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Post-crisis Resilient Governance in Centro region (Portugal) after 2017 wildfires

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ABSTRACT:

Governance systems, when addressing post-disaster action, play an important role in minimizing the community's vulnerability in future disruptive events. The literature describes how post-disaster actions towards resistance-resilience measures are often implemented, shifting to adaptive-resilience approaches as a second concern, and disregarding resilience-transformative strategies. Two consecutive wildfires in the Centro Region (Portugal), in 2017, cut off access to the Services of General Interest (SGIs) and knocked off-balance the socioeconomic territorial structure and identity (the main impact was 116 mortal victims). In this paper, the media coverage of the phenomena during the 12 months following the disaster is analysed using a sample of 150 news articles published in two newspapers. The public discourses are indicative of the overall importance given to the impact and to the responses based on resistance-resilience measures. Moreover, the theoretical and practical challenges for the policy design and organization of the governance systems in post-disaster contexts is discussed.

KEYWORDS: Post-disaster resilience; governance systems; services of general interest; resistance; adaptability; wildfire.

JEL CLASSIFICATION: D81; D85; H40; H12; Q23; Q54.

Gobernanza resiliente posterior a la crisis en la región Centro (Portugal) después de los incendios forestales de 2017

RESUMEN:

Los sistemas de gobernanza, al abordar la acción posterior al desastre, juegan un papel importante para minimizar la vulnerabilidad de la comunidad en futuros eventos disruptivos. La literatura describe cómo las acciones posteriores al desastre hacia medidas de resistencia y resiliencia a menudo se implementan, cambiando a enfoques de resiliencia adaptativa como una segunda preocupación, y sin tener en cuenta las estrategias transformadoras de resiliencia. Dos incendios forestales consecutivos en la Región Centro (Portugal), en 2017, cortaron el acceso a los Servicios de Interés General (SGI) y desequilibraron la estructura e identidad territorial socioeconómica (el impacto principal fue de 116 víctimas mortales). En este documento, se analiza la cobertura mediática del fenómeno durante los 12 meses posteriores al desastre utilizando una muestra de 150 artículos publicados en dos periódicos. Los discursos públicos son indicativos de la importancia general dada al impacto y a las respuestas basadas en medidas de resistencia y resiliencia. Además, se discuten los desafíos teóricos y prácticos para el diseño de políticas y la organización de los sistemas de gobernanza en contextos posteriores a desastres.

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PALABRAS CLAVE: Resiliencia post desastre; sistemas de gobernanza; servicios de interés general; resistencia; adaptabilidad; incendio forestal fuego fatuo.

CLASIFICACIÓN JEL: D81; D85; H40; H12; Q23; Q54.

1. INTRODUCTION

The frequency, magnitude, and synchronized effects of extreme events caused by crisis and/or catastrophes are growing, with destructive repercussions (on housing, infrastructure, service networks) in urban subsystems (Homer-Dixon et al. 2015). Between 1900 and 2015, the extreme events (floods, storms, earthquakes, and fires) caused the displacement of 132 million people, and 23 million of those were recorded in the decade between 2005 and 2015 (United Nations 2015).

The uncertainty arising from the recurrent catastrophes and crises caused by natural or technological factors has increased the importance of understanding the determinants of resilience and its relation with governance systems by assessing the decision patterns in post-crisis periods (Pu and Qiu 2016).

Some authors suggest to explain the extent of disparities based on the classification of the responsiveness considering the time of reaction, who benefits or loses, which sectors are affected or disrupted, which territories are prioritized (Pu and Qiu 2016). Other authors are focused on identifying flexible development paths concerning expected or unforeseen changes, by addressing the resilience of socioecological systems (combining persistence and adaptability), and mobilizing transformability through the interdependent nature of the links between people, communities, and the biosphere that supports them all (Folke 2016).

The literature review (Gong and Hassink 2016; Hosseini, Barker, and Ramirez-Marquez 2016; Meerow, Newell, and Stults 2016) and the resulting empirical works show some of the efforts in distinguish the strategies of resistance, adaptation, and transformation (Gonçalves et al. 2018). The resilience framework shares some assumptions with the theory of complex systems, where the recurrent practice of returning to business as usual is questioned (Davoudi 2016b) and considers attributes such as robustness, flexibility, adaptation, vulnerability, risk, and agility (Hoffman and Hancock 2017) to support the effort in measuring post-crisis communities' needs (Fu and Wang 2018).

The following sections are addressed to i) reorganize the resilience framework to incorporate the importance of the governance dimensions on the communities' resilience in post-crisis contexts; and ii) apply this framework within a concrete crisis scenario. In this second phase, using content analysis methodologies, the news stream about this disruptive phenomenon is analyzed in order to evaluate the performance of the governance system managing different communities' subsystems and how this played a role, or not, to increase the resilience (resistance, adaptability, transformability) in these territories.

2. POST-CRISIS RESILIENT GOVERNANCE

In the last 3 decades of the 20th century ecologists have shown that ecosystems do not always obey to the equilibrium laws (engineering resilience) and, in crisis contexts, the elasticity and the capacity to organize multiple equilibrium (ecological resilience) ensure the ecosystems' survival and longevity (Holling 1973, 1996). In the next phase, social transformations began to be placed together with the drivers of resilience (socioecological resilience).

This transplantation into the social sphere required special care because, unlike ecosystems, communities, through the action of governance systems, can shape decisions towards desired futures. That is, the exposure of communities to the crises destructive effects caused by environmental, economic or social changes cannot be seen as a mere fatality (Adger 2000). In this sense, the critical approaches shown by the "stop calling me resilient" movement (Kaika 2017) demonstrate the risks posed by careless extrapolations of the biophysical systems' laws to processes of socio-economic change. In addition, neoliberal ideologies, tend to "naturalize" (imposing the principles of self-sufficiency and self-organization)

the reality of communities which are more vulnerable to crises, while policy-makers are freed of responsibilities (Davoudi et al. 2012; Weichselgartner and Kelman 2015).

For this reason, during the 21st century, in the context of crisis management, the need to link resilience to the concept of governance increased (Béné et al. 2018; Fröhlich and Hassink 2018; Peng et al. 2017). At this time, pro-resilience governance is assumed, in national and international policy circles, as a useful device to improve the capacity to deal with socio-economic and environmental changes. There are many policy instruments addressing these issues. For example, the Sendai Framework for Disaster Risk Reduction and the Paris Agreement on Framework Convention on Climate Change, as well as the Agenda 2030 (Sustainable Development Goals) assume resilience as a key framework to find answers to the societal challenges (Cutter 2016).

Within this framework, the importance of developing governance models is generally assumed, while improving its understanding based on methodologies that can assess their influence in building community resilience (Béné et al. 2018; Bohland, Davoudi, and Lawrence 2019; Mehmood 2016). Once it is recognized that governance models influence the resilience of communities, (Normandin et al. 2019; Weichselgartner and Kelman 2015; Wilson 2017), the methodologies provide the material to answer such questions as: *resilience of what, for what, for whom, when, where, why and who gets to decide?* (Cutter 2016; Meerow and Newell 2016) “and meet the insights and critiques from the social sciences about agency, power and knowledge (Cote and Nightingale 2012), increasing knowledge about socio-ecological-systems” (Gillian Bristow and Healy 2015), considering all trade-offs that reinforces sustainability (Chelleri et al. 2015).

