Island vulnerability and resilience to wildfires: A case study of Corsica

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Abstract

The number of wildfires occurring globally is exacerbated by urbanisation and changes in weather patterns. In response, researchers have conducted studies of wildfires and human behaviour in regions such as Australia and the USA. Regions in Europe have received less attention, despite facing the same issues. Even more overlooked are one particular type of territory: islands. With their climates, islands across the Mediterranean remain attractive second home and tourist destinations, resulting in urban development. Yet due to certain features (e.g. cultural, socio-political, geographical), the ways in which their people deal with wildfires may differ somewhat from that in some mainland territories. This paper explores human behaviour in wildfire emergencies in the context of island vulnerability and resilience in Europe, with the Mediterranean island of Corsica as a case study. Qualitative analysis of semi-structured interviews (n = 8) with Corsican professionals involved in wildfire management and quantitative analysis of around 100 surveys from civilians was conducted. This analysis revealed that Corsica's population approach to wildfire safety is shaped by available information as well as a strong risk culture, which stands in contrast with new/temporary residents moving into the island each summer season. The results drawn from the analysed sample suggest potential social vulnerability in wildfires when a decision to evacuate the population is taken by emergency managers as the most effective emergency response. Population behaviour were not influenced by property attachment, perceived risk, hazard knowledge, community closeness and locus of control, suggesting that island WUI resident characteristics may not be generalised from human behaviour in wildfires studies carried out in the USA or Australia.

Keywords: forest fire, wildfire, human behaviour, Corsica, island resilience, wildland-urban interface

1. Introduction

Wildfires are a recognised major risk to communities across Europe [1], especially in the Mediterranean region [2], and more research is attending to the effects of wildfires on populations' vulnerability in the wildland-urban interface (WUI) [3]. Nonetheless, less research is focused on understanding these populations' preparedness for and their lived experiences in responding to wildfire events, for example having to evacuate their homes. While current studies on human responses to wildfires are mostly focused on North American and Australian populations [4,5,6], studies particular to the context of European populations are rare, particularly so for the islands at-risk from wildfires [7,8].

This paper begins by reviewing the occurrence of wildfires in the islands in the Mediterranean and across Europe, as well as contextualises important features of WUI communities, recognised by wildfire research, to islands. Key elements widely reported to influence human behaviour in disasters are outlined and their importance for one European island with a WUI population, Corsica, is explored. The results highlight the differences and convergence between the findings across risk culture, wildfire management and response to a developing fire, comparing the results with those from previous studies and their implications for policy.

1.1 Island wildfires

Wildfires are a major challenge connected to urban sprawl. Growing cities force humans further into natural territories, both through the outward extension of the city limits and through generating a desire in some to permanently or temporarily escape densely built-up areas [9,10]. Growing cities also draw people in from rural communities, with forestation replacing their now abandoned farmland, resulting in wider areas covered in more combustible vegetation [9]. This movement, of city limits, of people to and from more isolated settlements, and of vegetation, results in a clash between wildland and urban areas, the so-called wildland-urban interface (WUI) [11]. Proximity between human habitats and wildland causes abnormalities in natural land cover, subsequent changes in weather patterns, posing the risk of fires to WUI residents [2], and depreciation of landscape resulting after fire affected environmental degradation [12]. In addition, it is predicted that climate change will have a significant effect on lengthening the fire season across Europe and the number of fire danger days in the Mediterranean region is going to increase [1,2]. In fact, extreme weather anomalies and low precipitation have already resulted in an unusual number of wildfires in Scandinavian and Baltic regions in 2014 and 2018-2019 [13,60,61,62,63], as well as caused an unprecedented number of wildfire-related deaths recently in Greece (91 fatalities) and in Portugal (exceeding 100 fatalities over two wildfire events) in 2017 [64], along with mass

evacuations throughout Europe's southern regions that same year [83], for which official evacuation records are still unavailable.

Each year, from 2000 to 2009, south-western Europe (specifically Italy, France, Spain, Portugal, and Greece) experienced around 57,000 wildfires, resulting in 430,000 hectares being burned [67]. While no official statistics exist on how many of these fires disrupted the lives and affected the well-being of the populations on each of the aforementioned countries' islands, available research indicates that such effects may indeed be substantial [3,65,66]. Along with research into wildfire occurrence and dynamics, recent media coverage illustrates some of the impact to the communities: Madeira (Portugal) [79], Ibiza (Spain) [78], Corsica (France) [83], Sicily (Italy) [80], and Zante (Greece) [81] are a just few examples of extreme fire events requiring mass evacuations and claiming individual lives on European islands.

Environmental changes are particularly problematic on islands, where topography is often complicated [12] and as a result in the event of fire civilians or their vehicles can block fire vehicle access (P. Colombani & O. Tomi 2017, personal communication, 18 April). Islands may experience challenges in adaptability to climate change and local disaster management capacity [14]. Moreover, islands may be isolated in terms of the physical distance involved for the mainland to provide often required support by air [15], as well as have a limited capacity to relocate individuals requiring the use of alternative evacuation methods such as boats [16], thereby increasing the risk for both local resident and tourist populations. Nevertheless, islands may also have a good capacity for resilience [17], possessing local knowledge systems [18] that may allow for personal and community resilience in the face of a disaster. Historical memory is often at the core of such resilience and emergency response awareness [19,20], but changes in policies or housing and emergency response planning uncover new vulnerabilities. Identifying such effects in time before the next disaster happens could help improve community safety.

1.2 WUI community vulnerability and resilience

A disaster is formed of a combination between a hazard and vulnerability [21] and is followed by multiple consequences, such as a loss of lives and livelihoods, and traumatic experiences [22]. Wildfires – referred to as forest fires in places – are rapidly claiming their place among other highly devastating disasters [79] caused by human activity, both unthinking and malicious behaviour, and natural phenomena (e.g. lightning).

Vulnerability to a wildfire is particularly evident in communities that have little or no capacity to cope or adapt in response to the hazard. Vulnerability traits are not entirely opposite to resilience [23], but they coexist at the expense of one another. For example, official safety

regulations for disaster can conflict with habituated responses by populations in at-risk areas, as is deeply rooted in the understanding of sociology of everyday practice [24]. It suggests that communities' relationship with the environment cannot merely be defined through evacuation policies and mitigation of fire hazards; a deeper connection should be acknowledged.

Thus, apart from geographical features of the WUI, it is recognised that WUI communities differ in their social and economic aspects that influence their response to disasters [20,25]. To illustrate this, some suggest that individuals living in WUI, compared to city dwellers, possess specific characteristics, such as adaptability, informal relationship and knowledge fostering, often related to "generational ties" [25, p.1089]. The authors further argue that WUI residents differ in their special local spatial knowledge, are networked and understand the wildfire risks [25]. Thus, cultural and social ties within the community are somewhat a distinguishing feature of WUI residents (also noted by [26]) that contribute to their resilience to disasters.

The arguments around distinguishing features of WUI communities are attributed to the variety of land use types and ownership in the WUI, meaning that populations with a "different set of values, lifestyles, and land ethics" are coming into coexistence [27, p.705]. This often results in tension arising from the conflict between the newcomers and established communities and their culture [27]. Conceptually, a community's core idea is social interaction [28] which potentially shapes individuals' involvement in wildfire risk mitigation [25]. Studies of social cohesion analyse how such social interaction and social organisation may positively influence community resilience [29] in response to disasters. However, such research more often looks at communities from a geographical perspective [30], not accounting for dynamic population changes such as those observed in small islands due to summer tourism and recreational seasons, and do not raise questions of the possibility of non-uniform wildfire knowledge and conflicting population interests.

1.3 Human behaviour in wildfires

Research on human behaviour in wildfires has already shown that individuals tend to act on their own 'agenda' when it comes to responding to evacuation warnings [20,31]. For example, often people will delay evacuation, evacuate when it is not needed, create traffic congestion in vulnerable areas, or simply take too long to understand the risks that they are facing [32], including returning to their homes before it is safe to do so [33]. Such behaviour is found to be consistently reported by the media throughout the recent (2016–2018) wildfire disasters in Portugal, Spain and France, as well as in the USA and Australia [34,35,36,82,83].

Nevertheless, there is little research looking at the core challenges and particularities of island WUI populations and their behavioural responses to a wildfire. Such quantitative studies are relatively scarce, even more so for parts of Europe and, further still, for European islands. Qualitative studies exist but mostly for larger wildfire regions such as the USA and Australia [18,37]. Therefore, to identify key factors to explore, ones that might influence the behavioural responses of the island WUI populations to wildfires, more expansive literature on other types of disaster that could prompt evacuation, such as hurricanes, was consulted, as well as the existing studies on wildfires from other regions. Five such variables, outlined below, have been repeatedly explored across these studies: property attachment, risk perception, hazard knowledge, community closeness, and locus of control [20,44,47,48]. These variables were of particular interest due to their relation to aforementioned WUI community features, risk culture, wildfire preparedness, and possible connections with evacuation decision-making.

Attention is often drawn to individuals' property attachment, where greater attachment, according to the literature, is associated with a reluctance to evacuate [44,45]. It has mostly been measured in 'years' of residence [20] but could also be captured by type of resident, e.g. permanent resident living in their primary residence vs. temporary resident staying somewhere on vacation. Perception of personal risk when residing in an at-risk area has shown to be a significant factor for deciding to evacuate in studies of both actual and hypothetical wildfire situations [44]; on the other hand, separate research found that perceived threat was not a sign of early mobilisation [48]. Thus, this factor needs further exploring. Another important factor is seen to be individuals' hazard knowledge, which increases both the likelihood of receiving warnings [48] and the likelihood of perceiving risk [47]. At the same time, official information sources during the disaster also result in greater population compliance [49]. Nevertheless, there seems to be little exploration of a connection between where knowledge of a hazard comes from and preparation for a potential emergency. In addition, studies also find that involvement in one's community and close relationships within communities increase the likelihood of receiving a warning in an emergency as well as the likelihood of evacuation [20,48]. Finally, locus of control (LOC), which relates to a belief about who or what has control over what happens to people, is seen to matter in decision-making in response to disasters. For instance, individuals with a strong internal locus believe they themselves can control the outcome of events while those with a strong external locus believe outside forces, for example spiritual beings, are in control (see [50]). Even when rejected as non-significant in disasters such as hurricanes [44], LOC is a relatively unexplored concept in groups with non-uniform beliefs [51,52] in which religiousness seems to decrease the likelihood of evacuation [20], but there is no data on the role of such beliefs in wildfire response.

Thus, whilst a body of literature analysing human responses to disasters is growing, insufficient attention is paid to WUI communities' preparedness and response to wildfires on European islands. Such knowledge is paramount to the safety of these communities given the wildfire risks projected for the future. Therefore, this study aimed to take a first step at addressing that gap. The objective was to understand what factors may influence responses to wildfires and what cultural aspects of a WUI island population may affect their capacity to cope in the event of a wildfire. The case of Corsica, located in the South of France, was chosen. To answer the research questions, interviews with professionals involved in wildfire management and questionnaire surveys with civilians were conducted in Corsica. This offered a rich view that contextualised human behavioural responses to wildfires in an island WUI, provided an insight into official aspects and observations of the people's culture and behaviour, as well as offered first-hand accounts of behaviours and motivations to compare with those observations. The findings are targeted primarily at policymakers, to highlight areas for consideration when shaping wildfire management policies, as well as at practitioners who implement the policies, to assist their understanding of what behaviours and challenges they may or may not encounter when attempting to protect WUI island populations.

