


ENVIRONMENTAL INSECURITY AND RESILIENT TERRITORIALITIES: A COMPARATIVE STUDY BETWEEN THE POPULATION'S REBALANCING IN CENTRAL REGION OF PORTUGAL IN 2017 AND VICTORIA (AUSTRALIA) IN 2009

**INSEGURANÇA AMBIENTAL E TERRITORIALIDADES RESILIENTES:
UM ESTUDO COMPARATIVO ENTRE O REEQUILÍBRIO DAS
POPULAÇÕES NA REGIÃO CENTRO DE PORTUGAL EM 2017 E
VITÓRIA (AUSTRÁLIA) EM 2009**

**INSÉCURITÉ ENVIRONNEMENTALE ET TERRITORIALITÉS
RÉSILIENTS: UNE ÉTUDE COMPARATIVE ENTRE LE RÉÉQUILIBRAGE
DES POPULATIONS DANS LA RÉGION CENTRALE DU PORTUGAL EN
2017 ET VICTORIA (AUSTRALIE) EN 2009**

Ricardo Oliveira¹

 0000-0002-7616-869X

rikacd@hotmail.com

¹ Licenciatura em Geografia e Mestrado em Dinâmicas Sociais Riscos Naturais e Tecnológicos. Pós-graduação em Gestão de Emergência e Resgate e possui o nível IV na qualificação de Bombeiro. Atualmente, é estudante de Doutorado no Instituto de Geografia e Ordenamento do Território (IGOT) na Universidade de Lisboa e está a desenvolver a sua tese de Doutorado sobre os Incêndios Florestais, "A exposição dos Incêndios Florestais no Centro de Portugal". É também autor e coautor de vários trabalhos científicos nesta área e ainda na dos riscos naturais e tecnológicos. ORCID: <https://orcid.org/0000-0002-7616-869X>. E-mail: rikacd@hotmail.com.

Artigo recebido em novembro de 2022 e aceito para publicação em maio de 2023.



Este artigo está licenciado sob uma Licença
Creative Commons Atribuição 4.0 Internacional.

ABSTRACT: A clear technological optimism gave us the idea that the answers during times of crisis would be universally resilient and effective. That same confidence in progress created the idea of a New Mankind, who was safeguarded from risks and threats. Even in favourable socioeconomic contexts, this protection is a myth. Old threats, such as wildfires, not only continue to disrupt daily routines, but they also require timely responses, high levels of resource mobilization and institutional organization. These factors are important to determine the degree of resilience demonstrated in rupture times. In fact, this flexibility, which helps to mitigate the risk of territorial precariousness, is even one of the factors that separates different populations by highlighting asymmetries between the most and the least prepared to meet further demanding conditions. This reflection will lead to the analysis of geo-humans' occurrences of wildfires complexes in Central Region of Portugal that occurred on October 15th and on June 17th of 2017, and in Victoria, Australia during the Black Saturday Bushfires which happened between February 7th to 9th.

Keywords: Time. Wildfires. Territorial precariousness. Resilience. Reterritorialization. Communities. Mobility capital. Financial resources.

RESUMO: Um claro otimismo tecnológico deu-nos a ideia de que as respostas em tempos de crise seriam universalmente resilientes e eficazes. Essa mesma confiança no progresso criou a ideia de um novo Homem, resguardado de riscos e ameaças. Mesmo em contextos socioeconômicos favoráveis, essa proteção é um mito. Antigas ameaças, como os incêndios florestais, não só continuam a perturbar as rotinas diárias, como exigem respostas atempadas, elevados níveis de mobilização de recursos e organização institucional. Esses fatores são importantes para determinar o grau de resiliência demonstrado em tempos de rutura. De facto, esta flexibilidade, que ajuda a mitigar o risco de precariedade territorial, é mesmo um dos fatores que separam diferentes populações ao evidenciar assimetrias entre os mais e os menos preparados para enfrentar condições mais exigentes. Esta reflexão conduzirá à análise das ocorrências *geo-humanas* de complexos de incêndios florestais na Região Centro de Portugal ocorridos a 15 de outubro e 17 de junho de 2017, e em Vitória, Austrália durante os incêndios florestais do *Black Saturday* ocorridos entre 7 e 9 de fevereiro de 2009.

Palavras-chave: Tempo. Incêndios florestais. Precariedade territorial. Resiliência. Reterritorialização. Capital mobilidade. Recursos financeiros.

RÉSUMÉ: Un clair optimisme technologique nous a donné l'idée que les réponses en temps de crise seraient universellement résilient et efficaces. Cette même confiance dans le progrès a créé l'idée d'un nouveau homme, protégé des risques et des menaces. Même dans des contextes socio-économiques favorables, cette protection est un mythe. Vieilles menaces telles que les incendies de forêt non seulement continuent de perturber les routines quotidiennes, mais avoir besoin des réponses rapides, des niveaux élevés de

mobilisation des ressources et réponse institutionnelle. Ces facteurs sont importants pour déterminer le noter de résilience en période de perturbation. En effet, cette flexibilité, qui contribue à atténuer le risque de précarité territoriale, est en réalité l'un des facteurs qui séparent les différentes populations en montrant des asymétries entre les plus et les moins préparés à affronter des conditions plus exigeantes. Cette réflexion conduira à l'analyse des occurrences géo-humaines des incendies de forêt dans la région centrale du Portugal qui se sont produits les 15 octobre et 17 juin 2017, et à Victoria, en Australie, lors des incendies de forêt du *Black Saturday* qui se sont produits entre le 7 et 9 février 2009.

Mots-clés: Temps. Incendies de forêt. Précarité territoriale. Résilience. Reterritorialisation. Mobilité des capitaux. Ressources financières.

INTRODUCTION

Despite the socio-economic, technological and scientific progress, there has not been an increase of the capacity for forecasting and active anticipation in the face of scenarios less favourable to comfort and safety. In fact, populations have not yet taken complete control over previous problems such as floods, volcanic eruptions or seismic episodes. In addition, human society is now exposed to new risks and vulnerability factors, which are largely associated with externalities of the so-called technological progress (BECK, 1992, 2006).

This double exposure, which is different from a social and spatial point of view, is associated with accumulated effects such as the unequal distribution of gains of progress, the externalities of urban-industrial models and the occurrence, in many cases uncontrollable, of crisis which are triggered by natural factors. Depending on the circumstances and issues such as spatial planning, these leave marks with more or less lasting effects. This can lead to an increase of the vulnerabilities, to the idea of an unpredictable and unstable world which has increasing signs of deregulation and inefficiency of the correction instruments. That is why natural risks are identified, but also, for example, social and technological risks, all of which are separated by diffuse boundaries.

From seismic events to active volcanism, from floods to wildfires and landslides or periods of drought, natural risks cannot fail to be associated with others that, in the social sphere, mitigate or amplify the effects of the former. The population's ageing; the unemployment, the spatial mobility barriers and the diseases are among the factors that condition the population's degree of a very differentiated spatial mobility capital - when facing critical crisis contexts.

Age, political and economic power, - and spatial mobility, on different scales and time is, in some circumstances, one of the most, or the only effective response to extreme events, the perception of risk, the level of literacy or the degree of organization of the institutional responses, are all variables that affect the degree and effectiveness of the responses.

To frame the dynamics of the individual or collective vulnerability, (HAESBAERT, 2004) develops the concept of deterritorialization, a terminology that identifies territorial

precariousness, loss of control and the shrinking of spatial options for those exposed to crisis contexts. According to this author, human vulnerability has a spatial component, deterritorialization may not imply the compulsory relocation of populations (in this case, Haesbaert states that it is a deterritorialization in situ) but it contributes to the degradation of spatiality and the shrinking of geographical options. This is the case when in urban areas, the space is fragmented, because a highway passes through a residential area.

In other circumstances, this loss temporary or permanent of living space implies coercive distancing (the so-called ex-situ deterritorialization, according to Haesbaert) from personal or collective living spaces. In this case, and as it has been the case that followed the construction of a dam, it may occur a more or less negotiation of the populations' relocation. For Rogério Haesbaert (2004), these dynamics of deterritorialization will be nothing more than the beginning of a new territorial reality, which may be individual or collective and that is called reterritorialization. Therefore, this is a question of a reorganization of the spatiality after a more or less prolonged moment of rupture.

The processes of ex-situ deterritorialization can occur in different contexts and rhythms. When this fragility is downstream and it causes changes in the soil, water, air, vegetation cover or any other ecological element, it is common to apply the concept of environmental displacement. In this case, the displacement reveals a spatial depletion. Nonetheless, it can also be a sign of the resilience of populations that mobilise funds in order to refuge themselves in a safe place. In this sense, an environmental displaced person will be anyone who, in a process of ex-situ deterritorialization (and consequent reterritorialization), departs from their daily territories by direct or indirect action of environmental imbalances. This displacement differs in terms of triggering factors which could be in the spatial scale, in the pace of mobility and its spatial scope and the number of people involved.

These precarious mobilities are almost always the result of slow or fast processes of degradation of ecological variables (FERNANDES, 2008). However, some flows of environmental displaced people are originated from unbalanced management models and from policies and practices which are not sustainable or less sensitive to the local communities.

On one hand the ecological degradation may have a natural origin - for example, a volcanic eruption or an earthquake. On the other hand, it can be enhanced by human factors such as (un) spatial planning. The ecological degradation may be associated with direct anthropic factors such as the construction of a dam; or oppositely with indirect ones such as desertification, pedological dynamics which are intensified by practices like the intensive agriculture or pastoralism. Having said that, there are differences, in terms of the velocity of occurrence, between fast events and slow events, which extend over time.

In addition to the upstream factors, the displaced people are also differentiated by the downstream dynamics. It is essential to consider the duration of the journey (short or long term), with or without returning to the place of departure, as well as the distance travelled between the origin and the point (s) of arrival.

These imbalances were reflected by (HOMER-DIXON, 1994) who, starting with the knowledge of Political Ecology, systematized the Resource Capture and Ecological

Marginalization models: in the first case, a group loses access to a resource due to the imposition of another group's power; it occurs the same in the second situation due to the degradation of the supply itself. Both procedures lead to a state of environmental deficit or ecological marginalization, which is the ultimate reason for loss of space and territorial precariousness.