This issue has been addressed to strengthen the multidisciplinary nature of the civilizational challenges of sustainability, often centred on results, while resilience is process-focused (Rogov and Rozenblat (2018), Chelleri and Olazabal (2012). The resilience process-driven shows efforts in the prevention of crises that affecting urban infrastructure networks which in turn enhances the capacity to identify local vulnerabilities and governance systems (Monstadt and Schmidt 2019; Rigaud et al. 2018). In terms of planning, this relates to the identification of spatial dimensions that diminish natural risks (Masnavi, Gharai, and Hajibandeh 2019). It reinforces the debate on the political side of social transformations (Wilson and Jonas 2018) and supports a global agenda capable of intervening on (and improving) life conditions of the vulnerable communities (Leitner et al. 2018).

The research on the resilience drivers is divided between the nature, the consistency and the traction of the development trajectories (development with innovation and cohesion gains). However, little attention has been given to the role of governance systems in directing reaction and mitigation actions. The resilience of communities decreases in contexts where the chain of decisions fostering recovery strategies is not consolidated, and actions are unclear (G. Bristow and Healy 2015). The range of decisions can be grouped into three types: i) decisions focusing on resilience capital, by restoring normality; ii) adaptation decisions, which improve the system; iii) or transformability decisions, when there is a functional jump which shapes the system to a new domain of attraction.

In post-disaster periods, the emergency stage can lead the stakeholders (part of a complex governance system) to make immediate decisions that block long-term strategies and limit the opportunities of a community reducing its vulnerability to future disasters. Rebuilding a post-disaster community is a challenging mission. The most effective way of dealing with the multidimensionality of this objective is the anticipation of its effects and the implementation of preventing measures (American Planning Association 2008).

Improve the resilience of communities requires a comprehensive approach on the system behaviour involving institutions, social capital, services, and infrastructures (American Planning Association 2005). So, the governance structures enable an effective support on communities, as it is within them that post-disaster strategies are defined. During post-disaster periods, a set of interconnected issues require immediate attention. Who is responsible for preserving the infrastructures, equipment and systems of services that support the equilibrium of communities? This is a complex issue, because of the multiple forms of interaction between public and private entities through which communities' access to water, electricity, garbage collection, road infrastructure, telecommunications and the social media, education,

health services or other social services. Where and how decision-making networks need to be assembled in crisis situations to organize both response and mitigation actions is therefore a difficult issue (American Planning Association 2014).

It is necessary for organizations to negotiate collective decisions that have immediate, medium, and long-term effects, regardless of their divergent positions and conflicting interests. The goal is to create a governance system that works above administrative sources, responsibilities and attributions accepted and often contested by the different institutions. Through this exercise, decision-making capital meets the requirements (time, resources, extension, persistence, effectiveness, and efficiency) of the decisions and the planning and management instruments that support them (Kalkman, Kerstholt, and Roelofs 2018).

When a given territory faces a disruptive situation (crisis, disaster, catastrophe) with impact on its functions' structure, the quality of the response is not uniform, as it depends on the way in which decision makers organize themselves (G. Bristow and Healy 2015). This is the nature of the institutional culture and hence its outcome on the governance system. The robustness of this governance system is enhanced by the existence of key players who are able of bridging institutions and civil society. Simultaneously, they ensure the operability (negotiating in-time, mediate collective decisions) of the planning and management teams intervening in territories facing crisis or collapse contexts (Kalkman et al. 2018). Other aspects can be added to the decision domain, namely the characteristics of the stakeholder's network, which improve the strategic positioning (medium and long-term) and the coordination of immediate measures (short-term). When placing governance in the context of complex adaptive systems, it is possible to understand the functioning of coevolutionary environments and the correlative array of options that qualify the interventions in disruptive situations and improve the adaptive resilience of territories that have been or may be affected (G. Bristow and Healy 2015).

Governance for resilient post-crisis communities as it append in urban resilience "will be most effective when it involves a mutual and accountable network of civic institutions, agencies and individual citizens working in partnership towards common goals within a common strategy" (Rigaud et al. 2018:403).

The research findings in this domain has allowed to establish the relation between planning command and control (Holling and Meffe 1996) associated with efficiency gain, persistence and predictability (fail-safe), as well as with the lack of resilience in complex adaptive systems and potential regime changes to less desirable functional arrangements (Folke et al. 2004). In summary, three possible resilience trajectories were identified: (i) resistance (ability to absorb changes while maintaining the same function structure), ii) adaptability (ability of governance systems to reinforce resilience); and iii) transformability (ability to create new structures whenever existing ones appear to be undesirable) (Walker et al. 2004).

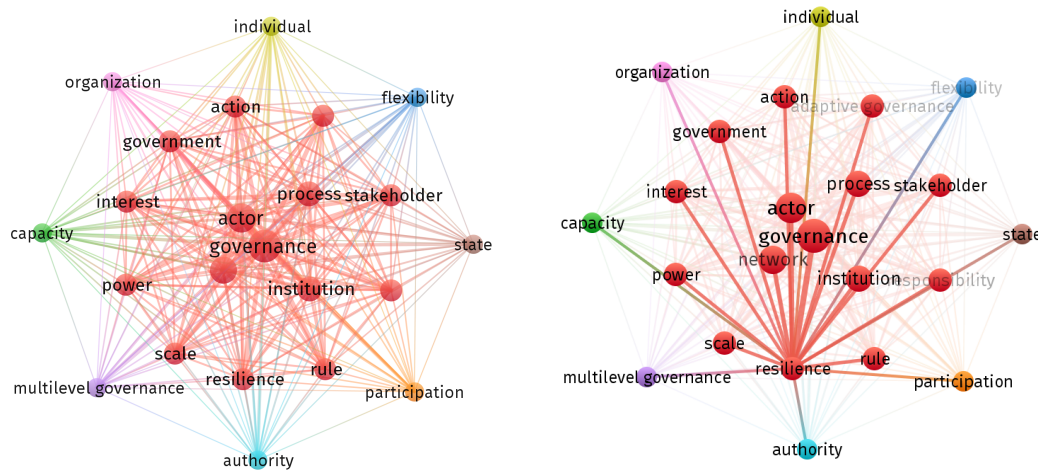
Recalling both, the types of actions and the multiple concepts of governance, the analytic challenge remains in understanding the players' involvement within the subsystem they operate and deal with specific power structures (Figure 1). While addressing resilience, adaptive governance, or disaster risk governance as key concepts within the scope of this paper, the main issues remain consistent with the above mentioned. Individuals, organizations, agencies, and institutions are forced to (in)formally meet across different spatial or sectorial scales.