2. Materials and Methods

2.1 Study area

As part of the Mediterranean region, Corsica is the fourth largest island in the basin. Over the period of 2013-2017 there have been around 2,663 wildfires in Corsica, although some data remains unprocessed by the main database used for this research [38]. The 'hotspots' of fire occurrence over this 4-year period can be seen in Fig. 1. Thus this island provides a unique study area for risk culture research, as it is estimated that out of 360 Corsican communes, 200 are exposed to wildfires [12] and have high probabilities of wildfires affecting people, their livelihoods and infrastructure.

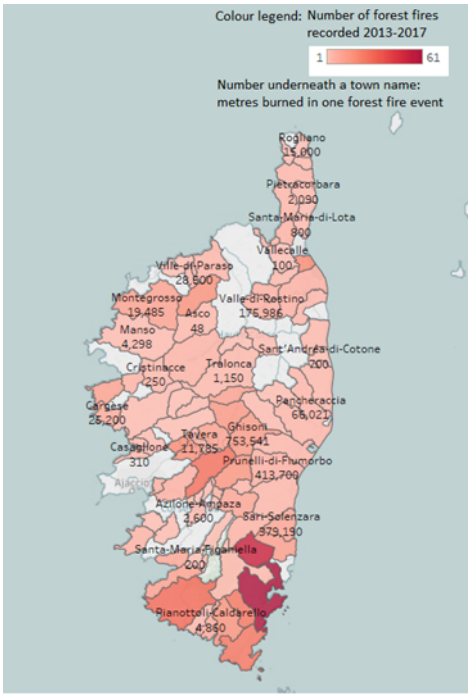

Fig. 1 Corsican communes where wildfires occurred during 2013-2017 (based on data available at http://www.promethee.com/incendies).

The northern part of the island (which until recent political changes was known as the Haute-Corse department) has seen the largest wildfire occurrence, while the southern part (until recently known as the Corse-du-Sud department) has suffered the largest burned area by such fires. Areas burned here vary from a mean fire size of 0.08 km^2 to 55.32 km^2 burned in a single event (data based on the period from 1995 to 2009) [67]. The north's driest region, Balagne, as well as being one of the more largely populated parts of Corsica, is also considered to be most susceptible to wildfires [39]. Susceptibility to wildfire may be due to climatic conditions and, with cool winters and hot, dry and windy summers, Corsica's vegetation types are typical examples of the Mediterranean land cover (i.e. in terms of their nature and, importantly, combustibility). Additionally, the decline in agriculture as an economic source, and accompanying land abandonment, has meant vegetation growth has been less controlled in Corsica [85]. It is predicted that due to changes of land use and climate change, ecosystems will change and colonise the areas that are not yet exposed to wildfires, increasing ecosystem vulnerability [12]. However, it is not only vegetation that is growing. Despite only 2% of the Corsican island being covered by urban or other anthropic areas, populated by 0.3 million inhabitants [67], urbanisation is continuously expanding [73], and the population almost doubles in summer peak periods [69,70], with tourists staying in the cities and towns as well as more isolated settlements such as villages, campsites and refuges on hiking trails [68]. Thus, in Corsican WUI areas, the associated wildfire risks are similar to the rest of southern

Europe, which sees large numbers of local and tourist populations during the peak wildfire seasons [71].

Therefore, Corsica's geography, dynamic demographic and socio-economic profiles make it a useful case study for island vulnerability research. Nevertheless, Ganteaume and Jappiot [40] note the lack of available studies on large fires in southern Europe, particularly in France, compared to the South West of Australia, California (USA) and South Africa. In the case of Corsica, underrepresentation is often prominent due to the island being seen simply as part of the Mediterranean territory [41]. Vilain-Carlotti [41] identified the specific issues surrounding the contemporary wildfire risk in Corsica, such as change in land use, new clusters of settlements in the WUI and their increased exposure to wildfire hazard, making it one of the few studies that only begin to explore relationships between socio-economic and cultural factors, the natural environment and wildfires on this island [54].

2.2 Semi-structured interviews

To contextualise human behaviour in wildfire within an island WUI context, semi-structured interviews with representatives of Corsica's wildfire management network were conducted. The interviews (n = 8) were carried out throughout April 2017 before that year's wildfire season commenced, allowing optimal access to the participants' time. The participants were purposefully sampled [33] to engage in face-to-face audio-recorded (with consent) discussions, which were conducted at participants' workplaces lasting 30-45 minutes on average.

The interviewees were from multiple organisations with diverse responsibilities including the emergency services, voluntary services, forest management agencies, local government, plus others responsible for areas of habitation. They were the chief of a fire service, two incident commanders, a fire officer whose duties covered frontline firefighting and prevention work, a co-ordinator of civilian reserves, an official from the National Forests Office, a mayor, and a campsite owner. The interview sampling stopped early when saturation of answers was reached. Saturation was seen to be achieved when responses did not deviate from each other, therefore no new themes were arising from the collected data [72]. Despite the interviewees' backgrounds representing different branches of the wildfire management network, the responses received were all in line with the national policy and risk plans.

The interviewer's question schedule – constituting two parts (I) behavioural responses of individuals and (II) emergency planning, preparedness and response (Table 1) – was designed to capture information on risk, planning, and observations of common patterns of adult (and child) behaviour in wildfires and evacuations. The questions in this schedule were

prompts that elicited lengthy answers from the interviewees; follow-up questions were asked where appropriate. Thus, the interview format allowed for more in-depth discussion of the behaviours' context such as risk culture, policy and compliance. Typically, discussions were in French and relevant points written-up into English subsequently.

Table 1. Interview questions for professionals.

Item	Part I – Behavioural responses
1	What are your main tasks, roles and responsibilities during emergencies and evacuations?
2	Could you describe your observations of inappropriate responses to forest fires by individuals in this community?
3	Could you describe what would be the appropriate behaviours for what you have just mentioned?
4	What are the actions of individuals that make your response difficult or complicate it?
	Part II – Emergency planning, preparedness and response
1	What are the main disaster risks that Corsica faces?
2	What would you say resilience and vulnerability mean in Corsica?
3	Does island status compromise or enhance Corsica's capacity in fighting forest fires and protecting civilians? If so, how?
4	How is Corsica's resilience to forest fires different to that of the rest of France's?
5	Do you feel that you can get substantial support from mainland France if needed when fighting fires and protecting civilians in forest fires?
6	Do you feel that there is enough understanding among people in Corsica on what to do in the case of a forest fire?
7	When is the decision to shelter-in-place taken over the decision to evacuate?

Thematic analysis was employed to reduce and clarify interview data [42], and to derive the national context [43], i.e. help elicit indications of potentially more abstract concepts such as Corsica's risk culture and its people's general attitudes towards forest fires. The following themes were derived, each highlighting elements of human behaviour: (1) risk culture, (2) wildfire management and (3) responses to a developing wildfire, including evacuation.

2.3 Questionnaire Survey

To gain first-hand accounts of the behaviours and motivations of people when faced with the threat of a WUI wildfire, as well as explore the influence of the five key factors identified in section 1.3, a questionnaire survey was employed with civilians in Corsica. As the intended responses of civilians living in at-risk areas but with no recent/any experience of wildfires was as much of interest as the actual responses of civilians with recent experience, two complementary versions of the questionnaire were designed; the first posed hypothetical

wildfire scenarios while the second asked about real, experienced scenarios. The use of actual experience (AE) and hypothetical (H) case questionnaires was encouraged by past results showing a "degree of similarity between the effect sizes" [44, p.1014] calculated from data from both types of questionnaire as well as the finding that individuals' intentions (e.g. to evacuate in the event of emergency) are usually eventually realised [59].

The questionnaire was disseminated online via the social media channels Facebook and Twitter, where an official account for the research study was created and civilians across Corsica were targeted using a geo-targeting tool. In addition, participant recruitment was facilitated by engagement with the French regional news outlet Corse-Matin, which ran a feature advertising the study's aims and objectives, and by engagement with a Corsican fire and rescue service (until recently known as SDIS 2B, now SIS 2B), who disseminated the survey via their own social media channels. Non-probabilistic sampling was chosen due to the difficulty in reaching wildfire survivors, because no public or private list of such individuals and their contact details exists in Corsica, and because survivors may be protective of their privacy in order to avoid press intrusion. Therefore, the sampling method known as self-selection was used, recognising that while it may over-represent certain segments of the population, in the past this method has shown to nevertheless sufficiently inform study findings [74]. Because participants were difficult to reach in this sense, as well as in a physical sense given their locations across Corsica, an online survey was the most feasible data collection method, reducing time, effort and costs, as well as offering a paperless solution. The questionnaire was available in both English and French. All participants were informed that their participation would be anonymous and voluntary, with no financial incentives offered. The data was collected during the peak forest fire season in Corsica 2017 – August to September; in the past, studies have shown this to be a good time to capture participants' attention, since many individuals are actively interested in the ongoing phenomena [75]. Data collection stopped once all available channels of dissemination were exploited and a wide coverage of Corsican communes was observed.

The design of survey questions were guided by the Bushfire CRC questionnaire administered to survivors of the Black Saturday bushfires in Australia, 2009 [46]. The questions were comprehensive, taking around 25 minutes to complete in total, and covered topics such as: experience and preparedness; socio-demographic and other personal factors; behavioural responses (actions, emotions and cognitions) to various environmental and social cues, including whether the participant decided to evacuate or stay, both in relation to the actually experienced/hypothetical scenario in question and in relation to if a similar wildfire event were to occur in the future; plus situational factors. Given the subject matter, participants were advised from the outset to consider if they would be comfortable answering questions

on wildfires and were provided with links at the end of the questionnaire to local providers of confidential support and advice.

Table 2. Codes used for the statistical analysis.

Variables	Codes	Definitions
Property attachment	Permanent resident = 1	Participant owned or rented the property and it was their primary residence.
	Temporary resident = 0	Participant was staying over at the property as a visitor/vacationer/worker/in some other capacity.
Perceived risk	High risk = 1	Participant rated themself as either being 'to a great extent' or 'somewhat' concerned.
	Low risk = 0	Participant rated themself as either being 'to a very little extent' or 'not at all' concerned.
Planning for wildfires	Had a plan = 1	Participant/their household had formally prepared a plan.
	Had no plan = 0	Participant/their household had not formally prepared a plan or had made no plan at all.
Community closeness	High closeness = 1	Participant rated themself as either being 'to a great extent' or 'somewhat' close.
	Low closeness = 0	Participant rated themself as either being 'to a very little extent' or 'not at all' close.
Locus of control	Internal LOC = 1	Participant chose one or more answers that included the option 'myself'.
	External LOC = 0	Participant chose one or more answers that did not include the option 'myself'.