It is in this context that wildfires, when they occur in populated geographical spaces, are events with a social impact. Not because of the origin, which will not be discussed here, but because of the socio-spatial and economic effects that they trigger, with degrees that may vary with the circumstances. This variation also includes the level and speed of recovery from a state of deterritorialization. According to Haesbaert, (2004) it is called reterritorialization and corresponds to the recovery, in situ or ex-situ, of the levels of security, comfort and self-controlled territoriality after a situation of crisis and disruption.

Our study aimed to demonstrate, on the one hand, how community response to a catastrophic event, such as a wildfire, is influenced not just by the event itself, but also by geographic and institutional contexts. The safety population option, on the other hand, is influenced by the degree of population mobility driven by geographical and other individual and collective variables.

Historically, the notion of waiting areas has been employed. As proposed by Musset (2022), waiting territories are becoming more relevant in modern societies. Waiting territories, defined by geographic areas in suspended and transient temporalities, can also be created by wildfire occurrences. The waiting territory can flow through the domains of everyday living and housing while waiting for assistance or the end of the fire. Individual attributes such as fear, revolt, aid in battling the fire, defence of the house, leaving or rushing away without adequate risk calculation influence the dynamics of these waiting regions (FERNANDES, 2008). The waiting territory can be another place where persons have already left the danger zone and are awaiting their return home or to an alternate region. In these waiting territories during the disturbance period the institutions can be more or less present and recover to daily life with different velocities.

MATERIALS AND METHODS

To assess the effects of wildfires on communities, political and technical reports were reviewed to determine the degree of recovery in each affected area. To compare both territories, data from the National Statistics Institute (INE) in Portugal and the Australian Bureau of Statistics (ABS) were collected and thus analysed. The data obtained was processed using the software's ArcGIS version 10.5.1 from ESRI, which allowed the elaboration of maps and the respective files exportation into an excel format which enabled the creation of tables.

Study areas and data collection

For this paper, three events were selected for comparison, ranging in time from the most recent to the oldest: Wildfires complexes (WC) occurred in Portugal's Central Region

(PCR) on October 15th, 2017, Pedrógão Grande and neighbouring municipalities WC started on June 17th, 2017, and WC of Kilmore West and Murrindindi during Black Saturday Busfire (BSB) occurred in the Australian State of Victoria (VIC) on February 7th to 9th, 2009. The following criteria were utilized in selecting events: i) the large number of victims, ii) the material and environmental damage, iii) their contemporaneity, iv) the social disruption they created, v) community mobilization in decision-making, and vi) the opportunities attained in risk mitigation. Each event will be examined in four categories: the vertical framing of the territory (from general to particular), a brief description of the event, meteorological and climatic conditions, and, ultimately, the geohuman framework and building structure.

Study area 1 – Wildfires complexes that occurred in Portugal Central Region on October 15th, of 2017

Territorial framework

Portugal is the westernmost country of the European continent, it is positioned in the western half of the Iberian Peninsula, hence bordering the north and east of Spain and the south and west of the Atlantic Ocean (FERNANDES, 2018). It has a total area of 92,090 km² (Figure 1). Its geographic location is influenced by the Mediterranean climate, which features rainy winters and hot, dry summers, resulting in an edaphoclimatic adaptation which exacerbates the wildfires issue (OLIVEIRA *et al.*, 2021). This combined hazard (natural and anthropogenic) triggers one of the most dangerous situations with serious social, economic, and environmental consequences. The majority of wildfires in Portugal result from anthropogenic actions and, in fact, the leftover burning is considered the most common cause (OLIVEIRA *et al.*, 2020). This part of a NUTS II region which was established by Decree-Law No. 46/89 of the 15th of February and is bounded to the north by the North Region, to the south by Alentejo, to the east by Spain, to the southwest by the Lisbon Metropolitan Area, and to the west by the Atlantic Ocean (Decreto-Lei 46/89 de 15 de Fevereiro, 1989). It can also be affirmed that it has surpassed all previous wildfire records in Portugal, including those verified in 2003 and 2005 (OLIVEIRA *et al.*, 2020; VIEGAS *et al.*, 2017). In fact, it accounts for more than half of the burnt land in Southern Europe for that year (CTI, 2017).

Synthetic description of the PCR - WC

On October 15th, 2017, there were 532 wildfire occurrences (Mainland Portugal), of which only a small number evolved into large wildfires, resulting in 51 fatalities, dozens of injuries (both serious and minor), with a record of approximately 500,000ha (CTI, 2017; VIEGAS *et al.*, 2019), of burnt areas, and severe environmental and socioeconomic impacts. Despite the large number of wildfires reported that day, only seven wildfires provoked severe damages and deadly victims, by order of ignition time: Seia, Lousã, Oliveira do Hospital, Sertã, Quiaios, and Vouzela (Figure 1).

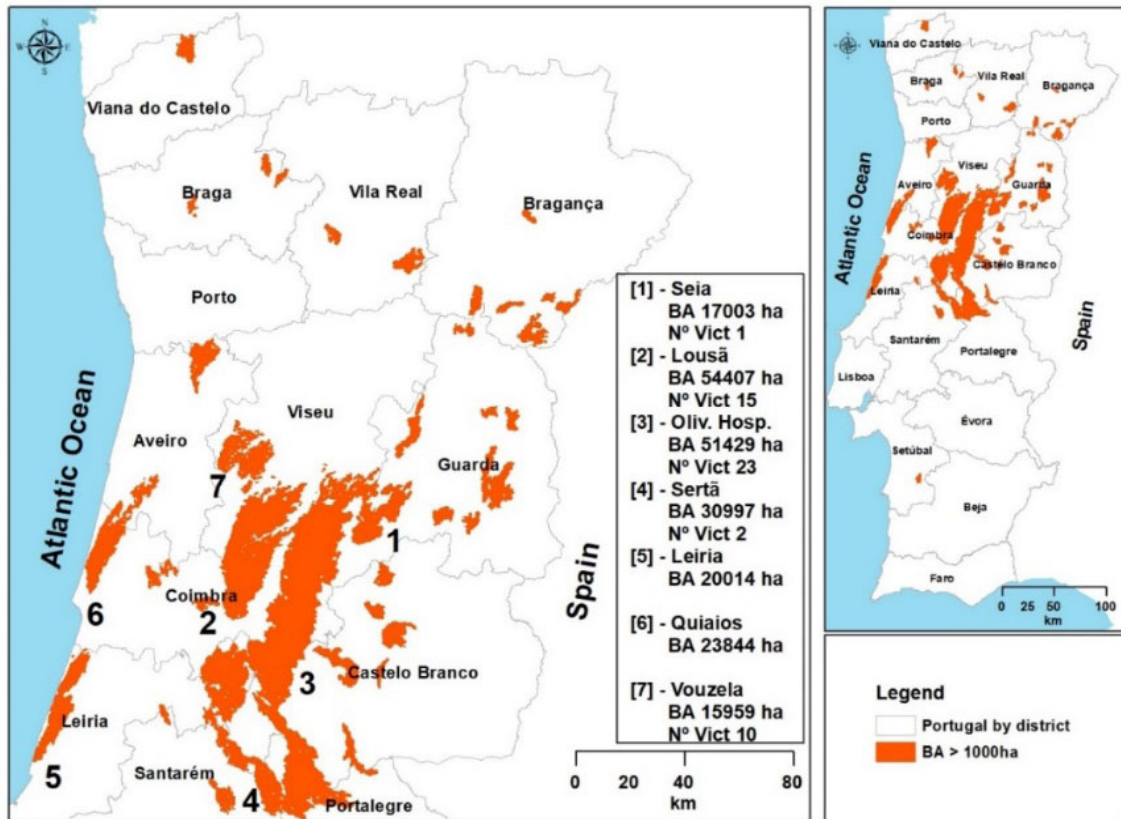


Figure 1. Distribution of the large wildfires of affected Portugal Central Region on October 15th of 2017.

Climate and meteorological conditions

In 2017, Mainland Portugal faced a water deficit due to the absence of rainfall in the earlier spring and summer, i.e., with the average rainfall being 70 % lower than the one between 1971 and 2000 (VIEGAS *et al.*, 2019). In October, two heatwaves were recorded, one of these from October 1st to 16th and the other from October 23th to 30th (NOVO *et al.*, 2018). As a result, October was the warmest month that there is a record of since 1931 and the driest in the previous 20 years.

This pyro meteorological scenario was exacerbated by the impact of category 3 hurricane Ophelia, which was developed on October 9th in a region that is positioned east in the Atlantic and achieved an high intensity. Until that moment, just one identical occurrence had ever been recorded, it happened on April 3rd, 1978 in Perth (Australia). Ophelia's pyro meteorological contribution was primarily due to: i) a strong drop in the atmospheric pressure field, an increase in the respective gradient, and intensification of the south/southeast flow, with a rotation to south/southwest when closer to Mainland Portugal (16-22 hours on October 15th); as well as ii) a temporal coincidence on October 15th between the increase in wind speed and turbulence and the daily minimum and maximum relative humidity and air temperature and, iii) the involvement in the advection of dry and hot air, which was widespread over the country around 7 p.m. on October 15th,

intensifying the south/southeast flow (CTI, 2017). These unusual triad (extreme drought, heatwaves and the effect of the Ophelia hurricane) exacerbated the earlier breakouts, fire behaviour and the inability to manage the fire spreads.

Geohuman framework and structure of the settlements

Two dimensions were used in order to synthesize and standardize the data that allows for the comparison between the geohuman framework and the settlements' structure across the different territories: i) population dynamics in relation to each season of the year, and ii) the total proximate number of human structures impacted by wildfires in each WC.

According to preliminary data collected by the 2021 Census a total of 2227,912 people reside within in the PCR, of which 1059,816 are men (48 %) and 1168,096 are women (52 %). Nowadays, the region's effective population is identical to that of the 1970s, which contributes for 21.5 % of the overall National population, i.e., the lowest percentage in the last five decades. In 1960, the PCR concentrated 27.4 % of the total National population (CCDRC-Comissão de Coordenação e Desenvolvimento Regional do Centro, 2021). Regarding the aging index that concerns PCR, it is situated on 206.8 (elders per 100 persons younger than 15 years old in a specific population) which is the opposite from Portugal Mainland that is situated on 169.6 (INE, 2021). PCR is comprised by 100 municipalities and in the last decade [2011-2021], 87 of those municipalities experienced depopulation, with only 13 recording a population growth.

