



# When Authorities' Response Fails and Citizens Act: Social Media Responses to the DANA Disaster in Spain

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## Abstract

Spain experienced an extreme weather event known as DANA (Cut-off Low) between late October and early November 2024. This event triggered intense rainfall, causing several rivers to overflow and severely damaging infrastructure. The Valencian Community, with over 200 fatalities, was among the most affected regions in what is considered one of the most severe hydrological disasters in the country's contemporary history. This research aimed to understand how digital environments facilitated the organization and mobilization of citizens in response to institutional inaction during this crisis. The study's primary objective was to analyze public reactions on social media, specifically on X, in light of the lack of effective intervention by authorities. A mixed-methods approach achieved this by combining a review of official documents and media reports with an analysis of social media posts. The main conclusion drawn from this study is that social media interactions during this emergency fostered emotional, social, and organizational bonds in the initial days of the crisis. These connections aimed to safeguard citizens' well-being through the aid offered by individual platform users as part of spontaneous collective action.

**Keywords** Climate change · Collective action · Communication · Extreme weather · Social networks · Spain

## 1 Introduction

Towards the end of October 2024, Spain experienced an extreme weather event known as DANA (Cut-off Low), commonly referred to as the “cold drop” (Martín-León 2003). This phenomenon unleashed torrential rainfall of up to 600 liters per m<sup>2</sup> in some areas, causing rivers to flood and inflicting severe infrastructure damage. Valencia, with 229 fatalities, emerged as one of the hardest-hit areas, marking the event one of the most severe hydrological disasters in Spain's recent history. The Valencian Community is the fourth most populous autonomous community in Spain, with more than five million inhabitants. The impact of the DANA on the population was devastating, with consequences both in terms of human lives and the economic and social fabric of the province. The study of this case, from the perspective

of official communication and crisis management, is of great interest due to the challenges and shortcomings revealed by the institutional response.

DANA regularly occurs in the Mediterranean basin due to the specific climatic conditions of autumn. During this season, interactions between cold and warm air masses intensify rainfall. These recurring events pose significant challenges for risk management and infrastructure adaptation, underscoring the importance of developing effective communication strategies for climate emergencies (Kelman 2017; Coronese et al. 2019; Schneider 2011).

Despite warnings issued by the State Meteorological Agency (AEMET) several days in advance, authorities' response to DANA was widely perceived as inadequate (Cooney 2024). Ineffective communication, compounded by the collapse of emergency services in the worst-affected areas, left citizens feeling vulnerable and abandoned (Mallorca Diario 2024). According to various media reports, many individuals were trapped without immediate assistance, while others lacked accurate information about risk zones and safety recommendations (Solsona 2024). This perception of governmental inaction worsened due to the limited capacity of emergency infrastructure, which was quickly overwhelmed by the disaster's scale.

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Social networks became crucial tools for citizen organization and mobilization in this atmosphere of mistrust and a lack of information. Without clear official guidelines, citizens turned to platforms like X (formerly Twitter) to share real-time updates, issue warnings about hazardous areas, and coordinate relief efforts (Riesco 2024). This spontaneous social media response supplied essential information unavailable through official channels and fostered solidarity networks and mutual support during the crisis. The potential of digital tools to act as hubs for coordination and support during crises has been explored in previous studies. Houston et al. (2015) asserted that these digital spaces emerge as alternative mechanisms for managing collective responses where institutional structures fall short.

This study built on this premise by examining how digital environments enable citizens to organize and mobilize in response to institutional inaction during an emergency. The main objective was to analyze citizens' reactions on social media to the lack of adequate governmental intervention, examining how these platforms served as support channels and community resilience during the crisis.

This research offered valuable insights into the role of social networks during emergencies, particularly when institutional responses are delayed or insufficient. Its significance lies in its contribution to digital communication and resilience studies, demonstrating how digital environments can substitute for institutional shortcomings and become effective channels for collective coordination and support. Furthermore, the study's findings could inform public management by offering recommendations. Enhancing communication and enabling real-time interaction can help institutions respond more effectively, ensuring quicker and more coordinated actions in future emergencies.

## 2 Theoretical Framework

The global implementation of information and communication technologies across all areas of daily life (Viché 2018) and the ongoing digitalization process affecting most societies have accelerated and reshaped the contexts in which people interact, which continue to evolve dynamically (Kim et al. 2021). These processes have significantly influenced human relationships and communication methods (Arjona-Martín et al. 2020) within a cultural context where cyberculture has become a dominant practice, shaping other social behaviors (Levy 2010; Turner 2021). The traditional public sphere, previously shaped by the influence of mass media as the primary catalyst for public opinion, has transformed into a hybrid public sphere. This hybrid model combines traditional media—characterized by one-way communication that limited participation—with a digital public sphere that incorporates nodes for creating, disseminating, and

interacting with messages (Dahlgren 2018). The reinvention of mobile and digital media has driven cultural transformations (Jenkins 2013). The central element of the digital sphere is conversation (Scolari 2009). Transformations hinge on digital platforms' bidirectional, participatory, and collaborative nature, mainly social media (Hernández 2016).

Digital platforms foster universal, ubiquitous, and free communication (Alonso 2015), where citizens act simultaneously as producers and consumers, shaping a new agora for opinion exchange that drives social change (Mendes et al. 2018). These platforms provide spaces for collective action that facilitate autonomous social transformations (Castro-Martínez and Díaz-Morilla 2021; Sierra 2018). Citizens increasingly recognize and use these spaces for debate and expression. As Liu and Han (2025, p. 14) put it, “this shift reflects a cognitive escalation in resilience-building, where global disaster experiences are translated into localized preparedness through social media discourse.” Castells (2012) highlighted how cyberactivist initiatives form digital resistance to global power in the informational context, connecting actors who may inhabit distinct scenarios but share similar concerns, positions, and demands. As Shen et al. (2025) recently demonstrated in their study of online discussions around the Türkiye-Syria earthquake, collective actions in these intangible spaces create connections that later materialize in physical spaces (Schroeder and Vilo 2020), amplifying what Rovira (2017) conceptualized as “connected crowds.” This effect becomes especially evident during crises, where citizens use social media to seek up-to-date information and news despite the potential risks of unreliable data (Victoria-Mas 2020). During the Covid-19 pandemic, for instance, social media played a vital role in keeping people informed and connected while providing entertainment (Sued Palmeiro and Loureda 2020). In the early lockdown phase, Twitter facilitated the formation of social and organizational bonds based on solidarity, a sense of community, social support, and communal participation (Castro-Martínez et al. 2021).