For the first of the five key factors, the questionnaire asked participants to describe their relationship to the property in which they were residing, to attain a proxy measure of attachment to that property. Answers were coded into two dichotomous categories (see Table 2 for codes and their definitions). For perceived risk, participants were asked for the extent to which they were concerned about a wildfire affecting them or their property, while for community closeness participants were asked for the extent to which they were close, in a social sense, to those in their community (i.e. their neighbours). Answers to both these questions were on a Likert-type scale and were again coded into two categories. For hazard knowledge, participants were asked to describe the sources (if any) from which they gained information in the last 12 months about how to prepare for a wildfire, and also were asked if, in the same time period, they (or their household) had prepared a plan to take some action, be it to evacuate or stay, in the event of a wildfire. Answers about information sources could be multiple and remained so. Answers about a plan were coded into two categories. Finally, for locus of control, participants were asked about who they believe has control over wildfire consequences to them and their property. Answers on this question could also be multiple, with options including 'myself', 'luck', 'spiritual being', 'government authorities', 'emergency services', and 'other'. However, the answers were coded into two categories. Note, the AE

sample were asked to answer the questions about the above variables in relation to their pre-fire situation rather than their current situation.

A total of 98 completed questionnaires were included in the following analysis. Participants were from a variety of Corsican communes (see Fig. 2), including Ajaccio, Biguglia and Borgo, which are relatively larger towns or towns that have historically been affected more by forest fires. The ages of AE participants (n=48) ranged from 20 to 71 years (M=45.93, SD=14.91). For males (51% of AE sample), the mean age was 46.71 years (SD=14.20) and for females (49% of AE sample), the mean age was 45.09 years (SD=15.93). Similarly, the age range for H participants (n=50) was 21 to 75 years (M=43.50, SD=13.47), with a mean age of 44.37 years (SD=14.44) for males (38%) and 42.97 years (SD=13.06) for females (62%). The ratio of males to females did not differ significantly between the AE and H samples ($X^2(1) = 1.68$, $p = .196$), nor did the mean age of participants ($t(94) = 0.84$, $p = .403$).

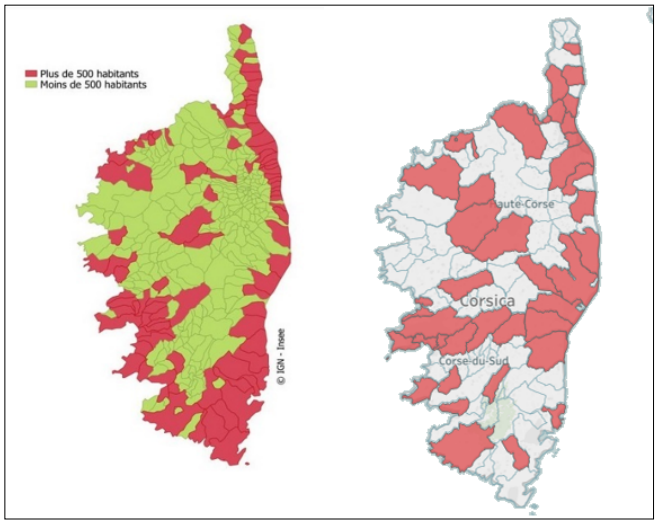

Fig. 2. Population distribution (left; source: IGN ® Insee; red colour denotes areas with more than 500 habitants, green with less than 500 habitants); questionnaire respondent distribution (right: based on data available at http://www.promethee.com/incendies).

2.4 Statistical analysis

For the questionnaire data, statistical analysis of relationships between variables typically took the form of tests of 2 x 2 cross-tabulations. An alpha level of .05 was used as the cut-off for statistical significance in all tests. Using the tool G*Power v3.1 [77] to conduct a power analysis – with degrees of freedom = 1, alpha level = .05, power = .8, and effect size = .4 (i.e. medium to large) – it was calculated that a minimum sample size of around 50 participants would be sufficient for this type of analysis. While there is some debate amongst statisticians regarding which specific test is best for analysing cross-tabulations (see for example [84]), this

paper followed the procedure common in the social sciences, i.e. used Chi-Square Test except for where expected frequencies were lower than five; then Fisher's Exact Test was used (Field, 2015). The associated p-values and effect sizes (Cramer's V) are reported. Data was analysed using SPSS statistics v25 software.

3. Results

3.1 Risk culture

3.1.1 Interviews

To a certain degree, the understanding of risks among the Corsican population seems to have come as a generational inheritance, noted in the literature as part of the features depicting island resilience [17]. It is currently sustained through the local fire services' initiative to educate schoolchildren about wildfire risk mitigation and behaviour during wildfires:

"*Culture of risks begin at school and it is better understood by adults if they have the first information very early. Children talk also to their parents [about] what is good and what is not good and presumably it has a bigger effect.*"– civilian reserves co-ordinator.

Emphasis was put on inherent knowledge ("*It's our culture – people are sensitized to wildfires, they know what they have to do. We have more problem with summer vacationers than local people*" – incident commander) but it was noted to be currently challenged by growing urbanisation. For example, individuals often insist on building homes in the high wildfire risk areas, for which permissions are not granted. In addition, a fire officer noted that people are now starting to build wooden structures, instead of making homes from highly popular rock material, which increases vulnerability in wildfires.

Since Corsica is considered to be an attractive holiday place for people from mainland France as well as the rest of Europe, the population in peak summer periods (July-September) almost doubles. Local school holidays also coincide with these peak periods (July-August), when families often choose to go camping. A change in risk culture was noted by most of the interviewees as a result of the influx of new permanent residents to the island as well as growing tourism. While tourists were said to be more rule-obedient compared to local residents in the presence of authority such as firefighters, tourists were also less equipped with knowledge of what to do when the firefighters were not present.

"*As there is a lot of people [in summer] there is a lot of imprudence; they do barbeque and they don't know that it's dangerous to make fire here*" – fire officer.

Nevertheless, the local population was generally thought to be desensitized to wildfires and capable of protecting themselves from hazards. In essence, the local population who have been living in Corsica for a few generations have useful knowledge, such as regarding the direction and speed of wind and the behaviour of fire. For this reason, they are able to make more informed decisions compared to tourist and transient populations:

"*If we have a knowledge that 1, 2 or 3 people in the village can be alone in the fire, maybe we say there is no more risks because they have the culture of wildfire, but if we have 1 or 10 people who are new inhabitants here it would be more dangerous because of them*" – civilian reserves co-ordinator.

Wildfire risk mitigation issues seem to rest with long-term local populations rather than transients, while the latter are more obedient regarding rules:

"*First, for the new habitants it is easier to make them clear the field grounds [i.e. engage in mandatory land clearing activities, such as pruning or removing vegetation around buildings] but in case of wildfires there is panic; with the older habitants, it is more difficult to make them clean their fields but in case of wildfire or smoke there is no panic, people are safer*." – town mayor.

3.1.2 Questionnaires

As the interviews highlighted factors such as being a long-term local vs. transient, wildfire exposure, and associations with risk perception and decision-making behaviour, the analysis of questionnaire data first focused on these issues.

Although the questionnaire was administered during the peak tourist season, the majority of respondents (AE: 59%; H: 69%) were in the 'permanent resident' category. The remaining AE respondents who were a 'temporary resident' were more likely to perceive 'high' (75%) rather than 'low' (25%) risk, i.e. have a greater level of concern about a wildfire affecting them or their property; however, so too were respondents who were a 'permanent resident' (high risk = 76%; low risk = 24%). As such, no significant relationship was found between AE participants' property attachment and their perceived risk ($p = 1.00$, $V = .01$). A similar situation was revealed for H participants' property attachment and perceived risk (temporary resident: high risk = 57%, low risk = 43%; permanent resident: high risk = 55%, low risk = 45%; $p = 1.00$, $V = .02$). When it came to their evacuation decision, AE participants who were a 'permanent resident' more often stayed (72%) than evacuated (28%); however, so too did participants who were a 'temporary resident', and at a somewhat greater frequency than the former group (stayed = 88%; evacuated = 12%). No significant relationship was found between

AE participants' property attachment and the decision to evacuate or not (p = .628, V = .17). Note, H participants were asked for their evacuation decision across multiple related scenarios rather than a single scenario, thus a similar test was not conducted for them.

In terms of wildfire exposure, 54% of H respondents had never experienced a wildfire, 18% had experienced a fire once but in the distant past, and a slightly larger proportion (28%) had experienced a fire more than once but again in the distant past. With AE respondents, 19% reported that their recent wildfire experience was their only one while 81% had experienced a wildfire more than once. Additionally, 40% of all AE respondents had experienced an evacuation due to a wildfire, whereas 60% had not. Those AE respondents who had experienced multiple wildfires did not perceive a significantly different level of risk (high risk = 75%; low risk = 25%) than those with just a single recent wildfire experience (high risk = 78%; low risk = 22%; p = 1.00, V = .03). Likewise, the level of perceived risk reported by H respondents was not significantly associated to their wildfire exposure (never experienced: high risk = 58%, low risk = 42%; experienced once: high risk = 57%, low risk = 43%; experienced more than once: high risk = 50%, low risk = 50%; Fisher-Freeman-Halton p = .917, V = .08). Regarding decision making, AE respondents who had experienced multiple wildfires did not choose to evacuate (27%) during their recent wildfire experience at a significantly different frequency than those with just a single recent wildfire experience (0%) (p = .542, V = .23); nor were they significantly more or less likely to choose to evacuate in future (29%) than those with a single experience (33%) (p = 1.00, V = .03). However, AE respondents who had prior evacuation experience were significantly more likely to choose to evacuate in future (56%) than those with no evacuation experience (9%) (p = .050, V = .50).

A relationship between risk perception and decision making was explored next. Regarding concern about a wildfire affecting them or their property, AE and H respondents were not significantly different in this respect: the majority (76% and 56%, respectively) perceived a 'high' level of risk ($X^2(1) = 3.80$, p = .051, Cramer's V = .21). In the AE sample, 100% of participants who perceived the risk to be 'low' stayed at their property during their recent wildfire experience, whereas 71% of those who perceived the risk to be 'high' stayed, but there was no significant relationship between perceived risk and evacuation decision (p = .298, V = .27).

3.2 Wildfire management

3.2.1 Interviews

Currently, the only emergency communication tools used are television (France 3) and radio (Bleu RCFM, 101.7). For some communes (administrative division comparable to a municipality), government projects involving text message notifications are being developed, as well as text message alerts by insurance companies, although these are still relatively rare.

In the case of a wildfire emergency on camping sites, site managers use megaphones to alert the campers. In most cases affecting areas where people are residing, homeowners would be visited by a firefighter or a police officer and informed face-to-face about the need to leave their property. Fire and rescue service officers would also communicate the wildfire risks and events to the prefecture (the administration that carries out governmental work at the departmental level) and the prefecture would put up the relevant information on their website (e.g. haute-corse.gouv.fr) for the public to access. Such information is regularly checked by the tourist information centres, who may advise people against their trekking plans in certain areas if the fire danger is high or a wildfire is present.