The settlement structure in Portugal varies widely between places, municipalities and regions. The rural environment is interspersed with forestry and subsistence agriculture, as well as human structures as for example, isolated houses, dwellings, settlements, and small villages (which are comprised by less than ten continuous buildings). Thus, this human structure typology is more difficult for a wildfire with less than 100ha, since it does not generate impacts in WUI or Wildland Industrial Interface (WII) zones.

In these WC, nearly to 500,000 ha were burned and this area was dispersed in over than 50 municipalities (half of those are part of the PCR), it has also destroyed more than 7,000 houses which were divided between 2,000 of 1st accommodation and 5,000 of 2nd accommodation (MAAVIM, 2018) and 403 industrial facilities (VIEGAS *et al.*, 2019).

Study area 2 - Pedrógão Grande and neighbouring municipalities wildfire complex started on June 17th of 2017

Territorial framework

Despite being listed as the Pedrógão Grande Wildfire (PGW), this event was in fact a composite of five major wildfires, including Pedrógão Grande, Gois, Figueiró dos Vinhos, Penela and Ansião. To simplify the description of the geographical framework, we use the burnt area that exceeds 10 % of the municipality's total area as a reference.

Thus, from the highest to the less burnt area by municipality: i) in the district of Leiria, Central Region (CR), the municipality of Figueiró dos Vinhos, which is subdivided into four civil parishes, is bounded to the north by Lousã, east by Castanheira de Pera and Pedrógão Grande, southeast by Sertã, south by Alvaiázere, Ansião, and Penela, and to the northwest by Miranda do Corvo, ii) furthermore, in the district of Leiria CR, the municipality of Pedrógão Grande is bounded to the northwest by Castanheira de Pera, east by Góis and Pampilhosa da Serra, southeast by Sertã, and to the west by Figueiró dos Vinhos, iii) finally located in the district of Coimbra CR, the municipality of Góis is subdivided into four parishes, and is therefore bounded to the north by Arganil, east by Pampilhosa da Serra, southeast by Pedrógão Grande and Castanheira de Pera, west by Lousã and to the northwest by Vila Nova de Poiares (Figure 2).

Synthetic description of PGW

The WC that started on June 17th, 2017 in Pedrógão Grande and its neighbouring municipalities (Figure 2) will be remembered as one of the most devastating natural and anthropogenic disasters in Portugal and one of the deadliest in Europe since it has recorded 65 fatalities and injured over 250 others while burning 45,328ha (OLIVEIRA *et al.*, 2020).

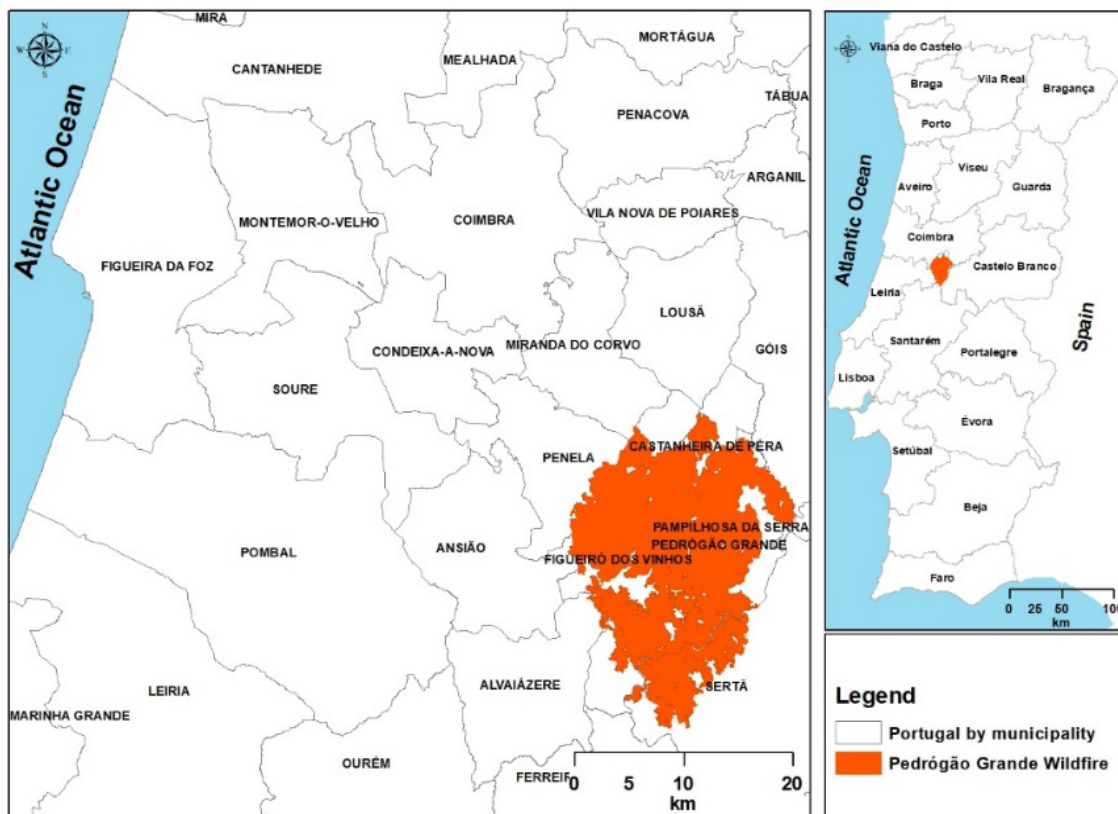


Figure 2. Pedrógão Grande Wildfire.

Climate and meteorological conditions

As previously mentioned in the year of 2017, the country's climate condition throughout spring and early summer was defined by extreme drought, which was a result of the country's rainfall deficit. According to the Meteorological Agency, on June 17th, 80 % of the country was under a serious drought. Between the 16th and 22nd of June, the maximum temperatures throughout the Mainland Territory exceeded 30 °C, with the relative air humidity levels below 30 %, indicating therefore hot and dry days. The weather forecast for the 16th predicted a very hot and dry day. On the 17th, the relative humidity levels decreased to under the 20 % during the day period. In general, the wind speed was around 25 km/h with no discernible direction (erratic) and fluctuating between NW and NE. To the 17th, stronger gusts of wind were observed at the stations Ansião (15:00), Lousã (20:00) and Proença-a-Nova (18:00), with values of 40, 66, and 85 km/h, respectively, with furthermore a main direction of NE, which is related to the local convective phenomena.

The important interaction and influence that occurred between the fire and the atmosphere was one of the distinct features of the PGW. This interaction is usually present, especially in large fires. However, in this situation, it is assumed to be of enormous relevance, especially on the first day of progression. The interaction of the atmosphere and fire is a topic of which there is still relatively little understanding, which is why it has been a long-standing research issue until that moment namely Countryman, 1964; Carrier *et al.* 1985; Finney; McAllister, 2011; Coen; Riggan, 2014, Werth *et al.*, 2016 c.f. (VIEGAS *et al.*, 2017).

This is especially important in the case of large fires, where the convection column might reach several hundred meters and interact extensively with the lower layers of the atmosphere, making the fire's behaviour highly sensitive to the atmospheric factors. Brown and Davis (1973) claim that the proximity of a thunderstorm to a fire can effect it at a distance of more than 8km via "downbursts" or descending currents from cumulonimbus convective cells. According to the researchers, these currents have a rapid start but a brief duration, ranging from 15 to 30 minutes, however it can last longer. When they reach the ground, they spread out radially, with the flow determined by terrain and the relative velocity of the convective cell (VIEGAS *et al.*, 2017).

Geohuman framework and structure of the settlements

The Mainland Interior has shown a progressive trend of depopulation over the previous decades, which has undoubtedly contributed to an increase in the ageing index, transforming for this reason these communities into repulsive and undesirable areas for the young people. In absolute value of inhabitants, the respective percentage of males according to the descending order of the municipality of i) Figueiró dos Vinhos is 5,296 (47,2%); ii) Gois is 3,806 (46,08%); iii) Pedrógão Grande is 3,392 (47,49%); iv) Castanheira de Pera is 2,647 (47,10%). As previously noted, the gender distribution

displays that the female gender has a longer expected lifetime than the males. When paired with an aging population, this longevity becomes more pronounced. The ageing index observed in Mainland Portugal is 169.9, which, compared with other countries, indicates an aged population. When compared to the affected municipalities, it doubles in Góis, the oldest concerned municipality, with an index of 310.5, followed by Pedrógão Grande with 302.1, Castanheira de Pera with 295.9, and Figueiró dos Vinhos with 277.8.

In all the studied municipalities, the population distribution by activity sector transitioned from primary to secondary and tertiary. This transition among sectors of activity is the result of a social transformation that has occurred in Portugal over the last five decades and has also accompanied the level of education, which has become increasingly interconnected with the territory's urbanization and industrialization in a rural environment. In the early 1980s, Pedrógão Grande and Castanheira de Pera began to lose employees in the secondary sector, whereas Figueiró dos Vinhos registered developments in the secondary sector until 2000, then followed the other peripheral municipalities. This loss of employment in the secondary sector indicates when numerous industries have closed or relocated in a specific region. Those who lack adequate qualifications to access the tertiary sector will be compelled to seek employment outside. The migration contributes to an increase in the population ageing index, which, in certain municipalities, is double when compared to the national average.

As described in section "Study area 1" the settlement structure of Portugal varies widely, even across short distances. A survey of impacted properties was conducted in all municipalities to identify candidates for rebuilding or rehabilitation assistance. By using a collaborative platform named "FireHub 2017", it was possible to georeferenced 1,043 structures that were directly harmed by the PGW and are distributed between 1st and 2nd accommodations. Structures that were in ruins at the time of the event were not counted in terms of impact.

Study area 3 – Black Saturday Bushfires occurred in Australian State of Victoria on February 7th to 9th of 2010

Territorial framework

The State of VIC is located in the southwest of the Australian continent, bordering two states, in the north with New South Wales (NSW), in the west South Australia (SA), and in the east and south lays the Pacific Ocean with 1,000 km of coastline (Figure 3). Despite being the smallest state in terms of area, as illustrated in Figure 3, VIC is divided into ten biogeographic areas with well-defined edaphoclimatic zones (EBACH, 2012). These biogeographic zones combined, produce the most biodiverse State in Australia, with geomorphology, climate, vegetation, and animals that are distinct from the rest of the continent (EBACH, 2012). Aside from the dominant climate, lengthy periods of dryness and low relative humidity increase the hazard of bushfires in VIC. This geographic region

is characterised by a convergence of features (topography, land cover, climate, and climatic circumstances) that combine to make it one of the most extreme pyro environments worldwide (MCCOLL-GAUSDEN *et al.*, 2020).