Further discussions can rely on the importance and effectiveness of such interactions either in solving random problems, or in the design and implementation of relevant instruments. In this context, it is applied the logic of representation of social networks, as the analytic approach to organize and identify the set of actors and the relations or ties that characterize their links. These links are often illustrated by graphical representations that enable the broad understanding of the behaviour of the networks, which are based on mathematical and statistical criteria. In the social science's scientific domain, when issues around information flows or actor-centred relations arise, the use of such approaches become useful.

However, due to the multidisciplinary dimension of the social phenomena, the understanding and analysis of the overall subsystem, composed by nodes and linkages, is subject to multiple (and, yet, valid) interpretations. Therefore, the analysis is improved when the interpretation of the network outputs combines the theoretical framework and the specific data set characteristics. Such awareness held the

selection of the methodological specifications applicable to the case study of this research, which are detailed on the following sections.

FIGURE 1.
Urban resilience governance drivers: a bibliometric review



Source: VOSviewer bibliometric output based on a literature review on urban resilience governance.

This paper combines the principles of socio-ecological resilience (Folke et al. 2010), evolutionary resilience, (Simmie and Martin 2010), regional economic resilience (Martin 2012) and community resilience (Sharifi et al. 2017). Furthermore, it intends to shed light on the importance of governance systems' decisions, while debating the use of methodologies for assessing the impact of such decisions on the post-crisis communities resilience (Gonçalves 2018, 2014). The aim of this work is to contribute for a solid debate on post crisis resilience governance based on empirical outputs.

3. METHODS

Territories with structural vulnerabilities are more exposed to lasting post-crisis consequences, namely those related with the disruptions in the service network provision. This calls for the need of solid strategies to avoid preventing coming back again to crisis and to reduce the magnitude of its impacts.

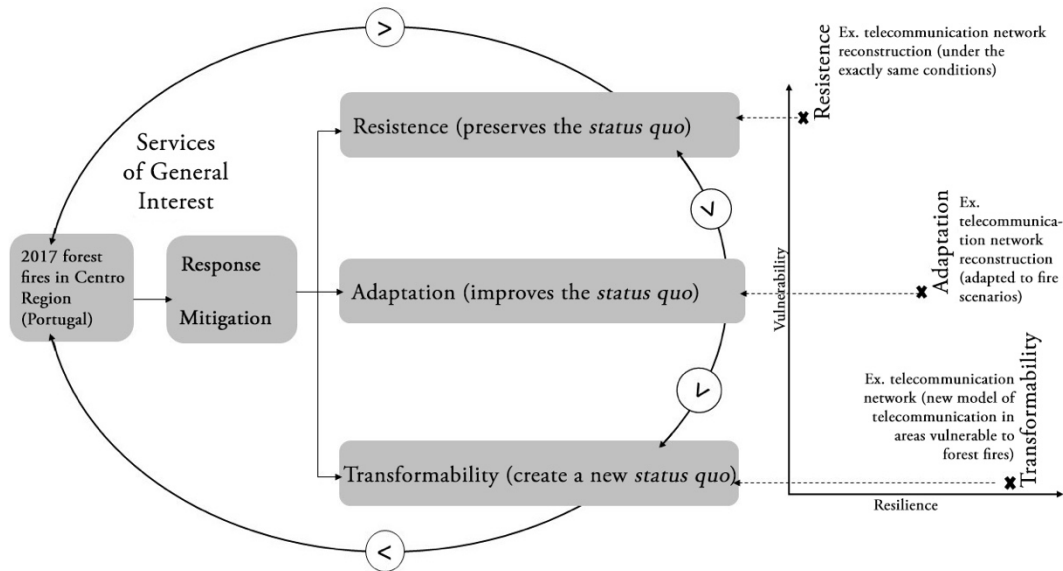
The above-mentioned dimensions and criteria for defining post-crisis decision typology (Figure 2) establish the framework for the qualitative analysis performed. The analysis of a set of news on wildfires in Portugal and its effects on the SGIs networks have shown the relevance of such approach. This paper contributes for a structured debate about the articulation of resilience, governance and accessibility to SGIs.

The news contain discourses, which can be understood as the collective meaning of the phenomenon in analysis (Doulton and Brown 2009). Therefore, as presented in the next section, the main content shows the specific focus of the social media on the post-disaster response, referring actions resulting from the governance system. The Portuguese newspaper sources follow two typologies, as suggested by Araújo (2017): reference newspapers (*Expresso*, *Público* and *Diário de Notícias*) and ordinary newspapers (*Sol*, *Jornal de Notícias* and *Correio da Manhã*).

The selection of the newspapers source was based on the following criteria: to include systematic a follow-up of the crisis episodes under analysis, to present a multi-scale analysis (national, regional and local), to assume a more rigorous approach instead of a sensationalist focus, to allow access to online archives for a one-year period. As a result, two newspapers were selected: *Expresso* and *Público*. The

keywords used matched the designations adopted by the media to address this issue: *Pedrogão's fire*, *Pedrogão's wildfire*, *October's fire* and *October's wildfire*¹.

FIGURE 2.
Interactions and typology of response and mitigation



Source: Authors.

For a period of 12 months following the date of the catastrophes, the search returned 150 articles, later classified and coded using NVIVO software. The codification followed two steps. The first consisted on a general classification of the sample based on the i) classification of the main subjects based on the headline of each news²; ii) analysis of the content of the news focusing on the impact of the wildfires; and iii) identification of response actions. The second details the governance landscape created to manage this crisis episode, where i) the actors are identified in specific sentences of the news and ii) those references are matched with different types of actions (resistance, adaptability, transformability).

The complexity of the stakeholders system and the constant need to characterize its interaction pattern, acknowledge their connections and the influence in the organizational processes recalls the development of analytic tools. This type of analysis is, however, dependent on the sample and type of information (content available, detail and organization). Among the multiple available tools, which provide different features including the creation, visualization or manipulation of networks, this exercise of network analysis was supported on the Social Network Visualizer (SocNeV). The SocNeV is a free software tool that provides a clear graphical visualization of the ties and characterization of the network, based on its basic properties, such as density, diameter and distances, centralities, or other grouping rules.

¹ In Portuguese: “fogos Pedrogão”; “incêndios Pedrogão”; “fogos outubro”; and “incêndios outubro”.