Wildfire risk is assessed each day at 9.30 am and 5.30 pm. In the case of an emergency in Corsica, the command centre at the fire and rescue service headquarters, called CODIS, serves two functions: (1) alert processing through an alert management system, which draws upon calls staff receive from the European emergency number 24/7; and (2) operations management, which can involve receiving communications from the ground as well as communicating with their GPS-tracked vehicles. CODIS staff numbers increase during the summer due to the increased fire risk. The call centre receives approximately 100,000 calls every year and carries out 15,000 operations.

While Corsican fire response training is extensive and support from mainland France was noted to be strong and reliable, some disparity between Corsican and mainland France's response capacity exists:

"we have people who are ready to face fire catastrophes, but we don't have structures and materials and proximity with the rest of the France to be [as] well prepared as them" – incident commander.

In addition, the inability to receive support from other EU countries was highlighted as a potential drawback, since countries such as Italy or Greece use a different type of equipment that cannot be used in conjunction with the equipment in Corsica. At the same time, Corsica's isolation with regards to time taken to receive support via air and by ferries due to island geography also impacts the capacity to fight fires.

Another vulnerability of the island comes down to its changing climate (stronger winds and higher temperatures), growing urbanisation and the change of land use:

"*There is no more presence in the field, like agriculture and people who have farms, […]; a lot of people now want to work in the beach, in the city, and the shops, and not as farmers; the field is abandoned, there is no cleared areas and if you have a fire, it could be a very big fire*" – civilian reserves co-ordinator.

Overall, tourists' and the general population's safety depends significantly on fire safety planning, evacuation operation plans and strategic firefighting, all of which is detailed for each of the communes in the communal information document on major hazards called DICRIM (Le Document d'Information Communal sur les Risques Majeurs) and in a forest protection plan against fires called PPFENI (Plan de Protection des Forets et des Espaces Naturels Contre les Incendies). Nevertheless, cooperation from people in danger is essential to make the most of the fire safety services' work. For example, there exists a regulation to clear 50m of vegetation and debris around structures and homes, with occupants collaborating with neighbours when such 50m overlap or stem into a territory beyond ownership. People are also asked to be vigilant in times of a total fire ban (July-September) and in cases of fire to follow emergency services' orders. Such expectations are conveyed to people through information at schools and in public spaces, but limitations to absorbing such information are seen as depending on 'human nature':

"*when fire arrives, people are stressed and panic, so it is important for us to speak to people [to tell them] what to do in wildfires; it is a long-term work because it is complementary to the work of firefighters and it is important to let people know they are responsible for their own security*" – civilian reserves co-ordinator.

Firefighters' priorities are divided in order of (1) saving lives, (2) saving property, and (3) fighting fire; but, as vocalised in the interviews, the population does not always seem to understand that and mistake the third priority as the most important one.

3.2.2 Questionnaires

Factors arising from this part of the interviews included the communication of information, planning, collaboration within the community, and the importance of individuals realising that they themselves play a role in what happens when a fire occurs. So, the analysis of the questionnaire data now addressed these factors.

When survey respondents were asked whether they had received any information from a range of sources about preparing for wildfires, either in the 12 months before the fire in question (AE) or simply in the last 12 months (H) (see Fig. 3), newspapers were identified as the main information source. Television, radio, internet, as well as social media, were also identified as information sources by a sizeable proportion of participants. Also, approximately one third of AE respondents said that they had not received information from any of the suggested sources, while just under one quarter of H respondents highlighted such a lack of information (although some did report that they had received information from other kinds of sources such as "experience" or "family"). When compared to the H sample, more than four

times as many AE survey participants had received information from their workplace and more than twice as many from community meetings. School was the least commonly identified source of information for both AE and H respondents.

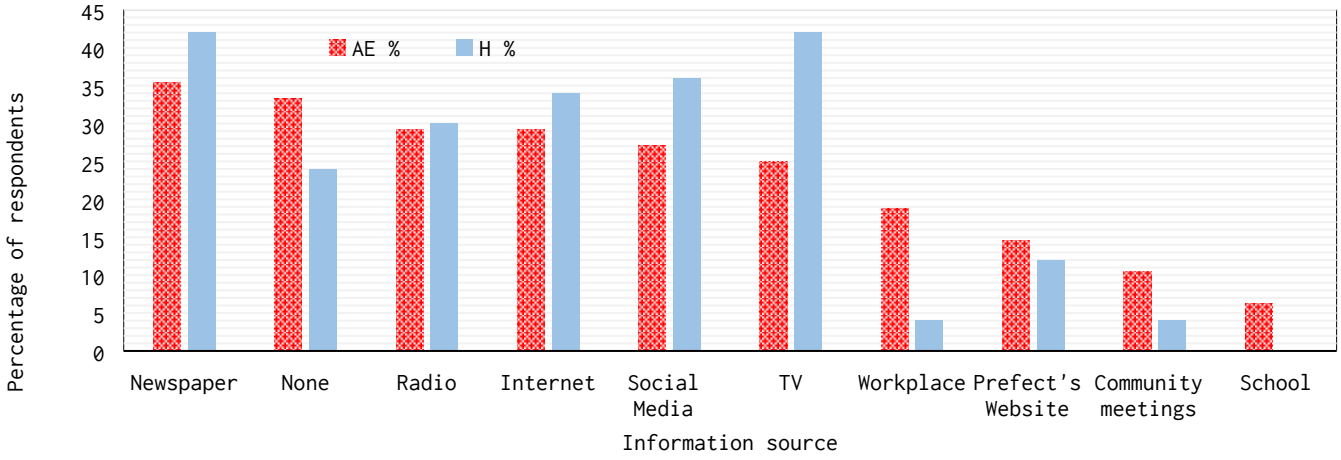

Fig. 3. Information sources aiding preparedness for actual experience (AE) and hypothetical (H) survey participants.

When asked if they had, in the 12-month period of interest, prepared a plan of action should a wildfire occur, very few respondents in either the AE or H surveys reported that they had done so (AE: 19%; H: 10%), although quite a number nevertheless felt they knew what to do, even if they had not taken the further step of developing that into a formal plan (AE: 42%; H: 32%). Despite H respondents appearing slightly less prepared than AE respondents, the difference between the two samples regarding having a formal plan vs. no formal plan or plan at all did not reach statistical significance ($X^2(1) = 1.64$, $p = .200$, $V = .13$). Since the top two most common sources of information were newspapers and TV, acquiring knowledge from these sources vs. others was compared against whether or not an individual had a formal plan. Neither of these sources were significantly associated with having a plan (AE Newspaper: had a plan = 29%, had no plan = 71% vs. AE Other Source: had a plan = 13%, had no plan = 87%; $p = .252$, $V = .20$; H Newspaper: had a plan = 14%, had no plan = 86% vs. H Other Source: had a plan = 7%, had no plan = 93%; $p = .638$, $V = .12$; and AE TV: had a plan = 25%, had no plan = 75% vs. AE Other Source: had a plan = 17%, had no plan = 83%; $p = .674$, $V = .09$; H TV: had a plan = 19%, had no plan = 81% vs. H Other Source: had a plan = 3%, had no plan = 97%; $p = .148$, $V = .26$). However, individuals who had received no information from any of the suggested sources were significantly more likely to have no plan at all (AE: $X^2(2) = 6.03$, $p = .049$, $V = .36$; H: $p = .030$; $V = .39$). Nevertheless, probing further into AE respondents' behaviour, the lack of a plan was not found to be significantly associated

with one's evacuation decision (had a plan: stayed = 100%, evacuated = 0%; had no plan: stayed = 73%, evacuated = 27%; p = .542, V = .23).

As noted above, some survey respondents highlighted that not all information comes from official or organised channels and may instead come through more social channels, while the interviewees highlighted that everyone in the community must contribute actions to improve safety, for others' as well as for their own sakes; in other words, community closeness is important. As a particularity of WUI communities, the majority of participants were expected to report close ties to their neighbours; this was indeed the case, with 64% of AE respondents and 58% of H respondents reporting a 'high' degree of community closeness. However, while this closeness might play a role in the prevention and preparedness stages of wildfire management, it did not result in a significant association with evacuation decision, where the minority (14%) of AE participants reporting 'high' community closeness evacuated and the majority (86%) stayed, and the same pattern was observed with those reporting 'low' closeness (evacuated = 38%, stayed = 62%; p = .309, V = .27).

Turning to individuals, it appeared that not everyone believed they had the ability to control the outcomes of wildfires on them and their property: a significantly larger proportion (53%) of H participants than AE participants (23%) reported an internal LOC ($X^2(1) = 4.99$, p = .025, V = .30). Of those who reported an external LOC, control was most commonly attributed to luck (AE = 52%; H = 50%) and least commonly attributed to a spiritual being (AE = 9%; H = 6%). Due to the latter result, no test could be conducted specifically on religiousness and evacuation decision making. However, a test was conducted for a relationship between AE participants' locus of control more generally and their evacuation decision and the result was not significant (internal LOC: stayed = 100%, evacuated = 0%; external LOC: stayed = 71%, evacuated = 29%; p = .290, V = .29).

3.3 Responses to a developing wildfire

3.3.1 Interviews

Generally, in Corsica, evacuation is considered to be the last resort and the official preferred response to a wildfire is sheltering in place or, as described by the incident commanders, 'confinement'. However, exceptions are made for populations that are considered to be vulnerable to wildfire effects and of limited self-efficacy, such as children and the elderly. These populations would be evacuated first in advance and it would be the responsibility of the mayor of the commune to identify such households where vulnerable people reside (communities are seen as very close and the mayor is often familiar with the population).

"*The appropriate response is to go inside, shut the windows, shutters, close gas, to open the gates for firefighters' vehicles to be able to come in and protect the homes; put the wet towels at the doors, close chimneys so that fire cannot go inside; to put the car behind the building so that the car is protected by the building and does not burn; there is no time for cleaning [outdoors] – it's too late. If you have automatic sprinklers you can turn it on.***" –** *fire* officer.

Sheltering indoors is also a preferred option after the evacuation of individuals' homes is chosen. In such cases, the evacuation destination is a safe structure in the town, rather than any place outside the area. This is due to mainly three reasons: (1) people's homes and/or other town buildings, such as churches, are architecturally robust stone structures which are capable of withstanding most fires; (2) narrow roads, varied topography (hills and slopes), as well as vegetation close to the roads, present challenges for road traffic; and (3) most camping areas and town surroundings are cleared and thus adequately prepared for firefighting, making it relatively safe for people to stay within their homes, or shelter in camping areas; nevertheless, it has to be noted that structures such as camper vans, cars, tents and wooden homes are seen as unsuitable shelters and thus people are confined within other structures such as any concrete/stone buildings or swimming pool areas if such buildings are absent or unable to contain large numbers of people.

Another option for campsite occupants is confinement on the beach, if one is available nearby. For areas that are not cleared, such as forests, shelters are available and marked, and are used as assembly points from which individuals are rescued by fire service transport before the fire front arrives. In towns, once people are evacuated and inside a local durable structure, such as gymnasium, church or other house known to the authorities, people are counted, and their needs assessed.