Synthetic description of BSB

On February 7th, 2009, around 50 bushfires erupted in the state of VIC, resulting in 173 fatalities, more than 430 injuries (both major and minor) and a total burnt area of roughly 430,000ha. These events will be remembered as the BSB in the Australian’s forest fire history (MCGOURTY J, 2009). Regardless of the significant number of occurrences, most were promptly resolved, with only six which escalated into big fires: Beechworth, Bunyip, Churchill, Redsdale, Kilmore, and Murrindindi. The last two are the Kilmore West and Murrindindi bushfires, which were responsible for 121 and 38 respectively of the 173 deaths and were chosen as case studies due to the similarities with the PCR wildfires in the large number of casualties, burnt area, and major social, environmental, and economic repercussions (Figure 3).

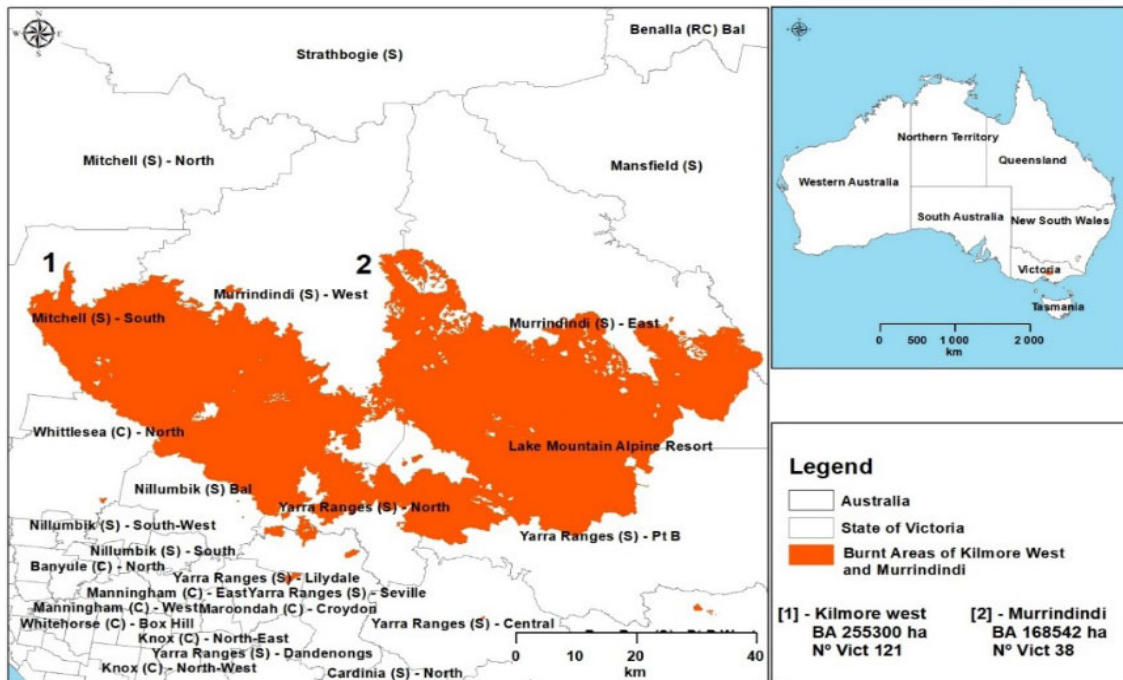


Figure 3. Kilmore and Murrindindi Bushfires during BSB.

Meteorological and climate conditions

The weather in VIC was extremely dried on February 7th, with temperatures exceeding 45 °C in numerous locations. The changes in wind speed and direction combined with the interaction with the atmosphere’s vertical structure, resulted in pyrocumulonimbus storms, which created lightning and therefore, ignited new bushfires (BoM, 2009). On the

7th and 8th of February, the Fire Danger Index, which was calibrated to range from 0 to 100, reached levels of 230 due to the exceptional meteorological conditions that occurred during the BSB. Large, burnt areas, fatalities and serious material and environmental damage, are the main consequence of those circumstances, a significant part of them are the weather and climate conditions (BoM, 2009).

Geohuman framework and structure of the settlements

Population areas ranging from 200 in Strat Creek to 6,500 in Wallan constitute the geohuman framework of the areas affected by the two most devastating bushfires. Clonbinane, Heathcote Junction, Hazeldene, Upper Plenty, Kinglake, Kinglake West, Yhittlesea, Strathewen, Arthurs Creek, St. Andrews, Steeles Creek, Toolangi, and Yarra Glenn have been the worst urban areas in Kilmore West, while Narberthong and Marysville were the worst in Murrindindi (OLIVEIRA *et al.*, 2010). In these 22 metropolitan locations a total of 37,943 inhabitants (49.62% male and 50.37% female) were affected (ABS, 2010).

The WUI in Australia differs from the WUI in Portugal, because the preponderance of structures in Portugal was masonry, characterized by heavy materials such as stone, bricks or concrete, which are far more durable than timber, which is predominant in Australia WUI. The main difference is in the materials used; whereas the dwelling in Portugal is resistant, in Australia it is resilient.

However, the settlement structure is a dynamic reality that does not always correspond to the quantitative rigidity that is suggested by the statistics. As a result of BSB, 78 settlements were directly impacted, more than 2,000 houses were destroyed and more than 60 industries went out of business (OLIVEIRA *et al.*, 2010).

RESULTS AND DISCUSSION

Limitations to study development

The following limitations linked to the study's development: i) physical distance between Portugal and Australia, which inhibits visits; ii) the data collected from various authors' perspectives was used to comprehend Australian case, even though these studies had stark differences from the personal experience that first author had as operational and technician to analysed the Portuguese cases; iii) seven years between events; and iv) different social dynamics which present an evolution of thinking, leading to the outdated information in both territories.

Human effects and consequences of the disruption of a territorial context

The primary human consequence of the studied wildfires in is the large number of deaths and severe injuries they caused (Table 1). Wildfires usually affect small places with few people who are well acquainted with one another and for that reason, only these

two variables, when considered separately, are indicative of the degree of disruption in communities. The breakdown of casualties by socioeconomic class, age, and sex reveals that the wildfires had an indiscriminate and transversal impact in all places, therefore affecting people from all classes.

Table 1. Wildfires in study.

Ref.	Name	Date	Nº victims	Nº injuries	Nº aff. houses	Nº aff. industrial units	BA (ha)
1	WC-PCR	Oct 15th, 2017	51	70	7000	403	500 000
2	WC- Pedrógão Grande	Jun 17th, 2017	65	*254	1043	ND	45 328
3	Kil. and Murr (BSB)	Feb 7th, 2009	159	**414	***2000	ND	255 300

Legend: * Viegas *et al.*, 2017; ** Cameron *et al.*, 2009; *** Oliveira *et al.*, 2010.

On October 15th, 2017, there were 532 wildfires (Mainland Portugal). Whereas most of them were immediately controlled, a small number of them developed into large fires, culminating in 51 fatalities. Ten days after the WC, the Civil Protection released a list identifying 45 fatal casualties and two missing people from the affected areas. The oldest man had 81 years and the younger 29 years, the oldest female had 93 years and the younger 30 years, and the average age was therefore 34 years for the males and 37 years for females.

Although all the 65 deadly victims of PGWC were identified, by legal order, the identification list remains in secret, as judgment sessions of the mega judicial process are still taking place in the Leiria Courts of Law.

Seven large fires began from the approximately 50 occurrences in the State of VIC on February 7th, 2009: Beechworth, Bunyip, Churchill, Redsdale, Kilmore, and Murrindindi. It depicts the geographic dispersion of human casualties, emphasizes the consequences of these two fires, with 121 deaths in Kilmore and 38 in Murrindindi, which summed up in 159 of the 173 fatalities recorded on that day.

According to the statistics, 100 men and 73 women died. Both men and women were on average 48 years old. There were 23 casualties under the age of 17, the youngest victim being only 8 months old. The death of an entire family nuclei, with the loss of a family of five components being reported (MCGOURTY J, 2009). The mortality rate in Marysville (Murrindindi WC) exceeds 6.5 %, the value of this index in Strathewen (Kilmore WC) rises to 13.5 %. This causes severe social disruption that, on a small scale, demands high degrees of resilience to recover from the psychological impacts of the event. This is the one-day geohuman scenario, which adds 25 % to the total number of deaths caused by bushfires in Australia after 1850 (696) with 173 recorded victims. In addition to the deadly victims, there are still injured people on BSB, in fact, during the first 72 hours, 414 people were hospitalized at the Melbourne's Alfred Hospital (CAMERON *et al.*, 2009).

WUI-related issues have had serious economic consequences in recent decades (OLIVEIRA *et al.*, 2020; 2021). As mentioned previously the WUI vary among countries and between places within the same country. The impacts caused by WC of PCR and Pedrogão Grande were severe, with massive dispersion throughout the territory, which affected many infrastructures. In opposite to PGW who recorded 1,043 houses destroyed, the WC of PCR ruined near 7,000 houses and 403 industries across several industrial parks was completely wrecked. Until that episode, it was never recorded a problem caused by wildfires like that in the industrial parks. Two different aid programs were created to recovered the affected structures: i) Support Program the Permanent Housing Recovery (Decreto-Lei n.º142/2017 de 14 de novembro) for the reconstruction of permanent and second houses and the Support System for the Restoration of Competitiveness and Productive Capacities (Decreto-Lei n.º 135-B/2017 de 03 de novembro) to recovery industrial facilities, both aim to promote the livelihood of communities.

If deaths are the only quantitative data concerning the social and geographic effects of wildfires downstream, additional data is needed to examine the geohuman and territorial disturbance produced by bushfire of Kilmore West and Murrindindi. In Marysville (Murrindindi), over 80 % of the building space has been damaged. This tragedy has left also a significant economic impact in a region that relies heavily on its tourism. This activity has contributed for nearly 40% of the overall economic activity in Marysville and mainly in the areas of hotels and dining. The wildfire burned 530 residences, 95 % of Marysville's retail business, and the whole shopping centre. It is estimated that half of the jobs in the tourism industry were lost. The town of Kinglake (Kilmore West) was mostly sustained by agriculture, tourism, trade and some minor industries. As a result of the tragedy, 328 homes were damaged, as well as other assets such as kindergartens, primary schools, and churches. In view of these social implications, a government and civil society response was required. The goal of the plan was to foster synergies which would help the local economy to grow and be restructured (NIXON, 2009).