Classic disaster sociology introduced the concept of social convergence to describe how unaffiliated individuals move toward crisis areas to offer help, driven by empathy or a sense of urgency (Fritz and Mathewson 1957). In the digital era, these impulses have migrated online, forming what scholars describe as digital volunteerism or digital citizen science—bottom-up processes in which ordinary users collect, share, and analyze crisis-related information (Palen et al. 2007). This study drew on both traditions to interpret spontaneous online mobilization during the 2024 DANA event. Various studies (Burke and Kraut 2016; Boas et al. 2020; Arrobo et al. 2021) emphasized that in emergency scenarios, social media becomes a tool for solidarity and social support, offering both expressive and instrumental provisions that generate social capital (Williams 2006;

Millán et al. 2019). The immediacy of these platforms enables real-time resource exchange, which proves invaluable during crises.

Extreme weather events have grown in frequency and intensity worldwide due to climate change (Coronese et al. 2019), and integrating coping and climate change adaptation (CCA) into disaster risk reduction and sustainable development processes has become increasingly more important (Kelman 2017). Climate change is a threat multiplier, exacerbating disasters when vulnerability and exposure align. It constitutes a subset of disaster risk reduction (Kelman 2015). Development policies must address climate change at the community level through CCA strategies to support the most affected (Mercer 2010), and improving coordination between emergency planning and CCA is vital for reducing current and future risks. Furthermore, effective communication remains crucial to counter public resistance to necessary preventative measures, which often entail non-returnable investments aimed to avoid future costs (Manzanedo and Manning 2020).

### 3 Methodology

This study is a preliminary investigation examining citizens' reactions on social networks to the floods in Spain in 2024. The hypothesis underpinning this research posits that (H) citizens organized themselves to take collective action in response to authorities' inaction during the emergency caused by the DANA event in October 2024. This study aimed to analyze conversations on social networks regarding the meteorological event. The following secondary objectives have been established:

- (1) Determine the chronology of events.
- (2) Identify key scientific milestones in the evolution of the event.
- (3) Analyze communications from authorities to the public.
- (4) Examine conversation topics and their reach on the social media platform X.

To achieve these objectives, data collection employed two primary methods: the examination of official documents and media reports related to the disaster (see Appendix<sup>1</sup>), and the qualitative and quantitative analysis of a sample of social media posts.

In order to conduct the analysis of media reports, news and institutional reports were selected based on three criteria: (1) publication within the temporal frame of the DANA (29 October–1 November 2024); (2) explicit reference to the

DANA, the affected areas, or institutional responses; and (3) citation or reproduction by other news agencies, indicating their relevance and reach. The sources prioritized generalist media outlets with broad national and regional circulation, such as *El País*, *RTVE*, *ABC*, *Las Provincias*, *Levante-EMV* and *À Punt*. In total, 24 items were selected and cross-checked for redundancy.

The selection of the social media platform for analysis was guided by theoretical and empirical considerations, aiming to identify the most relevant digital space for observing citizen reactions and communicative practices during the crisis. X was chosen for three primary reasons. First, its real-time and public nature allows immediate access to conversations during an unfolding crisis, unlike closed platforms such as WhatsApp or ephemeral content in Instagram Stories. Second, X has consistently been recognized as a key arena for public deliberation and official communication during emergencies (Houston et al. 2015). Third, preliminary observations confirmed that hashtags and keywords related to the DANA reached national trending status on X, while similar interactions were not observed with equivalent intensity on other platforms like Facebook, Instagram, or TikTok during the period analyzed. The timeframe for analyzing X activity spans from Tuesday, 29 October, to Friday, 1 November, covering the initial days of the crisis when citizen participation emerged spontaneously. For the content analysis, the content analysis proposal for digital publications developed by Castro-Martínez et al. (2021) has been adapted (Table 1), removing some of the categories specific to the pandemic that were not appropriate for this case study.

A random sample of 300 public posts on X was selected to ensure qualitative manageability and thematic saturation. We conducted the sampling using Getday Trends, focusing on the four days immediately following the peak of the DANA event (29 October–1 November 2024). We stratified the selection by day and trending terms, and chose posts based on their chronological distribution and the presence of specific keywords. The sample included various user profiles, ranging from individual citizens (verified and anonymous accounts) to local journalists and small organizations.

We selected the hashtags and keywords (for example, #DANA, “Mazón”, “Valencia”, “Utiel”, “Paiporta”, “Letur”) based on their recurring presence in the top 10 national trending topics during the analyzed timeframe. Their high visibility, semantic relevance to the event, and capacity to aggregate user attention around crisis-related conversations justified their inclusion.

The study employed the web metric tool Getday Trends, which provides hourly and daily insights into trending topics on X in Spain.

<sup>1</sup> <https://zenodo.org/records/17671023>.

**Table 1** Content analysis of social media posts

Social and organizational links	Community participation	<ul style="list-style-type: none"> <li>- Collaboration</li> <li>- Participation inactivities/initiatives/claims</li> <li>- Responding to calls on the networks</li> </ul>
	Sense of community	<ul style="list-style-type: none"> <li>- Meeting needs</li> <li>- Personal connection and belonging</li> <li>- Valuing personal opinions</li> <li>- Help and collaboration</li> <li>- Contact via social networks</li> </ul>
	Social support	<ul style="list-style-type: none"> <li>- Emotional</li> <li>- Instrumental</li> <li>- Informational</li> </ul>
	Resilience	<ul style="list-style-type: none"> <li>- Adaptation, recovery, and spirit</li> <li>- Collective and communicative learning</li> <li>- Managing negative emotions</li> </ul>
	Health and safety	<ul style="list-style-type: none"> <li>- Advice and information</li> <li>- Physical and mental health</li> </ul>
Conversation	Solidarity	<ul style="list-style-type: none"> <li>- Organized solidarity initiatives</li> <li>- Individual examples of solidarity</li> </ul>
	Political criticism	<ul style="list-style-type: none"> <li>- Criticisms of measures adopted</li> <li>- Criticism directed at political parties and their leaders</li> </ul>
	Criticism of the community	<ul style="list-style-type: none"> <li>- Denouncing unsupportive behaviors</li> <li>- Criticism of specific communities</li> </ul>
Communicative resources	Hashtags and emojis	<ul style="list-style-type: none"> <li>- Presence (high-medium-low)</li> <li>- Most commonly used</li> </ul>
	Photos/Video/Links	<ul style="list-style-type: none"> <li>- Presence (high-medium-low)</li> <li>- Source: media/RRSS/others</li> </ul>
Disinformation	Fake news/Bulos	<ul style="list-style-type: none"> <li>- Presence (high-medium-low)</li> <li>- Source: media/RRSS/others</li> </ul>

Source Adapted from Castro-Martínez et al. (2021)

## 4 Results

The progression of the DANA through the Valencian Community illustrates its rapid escalation from a meteorological warning to a critical emergency. The chronology of events was reconstructed by cross-referencing official communications from the State Meteorological Agency (AEMET), the Júcar Hydrographic Confederation (CHJ), and the Generalitat Valenciana, alongside news coverage from national and regional media (see Appendix<sup>1</sup>). The AEMET (Agencia Estatal de Meteorología) holds the national mandate for forecasting weather phenomena and issuing risk alerts. The CHJ oversees river basin management and hydrological warnings in the region. The Generalitat Valenciana is responsible for regional risk protocols and emergency coordination, including the activation of evacuation and response measures. Institutional sources were used to identify the sequence and timing of alerts, recommendations, and public communications before and during the crisis. This period saw severe flooding and river overflows, with a slow response from authorities and increased reliance on social media for assistance and information. The absence of effective official communication compounded the challenges.

