



# Disaster Journalism in Print Media: Analysis of the Top 10 Hydrogeomorphological Disaster Events in Portugal, 1865–2015

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**Abstract** Disaster communication guidelines emphasize that journalists should be aware of past major disasters and draw lessons from the coverage of those events. The press is an important source for the evolution of historical disaster and risk research paradigms over time. This study explored the top 10 damaging hydrogeomorphological events in Portugal selected from the disaster database, which includes events that caused human damages (fatalities, injured, missing, evacuated, and displaced) reported over a period of 151 years (1865–2015) by the Portuguese newspaper *Diário de Notícias* (DN). News analysis was guided by the news protocol. The analysis of the news published in DN enabled us to identify textual marks that present interconnections in the journalistic coverage and produce discursive standards for these disasters. The textual marks were associated with the hazard and risk paradigms. The discursive standards of DN did not clearly reflect the ruptures in the hazard paradigms. As a rule, the journalistic reports contributed to the naturalization of disasters and the gap in public understanding of risks, by presenting an approach focused on relief actions—ignoring social issues, vulnerability, and population resilience—reducing the discourse of preparedness for future disasters.

**Keywords** Disaster journalism · Hydrogeomorphological events · News protocol · Portugal · Print media

## 1 Introduction

Risks of hydrogeomorphological origin (floods, flash floods, urban floods, and landslides) have increased around the world in recent decades and have affected millions of people (EM-DAT 2019). Typically, these events cause large-scale human and material damage and attract great interest from the media, especially the press. In Portugal, for example, the press has been systematically reporting disasters since 1865 in the Lisbon-based daily newspaper *Diário de Notícias* (DN) (Antunes et al. 2020).

As with other disasters, flood coverage plays an important role in the recovery processes of affected people (Gortner and Pennebaker 2003) and can act as a vehicle to improve the understanding of flood disaster events (Bohensky and Leitch 2014). In this way, understanding disaster framing by mainstream media (for example, the type of themes addressed) can reinforce or discourage certain behaviors by the public (Ophir et al. 2021).

News agencies and journalists are essential components in the risk and disaster communication ecosystem, and play a central role in disseminating warnings and messages, as a source of information, and in engaging the public in remedial actions. But they can also distort what happens in a disaster and lead to misunderstandings. Failure to issue a warning, for example, could be the result of the myth that people could panic, a myth perpetuated by the media (Greenberg and Scanlon 2016; Scanlon 2011). The process of collecting and presenting news and information about events that have occurred, are occurring, or may occur in the future, is defined as disaster journalism (Houston et al. 2019).

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Thus, risk and disaster communication is a mediated communication, where the media play a central role (Murdoch et al. 2003). In the context of the mediatization of society, where “the functioning of institutions, practices, conflicts, culture, starts to be structured in a direct relationship with the existence of the media” (Verón 2001, p. 15), trying to separate communication from social facts is a problematic issue. With the advent of Web 2.0 and social networks, risk communication channels have changed. With this, it becomes possible to communicate directly with the public without negotiating with the media, mainly through the Internet. But according to Gesser-Edelsburg and Shir-Raz (2016) the media continue to have a critical role in risk identification and management.

Media coverage of past events can be one of the keys to understanding risks and disaster communication nowadays. Disaster communication guidelines emphasize that journalists should be aware of past major disasters and identify lessons to be learned from the coverage of those events (UNISDR 2015). In this context, the press is an important source for the evolution of historical disaster and risk research paradigms over time. In this way, press and journalism work as a memory space for disasters.

The United Nations International Strategy for Disaster Reduction (UNISDR) guides journalists to report the causes of disasters, and not just describe the facts and the impacts suffered (Leoni et al. 2011). This guidance reinforces Priority 1 of the Sendai Framework for Disaster Risk Reduction 2015–2030, in which disaster risk management policies and practices should consider the dimensions of vulnerability, coping capacity, exposure of people and properties, hazards, and environmental characteristics.

Additionally, the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health & Human Services introduced a new approach to communicating public health emergencies. It is a hybrid model that incorporates risk and crisis communication known as Crisis and Emergency Risk Communication (CERC) that was used by the organization during recent outbreaks of infectious diseases. Ophir (2018) argued that news analysis based on CERC guidelines demonstrated substantial discrepancies between what the CDC aims to communicate during epidemics and what the media actually disseminated to the public.

From this perspective, the strength of the mass media can be seen in the coverage of various disasters, such as forest fires, tsunamis, earthquakes, floods, and landslides (Knight 2006; Bohensky and Leitch 2014). This study focuses on press coverage (print media) of the top 10 hydrogeomorphological events in Portugal from 1865 to 2015, the most frequent hazardous phenomena in Portugal, causing widespread human and material damages in the country (Zêzere et al. 2014). Disaster journalism began in Portugal in the

second half of the nineteenth century with the coverage of floods and landslides (Antunes et al. 2020).

The knowledge of hazards and disasters has changed markedly through history. Smith and Petley (2009) and Hufschmidt et al. (2005) discussed a conceptual framework for addressing temporal variations in natural risk. Smith and Petley (2009) presented the environmental hazard paradigms, dividing them into periods: Naturalization (-1950); Engineering (1950–1970); Behavioral (1950–1970); Development (1970–1990), and Complexity (1990 onward). In the naturalization paradigm, disaster is seen as an “act of God”, which encourages the acceptance of disaster as an unavoidable external event. The engineering paradigm is based on making all built structures sufficiently strong to withstand a direct hazard confrontation. The behavioral paradigm recognizes the role played by human actions, warnings, and long-term land use planning for humans to avoid places more prone to natural hazards. The development paradigm is closely associated with disasters as resulting from the clash of two opposing forces: the socioeconomic processes that create human vulnerability and the natural processes that create geophysical hazards, which especially affect less developed countries. The complexity paradigm emphasizes the complicated interactions between nature and society, leading to improved long-term risk management according to local needs. According to this hazard and risk paradigms framework, we raised the following question: Did disaster journalism follow the evolution of these risk paradigms through time in reporting flood and landslide disasters in Portugal?

The analysis of local and national newspaper reports about floods and landslides illuminates how disaster experience frames perceptions of the hazards and risks, the events, and the responsiveness of governments and affected communities. In Portugal, the newspaper *Diário de Notícias* (DN) is a major reference on how historical events occurred in Portugal. Its history is intrinsically linked to the country’s history, as throughout its existence since 1865, the newspaper experienced different political regimes: monarchy (until 1910), republic (1910–1926), dictatorship (1926–1974), and democracy (1974 to present). Throughout DN’s history, there were freedom of expression and censorship moments in reporting the country’s news, including the news about hydrogeomorphological disaster events (de Oliveira Marques 1991). Antunes et al. (2020) discussed the disaster journalism during the monarchy period in Portugal (1865–1909) and how DN news reinforced the dominant risk paradigm of the time—the naturalization of disasters (Natenzon 2003). The focus of the news was based on socioeconomic impacts and post-disaster actions, without considering the exposure and vulnerability conditions of the affected populations. However, the work of Antunes et al. (2020) did not answer the question whether these characteristics

of the news published in DN on damaging flood and landslide events during the monarchy remained over time for the entire period covered by the disaster database (produced by the DISASTER project) that includes human consequences (fatalities, injuries, missing people, evacuated people, and displaced people) caused by floods and landslides that occurred in Portugal (Zêzere et al. 2014; Pereira et al. 2018). The DISASTER project filled the gap in the availability of a consistent and validated hydrogeomorphological database for Portugal, through the creation, dissemination, and exploitation of a GIS database on disastrous floods and landslides for the period 1865–2015 (Zêzere et al. 2014). In this context, this study aimed to analyze the media coverage of the top 10 damaging hydrogeomorphological (flood and landslide) events in Portugal for a longer period (over the course of 151 years, 1865–2015).