From pre-events to short term reterritorialization

The following chronology of events is based on the assumption that the time is absolute and linear and does not discuss the heterochronic principle. The process of reterritorialization of impacted areas was subdivided into the following phases: i) pre-event; ii) operational and humanitarian response; and lastly, geohuman reterritorialization (Figure 4). Each of these phases have a distinct waiting time which is based on one hand on the individual or community mobility capital, and on the other hand, on the individual and community resilience and resilience on another. Waiting, at any given time, function as a territory of consecutive cycles of reterritorialization. Previous concepts of deterritorialization on the one hand and territorialization on the other, supported by incomplete theories such as pull and push, where the interaction between space and time in between was uninteresting and ignored, were replaced because there was a whole world

of occurrences between the event and reterritorialization at each moment. Furthermore, each phase is described in detail, constantly referring to the associated processes, as well as the time and territory in which they happened.

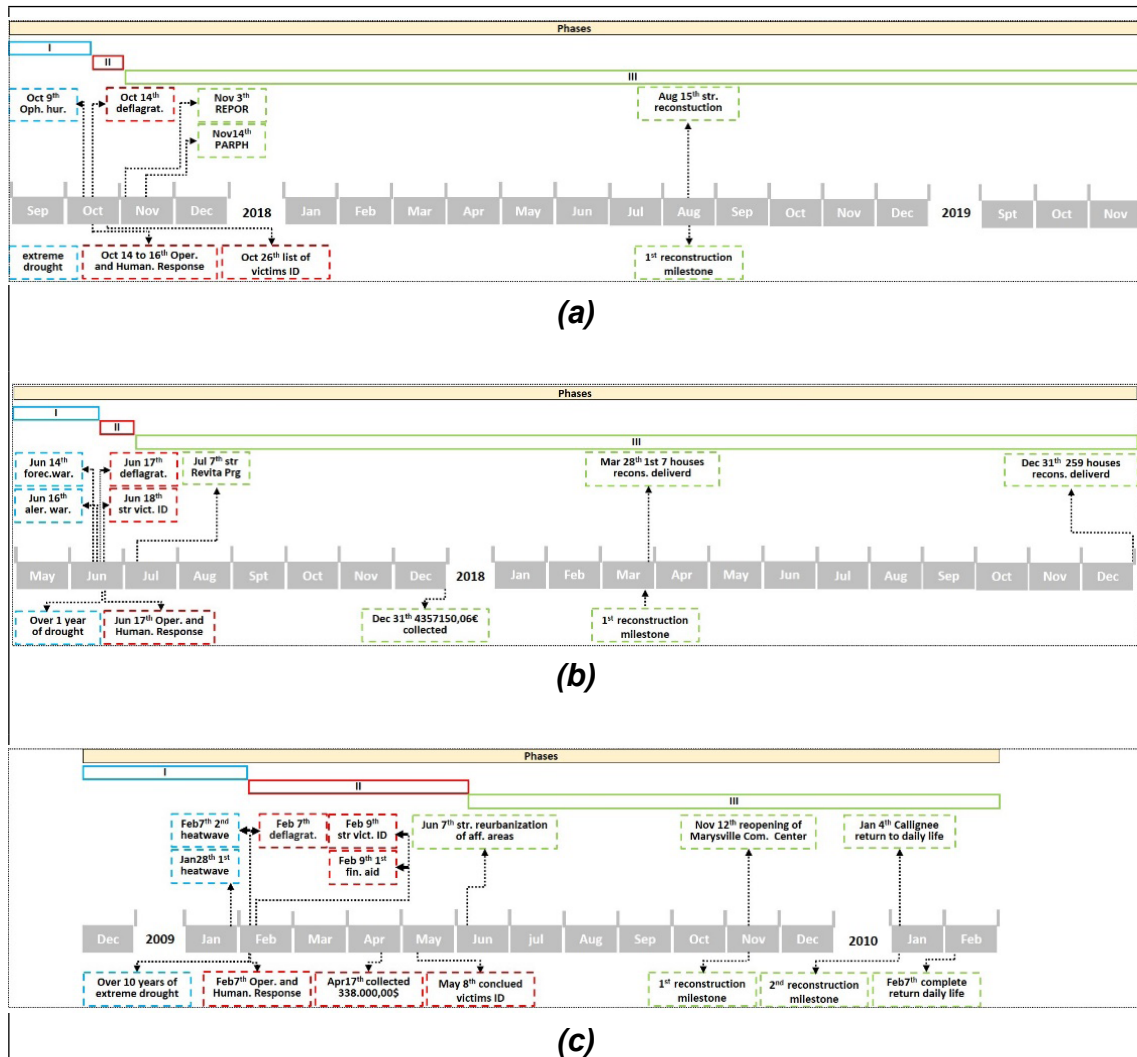


Figure 4. Timeline events (a) PCR wildfires complex's (b) Pedrógão Grande wildfire complex (c) Black Saturday Bushfires.

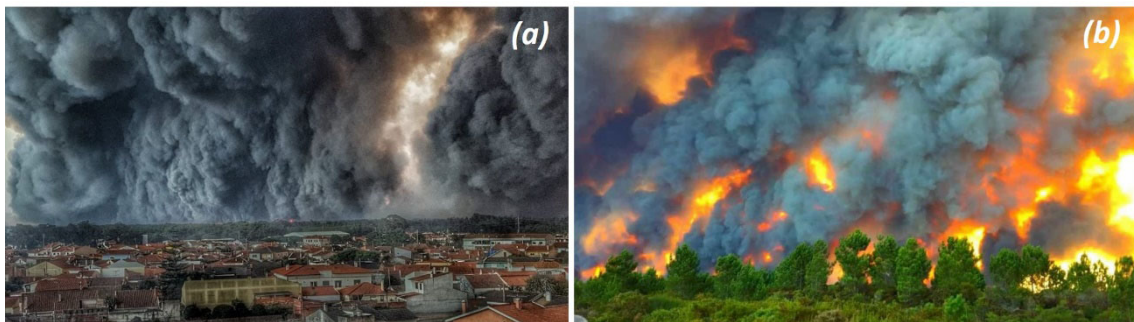
Although the anthropogenicity has a significant cause on the events under study, it cannot be isolated in the pre-phase from natural factors such as meteorology. It can be seen as a common pattern in the pre-phase, were the more or less extended periods of severe drought, heatwaves, and extreme climate phenomena like hurricanes were not felt in latitudes such as Portugal.

According to a rigid calendar imposed exclusively by political agenda, the Defense System Against Wildfires (DECIF) is divided in five phases which vary from Alfa to Eco (AUTORIDADE NACIONAL DE PROTEÇÃO CIVIL, 2017). This imposition can lead to appraisal errors, once the seasons of the year are no longer temporally delimited as

they formerly were. This calendar does not take into consideration essential factors such as meteorological conditions, dried days in late winter, early spring or late fall. The critical period of wildfire season in Portugal, known as phase Charlie, starts on July 1st and ends on September 30th and usually coincides with the summer season in the Northern hemisphere.

From July 1st to September 30th (phase Charlie), the terrestrial resources consisted of 9,740 firefighters, which correspond to 2,243 teams and 2,065 vehicles, supported by 48 aerial means. On September 30th, 2017, as legally mandated, a significant part of the DECIF was disassembled and from October 1st to October 31th the terrestrial mechanisms decreased almost for half with 5,518 firefighters, which correspond to 1,285 teams and 1,307 vehicles, supported with 22 aerial means. The idea to reduce the terrestrial and aerial means was based purely on economical intentions.

Four months after the worst disaster ever recorded in Portugal, in the aftermath of the PGWC, Portugal faced another unspeakable situation that occurred on October 15th, 2017. Facing the facts (Figure 5), despite the reduction on the DEFICI the outcome of the WC may not appear different once the operational and humanitarian response was given by the massive number of volunteer's firefighters who professionally controlled the wildfires.



Source: Diário de Notícias.

Figure 5. (a) Aspect of wildfire near Vieira de Leiria. (b) Progression of Pinhal de Leiria wildfire.

Despite the extensive burnt areas, the PGWC maintain a territorial concentration. Although its management was complex, especially due to the lack of experience in analogous situations, it allowed for the accurate data collection regarding the duration and instruments used. The occurrence of PGWC in the phase Bravo of the (DECIF) is similar in human and material resources (terrestrial and aerial), with phase Delta, with 6,607 firefighters, which correspond to 1,561 teams and 1,514 vehicles, supported by 32 aerial means (Autoridade Nacional de Proteção Civil, 2017) across National Territory, indicating the same calendar dictatorship. On June 17th an eventual incorrect assessment of the potential of evolution of an ignition occurred near Pedrógão Grande led to a large wildfire that spread into the neighbouring municipalities. The potential doubts remaining at that moment, were dissipated as the DECIF demonstrated that the maladjustment to not take into account the meteorological severity experienced in that period, led to the worst disaster caused by wildfires ever reported in Portugal.

If the DEFCEI was at its maximum readiness and the initial assessment had been more accurate, the outcome of the wildfire could have been different, however, once the window of opportunity in the initial attack was lost, the influence of the number of means faded (Figure 6) even with subsidiarity among fire brigades in the triangulation territory, which were mentioned in the legal diplomas.



Source: Espresso.

Figure 6. (a) Aspect of the PGW near to crossroad of Figueiró dos Vinhos.
(b) Attempt to mitigate the damages of a house in Pedrógão Grande.

Similar in territorial dispersion as PCR – WC, the BSB lead the Australian authorities to launch a complex operational and humanitarian response. On February 7th, 2009, the Country Fire Authority (the Government Agency responsible for the private regions) summoned around 12,000 firefighters, including operational and technical professionals from the Incident Control Centre (ICC). This operation encompassed 1,000 terrestrial vehicles and 50 aircraft ready to fight occurrences in the air. Due to the inclement weather, the operation could not be carried out in a safe manner, rendering useless these aerial techniques (TEAGUE, 2009). The Department of Sustainability and Environment (the Government Agency responsible for public spaces) provided an additional 2,347 firefighters. Neighbouring States of New South Wales, Tasmania, New Zealand, and Australia's Capital Territory were among the States that participated in the operational response. The Melbourne Metropolitan Fire Service, which is in charge of the Melbourne metropolitan region, also helped. Military assistance was provided by the Commonwealth. Twenty level 3 ICC technicians were on standby at pre-determined sites around the state of VIC. One of the pre-selected places was Kilmore Fire Station (TEAGUE, 2009).