### 4.1 Chronology of Events

The AEMET issued its first forecast of the phenomenon on 20 October and provided continuous updates over the following days. On 27 October, a Special Notice of Adverse Phenomena warned of a high likelihood of torrential rains. By the night of 28 October, red and orange alerts were declared for various regions in the Valencian Community, anticipating extreme rainfall.

On the morning of 29 October, the red alert extended across the province of Valencia. Authorities emphasized the extreme flood risk and advised against all non-essential travel. In response, the University of Valencia and multiple schools suspended activities, the Valencia Provincial Council instructed employees to return home, and the Military Emergency Unit (UME) deployed to Utiel.

By the afternoon, heavy rainfall caused the Poyo ravine in Torrent to overflow, impacting nearby towns. At 8:12 p.m., the Es-Alert system sends mobile notifications to residents, warning of imminent danger. Citizens turned to social networks to coordinate responses and share critical information as perceptions of insufficient official action grew.

The storm's peak on 29 October brought widespread overflows and evacuations, particularly in areas such as

Alzira and Gandía. Criticism of emergency management and inadequate infrastructure intensified. On 1 November, authorities released their first official damage assessment, while citizens continued to rely on informal networks for information and mutual support. Key stages in the DANA chronology are as follows.

#### 4.1.1 Preparatory Phase: Warnings and Precautions

- 20 October 2024: The AEMET issued its initial forecast regarding the potential formation of a DANA affecting the eastern coast of Spain.
- 25–26 October: Forecast updates highlighted the likelihood of heavy rainfall in the Valencian Community, shared via public notices and social media.
- 27 October: The AEMET released a Special Adverse Phenomena Warning, indicating a 70% probability of torrential rainfall in the region.
- 28 October, 10:48 p.m.: Red and orange alerts predicted extreme rainfall across Valencia.

#### 4.1.2 Day 1: Tuesday, 29 October 2024

- 07:31 a.m.: The red alert extended to Valencia's northern interior and southern coastal regions.
- 07:52 a.m.: The entire province of Valencia was placed under red or orange alerts.
- 08:04 a.m.: The AEMET published a social media post warning of torrential rains and urging the public to avoid unnecessary travel.
- 08:53 a.m.: The CHJ reported intense rainfall and rising water levels in local river channels.
- 09:48 a.m.: The AEMET expanded the red alert to more regions and issued further warnings, advising against proximity to riverbeds.
- 11:41 a.m.: The University of Valencia and approximately 20 schools suspended their activities due to adverse weather conditions.
- 11:50 a.m.: The CHJ reported the overflowing of several ravines and significant flooding in the Magro River. The AEMET released a video stressing extreme risks in Valencia and Malaga.
- 2:00 p.m.: The Valencia Provincial Council instructed employees to return home due to worsening conditions.
- 3:00 p.m.: Regional broadcaster À Punt recommended that residents stay indoors, reporting that the storm was shifting northwards.
- 3:20 p.m.: Severe flooding affected the town of Utiel, one of the first areas to experience significant impacts.
- 4:30 p.m.: The UME deployed to Utiel to assist with rescue operations.

- 6:30 p.m.: The Poyo ravine overflowed in Torrent, flooding nearby municipalities, including Picanya, Paiporta, Benetússer, Sedaví, Massanassa, and Catarroja.
- 8:12 p.m.: The Es-Alert system issued warnings to residents via mobile notifications.

#### 4.1.3 Day 2: Wednesday, 30 October 2024

- Overnight, citizens relied on social networks to share information about affected areas and coordinate assistance due to the perceived inadequacy of official responses.
- By midday, authorities released an initial damage assessment, public criticism of their crisis management escalated.

#### 4.1.4 Day 3: Thursday, 31 October 2024

- The DANA reached peak intensity, with rivers and ravines overflowing in urban and rural areas. Evacuations were conducted in severely affected zones, such as Alzira and Gandía.
- Infrastructure failures during the night hindered emergency operations, increasing citizens' dependence on social networks for real-time updates and assistance.
- The AEMET emphasized the importance of regional preparedness and inter-agency cooperation to mitigate the impacts of future meteorological events.

#### 4.1.5 Day 4: Friday, 1 November 2024

- Authorities released their first comprehensive report on casualties and economic losses.
- Public criticism regarding crisis management and the inadequate preparedness of infrastructure intensified.

### 4.2 Communications Chronology Issued by the Authorities

The following authorities were involved in responding to the events caused by the DANA:

- President of the Government: Pedro Sánchez
- President of the Valencian Community: Carlos Mazón
- Minister of Territorial Policy and Democratic Memory: Ángel Víctor Torres
- Minister of Defence: Margarita Robles
- Minister of Transport and Sustainable Mobility: Óscar Puente
- Secretary of State for the Environment: Hugo Morán
- Minister of Infrastructure of the Generalitat Valenciana: Vicente Martínez Mus
- President of the Popular Party: Alberto Núñez Feijóo



Between 29 October and 1 November 2024, political authorities and institutional representatives issued several statements addressing the crisis caused by the DANA. Carlos Mazón, President of the Generalitat Valenciana, initially used platform X to urge road caution, referencing red-level alerts issued by Emergencies 112 (elDiario.es 2024). Throughout the day, he participated in various official activities and appearances, stating at one point that “at the moment there is no evidence of personal injuries” and later suggesting that the storm was moving towards Cuenca, forecasting an improvement by 6:00 p.m. This message was subsequently deleted (elDiario.es 2024). However, Mazón’s absence from the Integrated Operational Coordination Center (CECOPI) meeting and delays in official communication reflected a lack of coordination (elDiario.es 2024).

From the central government, Pedro Sánchez assured that all necessary resources would be mobilized to support those affected (El País 2024). Ángel Víctor Torres, Minister of Territorial Policy, declared three days of official mourning, while the Minister of Defence, Margarita Robles, confirmed the deployment of UME troops (Levante-EMV 2024; RTVC 2024).

Additionally, the Royal Family supported the victims, ordering the flag to be flown at half-mast as a gesture of mourning (El País 2024). Despite the advanced meteorological warnings, Secretary of State for the Environment Hugo Morán acknowledged the shortcomings in response mechanisms, highlighting a disconnect between technical forecasts and their public communication (El País 2024). These statements underscore the interaction between institutional responses and public perception during emergencies. Effective and timely communication remains essential for managing crises and maintaining public trust. Table 2 presents a detailed chronology of statements and actions taken by the authorities.