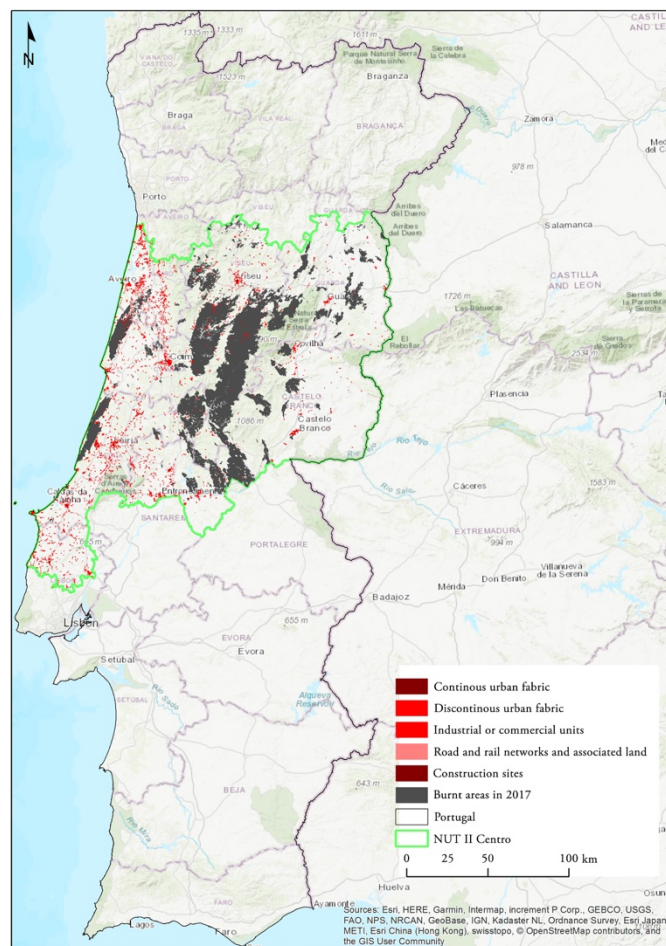
² Here are some examples of the coding rules assigned to the classification: Social assets – mortal victims, financial support, social protection responses; Telecommunication – telecommunication providers and infrastructure; Housing – housing stock destruction, financial support, emergency action such as evacuation; Health – immediate service supply (local health facilities and hospitals); Energy: electricity network and infrastructures; Infrastructure – road infrastructures and other equipment; Civil protection – all firefighting resources used; Forest planning and management – forest land use, planning instruments; Public funds – supranational funding; Economy – enterprises, employment and financial support.

4. CASE STUDY DESCRIPTION

Forest fires, particularly on the west coast of the United States of America and Southern Europe, have become a destructive phenomenon of human capital, biophysical and built environments, and socioeconomic structures. In 2017 (Portugal) and 2018 (Greece and Northern California), it assumed an exceptional and unprecedented impact. These wildfires causes the loss of dozens of human lives and multiple destructions of dwellings, industrial and tourism places, equipment and service networks, as well as communities displacement and landscapes ruined.

Figure 3 shows the affected area by Pedrógão's wildfire (P-W) and October's wildfire (O-W) in 2017, in the Centro Region of Portugal. In addition to climate drivers, the catastrophic effects of these wildfires that caused 116 mortal victims are determined by the vulnerability characterization. These include, for example, the extent and type of the main uses of the forest areas, as well as its speed of growth and spreading in a territory with a polycentric urban system, complemented by a constellation of small shrinking places (with declining and aging demography).

FIGURE 3.
Burnt areas in 2017 and urban structure in NUT II Centro, Portugal



Source: Burnt areas from the Portuguese Institute for Conservation of Nature and Forestry, with our preparation.

This region is home to 21.7% of the Portuguese population (2,231,346 inhabitants). It is a region characterized by a polycentric urban system with low density (79 inhabitants/km²) and disperse settlements. According to 2011 data, this dispersion results in a very dense network of small settlements with less than 2000 inhabitants (Figure 3), which represents 65% of the population. On the other hand, only 28% of the population lives in urban agglomerations with more than 10,000 inhabitants and 31.3% of the residents are distributed through the regional urban system organized by 43 cities. Furthermore, this region presents an aging demographic structure. In 2017, the ageing index corresponded to i) 147 in predominantly urban areas (50.6 % of the total population); ii) 202.5 in medium urban areas; and iii) 316.9 in predominantly rural areas (25.9% of total population).

The destructed Portuguese area by forest fires have been object of study, aiming at expressing and analyzing the manifestation and gravity of each occurrence. In 2002 a study of two decades (1980-2000) of forest fires in the Central Region evidenced the rising trend in the number of fires each year, along the territory (Nunes, 2002). Moreover, it draws attention to regional specificities which combine situations i) of municipalities that, although registering a small number of fires, have, on average, very significant burnt areas and, therefore high risk of spread (e.g. Arganil, Góis, Penacova, Figueiró dos Vinhos); and ii) municipalities, confined to territories where fires reach greater severity, that show the greatest propensity for fires, both in terms of occurrences and in terms of the average annually burned areas (e.g. Pedrógão Grande, Oliveira do Hospital, Tábua).

In the subsequent years, until 2010, this trend did not change, and the Center Region continued to stand out on large or very large (> 10 000 ha) burned areas (Ferreira-Leite, Bento-Gonçalves, Lourenço, 2012), and until 2017 there were less occurrences in relation to the average verified in previous periods.

THE PEDRÓGÃO'S WILDFIRE CONTEXT

The P-W took place between June 17 and 24, leading to a burned area of 28913,6 hectares, over seven municipal areas³. Although the origin of the fire was associated with an accidental cause, the primary source being the lightning in a medium voltage line, the remains of previous fires (some of which dated on 1991), and the weather conditions (very high temperatures above 40 degrees Celsius and very intense and variable wind) facilitated the ignition and subsequent spread of the fire. Just in an hour, this fire caused 64 deaths in 20 different places in an area of about 20 km², having more than a half (34) been registered in only 300 m of a municipal road⁴. The remaining victims died along the road network (52% inside their cars). In the following months the number of victims arose to 66 (Comissão Técnica Independente 2017a). The age distribution of the victims is of 14% of the victims under 18 years old and 23% over or equal to 70 years old. Beyond this fatality, more than 200 people were critically injured, including firefighters and children. In terms of material damage, more than 500 houses were counted as being partially or totally destroyed (about 33% were first homes, 40% secondary residence, and the rest were vacant houses), and numerous equipment and infrastructure was devastated. The provisional estimate of the total amount of losses was situated over € 500 million.

THE OCTOBER'S WILDFIRE

The second catastrophic situation (O-W), classified as a megafire and occurred between October 14 and 16 of October (3 months after the P-W), was associated with the extreme climatic conditions intensified by Hurricane Ophelia. In this episode, 48 people died in 14 municipalities⁵. In the following months, the number of victims rose to 50. Only one victim was under 30 years old (29 years old) and that more than 50% of victims were aged 65 or over. The assessments carried out point to direct damages of

³ Pedrógão Grande, Figueiró dos Vinhos e Castanheira de Pera, and other surrounding municipalities, as Sertã, Alvaiázere, Ansião, and Penela. These municipalities are part of different territorial units: NUTS III Region of Leiria, Region of Coimbra, and Médio Tejo.

⁴ Estrada Nacional 236-1.

⁵ Sertã, Arganil, Oliveira do Hospital, Pampilhosa da Serra, Penacova, Tábua, Gouveia, Seia, Carregal do Sal, Nelas, Oliveira de Frades, Santa Comba Dão, Tondela and Vouzela. These municipalities are part of different territorial units: NUTS III of Médio Tejo, Coimbra Region, Beiras and Serra da Estrela, and Viseu and Dão Lafões.

521 facilities of companies, estimated at around € 275 million, affecting, at least temporarily, more than 4,500 jobs over 30 municipalities (Comissão Técnica Independente 2017b).