General patterns of population behaviour in response to wildfires observed by the interviewees most of the time included a distinction between the 'locals' and 'tourists'. Certain behaviours were described as 'panic'. These were indicated in the interviews as tunnel-focus own priorities (such as putting one's self at risk to collect belongings, e.g. passport).

"they are vulnerable to accidents, they focus on one thing and cannot listen" – incident commander.

Interviewees emphasised irrational aspects:

"When people are stressed, they don't realise the danger of fire; when they see fire, they become completely out of their mind and don't have fair judgement, the reaction is very irrational" – incident commander.

This ‘panic’ behaviour reportedly manifested in potentially hazardous actions such as driving fast down the narrow roads:

“sometimes they are going on the road to escape but it’s very dangerous because they drive fast because they are afraid” – fire officer.

Among all types of resident, lack of experience in evacuation, or in confinement for some groups, as well as attachment to one’s home, was an emerging theme in the interviews: (“people here are not used to evacuating their home” – incident commander); at the same time, when people are told to go indoors and they refuse to do this, it is because “they think they will burn in their home” (fire officer).

“Typical for Mediterranean culture is that their house is often the fruit of their work life, it is [their] inheritance or [a] work tool for the farmers” – incident commander.

Thus, specifics of dealing with locals in an evacuation was commonly contrasted to tourist behaviour, which was often depicted as careless and disconnected from the local risk culture:

“the way of dealing with locals and tourists is different; first we need to deal with locals who don’t want to leave their home, second we deal with summer vacationers who don’t realise the danger of the fire and sometimes it’s problematic; you can see tourists on the road taking pictures; tourists when they come here they think that Corsica is a forest, that there are no rules to follow and they are the king here” – incident commander.

3.3.2 Questionnaires

Here, the interviews broached the subject of the rationality, or irrationality, of behaviours during a wildfire. Interviewees offered opinions on what might drive people’s behaviour; the following analysis of the questionnaire data turned attention to what the people themselves said about what drives their behaviour. This analysis also examined whether behaviours in the latter stages of evacuation (i.e. where people go when they evacuate and whether they stay there until safe to return to their residences) appeared to follow policy and logic.

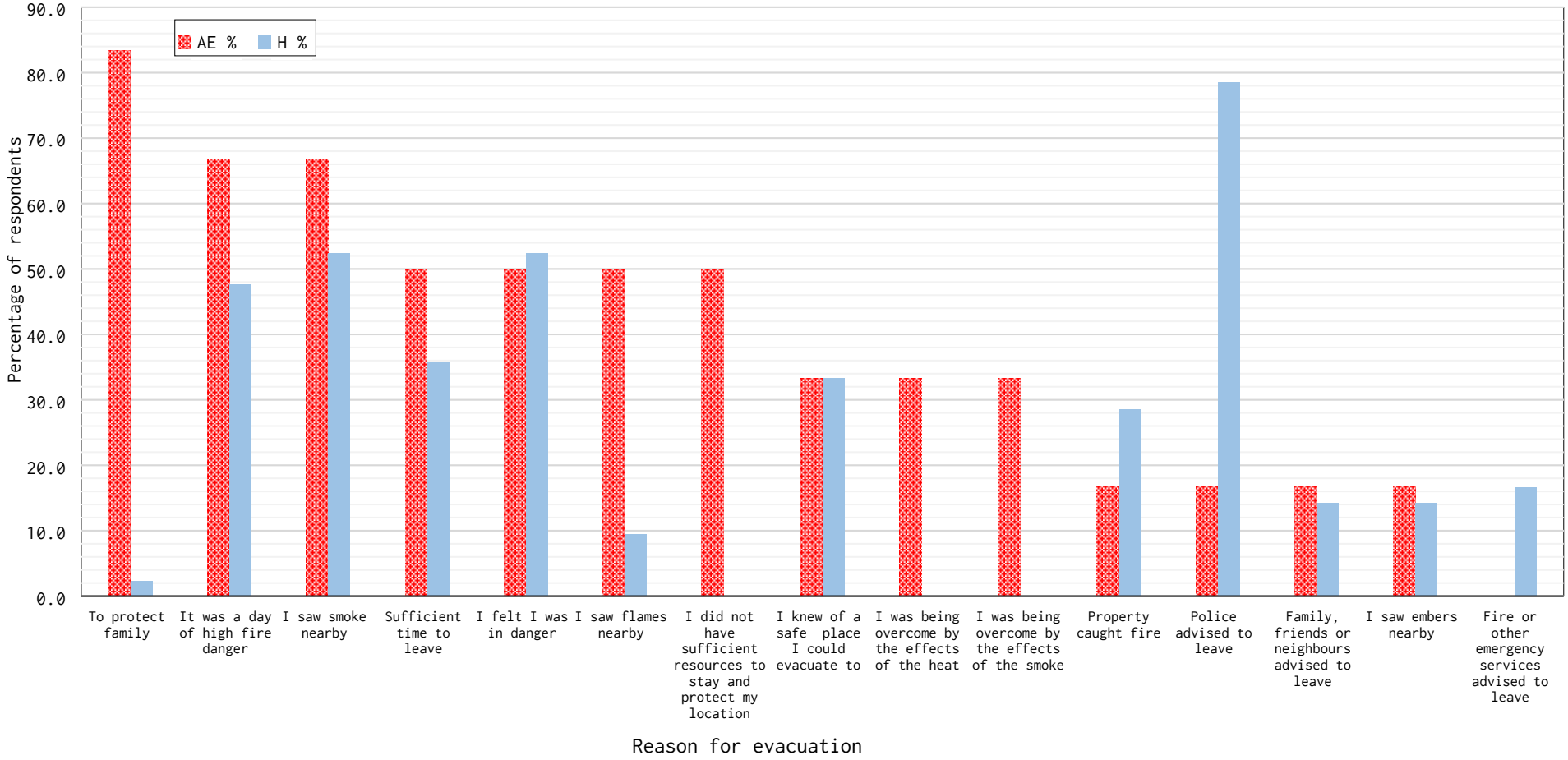

Fig. 4. Reasons for evacuation among actual experience (AE) and hypothetical (H) survey participants.

Of those AE survey participants who evacuated during their wildfire, a small number (n=6) provided reasons for why they evacuated at the particular moment they did, while all H survey participants answered what their reasons would be for choosing evacuation during a wildfire. The majority of AE participants who provided reasons stated that one reason was to protect their family (83%). In the H sample, only 2% stated they would choose to evacuate for this reason. Instead, the majority of H participants stated they would choose to evacuate if advised by police (79%) – a reason only reported by 16% of the aforementioned AE participants (see Fig. 4). Other reasons for evacuating given by half or more of the aforementioned AE participants were: it was a day of high fire danger (67%), seeing smoke (67%), having sufficient time to leave (50%), feeling in danger (50%), seeing flames (50%) and not having sufficient resources to stay (50%). Seeing smoke and feeling in danger (52% each) were the only other reasons cited by half or more of the H sample.

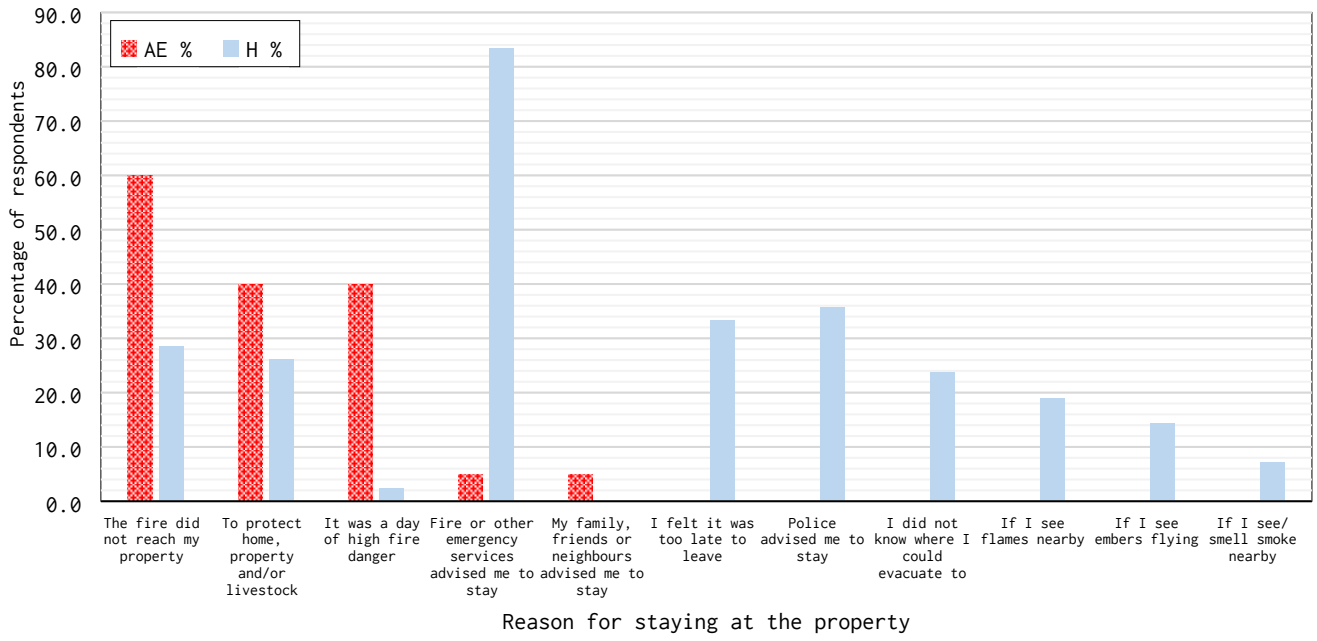

Fig. 5. Reasons for staying among actual experience (AE) and hypothetical (H) survey participants.

Since the official policy in response to a wildfire in Corsica is confinement, reasons for staying were also explored. Of the AE respondents who stayed during their wildfire and provided reasons for this (n = 20), the most frequent motivation was because the fire did not arrive at their property (60%). Additional reasons included that respondents wanted to protect their property or livestock (40%), and because it was a day of high fire danger (40%). Again, all H participants provided answers on this subject and the majority of that sample stated that they would stay if the fire service or other emergency services (excluding the police) advised them to do so (83%), while the next most common reason was staying if advised to do so by the police (36%) (see Fig. 5).

When evacuation was the chosen option, the evacuation destination for the majority of respondents in both surveys was a nearby town/village (AE: 80%; H: 28%); 24% of H respondents indicated an open area such as a beach would be their place of refuge (which was not chosen by any of the AE respondents), 12% stated they would seek refuge in another building such as a hall or church (again, not chosen by any AE respondents), and 8% stated they would go to another residence nearby (also not chosen by any AE respondents, the remaining 20% of whom chose an evacuation destination beyond the locations listed). Finally, 12% of H respondents stated they did not know where they would go in the event of evacuation.