From a qualitative perspective, the tone of the communications issued by the authorities varied greatly depending on the issuer, although they all maintained a formal style typical of communications from institutional posts. Users have been classified into four categories: authorities related to the regional government, authorities linked to the central government, the Royal House, and agencies related to meteorology, hydrographic channels, or emergencies. In the case of President Mazón, in principle the tone was friendly and reassuring, and through the expressive resources he used he conveyed that the risk situation was dissipating. As the DANA progressed, Mazón became unreachable, and therefore no further communication of any kind was made from his side. In contraposition to this silence, both the AEMET and the CHJ maintained a continuous flow of communications on the crisis, disseminating alerts aimed at the authorities and the public with a clear, concise tone that conveyed messages that, through textual, iconic, and audiovisual expressive

resources, unambiguously reflected the real danger posed by the meteorological phenomenon that was occurring, with the aim of minimizing its impact. The communicative actors related to the central government intervened privately on the day of the disaster through the CECOPI and the coordination of emergencies and publicly in the following days, issuing messages of condolence, explaining the resources that were mobilized and the actions that were taken.

The Secretary of State for the Environment was self-critical, pointing out that the warnings had not been effectively integrated despite the fact that they had worked correctly. For its part, the Royal House offered its solidarity, condolences and decreed mourning in a tone appropriate to the circumstances and following the official protocol for these cases. Finally, members of the regional government and the President of the Popular Party, the party that governs the area, criticized the malfunctioning of the warning system and the lack of coordination between authorities, employing a defensive strategy based on an aggressive tone, critical of the central government and through which no responsibility was assumed.

### 4.3 Communications on Social Networks by Users

The quantitative identification of trending topics was complemented with a qualitative reading of the most representative posts, in which their content, tone, and communicative resources were examined. The messages often conveyed strong emotions, ranging from indignation and fear to solidarity and gratitude, expressed through explicit language, capitalization, or exclamation marks. Users employed media resources such as photos and videos to document flooding and rescue situations, enhancing their messages’ credibility and emotional impact. While some posts came from verified accounts (journalists, local media, or officials), most originated from anonymous users, highlighting this mobilization’s bottom-up nature. We categorized these issuers by role (for example, individual citizens, media actors, institutions) and interaction style (informative, critical, supportive). We observed that the most shared content typically included direct calls for help or accountability.

It was not until 5:00 p.m. on 29 October 2024 that a term related to the DANA affecting the Valencian Community entered Spain’s top 10 trending topics on the social network X (Fig. 1). The term was “Utiel,” one of the towns most severely impacted by the floods. However, it had not yet surpassed 10,000 posts at that moment.

Three hours later, at 8:00 p.m. on the same day, the hashtags #DANA and “Valencia” had already become the two leading topics of conversation on X in Spain. Five other terms related to the meteorological phenomenon—“Paiporta,” “Civil defence,” “Utiel,” “Picanya,” and “Font”—were ranked among the top 10 trends, generating

**Table 2** Chronology of communications by authorities

Date	Political authority	Statements	Source
29-10-24, 8:53	Carlos mazón, president of the generalitat valenciana	Published initial updates on X.	La Vanguardia (2024)
29-10-24, 13:00		Stated, "At the moment, there is no evidence of personal injuries this morning."	elDiario.es, (2024)
29-10-24, 13:14		Published additional updates on X.	La Vanguardia (2024)
29-10-24, 14:30		Attended a private lunch.	elDiario.es (2024)
29-10-24, 15:00	Salomé pradas, minister of justice and interior	Convened the first Cecopi meeting for 5:00 p.m. to oversee the response to the rainy season. Mazón did not attend.	elDiario.es (2024)
29-10-24, 18:45	Carlos mazón, president of the generalitat valenciana	Received a call from Minister Pradas warning of the Forata dam's potential overflow.	elDiario.es (2024)
29-10-24, 19:30		Arrived at the Cecopi meeting in L'Eliana. Technicians briefed him on the situation. The alert was sent to the public at 8:12 p.m.	elDiario.es (2024)
30-10-24	Pedro Sánchez, president of the government of Spain	Announced that "all necessary resources will be made available today, tomorrow, and for as long as it takes" to help affected communities recover.	El País (2024)
30-10-24	Ángel Víctor Torres, minister of territorial policy	Declared three days of official mourning for victims and announced the approval of an "area affected by a natural disaster."	Levante-EMV (2024)
30-10-24	Margarita Robles, minister of defence	Confirmed the deployment of over 1,000 UME troops to assist in rescue and evacuation efforts in affected areas.	RTVC (2024)
30-10-24	Salomé Pradas, minister of justice and interior	Declared the activation of the multiple victim protocol and set up a helpline for relatives of missing persons.	RTVE (2024)
31-10-24	Spanish royal house	King Felipe VI and Queen Letizia expressed solidarity with the victims and cancelled the Queen's engagements. They ordered flags to be flown at half-mast.	El País (2024)
31-10-24	Hugo Morán, secretary of state for the environment	Stated that the forecasts worked "perfectly," but the "response mechanisms" failed to integrate the alerts effectively.	El País (2024)
31-10-24	Alberto Núñez Feijóo, president of the popular party	Criticized the management of alerts and the response to DANA, citing potential coordination failures between administrations.	EFE (2024)
01-11-24	Vicente Martínez Mus, minister of infrastructure	Announced restrictions on private vehicle access to municipalities most severely affected by the DANA.	Levante-EMV (2024)

Source Adapted from several sources

approximately 136,000 posts. "Font" refers to a Castilian town in La Mancha, also affected by flooding.