According to Verón (2004), a textual surface, in this case, the news, is composed of marks that can be interpreted as the traces of discursive operations. Thus, from the perspective of Verón (2004), it is possible to identify the textual marks that are repeated over time and that express themes and modes of operation of the DN. Each journalistic vehicle, in its mode of operation, provides the formation of a discursive standard to the journalists and the public (Verón 2004). Once this standard is recognized, the public's consumption of news becomes more readable, predictable, and immersed in its sociopolitical and cultural context. In this sense, one can expect to identify DN's discursive standard in the production of the news reporting of the top 10 damaging hydrogeomorphological disaster events over 151 years.

The analysis of the Portuguese journalistic coverage of these disaster events allows the answering of the following questions:

- (1) Does the DN press coverage of the top 10 damaging hydrogeomorphological disaster events highlight textual marks that constitute a discursive standard in the production of news over time?
- (2) Are the discursive standards connected to hazard and risk paradigms according to Smith and Petley (2009) and Hufschmidt et al. (2005)?

## 2 Data and Methods

The information on hydrogeomorphological events (floods and landslides) was obtained from the disaster database, which includes flood and landslide cases that caused human damages in the period 1865–2015 (Zêzere et al. 2014; Pereira et al. 2018). This database was gathered using a systematic analysis of 17 national and regional newspapers, where the DN provided the longest time record for data

collection (Zêzere et al. 2014). Analysis of news from DN was guided by the news categorization and analysis protocol.

### 2.1 Hydrogeomorphological Disaster Events

The floods and landslides that occurred in Portugal were obtained from the disaster database, which includes events that caused human damages (fatalities, injured, missing, evacuated, and displaced) in the period 1865–2015 (Zêzere et al. 2014; Pereira et al. 2018). *Diário de Notícias* is one of 17 national newspapers, and from DN the information about the top 10 damaging hydrogeomorphological disaster events used in this study was collected. It has been the only daily newspaper published continuously since 1865, providing the longest period for data collection (Zêzere et al. 2014).

In this study, the top 10 damaging hydrogeomorphological disaster events in the period 1865–2015 were selected from Zêzere et al. (2020) and the corresponding events news were explored, using *Diário de Notícias* (DN) as the data source. During this period, the most damaging hydrogeomorphological disaster event registered in mainland Portugal was the flash flood that affected the Lisbon region on 25–26 November 1967 that killed more than 500 people (Table 1) (Trigo et al. 2016). The December 1909 event ranks in second place because it resulted in the highest number of flood and landslide cases in the disaster database and generated 37 fatalities (Zêzere et al. 2020), and caused impacts over northern Iberia (Pereira et al. 2016). Other relevant events were identified, and most of them occurred during the twentieth century. The single top event that occurred in the twenty-first century was the January 2001 event that ranks 10th, characterized by floods and landslides (Zêzere et al. 2020).

### 2.2 News Analytical Protocol

The DN news reporting of the top 10 hydrogeomorphological events was systematically analyzed. The critical reading of the newspapers was guided by an analytical protocol (Fig. 2; Table 2) adapted from Antunes et al. (2020). It is important to highlight that the protocol was developed considering the characteristics of news production during the study period (1865–2015).

The news coverage of the disasters was divided into three dimensions: impacts, factual reporting, and dramatization. The disaster impacts were characterized in terms of socioeconomic, health, and environmental consequences (OPAS 2014). The socioeconomic impacts were classified into disruptions and losses in properties, transportation networks, public services, and economic activities. The impacts on health considered the damage suffered by the population and the effects on health services. Damage to the functioning of health services refers to the destruction and/or damage

**Table 1** Top 10 damaging hydrogeomorphological disaster events that occurred in mainland Portugal in the period 1865–2015 (Zézere et al. 2020), and the total number of pages that covered these events in the Portuguese newspaper *Diário de Notícias* (DN) news pages

Rank/Event ID	Event type	Date	Affected districts	Number of days	Disaster cases	Fatalities	Injured people	Evacuated people	Displaced people	Number of pages	Pages % of total (313)
1	F; FF	25–26 Nov 1967	11, 15	2	67	522	330	304	885	66	21
2	F; FF; UF; L	20–28 Dec 1909	1, 3, 4, 5, 6, 9, 10, 11, 13, 14, 15, 16, 17, 18	9	83	37	4	679	478	59	19
3	F; FF	15–17 Feb 1941	11, 15	3	6	33	0	109	0	40	13
4	F; L	9–12 Feb 1904	1, 3, 13, 17	4	4	27	1	1	3	2	1
5	F; FF	25–26 Nov 1865	11, 2	9	9	21	0	0	0	14	4
6	FF; UF; L	18–19 Nov 1983	11, 14	2	37	18	0	255	3239	29	9
7	FF; UF	2–9 Nov 1997	2, 8, 14, 15	8	16	11	22	141	134	32	10
8	F; FF; L	5–16 Feb 1979	5, 6, 11, 13, 14, 17	12	67	8	3	4244	14,322	18	6
9	F; UF; L	2–6 Jan 1940	4, 7, 11, 14, 15, 17	5	26	7	3	35	1043	17	5
10	F; L	26–27 Jan 2001	1, 3, 6, 9, 10, 13, 17, 18	2	28	6	5	402	570	36	12
Total										313	100

Event type: F (flood); FF (flash flood); UF (urban flood); L (landslide). Districts (see location in Fig. 1): 1-Aveiro; 2-Beja; 3-Braga; 4-Bragança; 5-Castelo Branco; 6-Coimbra; 7-Évora; 8-Faro; 9-Guarda; 10-Leiria; 11-Lisbon; 12-Portalegre; 13-Porto; 14-Santarém; 15-Setúbal; 16-Viana do Castelo; 17-Vila Real; 18-Viseu

to infrastructure such as water treatment, health facilities, and hospitals. The human damages suffered by the population include death, minor and serious injuries, the increase of diseases, especially those transmitted by vectors and of water origin (OPAS 2014). The impacts on the environment include biological and chemical contamination of water for human consumption, impairment of water delivery network and alternative sources of water supply, impairment of the sewage collection and treatment service network, and compromised garbage collection and disposal services (OPAS 2014).

Disaster news was also classified according to the factual dimension, linked to the news coverage provided by public or institutional entities, local correspondents, or the local population. The news provided data that may be related to event description and search and rescue operations. In this dimension, the category voices and sources was considered, as these actors are directly related to the event description, especially in the early twentieth century when access to news was less available than nowadays and travelling to reach the affected places was time-consuming.