During the relief operations, 1,386 incidences were documented, with 592 of them occurring in herbaceous and shrub areas, 263 in buildings, and 156 being false alarms. The majority of these outbreaks were immediately extinguished. However, 47 bushfires were still active, thus having the potential to evolve to a larger scale (Figure 7). Despite all the preparedness, the meteorological conditions enabled the fire to proceed as predicted and with a similar outcome pattern.

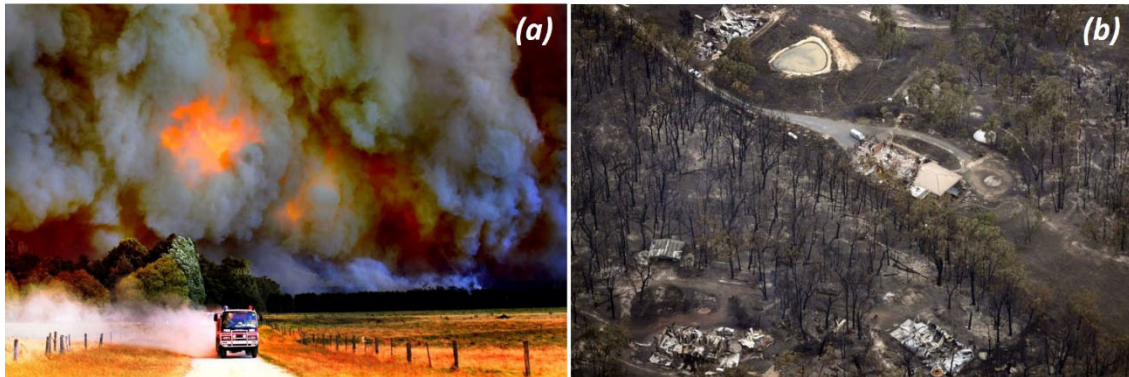


Figure 7. (a) Aspect of fire behaviour on BSB. Source: <https://www.sidmartinbio.org/>. (b) Damages in the WUI at Murrindind. Source: ABC news.

In the three mega events, the operational and humanitarian intervention responses to the victims were quite effective. The speed with which civil society, government, NGOs, and business enterprises responded, as well as the network organization that emerged, indicates significant efficacy levels.

Even though the tragedy of June 17th was so close in time and so alive in collective memory, on October 15th, once again the need for answers let the decision makers under pressure, and even during the aftermath the government ordered by second time in 2017, to the same technical committee who were tasked with investigating the fire's behaviour, community resilience, and spatial planning to elaborate new reports and propose a new legislative framework.

In VIC at the request of a panel of Supreme Court of Victoria Judges, a team of researchers from all around the world was less than 48 hours later in the field, various interim reports were prepared, and they were compiled into a single document called the Victorian Bushfire Royal Commission - Interim Report in August 2009.

Following the wildfires that devastated Portugal's Central Region in two different times, an unparalleled wave of solidarity erupted in Portugal, with numerous institutions, corporations, and anonymous people joining together in their desire and effort to support the victims. In the aftermath of October 15th, two assistance programs, REPOR and PARHP, were established.

The REPOR was established on November 3, 2017 by Decree-Law No. 135-B/2017 as a mechanism to aid industries affected by large fires that devastated multiple municipalities in North and Central Portugal. This initiative was essential in order to retain employment since, as previously said, the affected areas are, in terms of population, ageing. Due to the pandemic crisis that has been affecting the world since the beginning of 2020 and nearly three years after the events, the financial assistance was targeted to complete the reconstruction of the facilities. This delay reveals, on one hand, the weight of Portuguese bureaucracy, which has resulted in an incomprehensible complexity of processes that should be light and transparent; and, on the other hand, it is clear that the

political time is not correlated to the time of events, as the responses do not have the desired effect in due course.

The PARPH was established on November 14, 2017 by Decree-Law No. 142/2017 to support the building, reconstruction, conservation, or acquisition of housing for families whose permanent home has been destroyed or damaged by fire. The purpose of this program is to provide assistance to people and households whose permanent residences were damaged or destroyed by large fires in municipalities designated by government decree. Public persons and households permanently residing in residences damaged or destroyed by fire, as recognized in surveys conducted for this reason, were eligible to participate in this program.

Once the catastrophe of Pedrógão Grande was recognised, the Portuguese civil society engagement emerged as the biggest solidary wave ever recorded until that moment. Companies, banks, TV shows, beneficiary musical events, and other initiatives provided monetary help and also with simple donations. The monetary assistance was directed into a grey area of bank accounts that illegally favoured certain persons over others. After the problem was made public, a legal procedure was established, and the account holder was removed. The management of this Fund, which has a value of more than 4 million euros, was entrusted to a newfound and new entrusted Foundation (Calouste Gulbenkian).

To carrying out the mission entrusted to Calouste Gulbenkian Foundation, they sought, in a first phase, to respond to the formally addressed requests by the entities which, in the field, identified (and validated) the most immediate peoples' needs, namely housing and livelihood activities. The Foundation supported not only with post-emergency assistance, but also aimed together with local entities, initiatives and projects to improve the quality of the population's life and to add value to the existing resources. This action, aligned with the Calouste Gulbenkian Foundation's objectives, results in a more comprehensive look at the consequences of the tragedy. It also aims to contribute in a way so that, after the demobilization of solidarity and volunteer movements, local populations and organizations are endowed with resources that allow them to move forward and believe in their ability to get back on their feet.

The planning of the actions was established in a protocol with the donors. In order to facilitate the action, the granted support was organized into 5 areas: housing reconstruction, replacement of losses in subsistence activities, reinforcement of the response capacity of local institutions, enhancement of human potential and combat to loneliness and isolation, so exacerbate on that areas.

On February 9th, 2009, less than 48 hours after the BSB the Federal Government declared a relief package of \$10 million Australian dollars available for people who had lost their homes or required medical care. The Victorian government's Department of Human Services also provided emergency assistance in the total sum of \$1,067 for each impacted person. A fund that gathered a total of \$372 million was used to provide assistance to the victims. Another \$315 million was provided by the Red Cross. A total of 75 businesses, both public and private, offered millions of dollars in products and services

to help those affected by the bushfires. The Salvation Army conducted a fundraiser and raised \$17.5 million. The banking firms contributed \$3 million, split among the three major institutions: ANZ, Community Bank, and Westpac. Nine Network television network was embroiled in the Australian bushfires and floods of 2009 and planned a series of concerts to raise funds. Coldplay and Kings of Leon, for example, performed for free. The events gathered about 118,000 spectators and provided a total of \$8.8 million in ticket sales. The full sum was later donated to the victims of the fires, as well as those affected by the Queensland floods.

The response to the catastrophe was prompt and unwavering, but the area across where relief was disseminated was also enormous. A donation management fund and a regulating authority were also established. As of February, this institution, which was also approved by the Premier of VIC, has as its main objective the distribution of funds by sectors of activity (VICTORIAN BUSHFIRE APPEAL FUND, 2014). According to indemnities obtained by the Insurance Council of Australia the global monetary cost of BSB was estimated at \$1.2 billion Australian dollars as of April 30th, 2009 (TEAGUE, 2009). This disaster exposed a feature in the insurance industry's structure that ensured the financial circumstances for a prompt replacement of the territorial context. A survey was conducted about the peoples' requirements in the impacted areas, including children at risk, houses damaged, basic survival needs, and recovery plans, at the request of the State Statistical Agency (MCKENZIE; CANTERFORD, 2018).

In Portugal, until the PCR fires of 2017, the number of political or operational leaders formally prosecuted and held responsible was residual. Since that date, political leaders, namely the mayors and operational managers such as district level and fire brigade commanders, have been prosecuted in a mega judicial process. In order to maintain the balance and keep the trust capital among justice and citizens, a legal action was taken which involved over 5,000 people against the power distributor SP AusNet and the asset manager Utility Services Group after the Victorian Bushfires Royal Commission found that the Kilmore East-Kinglake bushfire was caused by an ageing SP AusNet power line. The Victoria Supreme Court has approved a \$494 million pay out to victims of the deadly 2009 BSB, and it is considered to be the biggest class action in Australia's legal history.

Each process constitutes a milestone for the justice system's legal act on wildfire issues. Nevertheless, the differences between both should be referred to, namely the time elapsed in each of the processes; nearly five years until the sentence is ratified by the Honourable Judge of the Supreme Court in Victoria; and nearly five years in Portugal, but without any sentence being issued so far. Despite the fact that SP AusNet is a multinational corporation with headquarters in Singapore, it was ordered to indemnify and be held liable for the upkeep of infrastructures to prevent future disaster. This legal decision is a prime example of distance responsibility between the headquarters of organizations, governments, or countries and the locations of the events. In Portugal, so far, none of the companies listed in the process, namely powerline distributors or fuel lanes managers, have been sentenced yet. This absence of liability will undoubtedly lead to a lack of capital trust and to disbelief

between the population and their understanding of justice, something that, by analogy with other mega-processes, the Portuguese are already used to.

Long term reterritorialization

The long-term reterritorialization is an incredibly slow phase, because it is carried out at different velocities depending on the topophilia in which it occurs. Although it has the same triggering mechanism as i.e., the terrorist attacks on September 9th, 2001 in the USA (GROSS, 2002; NEWMAN, 2005) and August 7th, 1998 in Nairobi (LAGAT, 2014), or the mega fires under study, the different topophilia produce different heterochronies.

In Portugal, more than four years after the events, the operational results of the reconstruction of infrastructures are far from completed, since per a government decision extend the deadline for applications to the support for (Decreto-lei no 88/2020 de 16 de outubro, 2021) reconstruction until December 31, 2021, in opposition to Victoria, where less than one year later, the infrastructures' reconstruction was already a reality (Nixon, 2009). Portugal and Australia have very different infrastructure typologies, with the Portuguese being more resistant and lasting, hence the time of the reconstruction being longer and more extended than Australia's. The short time used in the reconstruction of the affected areas by the fires in Victoria could be leveraged in the recovery by having less bureaucratic plans than the Portuguese's. The bureaucracy had a decisive contribution to the delay in candidacies to the recovery of the affected areas, despite the extraordinary measures, the scandals involving fund management-imposed constraints on the process's ability to move quickly. The effective identification and eligibility of the financial support was constrained in the first phase by scandals of personal and political advantage.