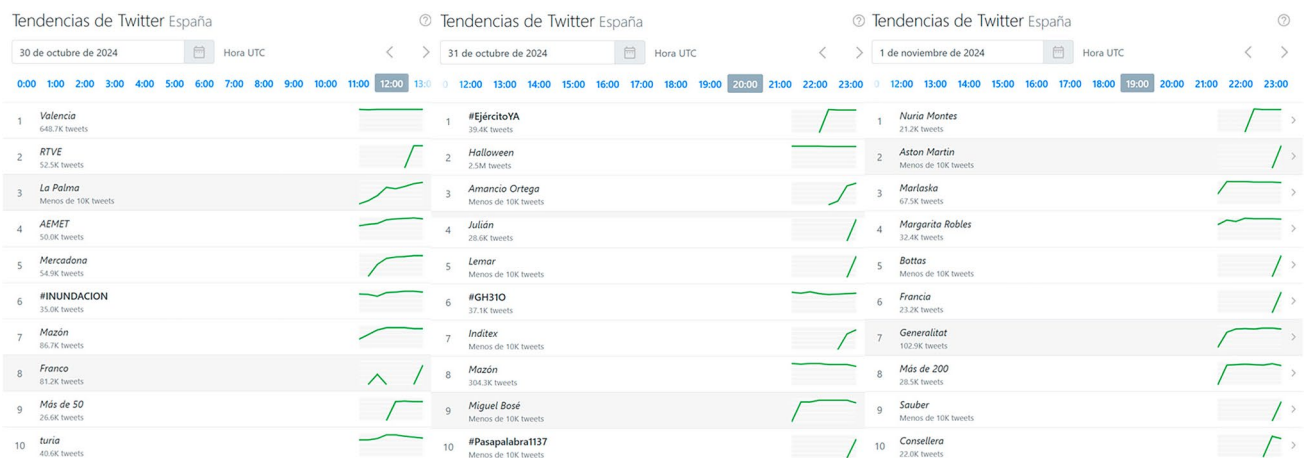
At midnight on 30 October, the term "Mazón," the surname of the President of the Valencian Community, appeared for the first time in the top 10 trending topics. By 1:00 a.m., the acronym "AEMET," representing the Spanish Meteorological Agency, had also entered the list. Later that morning, at 8:00 a.m., attention shifted to another key agent in the crisis: the Military Emergency Unit (UME). By 9:00 a.m., the term "Mercadona," Spain's largest supermarket chain, emerged as a trending topic. The company gained attention for its controversial decision to keep employees

at their posts during the worst phases of the DANA and, in subsequent days, for requiring them to return to work despite red alerts. The company also faced criticism for disposing of usable products from its flooded stores.

As the scale of the crisis became clearer (Fig. 2), the conversations on X about the DANA grew increasingly politicized. Notably, Franco, the surname of the dictator who ruled Spain from 1939 to 1975, ranked eighth among the top trending terms at noon with over 81,200 posts. This trend can be contextualized by linking it to accusations from far-right users and climate change deniers in the months preceding the floods. They baselessly claimed that the Spanish



**Fig. 1** Top Trends on X in Spain for 29 and 30 October 2024. *Source* Getday Trends



**Fig. 2** Top Trends on X in Spain from 30 October to 1 November 2024. *Source* Getday Trends

government aimed to destroy hydraulic works built during Franco's regime as part of the so-called objectives of the 2030 Agenda.

RTVE, the Spanish public broadcaster, also remained among the top trending topics. This was due to its extensive coverage of the disaster and the ensuing debates on social media regarding the perceived objectivity of its reporting.

Starting at noon on 31 October, Feijóo, the President of the Popular Party (the main opposition to the Spanish socialist government and the party to which Carlos Mazón, President of the Comunitat Valenciana, belongs), dominated much of the debate on X in Spain. This attention followed statements in which Feijóo expressed support for his regional president while criticizing Pedro Sánchez, President of the Spanish government, and other agencies under central government control, such as the AEMET and UME.

Between 5:00 p.m. and 9:00 p.m., the hashtag EjércitoYa emerged as the most-discussed topic, reaching a peak of 45,300 posts in the final hour. Users called for a

faster and more substantial intervention by the military to address the ongoing crisis.

On this study's last day of data collection (1 November), several new names became prominent in X discussions in Spain. These included Marlaska, the Minister of the Interior, and Margarita Robles, the Minister of Defence. Notable social figures such as Amancio Ortega—the owner of the Inditex group and donor to relief efforts—and Miguel Bosé—a singer known for his denialist positions and controversial Instagram post about the DANA—were also featured in trending topics.

However, the most-discussed individual during the crisis between 4:00 p.m. and 8:00 p.m. on that day was Nuria Montes, the Councillor for Innovation, Industry, Commerce, and Tourism in the Generalitat Valenciana. Montes was dismissed days later by Carlos Mazón following her controversial comments, which prohibited the families of deceased individuals from accessing morgues set up for the disaster.



From 8:00 p.m. until the end of the day, the term “Resign” topped the trending list. This word reflected two opposing movements on X: One group called for Pedro Sánchez to resign as President of the central government. At the same time, another demanded the resignation of Carlos Mazón as President of the Generalitat Valenciana.

Predominant posts centered on shared messages, themes, and sentiments:

- Informational support: Users shared applicable content to address or resolve specific problems, including disseminating media reports and recommendations from authorities.
- Emotional support: Posts included messages of encouragement, solidarity, affection, and gratitude towards individuals involved in relief efforts and rescues.
- Instrumental support: Users offered tangible assistance to those affected, including checking on the physical condition of missing individuals or making homes available for displaced persons.
- Community participation: Posts reflected a positive response to calls for action and requests for information, including appeals for specific individuals, reports on affected areas, and various types of mobilization efforts.

The multimedia content illustrating the magnitude of the event is extensive, encompassing both photographs and videos. In addition to the publications by media outlets covering the event, most of this content originated from private users who captured the conditions faced by the population during and after the torrential rains using their mobile devices. These posts conveyed feelings of surprise, fear, and uncertainty.

Numerous posts focused on supporting collective morale, which links to resilience and a sense of community, even among users not necessarily territorially connected to the affected areas. These shared emotional ties strengthened identification and solidarity within communities that extended beyond local boundaries, fostering an expanded perspective, identification, and collective awareness in response to the crisis.

X was used to request and offer assistance, share information, and provide emotional and material resources. The findings indicate a strong presence of social support in various forms, which collectively transcended into self-organized collective action, resulting in valuable social capital. Social media posts enabled users to express their feelings, seek support and understanding, and offer resources to address the collective’s challenges. Regardless of the timeline or community, hashtags were initially employed to share warnings, offers, and requests for help. As time progresses, these posts began to reflect anger and indignation.

There was no evidence of typical usage of emojis, GIFs, or memes in the conversations. Given the profound and mournful nature of the topic, users avoided such resources. The leading identified hashtags—both those analyzed and others used alongside them—were part of the natural language of online conversations. Users often did not apply hashtags explicitly but incorporated them organically into their written expressions.

From the night of 29 to 30 November, as the magnitude of the crisis became more explicit, the dissemination of fake news emerged prominently, although it remained thematically localized. These false narratives primarily sought to blame the central government for mismanagement. Concurrently, criticisms of governmental inefficiency and political disputes over crisis management arose, extending into the following days.

Although high-impact posts from public figures and organizations were identified, most of the viral content originated from anonymous users. This dynamic indicated no significant pre-existing influencers dominated the conversation; any user could become a relevant and impactful voice in this context. This phenomenon was often supported by multimedia content accompanying such posts.