In the dramatization dimension, the category Personal Dramas represents the narrative about the victims who were directly affected by the floods and landslides. Accountability/blame is related to the journalist and victim reports about the lack of risk and disaster management, as well as the delay in post-disaster actions.

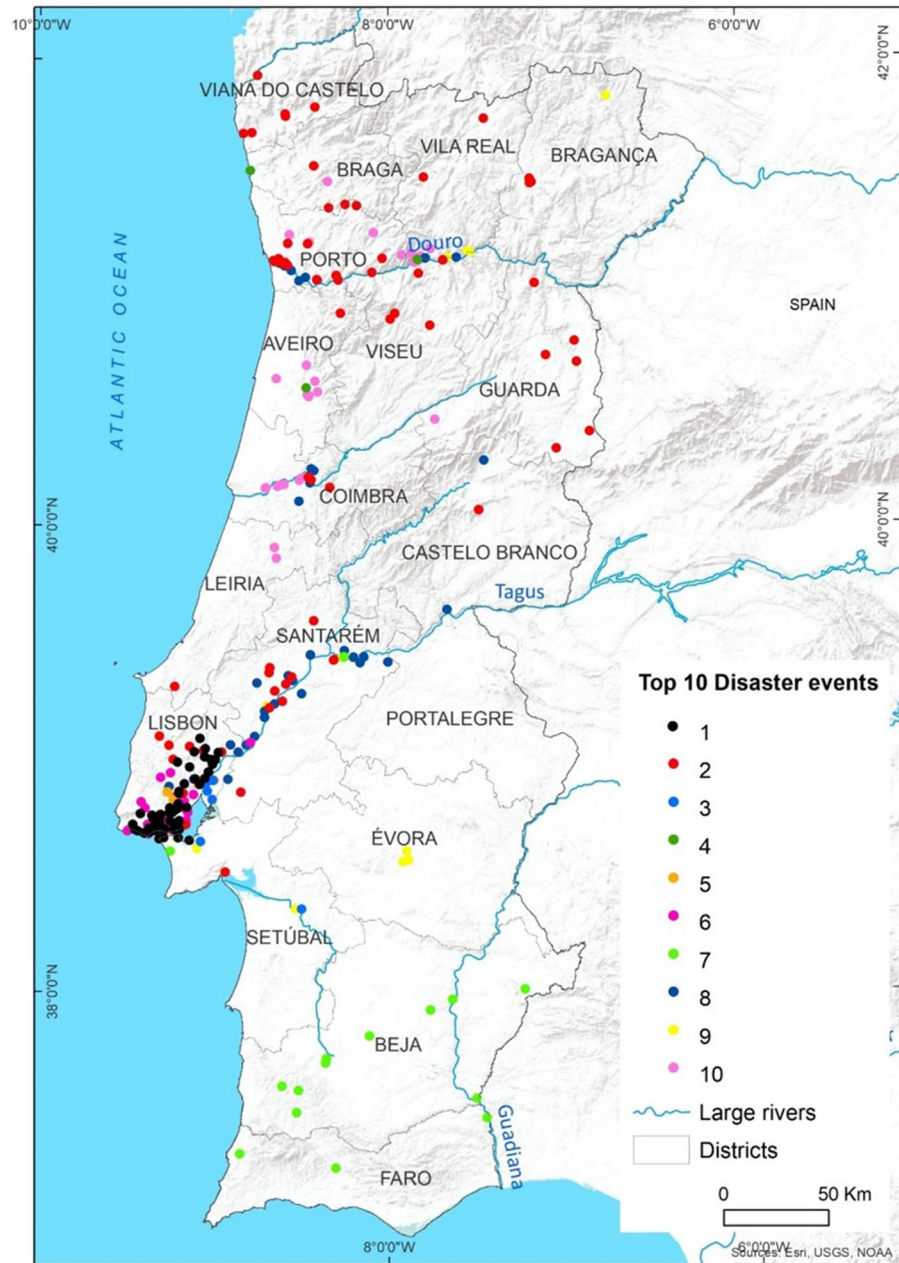
The published news about the top 10 damaging hydrogeomorphological disasters was read in detail. The statements were classified according to the analysis categories (see Fig. 2) in Maxqda, version 12. All news content was categorized, gathering text fragments that deal with the same subject within the same category.

After analyzing each category and subcategory (see Fig. 2), it was possible to identify textual marks, which were repeated more frequently in the news production throughout the events. This repetition constitutes a discursive standard in disaster coverage (Jemphrey and Berrington 2000). After this step, the textual marks identified in the DN were associated with the hazard and risk paradigms according to Smith and Petley (2009) and Hufschmidt et al. (2005).

### 2.3 The *Diário de Notícias* Case Study

The structure of the DN, the oldest daily newspaper in Portugal with a continuous circulation, was affected over the years by successive and important changes, both in the evolution of the press and in the macro-social context of political and economic transformations. The DN had different owners and went through different political regimes, consequently following quite varied editorial alignments and remodeling in form and content.

**Fig. 1** Location of the sites affected by the top 10 damaging hydrogeomorphological disaster events in mainland Portugal in the period 1865–2015. *Source* Disaster database (Zêzere et al. 2020)

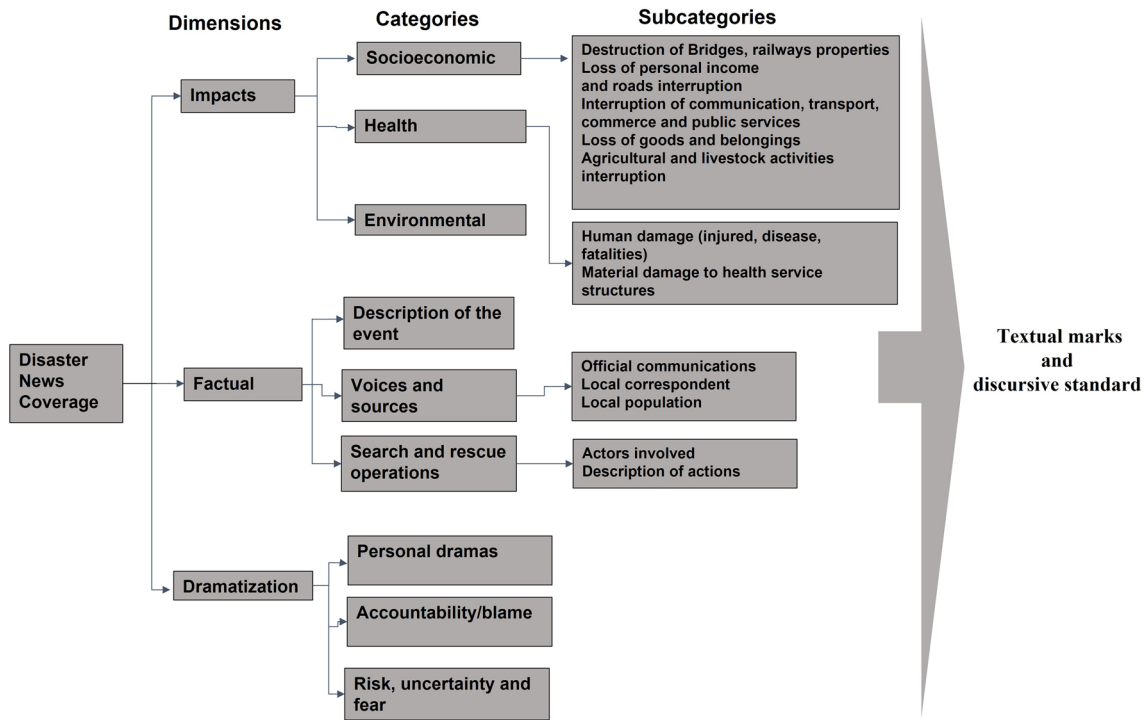


The studied events can be grouped in four periods. The first period includes the events of 1865, 1904, and 1909, a period characterized by the monarchy and, as discussed by Antunes et al. (2020), these events marked the early days of disaster journalism by the DN in Portugal. In the second period, characterized as Estado Novo (1933–1974), including the events of 1940, 1941, and 1967, the DN was one of the newspapers favorable to this regime (Tengarrinha 2016). In the third period, after the 1974 revolution (events of 1979 and 1983), DN was under government control until 1991, when the newspaper was reprivatized. The third period is characterized by two phases: one of “public service” and the other by the attempt to form an increasingly democratic

