.; Mahdavian, F.; Platt, S. Tourism Recovery Scorecard (TOURS)—Benchmarking and monitoring progress on disaster recovery in tourism destinations. *Int. J. Disaster Risk Reduct.* **2018**, *27*, 75–84. [[CrossRef](#)]
54. Copernicus 2022. Tourism. Available online: <https://climate.copernicus.eu/tourism> (accessed on 1 May 2023).
55. Lourenço, L. Impacte ambiental dos incêndios florestais. Comunicação apresentada na III Semana de Geografia Física. *Cadernos Geografia* **1990**, *9*, 143–150. [[CrossRef](#)]
56. Palaiologou, P.; Kalabokidis, K.; Troumbis, A.; Day, M.A.; Nielsen-Pincus, M.; Ager, A.A. Socio-Ecological Perceptions of Wildfire Management and Effects in Greece. *Fire* **2021**, *4*, 18. [[CrossRef](#)]
57. Adame, J.A.; Lope, L.; Hidalgo, P.J.; Sorribas, M.; Gutiérrez-Álvarez, I.; del Águila, A.; Saiz-Lopez, A.; Yela, M. Study of the exceptional meteorological conditions, trace gases and particulate matter measured during the 2017 forest fires in Doñana Natural Park, Spain. *Sci. Total Environ.* **2018**, *645*, 710–720. [[CrossRef](#)]
58. de Barros, A.E.; Morato, R.G.; Fleming, C.H.; Pardini, R.; Oliveira-Santos, L.G.R.; Tomas, W.M.; Kantek, D.L.Z.; Tortato, F.R.; Fragoso, C.E.; Azevedo, F.C.C.; et al. Wildfires disproportionately affected jaguars in the Pantanal. *Commun. Biol.* **2022**, *5*, 1028. [[CrossRef](#)] [[PubMed](#)]
59. Aydin-Kandemir, F.; Demir, N. 2021 Turkey mega forest Fires: Biodiversity measurements of the IUCN Red List wildlife mammals in Sentinel-2 based burned areas. *Adv. Space Res.* **2023**, *71*, 3060–3075. [[CrossRef](#)]
60. Carrillo, J.; Pérez, J.C.; Expósito, F.J.; Díaz, J.P.; González, A. Projections of wildfire weather danger in the Canary Islands. *Sci. Rep.* **2022**, *12*, 8093. [[CrossRef](#)] [[PubMed](#)]

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