#### 4.4 A Global Perspective on the Dynamics of Communication during the DANA

With the aim of offering a global perspective of the communicative phenomena that took place during the DANA disaster, the results of this research begin with a chronology of the events, since, as has been shown in this study, some of the actors cast doubt on the facts that occurred and contrasted, offering the public an alternative account. The results compiled in Sect. 4.1. Show that the meteorological agencies and various authorities and institutions were correct in their forecasts about the danger of the event, while at the same time communicating them to the public in a gradual manner. Their messages were precise, clear, and constructed on the basis of various communicative resources that gave them veracity. However, these warnings were overshadowed by the communicative flows of the regional authorities, especially by the figure of the regional President Carlos Mazón, who did not give sufficient credibility to the data offered by these entities and opted to reassure the population and discredit the warnings. As a result, the population received conflicting messages and did not assimilate the warnings about the destructive potential of the DANA clearly and in advance. On the day of the crisis, there was an information blackout on the part of the regional President, who was the decision maker in emergencies of this type, who remained unreachable until mid-afternoon despite unsuccessful attempts by national authorities to collaborate in the emergency through internal communication flows that

were made public days later. This situation delayed political decision making on the dissemination of the extreme alert warning to the population, so that by the time it was issued, localities were already completely flooded.

This lack of official communication underpinned and encouraged citizens to organize themselves through a completely spontaneous digital mobilization once the large-scale crisis had been unleashed, offering content that would serve as a resource for information, mutual support, collaboration, and emotional support. In the days following the arrival of the DANA, the management of official communication by the regional authorities was also not planned or executed in a manner appropriate to a crisis of this magnitude: responsibilities were omitted, political opponents were blamed, and the leading role in crisis management was ceded to the national authorities, offering contradictory versions of President Mazón's absence.

## 5 Discussion

Social networks, particularly in exceptional circumstances, have proven to be channels for communication and the promotion of coexistence and participation. These findings confirm the critical role of social media as both an emotional outlet and an organizational tool during acute emergencies. The high level of citizen-driven information sharing observed aligns with previous work on digital collective action and grassroots mobilization (Castells 2012; Sierra 2018). However, the Valencian case revealed a significant evolution: digital solidarity was reactive, strategic, and anticipatory, compensating for institutional delays and communicating actionable warnings. This supports the notion that digital platforms can temporarily substitute state functions in the early hours of a disaster, especially in contexts of political disaffection or institutional mistrust. These dynamics reflect a classic feature of collective action: the spontaneous emergence of horizontal coordination networks in the absence of institutional leadership (Tilly 2004; Snow and Soule 2010).

Moreover, the predominance of non-institutional voices and the decentralization of message production challenge traditional models of top-down crisis communication. This reflects a shifting communicative ecology where legitimacy emerges not from authority but from the messages' immediacy, affect, and perceived usefulness. The crisis situation of the DANA, coupled with the lack of information and leadership on the part of the regional authorities, caused spontaneous collective action that led citizens to act in solidarity and self-organization with the aim of safeguarding the integrity of the DANA victims as far as possible.

They provide a space for connectivity that, during crises, allows users to collectively express concerns, emotions, and

collaboration, as was the case during the initial days of the DANA in Spain in 2024. Like the early months of the Covid-19 pandemic (Castro-Martínez et al. 2021), X—formerly Twitter—served as a platform for expressions of resilience and resource mobilization, enabling user communities to offer selfless assistance to citizens.

This case study showed how communication gaps are filled spontaneously, especially in crisis situations, when institutions and political authorities do not exercise the leadership they are entitled to. In the face of the DANA, citizens offered a collaborative and constructive response—even through spontaneous, non-hierarchical communication flows and very simple narrative resources—that regional politicians were unable to generate. These findings align with previous research (Williams 2006), indicating that social capital emerges within networks independently of their specific use, generating benefits based on the interpersonal connections formed, whether material, informational, or supportive. Despite their geographical dispersion, users share similar concerns that, at specific moments, foster collective models of coexistence within virtual spaces.

As Sosa Valcárcel et al. (2019) have noted in studies of previous crises, this case demonstrated the potential for new forms of organization, participation, and social mobilization among users driven by empathy and solidarity towards those affected by the floods. These findings are rooted in broader debates about digital collective action and how citizens organize their popular mobilization, especially in situations where authorities and political leaders fail to live up to the expectations placed on them. Digital activism and its various forms of mobilization, collaboration, and user-to-user support offer an amplified and complex framework for crisis communication models.

The theoretical implications derived from the analysis of situations such as the DANA extend to several areas, highlighting the decentralized nature of digital responses, the affective legitimacy assumed by non-institutional actors, who are forced to fill the informational and leadership vacuums, and the redefinition of communicative authority in the face of political inaction. In this case, there has been a process of framing of mobilization (Merlinsky 2008) that has contributed to the symbolic effectiveness of collective action despite its informal organization as a spontaneous network with digital participation as a cohesive nexus.

On the other hand, managing climate change presents significant communication challenges. In line with Kelman (2015), the results highlight the importance of communicating the urgency of swift and decisive action against what may seem like a distant and global threat. The findings also underscore the necessity of effective political interventions to address the risks and vulnerabilities associated with climate change, not only during specific events but also in the long term, through planning,

adaptive strategies, and developing resilient infrastructure. This conclusion echoes the insights of several prior studies (Mercer 2010; Ametepey et al. 2023).

This study successfully achieved its primary objective by analyzing social media conversations surrounding the October 2024 DANA in Spain. The interactions on social networks during this context revealed emotional, social, and organizational bonds developed in the early days of the crisis aimed at ensuring citizens' well-being through the help provided by this spontaneous collective action.

The chronology of events (objective 1) demonstrates that the authorities failed to prepare adequately for the risks associated with a forecasted event. All indicators pointed to a high likelihood of extreme weather in specific areas, prompting national and international entities to warn populations under their jurisdiction, advising caution and discouraging travel. However, the general public was not alerted until late afternoon, when water levels had risen in many affected areas, leaving citizens trapped at work.

The researchers identified key scientific milestones regarding the event's progression (objective 2), showing that warnings were issued well in advance—10 days before the event—providing sufficient time to activate emergency protocols. Organizations such as the AEMET and the Júcar Hydrographic Confederation provided real-time updates on the DANA, but regional authorities disregarded these.

The analysis of official communications to the public (objective 3) indicated that these were inadequate, unclear, and delayed, reflecting an underestimation of the risks associated with meteorological alerts issued by scientists. In the Valencian Community, the region's highest political authority provided contradictory and erroneous information, prioritized other matters, and arrived late to the Integrated Operational Coordination Center meeting. A year earlier, in November 2023, the Popular Party and Vox-led regional government dismantled the recently established Valencian Emergency Unit, which had been created to coordinate provincial fire services and disaster response efforts.

Regarding the topics of conversation and their reach on social media platforms (objective 4), the analysis revealed evidence of social support, community sentiments, and participation among digitally connected users. The platform served as a medium for collective expressions of collaborative feelings motivated by shared concerns about the situation, even among users geographically distant from the flooded areas. The platform's immediacy facilitated organic collaboration, enabling users to quickly mobilize a wide range of resources to address the lack of institutional action and information. The articulation of these hashtags operates as a framing device (Benford and Snow 2000), giving meaning and urgency to the collective behaviors observed. Instances of fake news and rumours were also identified,

primarily aiming to blame the central government while exonerating regional authorities.