public opinion, with an independent posture of the current political power. The changes in the 1990s ranged from the format to the graphics and editorial line (short texts, orientation towards the direct interests of readers, less reporting and reduction of political themes). In the last period, since 1995, DN has been present on the Internet (Mesquita 2019), so the 1997 and 2001 events correspond to the digital age of DN.

### 3 Results

The top 10 flood and landslide disaster events from 1865 to 2015 were reported in a total of 313 DN news pages (see



**Fig. 2** News categorization and analysis protocol of the top 10 hydrogeomorphological (flood and landslide) disaster events that occurred in mainland Portugal, 1865–2015, as reported in the Portuguese newspaper *Diário de Notícias* (DN)

**Table 2** Example of categorized news narratives according to the analysis protocol for flood and landslide disaster events reported in the Portuguese newspaper *Diário de Notícias* (DN)

News categorization	Example of categorized news
Impacts	“Rail and telephone communications are disrupted for all regions” (DN, 16 Feb 1941)
Description of the event	“The most spectacular and the most tragic of all floods caused by storms” (DN, 17 Feb 1941)
Voices and sources	“The Civil Governor <sup>a</sup> was there: ‘The case was worse than I thought’ ...” (DN, 12 Feb 1979)
Description of actions	“Firefighters constantly receive calls for help” (DN, 16 Feb 1941)
Personal dramas	“Once again, it was the unprotected of this city, those who live in slums or shacks and woods” (DN, 20 Nov 1983)
Accountability/blame	“Who is responsible for so many losses?” (DN, 22 Dec 1909)

<sup>a</sup>The Civil Government, in Portugal, was an organ of the public administration that administratively represented the government of the Portuguese Republic in each district.

Table 1). Large differences were found between events, where events #1 (1967), #2 (1909), and #3 (1941) had the highest journalistic coverage, which is in line with the highest number of fatalities recorded. Event #4 (1904) showed the lowest news coverage (see Table 1), despite the high number of fatalities (27 people), but the numbers of injured, evacuated, and displaced people were low.

### 3.1 News Coverage Dimensions

The analysis of the news coverage dimensions of the top 10 damaging hydrogeomorphological events reported in the DN for the evaluated time period shows that impacts were the

most reported in the news (56%), followed by the factual (30%) and dramatization (14%) dimensions. The impacts dimension prevails in most events, except for event #4 (9–12 February 1904), where the factual dimension (63%) is greater, although the number of pages published is very low (total = 2). A possible reason for this result is that in the event of 1904 there was a greater number of fatalities (27) and few evacuated and displaced people (4). The factual dimension (43%) also shows a slight advantage in comparison to impacts news (42%) for event #10 (26–27 January 2001). The 2001 event is the last of the ten studied. More recent event studies are needed to see if this trend continues.

The news coverage frequency for each event was analyzed by categories (see Fig. 2). Socioeconomic impacts were most frequent (48%), followed by the description of events (13%), search and rescue operations (11%), and personal dramas (7%) (Fig. 3).

When the news coverage categories are analyzed per event in a chronological order, differences are found in the number of references in the news (Fig. 4). The classification of narratives by events highlights the socioeconomic impacts of events #1 (1967), #8 (1979), #2 (1909), and #9 (1940), as those most extensively reported. These events also characterized the high number of evacuated and displaced persons, although the 1983 event did not feature prominently in coverage. These event reports focused on floods and landslides description, search and rescue actions, and personal dramas reports. These numbers may have contributed to the newsworthiness criterion (Traquina 2002) in news production.

### 3.2 Event Impacts Dimension

The number of references in the event news about the impacts dimension and the corresponding categories of socioeconomic, health, and environmental impacts are summarized in Table 3. The news coverage exposed how flood and landslide events affected communities and the life of the population (Antunes et al. 2020).

Socioeconomic impacts were the most reported in the news (83.5%), most often reporting consequences like

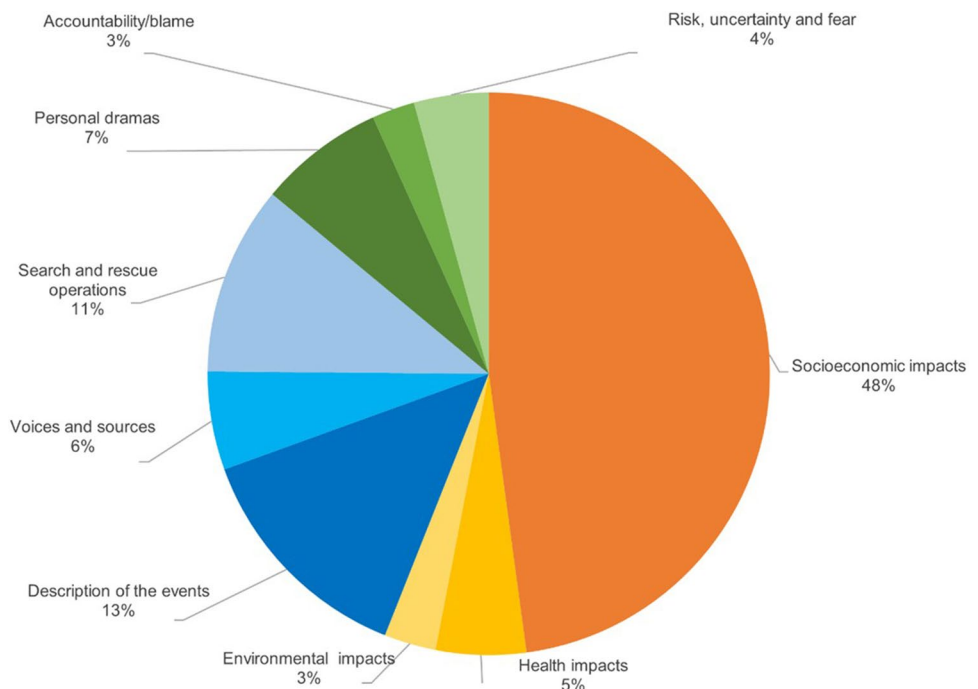
the destruction of rural and urban properties, agricultural and livestock activities interruption, and the disruption of communication, transport, commerce, and public services. Regarding the impacts on health (10.3%), human damage was the most portrayed, followed by damage on the structures of health services. The damage on the environment was reported to a lesser extent (6.2%).