SGIs such as energy and water supply, communications, and transport suffered severe damage. According to information collected by the tourism sector regional entity (Tourism of the Centre), 59 municipalities were directly affected, causing total or partial destruction of 38 tourism enterprises, resulting in the cancellation of 77% of hotel bookings.

5. RESULTS

This section focuses on the results of the analysis of the media coverage during the 12 months following the wildfire catastrophes, in the Centro Region of Portugal. The sample is composed by 150 articles from the two reference newspapers mentioned above (*Expresso* and *Público*). Following the criteria presented in section 3 (regarding the classification headlines of the news, and the identification of impact and response references within the content of each article) it is possible to explain the media coverage and, therefore, provide a contribution for the debate around different types of post-disaster resilience. At the same time, when, in addition to this content analysis, attention goes to the reference on actors associated with these dynamics, the density and cohesion of this interaction network becomes visible. This is, therefore, an important layer to understand post-disaster governance structure.

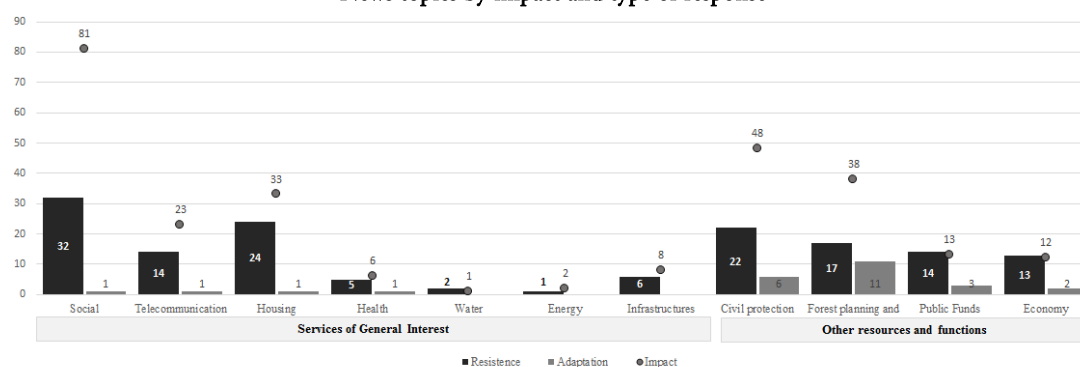
5.1. POST-DISASTER MEDIA COVERAGE: A 12-MONTH OVERVIEW

At first, the sample of 150 news articles was organized according to the headlines. Each news article was assigned to one dimension related with SGIs: social assets, telecommunications, housing, health, water, energy and infrastructure and other functions, civil protection, forestry planning and management, public funds and economic activities. Then, a content analysis codified with NVIVO was conducted, always organized according to the above-mentioned topics. Specific attention was given to both the description of the impact of the wildfires on the SGIs and reference to the type of resilience (resistance, adaptation, transformation). The SGI-related topics are slightly more represented (58% of topics covered in the news) than the other types of resources and functions considered in the analysis (42% of topics covered in the news). Given the identification of the main issues, impacts on social assets and civil protection match a substantial part of the news (43.3%). The remaining 36.7% concern three other categories (telecommunications, forest planning and management, and public funds). Greater emphasis is placed on social impact (81 articles of 150), civil protection resources (48 articles of 150), followed by the analysis of the effects on forest resources (38 articles of 150), and issues arising from the destruction of dwellings (38 topics in the contents). Additionally, cuts in the telecommunication network, the destruction or limitations on infrastructures, and health related harms are recurrent analytic dimensions.

There is a substantial difference between the news that describe disaster impacts and those presenting references to responses. In the case of social assets, although they are the most representative in the impact dimension (32% of total registrations), references on response actions are less frequent (18.8% of total registrations). This is partially explained by the several descriptions stating the impacts on human victims, which reached 116. In housing, for instance, the impacts are shown in 33 articles (12.5% of total registrations) and 25 references point to responses (14.2% of total registrations). Two other examples are mentioned. In forest planning and management resources there is a smaller differential, 38 news classified with impacts in this category against 28 articles with actions identified. In the civil protection category, the differential between impact topics and response references is greater (48 topics and 28 references to responses).

As illustrated, there is divergence between resistance and adaptation actions in all categories (85% correspond to resistance) and no reference was made to transformative resilience actions. From the 176 response references in the resource and functions categories, 22 concern adaptation actions.

FIGURE 4.
News topics by impact and type of response



Source: Authors.

5.2. GENERAL NETWORK CHARACTERISTICS

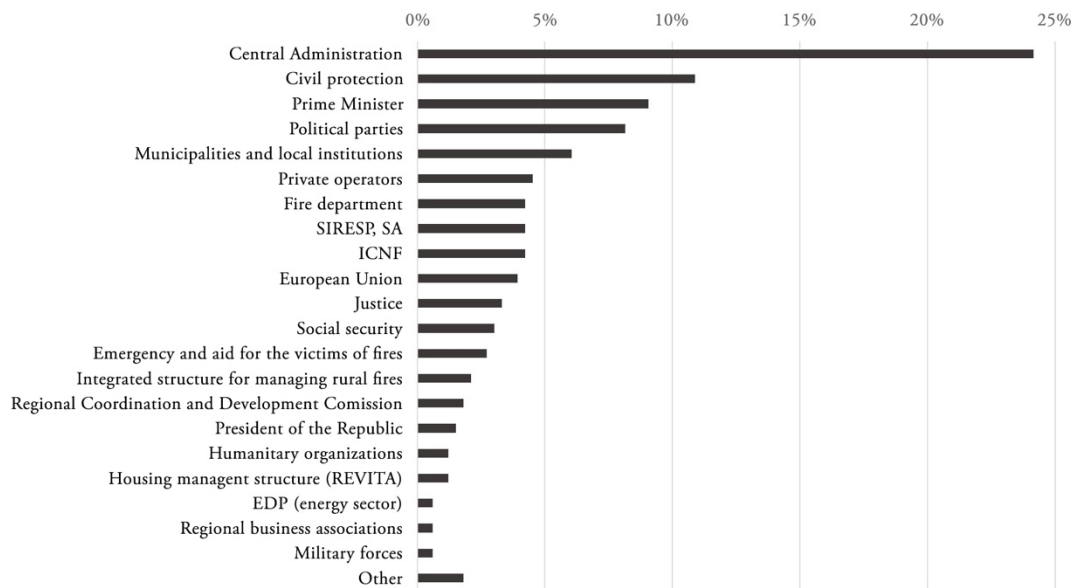
The previous analysis shows that media coverage focus changed 12 months after the wildfires, namely within each SGIs or resources and functions, suggesting different roles for the governance structures. Concerning the social component, in the first six months following the phenomenon, the main content recalls to direct financial support to families. The link with the economic and housing dimension is evident, given the homes and facilities of companies destroyed that led to the relocation of families and the need to create jobs or pay salaries. The descriptions on civil protection mainly relate to the management of the firefighters during the emergence stage. In the long term, responses point to the reform on the model of organization and operation of firefighters and to future integration with forest planning instruments. In the forest-planning domain, there is an obvious correlation with the reference of impacts, especially of the burnt area. In the medium and long term, the measures point to the management of land use, but also the rules allowing specific arboreal species.