In light of these findings, it can be concluded that the hypothesis is supported: Citizens organized themselves into collective action in response to the authorities' inaction during the emergency caused by the October 2024 DANA (H). The social capital generated during the early days of the crisis is evident in the results, which highlight various aspects of the spontaneous collective action through which users coordinated to assist those affected.

The limitations of this study stem from its nature as a case study, meaning its findings cannot be generalized to other situations, mainly as it represents preliminary research. Nonetheless, the study is valuable as it demonstrates how citizens can use social networks as communication tools during crises, especially when faced with contexts characterized by a lack of information. It highlights that in the face of authorities' inaction during an extreme weather event and their minimization of its significance, citizens organized themselves online to provide information, aid, solidarity, and support through digital interactions that had a tangible impact on the physical world.

## 6 Conclusion

The findings of this study underscore the communicative vacuum when political institutions failed to address urgent crisis effectively. In this context, citizens did not merely react emotionally; they assumed roles traditionally held by formal authorities—alerting, documenting, coordinating, and mobilizing. The DANA case exemplified a growing phenomenon: the configuration of distributed communication ecologies in which social media become a vehicle for solidarity and a strategic infrastructure for civic resilience. By foregrounding effective legitimacy and immediacy, these interactions demonstrate how online communities can generate real-time responses to environmental crisis, often ahead of official interventions. Another contribution of this work lies in contrasting the information provided by scientists about the meteorological phenomenon with the political decisions made in response. The disregard for scientific warnings left the population vulnerable, subjecting them to an avoidable crisis situation.

This topic holds significant interest due to the social capital generated through online interactions and the organizational structures they fostered. Future research should therefore investigate areas such as the long-term evolution of this initial solidarity, the role of digital platforms in communicating meteorological crises and disseminating alerts, comparative analyses with similar events, and the potential application of digital tools in managing climate change, among other related questions.

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## References

- Alonso, M. 2015. Podemos: Citizen cyberactivism reaches European politics (*Podemos: El ciberactivismo ciudadano llega a la política europea*). *Dígitos. Revista de Comunicación Digital* 1: 91–110 (in Spanish).
- Ametepey, S.O., C.O. Aigbavboa, and W.D. Thwala. 2023. Climate change response in sustainable road infrastructure development. In *Sustainable road infrastructure project implementation in developing countries: An integrated model*, ed. S.O. Ametepey, C.O. Aigbavboa, and W.D. Thwala, 105–111. Bingley: Emerald Publishing Limited.
- Arjona-Martín, J.B., A. Méndiz-Noguero, and J.S. Victoria-Más. 2020. Virality as a paradigm of digital communication: Review of the concept and update of the theoretical framework. *Profesional de la Información* 29(6): Article e290607.
- Arrobo, J.P., R. Mancinas, and I. Aguaded. 2021. The role of social media in natural disasters: The case of Facebook and the 2016 earthquake in Ecuador (*El papel de las redes sociales en los desastres naturales: El caso de Facebook y el terremoto de Ecuador en 2016*). *Revista Ibérica de Sistemas e Tecnologías de Información* 40: 232–245 (in Spanish).
- Benford, R.D., and D.A. Snow. 2000. Framing processes and social movements: An overview and assessment. *Annual Review of Sociology* 26: 611–639.
- Boas, I., C. Chen, H. Wiegel, and G. He. 2020. The role of social media-led and governmental information in China's urban disaster risk response: The case of Xiamen. *International Journal of Disaster Risk Reduction* 51: Article 101905.
- Burke, M., and R.E. Kraut. 2016. The relationship between Facebook use and well-being depends on communication type and tie strength. *Journal of Computer-Mediated Communication* 21(4): 265–281.
- Castells, M. 2012. *Networks of outrage and hope: Social movements in the Internet age (Redes de indignación y esperanza: Los movimientos sociales en la era de Internet)*. Madrid: Alianza Editorial.
- Castro-Martínez, A., and P. Díaz-Morilla. 2021. The political communication of the radical right on social media: From Instagram to TikTok and Gab, Vox's digital strategy (*La comunicación política de la derecha radical en redes sociales: De Instagram a TikTok y Gab, la estrategia digital de Vox*). *Dígitos. Revista de Comunicación Digital* 1(7): Article 67 (in Spanish).
- Castro-Martínez, A., P. Méndez-Domínguez, A.S. Valcarcel, and J.C. de Mesa. 2021. Social connectivity, sentiment and participation on Twitter during COVID-19. *International Journal of Environmental Research and Public Health* 18: Article 8390.
- Cooney, C. 2024. The government is doing nothing: Outrage over insufficient aid in the tragedy in Spain (*El Gobierno no está haciendo nada: La indignación por la insuficiente ayuda en la tragedia en España*). *BBC Mundo*, 2 November 2024. <https://www.bbc.com/mundo/articles/c89vy93xgg30>. Accessed 23 Mar 2025 (in Spanish).
- Coronese, M., F. Lamperti, K. Keller, F. Chiaromonte, and A. Roven-tini. 2019. Evidence for sharp increase in the economic damages of extreme natural disasters. *Proceedings of the National Academy of Sciences* 116(43): 21450–21455.
- Dahlgren, P. 2018. Online participation in the public sphere: The ambiguities of affection (La participación en línea en la esfera pública: Las ambigüedades del afecto). *Mediaciones de la Comunicación* 13(1): 25–47 (in Spanish).
- EFE. 2024. Political reactions to the DANA in Valencia: Criticism of the management (*Reacciones políticas a la DANA en Valencia: Críticas a la gestión*). EFE, 30 October 2024. <https://efe.com/espana/2024-10-30/reacciones-dana-valencia-victimas>. Accessed 15 November 2024 (in Spanish).
- elDiario.es. 2024. Mazón denied in a tweet that there was a flood warning despite the danger of overflowing reported 50 minutes earlier by his own government (*Mazón negó en un tuit que hubiera alerta hidrológica pese al peligro de desbordamiento comunicado 50 minutos antes por su propio gobierno*). elDiario.es, 1 November 2024. [https://www.eldiario.es/comunitatvalenciana/politica/mazon-nego-tuit-hubiera-alerta-hidrologica-peligro-desbordamiento-50-minutos-despues-propio-gobiernopublicara-redes\\_1\\_11782826.html](https://www.eldiario.es/comunitatvalenciana/politica/mazon-nego-tuit-hubiera-alerta-hidrologica-peligro-desbordamiento-50-minutos-despues-propio-gobiernopublicara-redes_1_11782826.html). Accessed 13 November 2024 (in Spanish).
- El País. 2024. The DANA in Spain live: Latest news on the storm and flooding (*La DANA en España en directo: Últimas noticias del temporal y las inundaciones*). El País, 29 October 2024 <https://elpais.com/espana/2024-10-29/la-dana-en-espana-en-directo-ultimas-noticias-del-temporal-y-las-inundaciones.html>. Accessed 20 Mar 2025 (in Spanish).
- Hernández, E. 2016. Government communication and social media: Opportunities and limitations for participatory and collaborative democracy (*Comunicación de gobierno y medios sociales: Oportunidades y límites para una democracia participativa y colaborativa*). *Más Poder Local* 28: 55–58 (in Spanish).
- Houston, J.B., J. Hawthorne, M.F. Perreault, E.H. Park, M.G. Hode, M.R. Halliwell, S.E.T. McGowen, and R. Davis et al. 2015. Social media and disasters: A functional framework for social media use in disaster planning, response, and research. *Disasters* 39(4): 608–634.
- Jenkins, H. 2013. From new media literacies to new media expertise. In *Current perspectives in media education*, ed. P. Fraser, and J. Wardle, 12–18. London: Palgrave Macmillan.
- Kelman, I. 2015. Climate change and the Sendai Framework for Disaster Risk Reduction. *International Journal of Disaster Risk Science* 6(2): 117–127.
- Kelman, I. 2017. Linking disaster risk reduction, climate change, and the sustainable development goals. *Disaster Prevention and Management* 26(3): 254–258.
- Kim, J., S. Kang, and K.H. Lee. 2021. Evolution of digital marketing communication: Bibliometric analysis and network visualization from key articles. *Journal of Business Research* 130: 552–563.
- La Vanguardia. 2024. DANA and storm in Valencia: rain, flooding, and live updates (DANA y temporal en Valencia: lluvias, inundaciones y última hora en directo). *La Vanguardia*, 30 October 2024. <https://www.lavanguardia.com/natural/20241030/10062133/dana-temporal-valencia-lluvia-inundaciones-ultima-hora-hoy-en-directo>. Accessed 10 December 2024 (in Spanish).
- Levante-EMV. 2024. Deployment of the army at ground zero: 500 soldiers today, tomorrow “as many as necessary” (*Despliegue del ejército en la zona cero: 500 militares hoy, mañana “los que hagan falta”*). Levante-EMV, 1 November 2024. <https://www.>