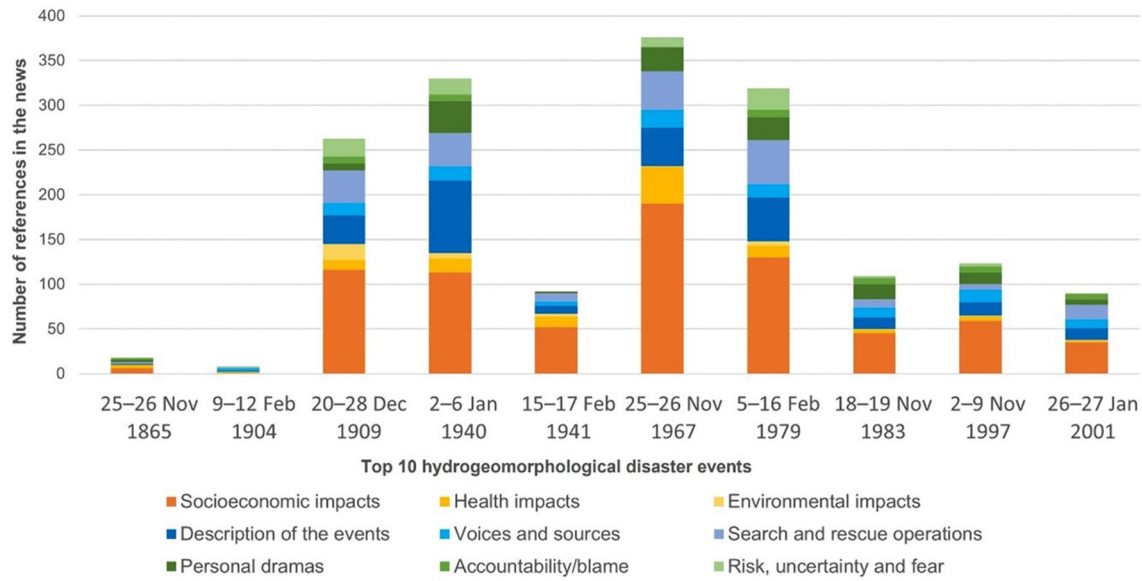
### 3.3 Event Factual Dimension

The description of the events is the second most discussed category in the coverage of the top 10 disaster events. The main narratives that are repeated over time are divided into five classes: negative adjectives (30%); spectacle of nature's fury (29%); focus on technical aspects (19%); memory of previous events (17%); and events described with human characteristics (11%).

The main negative adjectives used to describe the events were “dreadful catastrophe,” “real dread,” “violent storm,” and “bad weather.” Narratives such as “the most spectacular and the most tragic of all floods caused by storms” exemplify events characterized as spectacles of nature. A narrative example for events described with human characteristics is “the indomitable Mondego River climbed dikes, leapt over walls and dwellings, flooded agricultural fields.” Often, narratives referred to the past, such as “there is no memory of such a thing in the last 30 years (25 Nov 1997).” Another narrative used by journalists to describe the events was anchored in technical aspects: “Why did it rain? Weather

**Fig. 3** News coverage category frequency (in %) for the top 10 hydrogeomorphological disaster events in mainland Portugal in the period 1865–2015, as reported in the Portuguese newspaper *Diário de Notícias* (DN)





**Fig. 4** The number of references to the news coverage categories addressed for each of the top 10 hydrogeomorphological disaster events in mainland Portugal in the period 1865–2015, as reported in the Portuguese newspaper *Diário de Notícias* (DN)

explains. Impressive Record: 92 mm of rain in six hours!,” blaming the volume of rain for the impacts suffered.

Regarding search and rescue actions, the most recurrent narratives are related to the description of the relief actions carried out by the social actors involved, such as firefighters,

the local population, and civil protection (49% of events description), followed by administrative actions carried out by government agencies at the national and local levels (30%), and social support given to the affected populations (21%). The most cited actors involved were the volunteer

**Table 3** Impact categories and subcategories of the top 10 hydrogeomorphological disaster events in mainland Portugal in the period 1865–2015, as reported in the Portuguese newspaper *Diário de Notícias* (DN)

Impact Categories	Hits in DN	%
<b>Socioeconomic impacts</b>		
Destruction of rural and urban properties	225	24.6
Agricultural and livestock activities interruption	141	15.4
Interruption of communication, transport, commerce, and public services	130	14.2
Bridges, railways, and roads interruption	116	12.7
Loss of goods and belongings	75	8.2
Loss of personal income	76	8.3
Total	763	83.5
<b>Health impacts</b>		
Human damages (injuries and fatalities)	73	8.0
Material damage to health service structures	11	1.2
Illnesses	10	1.1
Total	94	10.3
<b>Environmental impacts</b>		
Contamination of water for human consumption and interruption of water supply	29	3.2
Accumulation of garbage	28	3.1
Total	57	6.2
<b>TOTAL</b>	<b>914</b>	<b>100</b>



firefighters (47% of references), followed by popular volunteers and relief committee volunteers (19%), and local-level authorities (16%).

### 3.4 Event Dramatization Dimension

The dramas experienced by the affected populations were also reported in the journalistic coverage of the top 10 disaster events. The reports were divided between dramas suffered at the individual level and those suffered at collective levels, corresponding to 49% and 51 % of the references in the DN, respectively. At times, vulnerable communities appear in newspaper reports as those who are always the hardest hit.

The DN resorted to official sources involved in the post-disaster actions and testimonies from the affected places. Local correspondents are cited until the 1940 event, after which period journalists assume the leading role in covering the stories in the affected territories, although local communities still provided event information in the respective territories.

The categories risks and uncertainty (4%) and accountability (3%) were less frequent. Accountability narratives are related to the lack of engagement of public authorities with respect to prevention and post-disaster actions. Concerning the 1909 event, for example, there is a question from a civil person: “Who is responsible for so many losses?” In the 1979 event, the affected farmers reported to DN that the consequences of the flood were the result of technical errors regarding dam discharges that could be corrected from that moment on to avoid future damages.

### 3.5 Textual Marks and Discursive Standards

After categorizing the news, it was possible to identify the textual marks that constitute the discursive standards in the production of DN news about floods and landslides over time in Portugal. Ten discursive standards emerged from the news coverage in the DN:

- (1) Focus on the socioeconomic impacts description.
- (2) Disaster metaphor describing an event as a spectacle of nature’s fury.
- (3) Nature as anthropomorphized.
- (4) Description of the event centered on the triggering mechanism.
- (5) Description of the event centered on memory of past events.
- (6) News based on official sources.
- (7) Focus on search and rescue operations.
- (8) News framed with dramatic stories of individuals and communities.