Despite this perspective of the monitoring of the phenomenon over time where, in some cases, it is possible to link impacts with responses and results, the governance structure analysis does not have a temporal association.

Of the 150 news articles, there are 337 references of actors, with the more varied associations. These correspond to 59 different stakeholders. For analytic purposes, some data mining was required, from which resulted the grouping of actors according either to the territorial and administrative level or to the scope of action. As a result, Figure 5 shows the 27 types of actors that were considered for further analysis⁶.

⁶ 1. Central administration includes all references on government ministries or council minister. / 2. Civil protection groups all general references on civil protection or other national authorities / 3. Municipalities and local institutions include all those sentences where either or both municipalities and associations are mentioned. / 4. Justice stands for all the elements related with judicial issues. / 5. Political parties include the references where any political positioning is present. / 6. Some actors were considered individually because of the overall importance within the analysis, because of the specific role they play (as happens with the Prime Minister, which has a representative number of references) and by representing central analytic dimensions (such as the Firefighters, or the Emergency and aid for the victims of fires).

FIGURE 5.
Actor density in Pos-crisis governance landscape



Source: Authors

5.3. NETWORK DYNAMIC AND INFLUENCE IN CENTRO REGION (PORTUGAL) AFTER 2017 WILDFIRES

In urban resilience and adaptation policies, the broad comprehension of the information flows and the governance models are often used to explain how the actors are dealing with complex multi-level problems (Therrien, Jutras, and Usher 2019). As they suggest, measurable features determine the effectiveness of the network within the subsystem, based on the strength of links between actors and on the potential bridges linking peripheral sub-networks to central actors. The social network analysis has been conducted in several studies, where it has proved to be a strategic tool for planning and decision making, as it creates a structured database with graphical representation, which demonstrates how actors communicate and gives clues on how they influence public policy.

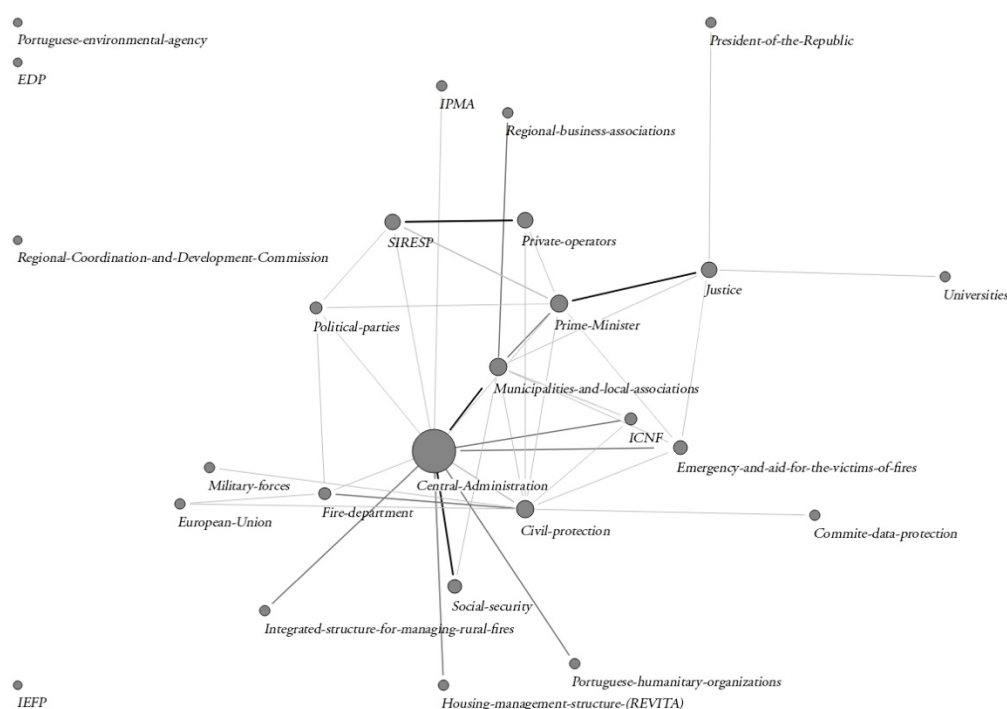
In our study, some of these questions, namely those regarding to the policy implications arising from the network design, are not entirely delivered. The network mapping will always depend on the organization of the input data. Here the objective is to discuss the importance assigned to each actor, identify the interrelations and stress their centrality for different types of responses.

Different metrics were used to illustrate the behaviour of the actors. The analysis is focused on a prominence-based placement to show the influence of each actor, represented as a node, on the system. The Social Network Visualizer provides a few methods to measure the prominence⁷ of each actor inside the network. Therefore, the importance of each actor is defined by the size of the node according to the centrality scores of the actor within the group. The Degree Centrality was specifically used to measure the activity of actors by quantifying the link each node has to others in the network. To strengthen this analysis, another visual-analytic layer was added, by assigning a colour to the node. As a result, the importance assigned to actors is based on the quantification of the references in the 150 newspaper articles and afterwards on the ties attached to each actor. The links between actors take shortest or longest path

⁷ "Prominence: Methods to measure how prominent (important) each actor (node) is inside the network. Contains all Centrality and Prestige measures: Degree Centrality, Closeness Centrality, Betweenness Centrality, Stress Centrality, Eccentricity Centrality, Power Centrality, Information Centrality, Eigenvector Centrality, Degree Prestige, Pagerank Prestige, and Proximity Prestige" (SocNetV Manual, published online: <https://socnetv.org/docs/index.html#Datasets>).

lengths (technically defined as geodesic distances). The digraph's representation assumes undirected relations, because the codification that preceded this analysis only enables the identification of the actors without association of additional dynamics. So, in other words, neither the order in the reference of an actor or the semantic context they appear in represent a hierarchical or directional relation⁸. Finally, once the node and edge configuration were defined, the layout was adjusted according to the force-directed placement. The Fruchterman-Reingold model was used to intensify the proximity of the actors, as this model is based on attracting or repulsing forces. Thus, the layout shows those vertices that are real-neighbours, by opposing (or repelling) to those which no relation can be detected. These forces are calculated within a circular area of optimal distance based on the overall sample.