In Portugal, 70 % of the population resides in two macrocephalic areas: in Lisbon and Porto regions, while the rest of the territory is occupied by only 30 %. The lack of a territorial planning strategy capable of fixing population issues in inland areas results in an increasing number of empty houses. There was an urgent need to rebuild industrial areas in order to prevent the unfettered population flight.

According to the projections of the 2021 census (CCDRC, 2021), the population of these areas is situated at absolute values in the decade of the 1970s. If, on one hand, the adopted measures aimed to maintain the jobs as territorial anchors, the same cannot be affirmed in relation to the reconstruction of individual homes, with the organizations of victims who advocated that people being left with their lives on hold, without the possibility of recovering from the damage, and being abandoned to their fate.

Events of this magnitude destroy the romantic vision of the idyllic countryside life and further accelerate this demographic loss. The most affected areas by the wildfires were predominantly rural areas, which are considered as repulsive from a demographic point of view. The measures to rebuild and restore the sectors of activity should have been faster, as seen in the areas affected by the Murrindindi wildfire (VICTORIAN BUSHFIRE APPEAL FUND, 2014).

Lessons learnt and how to deal with grief

Wildfires have mostly negative human, environmental, and economic consequences, either because of the large number of victims, or the environmental liability they create. In the beginning of the 21st century, Portugal suffered from an increasing problem related to wildfires. In order to mitigate their effects, some legal frameworks were sporadically altered. These legislative actions would be just cosmetic in form, as they would not solve a problem that has already been expressed since the 1970s.

Since 2006, in the scope of the base laws of Civil Protection and DECFI, a new legal framework was approved, but their supervision was very tenuous and the non-compliance, either by the public or individuals, was constant. Although the events in study are not continuous in time and space, because there is over than eight years and 8,000 km of distance among them, there are several similarities among the processes of humanitarian aid, risk governance, and resilience (Figure 8).

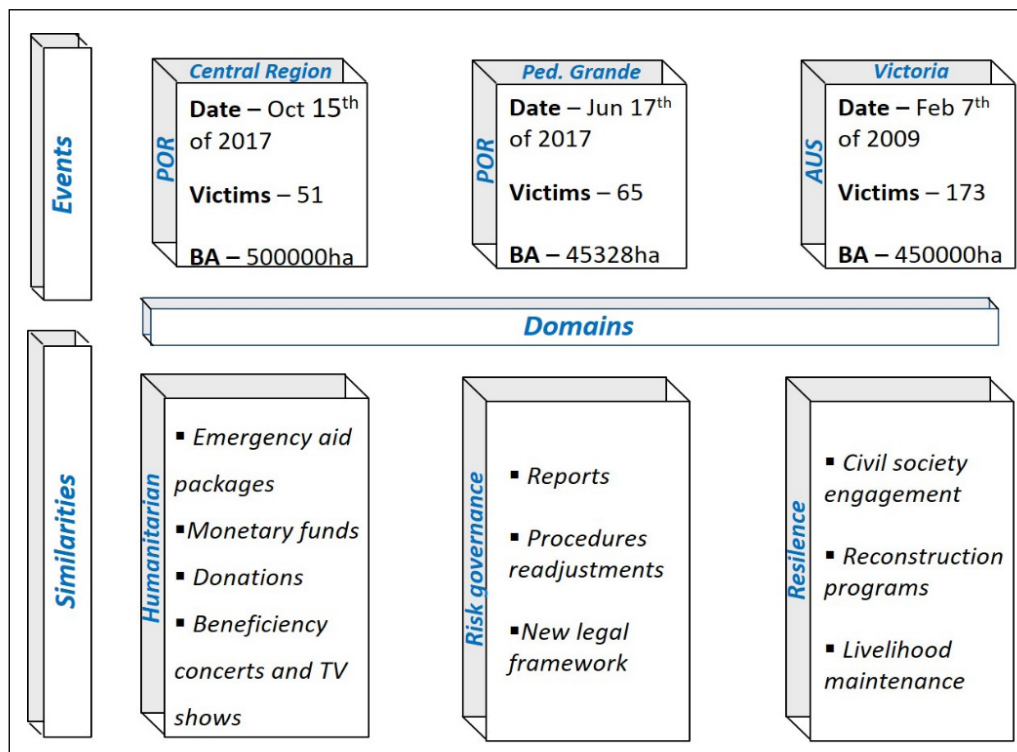


Figure 8. Similarities among processes.

However, such catastrophes also represent an opportunity to disrupt old paradigms, develop new processes and methods, and incorporate knowledge in order to mitigate the negative consequences. As lessons that we can learn from the old natural hazards such as wildfires and are amplified in the present by anthropogenic processes is that i) it can be mitigated with community involvement, but not eradicated by political agenda; ii) the legal framework is imposed retroactively by social disorder; that is, order is re-

established in the manner of new or reformed legal frameworks; iii) the lack of legislative oversight leads to the relaxation of the measures and it becomes obsolete; iv) too many laws affect their perception and confuse the people in risk about the communication process v) too many reports open up the multiculturalism of the debate, but affect decisions by the decision makers; vi) legislative compliance is more effective when it is coercive in opposition to the didactic way.

The process of grief is described as a person's reaction to bereavement, consisting of thoughts, feelings, and behaviours experienced after the loss that fluctuate through time. Some people die after a prolonged illness or disaster, while others die suddenly and without warning, like the 275 people who died in the events under study.

Since ancient times, it has been common to go on a pilgrim's journey to places where people suddenly perished, like accidents caused by wildfires. These places that record the deaths or severe damage are visited in two ways: to keep alive the memory of those who perished; and to explain what lessons can be learnt. In tributes to victims of wildfires, the United States leads in tributes to the Mann Gulch accident in the 1950s. However, these manifestations occur worldwide, i.e., in Portugal in 1962 in Vale do Rio and 2006 in Famalicão da Serra, Spain in 1979 in Lloret Del Mar, and in Greece in 2006.

In recent decades, grief has been diffused through the digitization of pain (PERLUXO; FRANCISCO, 2018) either through videos or posts that in the past worked as an expiation for a private feeling. Nowadays, the digitalization has shaped the physical world into social media platforms such as Facebook. The volume and velocity of information in circulation (PERLUXO; FRANCISCO, 2018) not only reaches more people, but also faster and with blurrier borders. Nonetheless, placement on social networking sites is very volatile, and it is necessary to preserve the physical space where tragedies occur that constitute a geosymbol. Collective trauma is more important than the sum of individual traumas, because it leads to a sense of community. The recomposition of a community around a trauma according to materiality such as a moment, place, or memorial leads to religiosity and a tendency towards convergence. When the territorial dispersion is large, as in the cases under study, the tendency tends to be to aggregate into emblematic monuments in memory of the victims (Figure 9).



Figure 9. Victims memorials (a) 15th of October – POR. Source: Diário de Coimbra. (b) PGWC – POR. Source: Diário de Notícias. (c) BSB – Callignee VIC. Source: Silvi Glattauer. (d) BSB Broadford Park VIC. Source: Silvi Glattauer.

Sculptures, reflection areas, murals, and sitting in commemorative gardens and roundabout are among the materiality memorials. The Memorial to the Victims of Fires in Pedrógão Grande, an intervention of €1.8 million of budget should be completed in June 2022, when five years have passed over the wildfires in that municipality. The Victorian and Commonwealth governments created the \$10 million Community Recovery Fund in February 2009 in order to aid with the community growth and recovery following the Victorian bushfires. 59 memorials across 18 municipalities have been built or are under construction as a result of this funding.

The amounts allocated to build memorials demonstrate the need to maintain the memory of those who perished but also to prevent similar outcomes in future.

Time erosion

Despite the social decomposition and human drama, local communities took a proactive approach in dedication to places that, in a manifestation of toponophilia, wanted to see recovery in the short term, even in the case of places like Kinglake and Marysville, which, as mentioned above, suffered a high relative population loss (Figure 10).



Figure 10. (a) Illustration of the residents of Kinglake's resilience; (b) Marysville's Temporary Family Housing (Victorian Bushfire Recovery and Reconstruction Authority, 2010).

As mentioned previously, despite almost five years after the events, the rehabilitation of burnt areas in Portugal is still far from being completed. However, the reconstruction prioritized interventions at the level of industrial parks and first accommodation homes as a way to avoid further depopulation. The rapid rehabilitation of the devastated areas was aided in part by the collaboration that this incident fostered among residents. The funds were distributed to initiatives for the recovery of devastated areas, which rehabilitated the impacted regions in a planned and prioritized manner. The utilization of volunteer activity is also emphasized. Ruled that the residents Portugal such as Victoria were not prepared for the wildfires, given the incidents they had experienced; that the response procedures were inadequate; and that the evacuation of the impacted districts was late and chaotic, despite the fact that the operation was excellent. In some ways, wildfires brought the issue of human vulnerability to the forefront of the news, as well as the scientific and technological research agendas of organizations.

CONCLUSIONS

Humans can demonstrate the ability to respond to specific environmental cues and, based on them, devise survival plans for both the individual and the society. In this sense, a tragedy such as the one endured by the people of PCR and VIC creates an opportunity to initiate subsequent cooperative processes. On the one hand, the wildfires were a series of occurrences and responses to triggering factors such as drought, heatwaves, storms, and the outbreak and progression of wildfires itself, which in the territories signalled deterritorialization. On the other hand, the whole procedure that followed, from the first compensation to victims to the fundraising efforts, from the physical recovery of the affected areas to the return of everyday routine.

The events surrounding the wildfires in study played a significant role in deterritorialization. Although the triggering elements are not fully covered in this article, several natural variables elevated the likelihood of this occurring. In this scenario, in addition to the fatalities and the visible drama that projected these events on a global

scale, the forest fires caused a clear social and territorial upheaval. Transient population displacements, a case of transient ex situ deterritorialization; impacted infrastructure; imbalances in economic structures, some of which are structured in that region, such as tourism; and an environmental deficiency with systemic consequences.