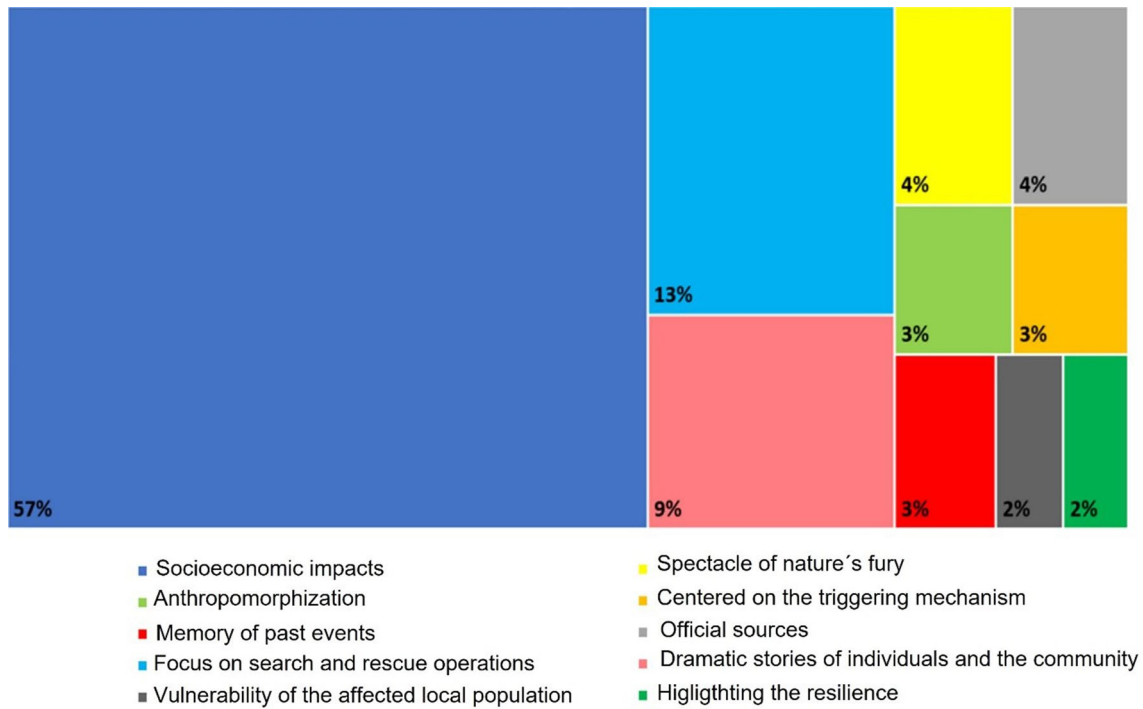
- (9) News pointing out the vulnerability of the affected population.
- (10) News highlighting the resilience of communities affected in post-disaster reconstruction.

Results of the discursive standard analysis of the top 10 disaster events show that focus on the socioeconomic impacts description is present in 57% of the DN references, followed by focus on search and rescue operations (13%), and framed with dramatic stories of individuals and communities (9%) (Fig. 5).

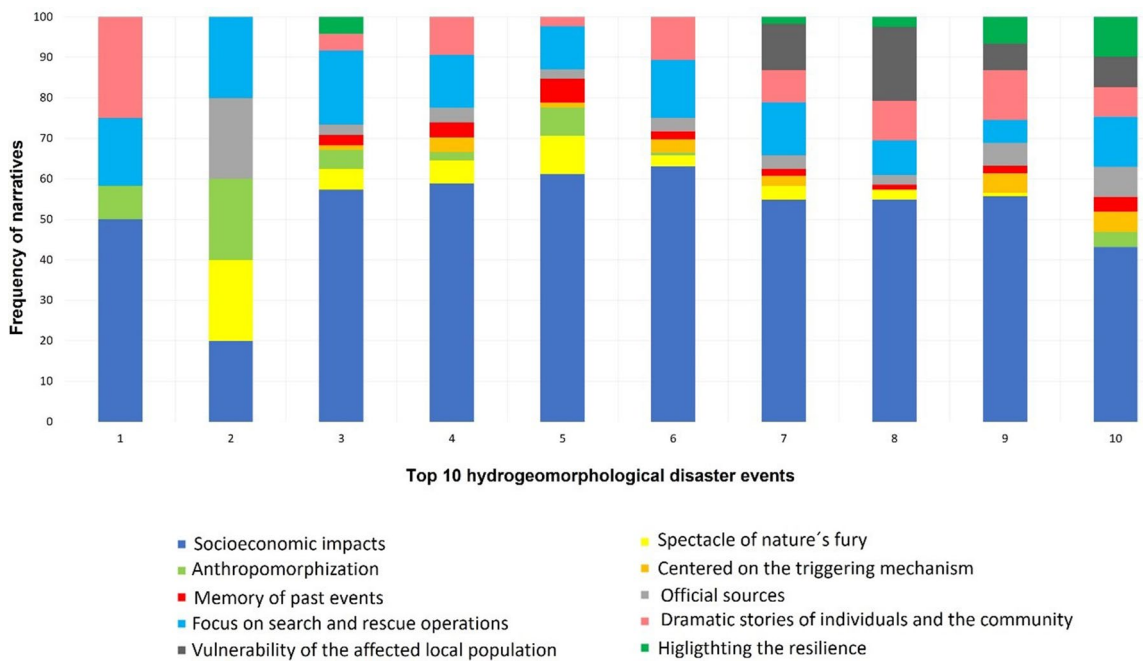
Less frequent is the disaster metaphor describing an event as a spectacle of nature’s fury and the news based on official sources, both with 4% of the references. The description of the event centered on the triggering mechanism, the focus on the discursive memory of past events, and the news pointing out the vulnerability of the affected population, account for 3% of the references each. Nature anthropomorphized and the resilience of communities affected in post-disaster reconstruction were covered by only 2% of the news.

Figure 6 shows the emerging discursive standards distributed by event, in chronological order. The socioeconomic impacts description is predominant in all events, while the disaster metaphor describing an event as a spectacle of nature’s fury and anthropomorphized nature had a higher frequency until 1941. After 1941, anthropomorphized nature disappeared from the news and returned only in 2001. Another aspect that should be highlighted is the emergence of news that points out the vulnerability of the affected population from 1979 onward. The same applies to news highlighting the resilience of affected communities in post-disaster reconstruction, though there was a previous occurrence in the reporting of the 1909 disaster event.

The frequency of discursive standards in the top 10 disaster events reported in the DN was associated with the hazard and risk paradigms: naturalization, engineering, behavioral paradigm, development, and complexity, according to Smith and Petley (2009) and Hufschmidt et al. (2005) (Fig. 7). Independent of the dominant paradigm, the focus on the socioeconomic impacts description, the discursive memory of past events, the search and rescue operations, and the framing of events with dramatic stories of individuals and communities have a constant rate of growth over the study period. The disaster metaphor describing an event as a spectacle of nature’s fury and anthropomorphized nature have a decreasing trend over time. These latter discursive standards are typically associated with the paradigm of naturalization of disasters, which encouraged the acceptance of a disaster as an unavoidable external event. In addition, the emergence of the development paradigm in the news highlights the vulnerability of the affected population, and the emergence of the complexity paradigm highlights the resilience of affected communities in post-disaster reconstruction.