When it comes to returning to one's evacuated residence before being officially notified that it is safe to do so, only two AE respondents said they tried and accomplished this, whereas 87% of H respondents said they would try and return. Of the AE respondents who returned early, their motivation was solely based around a concern for their property: i.e. to see if it had survived up to this point and to defend it. Neither respondent reported any concerns about looting. The main reason H respondents gave for choosing to return early was they would want to check on the safety of family and friends (50%). A sizable proportion also said they would return early if, in their opinion, the threat had passed (41%). A concern for defending property was the next most common reason (28%). More than a fifth of H respondents stated they would return early over a concern about looting (22%).

4. Discussion

Corsica is an island highly populated with WUI areas and a large number of its communes are deemed to be at risk of experiencing wildfires. The island's disaster response strategy is seen to be self-sufficient to face any risk to a certain degree. The reason for self-sufficiency was explained by the interviewees to be the available expertise of the firefighters and the training that they, as incident commanders, receive in mainland France. However, the main challenges for resilience and the vulnerability of the Corsican island seem to be related to limited infrastructure capacity to manage multiple fire emergency events at the same time, inhibited by relative isolation from the mainland and changing weather conditions, which is consistent with findings from other island studies of disasters in general [53].

As well as considering the professional disaster response to wildfires, this study contributes novel findings regarding how civilians respond. Several key variables, ones believed to influence the behavioural responses of civilians, were identified from previous literature on wildfires and other disasters. However, the results here indicate those previous findings should not automatically be generalised to populations residing in island WUI areas.

For example, despite previous studies [44,45] showing a relationship between property attachment and evacuation decisions, the results here suggest that both permanent residents (who should have greater attachment to their property) and temporary residents (who should be less attached) are more likely to stay at their locations rather than evacuate in response to a wildfire. The divergence in these findings are likely explained by Corsica having and commonly practicing a wildfire management policy of 'confinement' of individuals within their residences, as described by the interviewees.

Regarding the perception of risk and risk culture, this study indicated a certain level of confidence among interviewees that locals are better equipped to deal with both the threat and presence of wildfires compared to tourists. This emphasised division of locals' and others' risk perceptions and their behaviour in wildfires in broader terms was also shown by Candea's anthropology of Corsicans [54]. The current study revealed that neither being a permanent vs. temporary resident nor wildfire exposure (i.e. occasions of direct experiences with wildfires) had a significant association with risk perception. Given all groups were more likely to perceive themselves to be at 'high' risk, this suggests that the timing of the study (during peak wildfire season and therefore during peak media coverage of fires) might have played a role, i.e. inflated the ratings of those with less experience of wildfires and from transient populations during this time to a level similar to that of more experienced and permanent residents.

While this presumed hazard knowledge – or hazard awareness at least – may have influenced the perception of risk (cf. [47]),across wildfire literature it has nonetheless been observed that individuals who feel at risk may not necessarily plan their emergency response or even have access to information for such preparedness [45]. Indeed, the interviewees in this study put an emphasis on reaching out to communities to educate them on how to respond in a fire, and while at least two-thirds of survey participants reported receiving information about wildfires from a range of sources, predominantly the mass media, the type of information source had no significant impact on reported preparedness (having a plan). The exception was those who said they had received no information from the listed sources; they were significantly less likely to have prepared a plan of any kind. Indeed, most participants lacked a plan, although around a third or more believed they nevertheless 'knew what to do'. These findings somewhat affirm the 'inherent' resilience of Corsicans, and island communities in particular (discussed in the Introduction) but, as also discussed earlier in this paper, such 'resilience' may additionally indicate underlying vulnerabilities of island communities. Furthermore, these findings probably explain why no significant relationship was found between perceived risk and evacuation decisions, a result which also contradicts previous research findings [44], or between having a plan and evacuation decisions. That is, people in Corsica may be aware that they face wildfire risks and may be aware (if they have access and

have paid attention to information sources) that there is a policy of staying in one's residence rather than evacuating when a wildfire occurs. Since 'confinement' could be interpreted as a more passive than active response, this may lead people to not contemplate further what may actually be required of them should they stay and, in the event of staying not being feasible, what may be required of them should they go. Thus, those with even an informal 'plan' (which may most likely be to stay) may only be prepared for situations where such a plan is suitable, while those with no plan at all may be completely unprepared for either staying or evacuating and therefore their behavioural response may be unpredictable.

Therefore, community closeness may not have the kind of influence on evacuation in Corsica in the event of a wildfire as it has been found to have in studies of other regions and types of disaster [20,48] – not because it may not exist in Corsica, but because even where people are close to their neighbours, those neighbours may be similarly without a plan or only have heard about the authorities' policy to stay. Indeed, a form of community closeness – community collaboration (with the authorities, in the form of obeying official wildfire mitigation rules, as well as with other civilians) and community cohesion – was a recurring theme in the interviews, as well as in the literature on island and WUI communities [57]. It was also supported by the questionnaire data where the majority of both surveys' respondents reported a 'high' degree of social closeness to their neighbours. Yet, the majority of AE survey respondents, irrespective of whether they reported high or low closeness, seemed to go along with the official policy, i.e. in most cases stayed and sheltered indoors rather than evacuated.

The final key variable explored in relation to behavioural responses was LOC. Despite a number of survey participants expressing a belief that they knew what to do in the event of a wildfire, fewer among the AE respondents believed that their own actions could control what happens to them in a wildfire, i.e. AE respondents tended more towards an external LOC, which was more commonly identified as luck than government authorities or emergency services. Luck was also far more commonly identified as the external LOC than was a spiritual being, which suggests that any future research on the topic of LOC and disaster responses may need a broader scope than that seen to date [20,51,52]. This was one of the few areas where AE respondents answered differently to H respondents, who tended more towards an internal LOC. Such disparity is somewhat intuitive since while AE respondents were asked to answer the LOC question based on what they believed prior to their recent wildfire experience, most AE respondents had already experienced other incidents before that, possibly with diverse outcomes, and these experiences could have left respondents with a sense of helplessness against the forces of fire. Indeed, several interviewees from the fire services reported that people often discovered they had overestimated their chances of standing against the fire and the outcomes were 'unexpected'. This then likely explains the lack of a

significant relationship between LOC and AE respondents' evacuation decisions, and further highlights the potential vulnerability raised by a lack of planning, particularly for evacuation where staying is not viable.

Overall, it is important to note that while neither property attachment, perceived risk, planning for wildfires, community closeness, nor LOC predicted whether AE participants evacuated or stayed, those participants nonetheless did reveal the actual motivations for their behaviour, such as leaving due to a wish to protect their families and/or because they recognised signs of risk (e.g. noted it was a day of high fire danger, saw smoke), whereas the majority of H participants stated they would choose to evacuate if advised by the police. H participants' motivation for choosing to stay was also predominantly based around emergency service advice. It is possible that the dissimilarity between AE and H participants' answers here reflect the fact that the intentions of practiced behaviours can tend to be thought of more in terms of why an action is ultimately performed (for the protection of one's family), whereas intentions that have not been put into practice yet, as in hypothetical scenarios, may be thought of more in terms of how an action is initiated (by the emergency services issuing advice) [58]. The results on motivations also suggest that situational factors manifesting close to or during the wildfire may have been more influential here on decision making than situational or trait factors manifesting some time earlier.

Behavioural responses do not end with the decision to evacuate or stay, and this study explored what issues may arise with the island's WUI populations after a decision to evacuate is made. When a fire actually occurs, the reactions of 'others' (identified as newcomers from mainland France or tourists) while more easily managed in one sense, since they are reportedly more obedient than locals when given official evacuation orders (also evidenced in [55]), were noted by interviewees to be dangerously emotional when acting on their own instincts. For example, interviewees described tourists displaying 'panic', driving on the roads in a state of fear without being aware of the complexity of the topography and narrow roads and therefore of the risks (e.g. of getting trapped, of approaching instead of withdrawing from hazards, or of causing a crash), and risk-taking when stopping for photographs of the fire or engaging in other forms of careless behaviour. Although scholars (e.g. [56]) reject the notion that people panic *en masse* when faced with a disaster, these observations suggest there could be some groups more prone to hasty and unthinking behavioural responses. If so, on an island where such groups comprise a considerable portion of the overall population during the wildfire season, this could be particularly problematic. The reason why a division between locals and tourists may seem to exist can be found in the interviewees' claim that locals' awareness of wildfires begins early, during their school education, and continues through adulthood with exposure to wildfires, thus increasing their understanding of how fire behaves

and how people can and should behave in turn. In contrast, tourists' awareness of wildfires may be more recent and their understanding cursory. Note, while the questionnaire data revealed school to be the least frequent source of information about wildfires, this is likely an artefact of the study's inclusion criteria requiring survey participants to be adults aged 18 years or older while the question asked about information gained in a 12-month period, i.e. a time when many participants will have no longer been in school.

Compared to those with no prior experience of evacuation, AE participants who had evacuated previously were more likely to state they would evacuate in a future fire. This indicates that evacuation had a successful outcome for them, ensuring their safety. However, two other findings indicate that the safety of evacuees could potentially be compromised. First, the lack of AE (and H) participants selecting to evacuate to a building such as a hall or church suggests that they are not aware of the official evacuation shelters in their locality or such shelters have not been designated. In addition, upon arrival at an evacuation destination, a willingness to attempt to return to residences before receiving official notification that it was okay to do so – an issue widely recognised in the literature [33] – was reported by questionnaire respondents as well as interviewees, although few AE participants actually accomplished this feat. Given the high proportion of H participants who expressed this tendency, this challenges the interviewees' assertion that locals inherently know what is appropriate in a wildfire and highlights that human behaviour, not just fire behaviour, is dynamic (i.e. people may get away but not always stay away). To ensure the best outcomes in a wildfire, both civilians and professionals need to consider and understand – in advance – the various permutations of how a situation may develop, as well as the risks and resources each one entails.

5. Conclusions

Analysis showed that Corsica is facing wildfire safety risks due to population increase during peak tourist seasons, growing urban areas and drier and warmer weather conditions due to changing land use. The interviews opened up for discussion further vulnerabilities such as logistical challenges in receiving practical support from the EU and mainland France, which have not received much attention in the research literature to date. Factors which have received more attention, i.e. reported behavioural influencers such as property attachment, perceived risk, hazard knowledge, community closeness and locus of control, were not found to play a significant role here in survey participants' wildfire responses, suggesting that island WUI residents have specific characteristics and/or different determinants. Therefore, while policymakers in other at-risk European islands should consult existing studies of human

behaviour in wildfires carried out in regions with considerable expertise in such matters (i.e. USA, Australia), they should also commission further research to be conducted in their own regions, in order to establish which behavioural responses can be generalised and which are more specific to their particular settings. That way, policies and ensuing practices can be shaped to best meet the circumstances of the people at whom they are directed.