FIGURE 6.
Post-crisis resilient governance network in the Centro Region (Portugal) after the wildfires in 2017

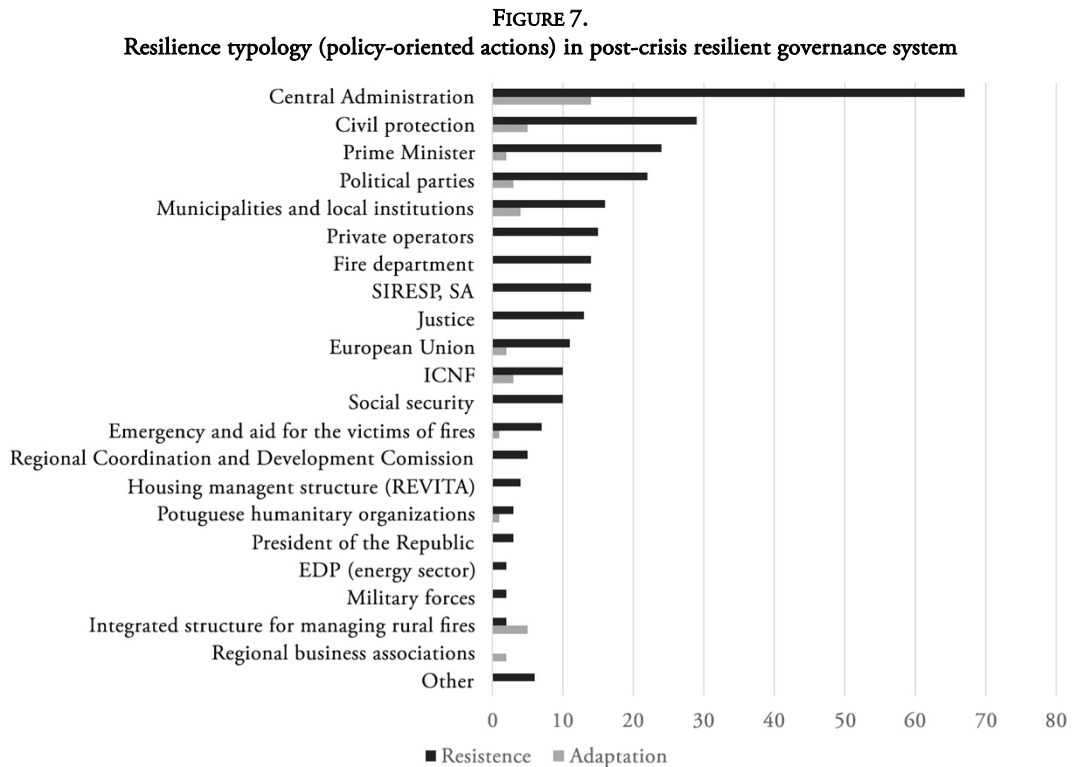


Source: Authors

As seen in the figure above, the core of this network concerns the actors grouped in the Central Administration category. In this governance model, the central administration is simultaneously the most referenced and the interconnected actor, even though many ties happen inside the group (note that these overlaps were excluded from the network analysis). Following this group are the civil protection, the Prime Minister and the Municipalities and local associations. Aggregated, these represent about 50% of the total references on actors in the 150 newspaper articles. Is important to notice that there are few cases (sentences) with multiple actors – only 30% of the coded text has more than one actor, which only 6% has more than 2. A radial analogy can support the analysis of the graphical illustration presented here, where some clusters can be visually detected. For instance, strong ties join both central administration Prime Minister and to municipalities and local associations, and link private operators to the Portuguese emergency operator and to justice elements. At the same time, the civil protection actors emerge as another satellite actor. These links are relatively expected, given the description about the media coverage explained in the previous subsection. However, an interesting issue goes to debate, which relates the actors in this subsystem

⁸ The network tools often use prestige measures to represent these directional relations, and when applicable they inform the researcher about the status, rank or popularity of each node. In this case such modelling does not comply with the data set.

within the specific context they appear. A considerable part of the content of the news published in the selected newspapers are impact related; but when understanding the role played by the governance arrangement no matching is found. The Central Administration, which is the core of this subsystem, has only four cross-references in the specific topic on social assets. So, in other words, more than describing or updating the post-catastrophe situation (themes undertaken in the social asset category), these actors play an important role in delivering policy oriented measures or stating political positioning, both mostly within the resistance typology (Figure 7).



Source: Authors

Only 13% of the actor-referenced sentences are related to adaptation actions, with strong expression in the forest management and civil protection news topics. These actions concern to the planning, assessment and strategic coordination skills for fire prevention and control in the rural areas. The central administration plays an important role in legitimizing the legal process, while the other actors (municipal and local associations, civil protection, fire department, etc.) assume more operative functions. Simultaneously, most of the resistance actions (50%) specify the short-term interactions and measures in civil protection matters, as well as determine the financial and funding orientations.

6. DISCUSSION

The communication strategies and post-crisis governance actions prove to be the basis of the capacity to attenuate the impact on human, technical and financial resources. Some authors suggest that this interactive process influences the media's priorities, which based on cultural, social, technical, and political values, balances the factual description of events with a communicational strategy (Miles and Morse 2007). Media channels, showing social and territorial destruction, where social assets were affected and the degradation and disruption of services of general interest was visible, covered the two episodes under analysis. The media coverage throughout the post-disaster period influences the notions of time and space in which they are experienced. Furthermore, the way the news are reported establishes the post-disaster

discussion agenda, influencing the visibility of the phenomenon and the innovation capacity of response policies (Ashlin and Ladle 2007). Thus, the integrated analysis that crosses the news' main subject, impacts and responses supports the debate on the governance systems, to provide insights on the influence the media coverage might have on the design and implementation of post-disaster strategies, and to shed light on the need to rethink resilience actions. Regarding disruptive events and its mediatisation, there is a visible articulation with local, social and political conditions, becoming feasible or blocking actions of Disaster Risk Reduction (DRR). When high involvement of communities is not compensated through actions of status quo reposition, the effect of disaster response exhaustion takes place (Van Belle 2015). The monitoring of the media coverage process is useful for assessing the effects of disaster response exhaustion and for considering the social costs of implementing risk reduction measures.

When analysing post-disaster response strategies, it is often difficult to explain why affected communities are not predisposed to adopt actions that reduce the risk of exposure to similar destructive phenomena. In fact, hostility reactions are common when attempting to integrate risk reduction in actions and recovery strategies. These positions advocate decisions oriented to re-establishing the same pre-crisis functions and economic activities in places affected by floods, mass movements or wildfires (Van Belle 2015). Davoudi, discussing the distortions that result from the incorporation of resilience in post-crisis public discourses and policies, argues that ideas play a very important role in changing attitudes (Davoudi 2016a). These collective discourses and arrangements are critical in the way communities deal with disruptions, disasters, and crises.

When this discourse occurs in the post-disaster period, it tends to assume vulnerability as an individual responsibility. Following this perspective, policies are the instrument to enable resilient individuals, improving their adaptation skills during crises, ensuring the restitution to normality. This collective discourse, when shared by the governance structure and disseminated by the media, is based on a set of technocratic principles advocating more adequate solutions to increase the resistance of the affected communities, in opposition to scenarios of greater evolutionary or transformative resilience. Such approach discards a deep understanding of the causes of the crisis and of the main reasons of the communities' vulnerability.