**Fig. 5** Frequency of discursive standards in the top 10 hydrogeomorphological disaster events in mainland Portugal in the period 1865–2015, as reported in the Portuguese newspaper Diário de Notícias (DN)



**Fig. 6** Frequency of emerging discursive standards in each of the top 10 hydrogeomorphological disaster events in mainland Portugal in the period 1865–2015, as reported in the Portuguese newspaper Diário de Notícias (DN)

### 4 Discussion

The analysis of the news published by DN describing the top 10 damaging hydrogeomorphological disaster events that occurred over 151 years in mainland Portugal allowed us to highlight some textual marks in the production of news by DN over time. These textual marks can be seen as a discursive standard that occurs as if there were a pre-programmed roadmap to be followed from disaster to disaster (Scanlon et al. 1985). The discursive patterns of naturalization, anthropomorphization, and the discursive memory of past events are discussed from the hazard paradigm’s point of view.

#### 4.1 Discursive Standards in Diário de Notícias

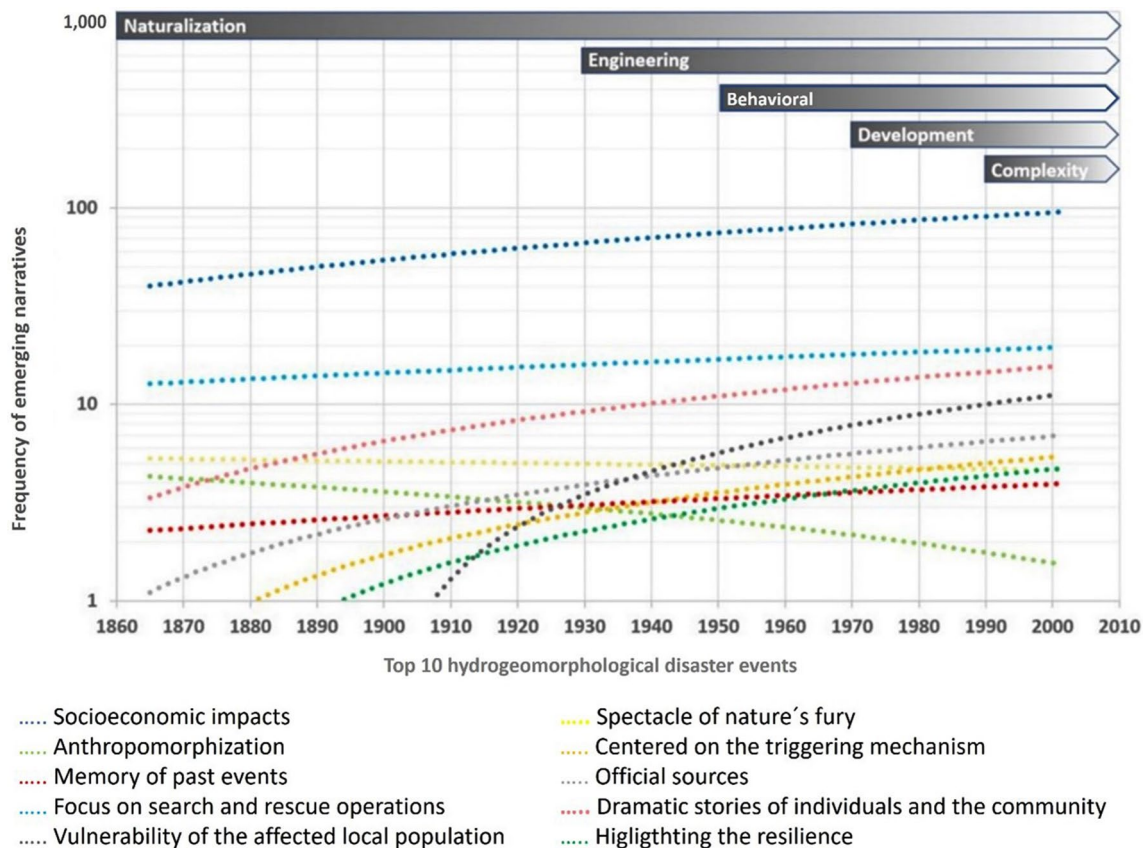
Hydrogeomorphological textual marks are understood as the social practice of text production. This means that every discourse is a social construction, not an individual one, and that it can only be analyzed by considering its historical-social context and its production conditions. It also means that the discourse reflects a specific worldview, necessarily

linked to its author(s) and to the society where an author lives (Pêcheux 1995).

In this sense, journalistic discourse is a constructor and producer of meanings about social reality and also allows the identification of the context of the mentioned facts and the type of message (meaning) transmitted to the reader, listener, or viewer. The discursive standards found in DN based on the textual marks, reduce disasters to their socioeconomic consequences, search and rescue operations, and the dramatization of individual and collective stories.

After identifying the discursive standards, they were associated with the hazard paradigms proposed by Smith and Petley (2009) and Hufschmidt et al. (2005). Some statements have a constant growth rate over time, regardless the dominant paradigm. These are focused on the description of socioeconomic impacts, on the discursive memory of past events, on the search and rescue operations, on the event’s triggering mechanism, and framed with dramatic stories of individuals and communities.

The discursive standard that represents the disaster metaphor describing an event as a spectacle of the fury of nature and the discursive standard where nature is



**Fig. 7** Linear trend of the frequency of discursive standards in the top 10 hydrogeomorphological disaster events in mainland Portugal in the period 1865–2015, as reported in the Portuguese newspaper

Diário de Notícias (DN) (log scale), and hazards paradigms according to Smith and Petley (2009) and Hufschmidt et al. (2005)

anthropomorphized show a downward trend over time. Both are related to the paradigm of naturalization of hazards. In the last decades, the increasing trend of framing events with dramatic stories of individuals and communities as well as the statements that point out the vulnerability of the affected population and highlight the resilience of affected communities in post-disaster reconstruction, can be associated with the paradigms of development and complexity.

## 4.2 Disaster Naturalization and Anthropomorphization

As discussed by Antunes et al. (2020), in the period from 1865 to 1909, the DN emphasized the report of the socioeconomic impacts suffered by the population and described the events as a great show of nature. During this period, there was a predominance of the naturalization of disasters in the news, characterizing the disaster events as independent of human action.

However, the analysis of the coverage of the top 10 damaging events showed that the naturalization of disasters continued to be a strategy employed in the DN news through the twentieth century. The framework of disaster naturalization is a common practice by the press. Parida et al. (2021) reinforced that the journalistic framework of disasters as purely “natural” events is highly problematic, requiring an urgent change in this approach. From this perspective, the location of human settlements on hazardous slopes and in alluvial areas is not taken into account to explain the location of disaster cases as well as the levels of destruction. Thus, for the press the impacts are more important than the causes of the events (Natenzon 2003).

The DN news reinforces the naturalization of disasters by qualifying the events as “aquatic spectacle,” “nature’s fury,” “devastating fury,” focusing on aspects such as the volume and intensity of the rains that was the main factor responsible for the social tragedies suffered. Furthermore, the socioeconomic impacts suffered are highlighted as a priority issue in the news, rather than emphasizing causal explanations and risk exposure of affected locations (Ploughman 1995).

Henriques (2019) explored the 1967 event (the most damaging hydrogeomorphological disaster) as a media event under censorship and highlighted the government’s efforts to blame rain for the death of hundreds of people, minimizing the catastrophe and ignoring the fact that people lived in precarious, disorderly built houses beside streams or in flood risk zones. This narrative also reinforces the paradigm of naturalization of disasters.