The main behavioural response studied in the survey analysis was evacuation decision-making. Most participants – regardless of whether they had actually experienced at least one wildfire recently or lacked experience and were answering about hypothetical scenarios – chose to stay and shelter indoors rather than evacuate, demonstrating that official policy was being successfully communicated to residents and complied with. However, this reliance on confinement suggests that the island's residents, particularly those who have not experienced a wildfire, recently or ever, would not be well prepared for a situation where evacuation became the best option. Thus, policymakers should consider means of including evacuation as a more viable option under suitable circumstances, and consider whether it is often viewed as a last resort measure because environmental aspects (e.g. speed and severity of the fire, wind, etc.) hinder its enactment or because human aspects (e.g. lack of preparedness and planning) are the hindrance. Especially since a lack of planning was evident, with H survey participants displaying that further through a heavy reliance on the emergency services to make the decision about whether to stay or evacuate, and through some indecisiveness with regards to an evacuation destination. While it is understandable that such decisions would depend on the situation, a lack of certainty and intuitiveness in respondents may indicate that more information on how to independently assess the risks and on available options for evacuation sheltering is needed. Another potentially unsafe behaviour highlighted was ingress attempts. If carried out in the proportions suggested by H participants, this would put a serious drain on emergency service resources regarding traffic management and life protection. In addition, since the main reasons for return were related to concerns about either property or others, communities should be assured by the authorities regarding their property security and receive better education with regards to how to contact loved ones during an emergency (e.g. preparing in advance a plan of where to meet if not initially together, using phone and online single-click apps that allow people to notify others that they are safe and well).

Ultimately, the findings suggest disparity in some areas between expected ("[Corsican locals] know what we have to do") and actual behaviours and strategies. Moreover, given the dynamics in the socio-cultural climate and new/temporary residents moving to the island each year, who reportedly have less developed risk cultures and are more emotionally driven, levels of resilience may alter as a result. Thus, as vulnerabilities are uncovered, it is important that communities develop an ability to adapt in response to hazards, as mass evacuations are

increasingly being observed in European islands. If the frequency of disruption to communities due to wildfire evacuations continues to rise, then island WUI communities must be mentally and physically prepared for such an eventuality.

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References

[1] IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

[2] Fox, D. M., Martin, N., Carrega, P., Andrieu, J., Adnès, C., Emsellem, K., Fox, E. A. (2015). Increases in fire risk due to warmer summer temperatures and wildland urban interface changes do not necessarily lead to more fires. *Applied Geography*, *56*, 1–12. http://doi.org/10.1016/j.apgeog.2014.10.001

[3] Oliveira, S., Félix, F., Nunes, A., Lourenço, L., Laneve, G., & Sebastián-López, A. (2018). Mapping wildfire vulnerability in Mediterranean Europe. Testing a stepwise approach for operational purposes. *Journal of Environmental Management*, *206*, 158–169. http://doi.org/10.1016/j.jenvman.2017.10.003

[4] Mclennan, J., Cowlishaw, S., Paton, D., Beatson, R., & Elliott, G. (2014). Predictors of

south-eastern Australian householders' strengths of intentions to self-evacuate if a wildfire threatens: Two theoretical models. *International Journal of Wildland Fire*, *23*(8), 1176–1188. http://doi.org/10.1071/WF13219

[5] Stephens, S. L., Adams, M. a, Handmer, J., Kearns, F. R., Leicester, B., Leonard, J., & Moritz, M. a. (2009). Urban–wildland fires: how California and other regions of the US can learn from Australia. *Environmental Research Letters*, *4*(1), 014010. http://doi.org/10.1088/1748-9326/4/1/014010

[6] Strahan, K., Whittaker, J., & Handmer, J. (2018). Self-evacuation archetypes in Australian bushfire. *International Journal of Disaster Risk Reduction*, *27*(August 2017), 307–316. http://doi.org/10.1016/j.ijdrr.2017.10.016

[7] Folk, L. H., Kuligowski, E. D., Gwynne, S. M. V, & Gales, J. A. (2019). A Provisional Conceptual Model of Human Behavior in Response to Wildland-Urban. *Fire Technology*. http://doi.org/10.1007/s10694-019-00821-z

[8] McLennan, J., Ryan, B., Bearman, C., & Toh, K. (2018). Should We Leave Now? Behavioral Factors in Evacuation Under Wildfire Threat. *Fire Technology*. http://doi.org/10.1007/s10694-018-0753-8

[9] Moreira, F., Viedma, O., Arianoutsou, M., Curt, T., Koutsias, N., Rigolot, E., Bilgili, E. (2011). Landscape - wildfire interactions in southern Europe: Implications for landscape management. *Journal of Environmental Management*, *92*(10), 2389–2402. http://doi.org/10.1016/j.jenvman.2011.06.028

[10] Price, O., & Bradstock, R. (2014). Countervailing effects of urbanization and vegetation extent on fire frequency on the Wildland urban interface: Disentangling fuel and ignition effects. *Landscape and Urban Planning*, *130*(1), 81–88. http://doi.org/10.1016/j.landurbplan.2014.06.013

[11] Cohen, J. D. (2000). Preventing disaster: home ignitability in the wildland-urban interface. *Journal of Forestry*, *98*(3), 15–21. http://doi.org/http://www.fs.fed.us/rm/pubs_other/rmrs_2000_cohen_j002.pdf

[12] Garbolino, E., Sanseverino-Godfrin, V., & Hinojos-Mendoza, G. (2015). Describing and predicting of the vegetation development of Corsica due to expected climate change and its impact on forest fire risk evolution. *Safety Science*, (October), 0–7. http://doi.org/10.1016/j.ssci.2016.02.006

[13] Schmuck, G., San-Miguel-Ayanz, J., Durrant, T., Boca, R., Libertà, G., Petroliagkis, T., … Schulte, E. (2015). *Forest fires in Europe, Middle East and North Africa 2014*. *Scientific and Technical Research series*. http://doi.org/10.2788/1082

[14] Mercer, J., Dominey-Howes, D., Kelman, I., & Lloyd, K. (2007). The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states. *Environmental Hazards*, 7(4), 245–256. http://doi.org/10.1016/j.envhaz.2006.11.001

[15] Spano, E. D. (2013). Modelling Fire Behaviour and Risk.

[16] Ronchi, E. (2017). e-Sanctuary : Open Multi- Physics Framework for Modelling Wildfire Urban Evacuation, (December).

[17] Kelman, I., & Khan, S. (2013). Progressive climate change and disasters: Island perspectives. *Natural Hazards*, 69(1), 1131–1136. http://doi.org/10.1007/s11069-013-0721-z

[18] Eriksen, C., & Prior, T. (2011). The art of learning: Wildfire, amenity migration and local environmental knowledge. *International Journal of Wildland Fire*, 20(4), 612–624. http://doi.org/10.1071/WF10018

[19] Dwyer, G., Hardy, C. (2016). We have not lived long enough: Sensemaking and learning from bushfire in Australia. *Management learning*, 47(1), 45-64. DOI:10.1177/1350507615577047

[20] Drabek, T. E. (1986). Human System Responses to Disaster An Inventory of Sociological Findings. New York: Springer-Verlag.

[21] Kelman, I., Gaillard, J. C., Lewis, J., & Mercer, J. (2016). Learning from the history of disaster vulnerability and resilience research and practice for climate change. *Natural Hazards*, 82, 129–143. http://doi.org/10.1007/s11069-016-2294-0

[22] Bourque, L., & Russell, L. (1994). Experiences During and Responses to the Loma Prieta Earthquake. California.

[23] Weichselgartner, J., & Kelman, I. (2015). Geographies of resilience : Challenges and opportunities of a descriptive concept. *Progress in Human Geography*, 39(3), 249–267. http://doi.org/10.1177/0309132513518834

[24] de Certeau, M. (1984). The Practice of Everyday Life. University of California.

[25] Paveglio, T. B., Jakes, P. J., Carroll, M. S., & Williams, D. R. (2009). Understanding social complexity within the wildland-urban interface: A new species of human habitation? *Environmental Management*, 43(6), 1085–1095. http://doi.org/10.1007/s00267-009-9282-z

[26] Brenkert-Smith, H., Dickinson, K. L., Champ, P. A., & Flores, N. (2013). Social Amplification of Wildfire Risk: The Role of Social Interactions and Information Sources. *Risk Analysis*, 33(5), 800–817. http://doi.org/10.1111/j.1539-6924.2012.01917.x

[27] Alavalapati, J. R. R., Carter, D. R., & Newman, D. H. (2005). Wildland–urban interface: Challenges and opportunities. *Forest Policy and Economics*, 7(5), 705–708. http://doi.org/10.1016/j.forpol.2005.03.001

[28] Eiser, R. J., Bostrom, A., Burton, I., Johnston, D. M., McClure, J., Paton, D., … White, M. P. (2012). Risk interpretation and action: A conceptual framework for responses to natural hazards. *International Journal of Disaster Risk Reduction*, 1(1), 5–16. http://doi.org/10.1016/j.ijdrr.2012.05.002

[29] Patel, R. B., & Gleason, K. M. (2018). The association between social cohesion and community resilience in two urban slums of Port au Prince, Haiti. *International Journal of Disaster Risk Reduction*, 27(June 2017), 161–167. http://doi.org/10.1016/j.ijdrr.2017.10.003

[30] Paveglio, T. B., Boyd, A. D., & Carroll, M. S. (2017). Re-conceptualizing community in risk research. *Journal of Risk Research*, 20(7), 931–951. http://doi.org/10.1080/13669877.2015.1121908

[31] Dash, N., & Gladwin, H. (2007). Evacuation Decision Making and Behavioral Responses: Individual and Household. *Natural Hazards Review*, 8(3), 69–77. http://doi.org/10.1061/(ASCE)1527-6988(2007)8:3(69)

[32] Martin, I., Bender, H., & Raish, C. (2007). What motivates individuals to protect themselves from risks: The case of wildland fires. *Risk Analysis*, 27(4), 887–900. http://doi.org/10.1111/j.1539-6924.2007.00930.x

[33] Wilkinson, C., Eriksen, C., & Penman, T. (2016). Into the firing line: civilian ingress during the 2013 Red October bushfires, Australia. *Natural Hazards*, 80(1), 521–538. http://doi.org/10.1007/s11069-015-1982-5

[34] Express, 2016. “Europe in flames as huge wildfires rage out of control in Portugal, France and Spain”, Express [online]. Available at: http://www.express.co.uk/news/world/707697/Wildfires-Portugal-France-Spain-firefightersblaze-arson-fires [accessed 10.10.2018].

[35] CNN news, 2017. “California fire officials planning repopulation of evacuated areas”, CNN [online]. Available at: http://edition.cnn.com/2017/10/15/us/california-fires-updatesrecovery/index.html [accessed 10.10.2018].

[36] The Guardian, 2018. “Bushfire rips through Tathra on far south coast of NSW”, The Guardian [online]. Available at: https://www.theguardian.com/australia-news/2018/mar/19/bushfire-rips-through-tathra-on-far-south-coast-of-nsw [accessed 10.10.2018].

[37] Paveglio, T., & Edgeley, C. (2017). Community diversity and hazard events: understanding the evolution of local approaches to wildfire. *Natural Hazards*, 87(2), 1083–1108. http://doi.org/10.1007/s11069-017-2810-x

[38] Promethee, 2017. [Online] http://www.promethee.com/incendies

[39] PPFENI, 2006-2012. Plan de Protection des Forêts et des Espaces Naturels contre les Incendies en Corse.