Environmental crises do not have a stable classification or interpretation that can be isolated from their location and geographic context. In certain circumstances, when confronted with a comparable disaster, the impacts change and the responses vary. The recovery cycles, as well as the correction of variable disturbances and repossession cycles, do not coincide. Despite widespread unpreparedness for a catastrophic disaster such as that under study, repossession was prompt in this situation. If the fatalities were indeed irreversible, the rehabilitation of the socioeconomic and territorial system would have been accelerated. From this perspective, two levels of repossession can be mentioned: one short-term, which coincided with assistance during in the acute phase of the occurrence, and another long-term, which refers to structural recovery of buildings, population return to their places of residence, and economic recovery.

Several factors that coincided in Australia contributed to these recovery cycles, but are not repeatable in other parts of the world, demonstrating that the cyclical and structural response, that is, in the short and long term, to these events is one of the fractures that divide the different spatial contexts on a global scale. In the example of Australia, short-term advantages were derived from media coverage of the incidence, which created a worldwide chain of assistance.

Another competitive advantage was the ability to organize reactions in a network comprising local and national groups and institutions. Another fact that does not exist in many areas of the world is the insurance system, which will have been critical in making accessible, in the short term, the cash that permitted the recovery. Finally, this crisis inspired initiatives, included communities in cooperative projects, and showed the resilience of communities that, from a local foundation, were active agents in the rehabilitation of their distinctive geohuman conceptions of life. The BSB brought also the vulnerability of populations to the forefront of concerns, with consequences that will be confirmed only in the future.

REFERENCES

- AUTORIDADE NACIONAL DE PROTEÇÃO CIVIL. **DON02/2017** (p. 130). Disponível em: <http://www.prociv.pt/pt-pt/Protecaocivil/legislacaonormativos/outrosnormativosdiretivas/documents/don_2_decif_2017.pdf>. 2017.
- BECK, U. Risk Society: Towards a New Modernity. In: **Economic Geography** (Vol. 69, Issue 4). <https://doi.org/10.2307/143601>. 1992.
- BECK, U. Living in the world risk society: A Hobhouse Memorial Public Lecture given on Wednesday 15 February 2006 at the London School of Economics. **Economy and Society**, 35(3), 329–345. <https://doi.org/10.1080/03085140600844902>. 2006.

- BUREAU OF METEOROLOGY. **Meteorological aspects of the 7 February 2009 Victorian fires, an overview**. Report for the 2009 Victorian Bushfires Royal Commission. February, 1–94. 2009.
- CAMERON, P. A.; MITRA, B.; FITZGERALD, M.; SCHEINKESTEL, C. D.; STRIPP, A.; BATEY, C.; NIGGEMEYER, L.; TRUESDALE, M.; HOLMAN, P.; MEHRA, R.; WASIAK, J.; CLELAND, H. Black Saturday: The immediate impact of the February 2009 bushfires in Victoria, Australia. **Medical Journal of Australia**, 191(1), 11–16. <https://doi.org/10.5694/j.1326-5377.2009.tb02666.x>. 2009.
- CCDRS - COMISSÃO DE COORDENAÇÃO E DESENVOLVIMENTO REGIONAL DO CENTRO. **Os Censos na Região Centro**. 2021.
- CTI - COMISSÃO TÉCNICA INDEPENDENTE. **Relatório da Avaliação dos incêndios ocorridos entre 14 e 16 de outubro de 2017 em Portugal Continental**. 2017. DIÁRIO DA REPÚBLICA. Ministério do Planeamento e da Administração do Território. **Decreto-Lei 46/89 de 15 de Fevereiro, 1989**. In Diário da República - 1.^a série: Vol. N.º38 (pp. 590–594).1989.
- DIÁRIO DA REPÚBLICA. **Decreto-Lei n.º 142/2017 de 14 de novembro de 2017**. Diário Da República, 611–612. Disponível em: <<https://diariodarepublica.pt/dr/detalhe/decreto-lei/142-2017-114200699>>. 2021.
- DIÁRIO DA REPÚBLICA. **Decreto-Lei n.º 135-B / 2017 de 03 de novembro de 2017**. Decreto-Lei n.º 135-B / 2017 - Diário da República n.º 212 / 2017 , 2º Suplemento , Série I de 2017-11-03. d, 1–7. 2020.
- DIÁRIO DA REPÚBLICA. **Decreto-lei nº 88/2020 de 16 de outubro de 2020**. (2021). Diário Da República - I Série-B, 27, 5–13. 2021.
- EBACH, M. C. **A history of biogeographical regionalisation in Australia**. *Zootaxa*, 34(3392), 1–34. <https://doi.org/10.11646/zootaxa.3392.1.1>. 2012.
- FERNANDES, João Luís J. Portugal between Lusophony, the European Union and the rest of the world. **Mediterranee**, 130, 1–20. <https://doi.org/10.4000/MEDITERRANEE.10549>. 2018.
- FERNANDES, João Luís Jesus. **Insegurança ambiental e migrações**. Contributo para uma sistematização de conceitos. 1–20. 2008.
- GROSS, E. The Influence of Terrorist Attacks on Human Rights in the United States: The Aftermath of September 11, 2001. **North Carolina Journal of International Law**, 28(1). 2002.
- HAESBAERT, R. Da desterritorialização à multiterritorialidade. **Boletim Gaúcho de Geografia**, 29(1), 6774–6792. 2004.
- HOMER-DIXON, T. F. Environmental Scarcities and Violent Conflict: Evidence from Cases. **International Security**, 19(1), 5. <https://doi.org/10.2307/2539147>. 1994.
- LAGAT, I. K. **Remembering the 1998 nairobi terror attack: cultural and trauma memory and the reconciliation of a nation**. PQDT - UK & Ireland, May. Disponível em: <https://search.proquest.com/docview/1779546705?accountid=10637&bdid=4312&_bd=%2B%2BCcCt622bL6fXsIKTaKCaQ9o7g%3D>. 2014.

- MAAVIM - Movimento Associativo de Apoio às Vítimas dos Incêndios de Midões (2018). p. 10.
- MCCOLL-GAUSDEN, S. C.; BENNETT, L. T.; DUFF, T. J.; CAWSON, J. G.; PENMAN, T. D. Climatic and edaphic gradients predict variation in wildland fuel hazard in south-eastern Australia. **Ecography**, 43(3), 443–455. <https://doi.org/10.1111/ecog.04714>. 2020.
- MCGOURTY J. **Black Saturday**: stories of love, loss and courage from the Victorian bushfires (N. S. W. HarperCollins, Pymble (ed.)).
- MCKENZIE, F.; CANTERFORD, S. **Demographics for Bushfire Risk Analysis Regional Victoria and peri-urban Melbourne**. 27. www.relayservice.com. 2018.
- NEWMAN, R. APA's resilience initiative. **Professional Psychology: Research and Practice**, 36(3), 227–229. <https://doi.org/10.1037/0735-7028.36.3.227>. 2005.
- NIXON, C. **Victorian Bushfire Reconstruction and Recovery Authority 100 Day Report Message from Christine Nixon**. 2009.
- NOVO, I.; PINTO, P.; SILVA, Á.; PEREIRA, M.; BARROSO, C.; SANTOS, M.; LOPES, M.; MOREIRA, N.; CORREIA, S. Incêndios ocorridos de 14 a 16 de outubro de 2017 em Portugal Continental - Caracterização meteorológica. **Ipma**, I. P., 1(1), 1–276. <https://www.portugal.gov.pt/pt/gc21/comunicacao/documento?i=avaliacao-dos-incendios-ocorridos-entre-14-e-16-de-outubro-de-2017-em-portugal-continental>. 2018.
- OLIVEIRA, R. F.; ROSSA, C. G.; RIBEIRO, L. M.; VIEGAS, D. X. **A study on forest fires in the State of Victoria (Australia) in February 2009**. February 2009, 1–12. 2010.
- OLIVEIRA, R.; OLIVEIRA, S.; ZÊZERE, J. L.; VIEGAS, D. X. Uncovering the perception regarding wildfires of residents with different characteristics. **International Journal of Disaster Risk Reduction**, 43. <https://doi.org/10.1016/j.ijdr.2019.101370>. 2020.
- OLIVEIRA, RICARDO; OLIVEIRA, S.; ZÊZERE, J. L.; VIEGAS, D. X. Uncovering the perception regarding wildfires of residents with different characteristics. **International Journal of Disaster Risk Reduction**, 43(April 2019). <https://doi.org/10.1016/j.ijdr.2019.101370>. 2020.
- OLIVEIRA, S.; GONÇALVES, A.; ZÊZERE, J. L. Reassessing wildfire susceptibility and hazard for mainland Portugal. **Science of the Total Environment**, 762, 143121. <https://doi.org/10.1016/j.scitotenv.2020.143121>. 2021.
- PERLUXO, D.; FRANCISCO, R. Use of Facebook in the maternal grief process: An exploratory qualitative study. **Death Studies**, 42(2), 79–88. <https://doi.org/10.1080/07481187.2017.1334011>. 2018.
- TEAGUE, B. (2009). Victorian Bushfire Royal Commissions.
- VICTORIAN BUSHFIRE APPEAL FUND. Victorian Bushfire appeal fund - **December 2014 progress report**. Disponível em: <http://www.dhs.vic.gov.au/__data/assets/pdf_file/0005/920345/Vic-bushfire-appeal-fund-progress-report-Dec2014.pdf>. 2014.
- VIEGAS, D.X.; ALMEIDA, M.A.; RIBEIRO, L.M.; RAPOSO, J.; VIEGAS, M.T.; OLIVEIRA, R.; ALVES, D.; PINTO, C.; RODRIGUES, A.; RIBEIRO, C.; LOPES, S.; JORGE, H.; V. C. (2019). **Análise Dos Incêndios Florestais Ocorridos a 15 De**

Outubro de 2017. Disponível em: <<https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=c2da3d7e-dcdb-41cb-b6ae-f72123a1c47d>>. 2019.

VIEGAS D.X; ALMEIDA M; RIBEIRO L.M; RAPOSO J; VIEGAS M.T; OLIVEIRA R; PINTO C; ALVES D; RODRIGUES A; LUCAS D; JORGE H; LOPES S; S. L.

O Complexo de incêndios de Pedrógão Grande e Concelhos Limítrofes, iniciado a 17 de junho de 2017. Disponível em: <<https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=3bb9773b-59fb-4099-9de5-a22fdcad1e3b>>. 2017.