By framing a disaster event as “natural,” DN reinforces confidence in an approach centered on short-term response and recovery (evacuation, rescue, and relief), moving away

from longer-term approaches such as disaster preparedness and prevention (adaptation, mitigation, and resilience). As it is frequent in the coverage of news about natural phenomena, the anthropomorphization of events was also observed in the coverage of the DN. Anthropomorphization is the tendency to ascribe humanlike features and mental states, such as free will and consciousness, to nonhuman beings or inanimate agents. Nature anthropomorphism refers to the attribution of human qualities to nature (Horowitz and Bekoff 2007). In the case of floods, the river waters were anthropomorphized and personified as “uncontrolled” (for example, “In the river the waves were so agitated that the waters rose over the walls and invaded the quays. At the same time, the wind rocked the boats, endangering many of them”). Sacchi et al. (2013) investigated the effect of nature anthropomorphization on people’s willingness to help victims of disasters, and their findings suggested that anthropomorphizing nature undermines the tendency to support victims of disasters. The nature anthropomorphizing had a downward trend over time in the news coverage of the top 10 damaging events.

## 4.3 Discursive Memory of Past Events and the Behavioral Paradigm

With regard to narrative focused on discursive memory, the analysis of the coverage of past events in the DN newspaper constantly reinforces the relationship between memory and journalism. Memory can be thought of as an instrument of reconfiguration of the past and the means of communication are not the only ones available, but they are configured today as some of the main actors in the work of framing past and present events (Pereira De Souza 2014; Rinne and Nygren 2016).

In this case, the journalist takes the role of mediator between the event and the reader, and becomes an authorized witness to the floods and landslides that happened in the past. In addition, memory represents for the journalist a discursive strategy that makes sense of current events, preventing the subject from being forgotten, and showing the readers what they should remember (Hufschmidt et al. 2005).

An example of this is the DN edition published on 25 November 1997, 30 years after the 1967 flash flood that hit the Lisbon metropolitan area. With the title “Memory – floods of 30 years ago,” a special 7-page edition of the DN recounted the worst moments lived at the time. Thus, by activating the memory of the 1967 flood, journalism connected the past to the present, highlighting facts that should not be forgotten. In this way, journalism is not just a record of what is happening, not only providing the archive of events, but it is also itself an archive. In the modern period, there is no cultural or collective memory that is not, at least in part,

journalistic (Gerk and Barbosa 2018). The narratives of past events reinforce the behavioral paradigm, as it recognizes the role played by human actions, warnings, and long-term land use planning for humans to avoid places more subject to natural hazards (Smith and Petley 2009).

#### 4.4 Development and Complexity Hazard Paradigms in the Press

The narrative framed with dramatic stories of individuals and communities addresses the needs of vulnerable groups, but at the same time, it incorporates a relief-centric approach that ignores issues concerning infrastructure and disaster resilience (Parida et al. 2021). This narrative appears over time and has an increasing trend, in line with the emergence of paradigms of development and complexity. The development paradigm is closely associated with disasters as resulting from the combination of the socioeconomic processes that create human vulnerability and the natural processes that create geophysical hazards.

In addition, the complexity paradigm implies more emphasis on the complex interactions between nature and society, leading to improved long-term risk management according to local needs. Previous studies have pointed out that media framing of disasters focused on personal stories helps to promote the needs of vulnerable groups, and increases forms of engagement, solidarity, and action (Pantti 2018; Parida et al. 2021). But at the same time, it can realize a relief-centric approach that ignores issues around disaster infrastructure and resilience.

Cox et al. (2008) highlighted that exaggerated media discourses undermine the local population's recovery process and pointed out that the growing emphasis on emotions and the individual has the potential to compromise the accuracy of disaster stories. Emotion and personalization can obstruct the critical discussion of serious social issues (Solman and Henderson 2019). This approach also has commercial appeal, as dramatic stories sell news.

After the 1979 disaster event, journalistic coverage in Portugal became more attentive to vulnerability in the country, triggering conditions, and possible disaster preventive actions. From that time on, narratives about the vulnerability of populations and the resilience of communities became more frequent; in 1979 the press was no longer under censorship in Portugal.

The affected population's vulnerability narratives and narratives highlighting the resilience of communities in post-disaster reconstruction that appear after the 1979 flood event are in line with the evolution of the environmental hazard paradigm (Smith and Petley 2009). From 1970 to 1990, the development paradigm reflected greater awareness of the human vulnerability to disasters and the understanding

of how low economic development and political dependence contribute to vulnerability (Smith and Petley 2009).

After 1990, the complexity paradigm reflected more emphasis on the complex interactions between nature and society leading to the improved long-term management of hazards according to local needs (Hufschmidt et al. 2005). Event narratives highlight the resilience of affected communities in post-disaster reconstruction, emerging as an important approach in the last decades of the twentieth century.

We argue that this is the first move in Portugal to replace disaster narratives with simplified frameworks that tend to speculate and naturalize narratives that aim at understanding the main driving forces of risk and disaster preventive actions.

It is necessary to move towards the visibility of risks and change the journalistic logic of producing only from what has happened, from what is factual. It is necessary to build reports that can change reality, with a view that anticipates, that is concerned with the future, and that seeks to approach risks and their forms of management, to avoid or minimize disasters. Journalists can contribute to building community resilience through narratives that promote awareness of resilience, and investigate economic inequalities and social disparities that tend to reduce resilience (Usher 2009; Newman and Shapiro 2014).

## 5 Conclusion

This study allowed us to identify textual marks that present interconnections in the journalistic coverage and produced discursive standards of the top 10 damaging hydrogeomorphological events over 151 years. Due to its long periodicity, the DN provides information for a systematic analysis of the top 10 events in Portugal, although we observed that in general, the DN's narratives about these events in Portugal did not clearly reflect the ruptures in the hazard paradigms. This fact may be more related to the evolution of the editorial line of the DN, together with the political evolution of the country. However, throughout the nineteenth century and in the twentieth century, the focus was on the impact of disasters on human beings, on the environment, and not on the disasters' causal explanations, emphasizing the social and economic impacts suffered by the affected territories.

Although the findings represent common practices in news production, these discursive standards contributed to the naturalization of disasters and to the gap in the public's understanding of risks, presenting an approach focused on relief actions, and ignoring social issues, vulnerability, and population resilience, reducing the discourse of preparedness for future disasters. The 1979 flood event was a key turning point, where narratives about the vulnerability of communities and social issues became more frequent in the

news, which is in line with the development and complexity environmental hazard paradigms.

The results of this study are specific to Diário de Notícias and cannot be generalized to other contexts and countries, which is a major limitation of this study. Moreover, it is possible that the results show the limitations of legacy media. Within disaster communication there are other spaces that can offer alternative perspectives, but the analysis and comparison of the top 10 hydrogeomorphological disaster events that occurred in mainland Portugal in the period 1865–2015 would not be possible with other media (for example, TV and the Internet).

Disaster journalism must be committed to the public interest and be aware of the population's vulnerabilities and risk exposure. It is necessary to create reports that can change reality, with a message that anticipates, that is concerned with the future that seeks to bring the public closer to the risks and their main natural and anthropogenic drivers (Pereira et al. 2020; Santos et al. 2020) to avoid or minimize disaster impacts.

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