[40] Ganteaume, A., & Jappiot, M. (2013). What causes large fires in Southern France. *Forest Ecology and Management*, 294, 76–85. http://doi.org/10.1016/j.foreco.2012.06.055

[41] Vilain-carlotti, P. (2017). Le risque d ' incendie de forêt en Corse : de l ' approche globale par l ' aléa à une approche locale des vulnérabilités. *Focus on Vulnerabilities*, 0–17.

[42] Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, 13(1), 1-8. http://doi.org/10.1186/1471-2288-13-117

[43] Save the Children. (n.d.). 6 Methods of data collection and analysis.

[44] Huang, S.-K., Lindell, M. K., & Prater, C. S. (2016). Who Leaves and Who Stays? A Review and Statistical Meta-Analysis of Hurricane Evacuation Studies. *Environment and Behavior*, 48(8), 991-1029. http://doi.org/10.1177/0013916515578485

[45] McLennan, J., Paton, D., & Wright, L. (2015). At-risk householders' responses to potential and actual bushfire threat: An analysis of findings from seven Australian post-bushfire interview studies 2009-2014. *International Journal of Disaster Risk Reduction*, 12, 319–327. http://doi.org/10.1016/j.ijdrr.2015.02.007

[46] Whittaker, J., Haynes, K., McLennan, J., Handmer, J., Towers, B., & CRC, B. (2010). Research Results from February 7th Victorian Fires. Second Report on: Human Behaviour & Community Safety.

[47] Kinateder, M. T., Kuligowski, E. D., Reneke, P. a, & Peacock, R. D. (2015). Risk perception in fire evacuation behavior revisited: definitions, related concepts, and empirical evidence. *Fire Science Reviews*, 4(1), 1-26. http://doi.org/10.1186/s40038-014-0005-z

[48] Sorensen, J. H. (1991). When shall we leave? Factors affecting the timing of evacuation departures. *International Journal of Mass Emergencies and Disasters*, 9(2), 153–164. Retrieved from https://training.fema.gov/emiweb/downloads/ijems/articles/when shall we leave factors affecting the timing of evacuat.pdf

[49] Thompson, R. R., Garfin, D. R., & Silver, R. C. (2017). Evacuation from natural

disasters: A systematic review of the literature. *Risk Analysis*, 37(4), 812-839. http://doi.org/10.1111/risa.12654

[50] Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80(1), 1–28. http://doi.org/10.1037/h0092976

[51] Jogia, J., Kulatunga, U, Yates, G.P., Wedawatta, G. (2014). Culture and the psychological impacts of natural disasters: Implications for disaster management and disaster mental health. *The Built & Human Enviornment Review*, Volume 7, 2014, 7, 1–10.

[52] Quarantelli, E. L. (1980). Evacuation Behavior and Problems: Findings and Implications from the Research Literature. Miscellaneous Report of the Disaster Research Center, The Ohio State University. Retrieved from http://udspace.udel.edu/handle/19716/1283

[53] Kelman, I. (2015). Disaster Risk Governance for Pacific Island Communities. *The Asia-Pacific Journal: Japan Focus*, 13(48). Retrieved from http://discovery.ucl.ac.uk/1473280/

[54] Candea, M. (2008). Fire and identity as matters of concern in Corsica. *Anthropological Theory*, 8(2), 201–216.

[55] Drabek, T. E. (1999). Disaster evacuation responses by tourists and other types of transients. *International Journal of Public Administration*, 22(5), 655–677. http://doi.org/10.1080/01900699908525400

[56] Drury, J. (2007). The Mass Psychology of Disasters and Emergency Evacuations : A Research Report and Implications for Practice; The mass psychology of disasters and emergency evacuations, (November).

[57] Kelman, I. (2014). Climate Change and Other Catastrophes: Lessons from Island Vulnerability and Resilience. *Moving Worlds: A Journal for Transcultural Writings*, 14(2), 127–140.

[58] Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124(1), 54–74. http://doi.org/10.1037/0033-2909.124.1.54

[59] McLennan, J., Elliott, G., & Beatson, R. (2013). Householders' Stated Bushfire Survival Intentions Under Hypothetical Threat: Factors Associated With Choosing To Leave, or Stay and Defend, or Wait and See. Bushfire CRC, La Trobe University, Melbourne, Australia.

[60] BBC News, 2019. "Europe wildfires: Norway police evacuate hundreds in Sokndal", BBC News [online]. Available at: https://www.bbc.co.uk/news/world-europe-48035682 [accessed 14.05.2019].

[61] The Local, 2018. “Norway calls in military to relieve exhausted fire service as one dies fighting forest blaze”, The Local [online]. Available at: https://www.thelocal.no/20180716/norway-calls-in-military-to-relieve-exhausted-fire-service-as-one-dies-fighting-forest-blaze [accessed 14.05.2019].

[62] The Independent, 2018. “Sweden calls for international help as wildfires rage in Arctic circle”, Independent [online]. Available at: https://www.independent.co.uk/news/world/europe/sweden-arctic-wildfires-international-aid-norway-finland-russia-global-warming-a8453346.html [accessed 14.05.2019].

[63] Forestry, 2018. “Forest fires in Sweden – huge areas burned in 2018”, Orbjörn Johnsen [online]. Available at: https://www.forestry.com/editorial/forest-fires-sweden/ [accessed 21.05.2019].

[64] ABC News, 2017. “Portuguese minister resigns as wildfire toll passes 100, PM under fire to stand down”, Reuters A/P [online]. Available at: https://www.abc.net.au/news/2017-10-19/portuguese-minister-resigns-as-wildfire-toll-passes-100/9065714 [accessed 21.05.2019].

[65] Cardil, A., Delogu, G. M., & Molina-Terrén, D. M. (2017). Fatalities in Wildland Fires From 1945 To 2015 in Sardinia (Italy). *Cerne*, *23*(2), 175–184. http://doi.org/10.1590/01047760201723022266

[66] Molina-Terrén, D. M., Xanthopoulos, G., Diakakis, M., Ribeiro, L., Caballero, D., Delogu, G. M., … Cardil, A. (2019). Analysis of forest fire fatalities in Southern Europe: Spain, Portugal, Greece and Sardinia (Italy). *International Journal of Wildland Fire*, *28*(2), 85. http://doi.org/10.1071/wf18004

[67] Ager, A. A., Preisler, H. K., Arca, B., Spano, D., & Salis, M. (2014). Wildfire risk estimation in the Mediterranean area. *Environmetrics*, 25(6), 384–396. http://doi.org/10.1002/env.2269

[68] Pasqualini, V., Oberti, P., Vigetta, S., Riffard, O., Panaïotis, C., Cannac, M., & Ferrat, L. (2011). A GIS-based multicriteria evaluation for aiding risk management Pinus pinaster Ait. Forests: A case study in Corsican island, western Mediterranean region. *Environmental Management*, 48(1), 38–56. http://doi.org/10.1007/s00267-011-9674-8

[69] Maire info, 2005. “La population double dans certains départements français en été, selon l'INSEE” (“The population in certain French regions doubles in summer, according to the INSEE”), Maire info [online]. Available at: http://www.maire-info.com/culture-sports-et-loisirs/tourisme/la-population-double-dans-certains-departements-francais-en-ete-selon-insee--article-6394 [accessed 21.05.2019].

[70] 20 Minutes, 2007. “Plus de touristes que d'habitants en Corse cet été” (“More tourists than locals in Corsica this summer”), 20 minutes [online]. Available at: https://www.20minutes.fr/marseille/191272-20071030-plus-touristes-habitants-corse-ete [accessed 21.05.2019].

[71] Eurostat, March, 2018. Tourism statistics at regional level. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tourism_statistics_at_regional_level [accessed 21.05.2019].

[72] Fusch, P. I., & Ness, L. R. (2015). Are We There Yet? Data Saturation in Qualitative Research Patricia. *The Qualitative Report*, 20(9), 1408–1416. http://doi.org/10.1097/HJH.0b013e32835fd32b

[73] Robert, S., Prévost, A., Fox, D., Trémélo, M., Robert, S., Prévost, A., … Pasqualini, V. (2015). Coastal Urbanization and Land Planning in Southern France. In *MEDCOAST 15, The Twelfth International Conference on the Mediterranean Coastal Environment* (pp. 119–130).

[74] Feild, L., Pruchno, R. A., Bewley, J., Lemay, E. P., & Levinsky, N. G. (2006). Using probability vs. nonprobability sampling to identify hard-to-access participants for health-related research: costs and contrasts. *Journal of Aging and Health*, 18(4), 565–83. http://doi.org/10.1177/0898264306291420

[75] Cahyanto, I., Pennington-Gray, L., Thapa, B., Srinivasan, S., Villegas, J., Matyas, C., & Kiousis, S. (2014). An empirical evaluation of the determinants of tourist’s hurricane evacuation decision making. *Journal of Destination Marketing and Management*, *2*(4), 253–265. http://doi.org/10.1016/j.jdmm.2013.10.003

[76] Field, A., 2015. Discovering statistics using IBM SPSS statistics. Sage publications.

[77] Faul, F., Erdfelder, E., Buchner, A., and Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. Behavior Research Methods, 41, 1149-1160.

[78] Phys.org, 2011. “Ibiza battles biggest wildfire in its history”, Phys.org [online]. Available at: https://phys.org/news/2011-05-ibiza-biggest-wildfire-history.html [accessed 12.06.2018].

[79] Guha-sapir, D., Hoyois, P., Wallemacq, P., & Below, R. (2017). Annual Disaster Statistical Review 2016: The numbers and trends. Centre for Research on the Epidemiology of Disasters (CRED). http://doi.org/10.1093/rof/rfs003

[80] The Telegraph, 2017. “700 tourists evacuated from Sicily by boat as wildfires continue to spread”, The Telegraph [online]. Available at:

http://www.telegraph.co.uk/news/2017/07/12/700-tourists-evacuated-sicily-boat-wildfirescontinue-spread/ [accessed 12.06.2018].

[81] The Independent, 2017. “Zante wildfires: Huge blaze sweeps tourist island as Greece declares state of emergency”, The Independent [online]. Available at: http://www.independent.co.uk/news/world/europe/zante-wildfires-latest-tourists-islandgreece-state-emergency-arson-stavros-kontonis-zakythnos-a7894631.html [accessed 12.06.2018].

[82] The Guardian, 2017. “Portugal forest fires under control after more than 60 deaths”, *The Guardian* [online]. Available at: https://www.theguardian.com/world/2017/jun/22/portugal-forest-fires-under-control [accessed 12.06.2018].

[83] BBC News, 2017. “France wildfires force mass evacuation”, *BBC News* [online]. Available at: http://www.bbc.com/news/world-europe-40725294 [accessed 12.06.2018].

[84] Ludbrook, J. (2008). Analysis of 2 x 2 tables of frequencies: matching test to experimental design. *International Journal of Epidemiology*, 37(6), 1430-1435. https://doi.org/10.1093/ije/dyn162

[85] Mouillot et al. (2005. Long-term forest dynamic after land abandonment in a fire prone Mediterranean landscape (central Corsica, France). *Landscape Ecology,* 20(1), 101-112. https://doi.org/10.1007/s10980-0004-1297-5