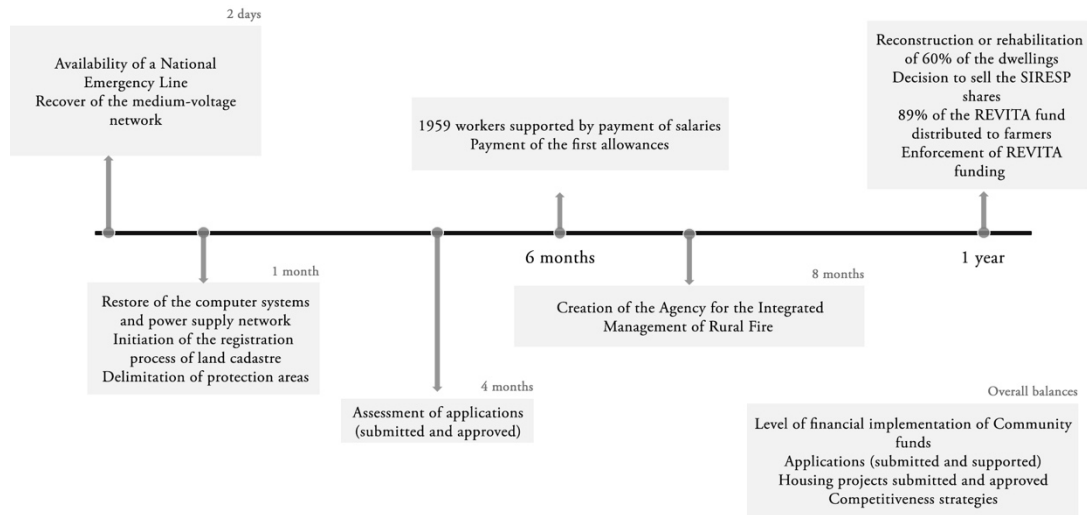
The analysis of the media coverage after the wildfires in 2017 in the Centro Region of Portugal adds to the debate on the impacts and main aspects of resilience, most valued by communities, structures of governance and, therefore, more represented in the discourse of the media in the different phases of the phenomenon. In this matter, the post-disaster media news stresses the dominant discourse on resilience by resistance. Thus, adaptation actions fit the discussion arena on potential or desired approaches. In the news sample, during the first year, there was no place for transformative actions. So, in accordance with other literature findings, immediate emergency policies or measures are facilitated while adaptive and transformative pro-resilience governance strategies are blocked (Medd and Marvin 2005). A logic of governance preparedness involves a complex network of institutions and actors (government departments, regional and local authorities, SGIs, public and private, communities, individuals and the media (Medd and Marvin 2005). Moreover, transformative resilience is based on strong institutional arrangements that learn from other crises, preparing the socio-ecological systems for future vulnerabilities to which they can be exposed. After disasters, the robustness of resilience strategies depend on how communities and territories share experiences, common needs, concerns, desires, aspirations, projects, plans, policies and actions (Vandergert et al. 2016).

As stated before, when dealing with resilience, the governance model is forced to balance structural dimensions that tackle the network dynamic, its capacity to deal with power relations and, therefore, implement actions in more varied contexts. Such understanding is a useful analytic framework for the post-disaster strategy. Here, this work sheds light on two subjects. One related with the network characteristics, which explain the collaborative perception and the adaptive capacity of the actors of the subsystem. Another one, process-related, placing specific actions in a timeline.

Figure 8 below summarizes the nature and direction of the response actions referred by the media during the first-year period post-disaster, based on the 150 selected news articles. In the first stage, emergency actions are the main answer to the communities' needs. Afterwards, to recover pre-disaster functions, multiple actions refer to socioeconomic drivers through the financial support for families,

households, and companies. In a last stage, towards the end of the analysed period, other measures arise to monitor and evaluate resources and time linked to the response strategies previously implemented.

FIGURE 8.
Post-disaster summary of the nature and direction of the responses during the first-year period



In the second half of the year, the creation of a new institution with the goal of strengthening the governance system and implementing adaptation measures deserves special mention. It illustrates the efforts of adaptation while stating some principles of transformability aimed at rethinking the socio-economic-environmental system affected by the catastrophe.

The moments referred above are those with more expression in the media communication and are, simultaneously, those to which is possible to associate actor-references. However, this cross-reference needs clarification. In this analysis, both dimensions (governance actors and decision process) do not have straight matching. It is interesting to observe that short-term measures – concerning resistance actions and immediate reactions to assure the social balance – are frequently associated to a certain accountability feature. Typically, these actions are monitored along the whole process, until complete reposition or improvement of the status-quo conditions. During this assessment, incidence falls on the impact or context characterization, which is followed by the assignment of responsibility to the entities responsible for the appropriate response. All other types of responses, when related with the intervention of specific actors, emerge in the form of statements. The role played by the elements of this governance model can, thus, be organized in two groups. As a simplification consider 1) those who legitimate the decision process, but do not interfere directly in the implementation post-catastrophe's policies or measures (e.g. Central Administration or Prime Minister); and 2) those from whom an immediate reaction is expected, to lessen the negative impacts imposed to the system (e.g. Municipalities, Civil protection, telecommunication's private operators).

From the policy-making point of view, the debate on resilient governance could be improved with further analysis aiming at understanding the compliance between the decisions stated in official documents (plans, regulations) and the decisions disseminated through media channels.

To conclude, even though the main aspects presented result from the analysis of 150 articles from two Portuguese reference newspapers, given the magnitude and particularity of the catastrophic events, is expected a certain similarity in the discourse focused on agents of change, who hold power within the governance arrangements to provide solutions and responses. Further research, extending the selection to other sources (online and local newspapers), can provide clearer understanding on both: i) the extent in which the desire for immediate answers, resulting from the interaction and communication between actors, within decision levels, is discussed; and ii) the territorialized impacts, capturing the perception of the populations in relation to post-disaster solutions and its efficiency.

7. CONCLUSIONS

The wildfires of 2017 that occurred in the Centro Region of Portugal created a catastrophic situation with consequences for the territorial system, exposing its vulnerability.

During and after this disaster, multiple actors and stakeholders began accounting for the impacts and started the implementation of response actions. The media, representing the public discourse, reported these efforts. The news articles developed during the 12 months after the disasters, allowed the monitoring of the disruptions in the SGIs networks, and, in a minor extent, the limitations on the other resources and functions of the territorial system.

Impacts are far more important in the post-disaster discourse than the response strategies. These strategies organize itself around the rational of resilience by resistance. Therefore, they aim at restoring the functioning of the socio-environmental system to the conditions before the crisis. The resources and the time needed to implement short-term interventions are often discussed.

The post-disaster debate, based on media coverage, reports on actions of governance structures and on the main concerns on the affected communities, with specific reference to emergency actions. Despite some progress towards adaptation, post-disaster planning (seen through public discourse) lacks on designing transformative resilience strategies. Indeed, the post-disaster here analysed is reported as an episode determined by laws of nature (in nature there is no reward or punishment, only consequences (Davoudi, 2016)) that produces impacts, which governance systems oppose (especially resisting), and favour actions that carry on the pre-crisis status quo.

The resilience framework is used as an analytical lens for understanding the challenges in minimizing the vulnerability of affected territories by severe catastrophe phenomenon when planning and managing SGI networks, resources, and function systems.

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