- levante-emv.com/espana/2024/11/01/dana-valencia-militares-ejercito-despliegue-111108712.html. Accessed 20 March 2025 (in Spanish).
- Levy, P. 2010. *Cibercultura*. Barcelona: Anthropos.
- Liu, H., and Z. Han. 2025. Earthquake resilience and public engagement: A social media perspective. *Risk Analysis*. <https://doi.org/10.1111/risa.70041>.
- Mallorca Diario. 2024. Outrage among those affected by the DANA storm in response to an inadequate response (*Indignación de los damnificados por la DANA ante una respuesta insuficiente*). *Mallorca Diario*, 4 November 2024. <https://www.mallorcadiario.com/indignacion-de-los-damnificados-por-la-dana-ante-una-respuesta-insuficiente>. Accessed 20 Mar 2025 (in Spanish).
- Manzanedo, R.D., and P. Manning. 2020. COVID-19: Lessons for the climate change emergency. *Science of the Total Environment* 742: Article 140563.
- Martín León, F. 2003. Cold drops/DANAs: Basic ideas and concepts (*Las gotas frías/DANAs: Ideas y conceptos básicos*). Madrid: Instituto Nacional de Meteorología. <http://hdl.handle.net/20.500.11765/5117>. Accessed 25 Mar 2025 (in Spanish).
- Mendes, K., J. Ringrose, and J. Keller. 2018. #MeToo and the promise and pitfalls of challenging rape culture through digital feminist activism. *European Journal of Women's Studies* 25(2): 236–246.
- Mercer, J. 2010. Disaster risk reduction or climate change adaptation: Are we reinventing the wheel?. *Journal of International Development* 22: 247–264.
- Merlinsky, M. 2008. New repertoires of collective action and environmental conflict: A chronology of the conflict over the installation of pulp mills on the Uruguay River (*Nuevos repertorios de acción colectiva y conflicto ambiental: Una cronología del conflicto por la instalación de las plantas de celulosa en el Río Uruguay*). *Nuevo Mundo Mundos Nuevos*, 16 January 2008. <https://doi.org/10.4000/nuevomundo.16412>. Accessed 23 Mar 2025 (in Spanish).
- Millán, M., L. Gómez, M.I. Hombrados, and A. García. 2019. The online and offline social support networks for immigrants in Malaga (Spain). *Migraciones* 47: 119–149.
- Palen, L., S. Vieweg, J. Sutton, S.B. Liu, and A.L. Hughes. 2007. Crisis informatics: Studying crisis in a networked world. In *Proceedings of the Third International Conference on e-Social Science*, 7–9 October 2007, Ann Arbor, MI, USA.
- Riesco, S. 2024. Social media is filled with initiatives to support those affected by the DANA (*Las redes sociales se llenan de iniciativas solidarias con los afectados por la DANA*). *RTVE*, 7 November 2024. <https://www.rtve.es/noticias/20241107/redes-sociales-solidaridad-afectados-dana/16320042.shtml>. Accessed 25 Mar 2025 (in Spanish).
- Rovira, G. 2017. *Network activism and connected crowds (Activismo en red y multitudes conectadas)*. Barcelona: Icaria (in Spanish).
- RTVC. 2024. Breaking news: effects of the DANA in Valencia (*Última hora: efectos de la DANA en Valencia*). RTVC, 30 October 2024. <https://rtvc.es/ultima-hora-efectos-dana-30-octubre-2024/>. Accessed 14 November 2024 (in Spanish).
- RTVE. 2024. Regional government activates multiple victim procedure and hotline for relatives of missing persons (*Generalitat active procedimiento de múltiples víctimas y teléfono para familiares de desaparecidos*). *RTVE*, 30 October 2024. <https://www.rtve.es/noticias/20241030/generalitat-activa-procedimiento-multiples-victimas-telefono-para-familiaresdesaparecidos/16309228.shtml>. Accessed 14 November 2024 (in Spanish).
- Schneider, R.O. 2011. Climate change: An emergency management perspective. *Disaster Prevention and Management* 20(1): 53–62.
- Schroeder, R.V., and M.E. Vilo. 2020. Public space and citizen participation: New meanings in the time of COVID-19 (*Espacio público y participación ciudadana: Resignificaciones en tiempos de COVID-19*). *Boletín Geográfico* 42(1): 105–133 (in Spanish).
- Scolari, C.A. 2009. Mapping conversations about new media: The theoretical field of digital communication. *New Media & Society* 11(6): 943–964.
- Shen, M., H. Xu, H. Liu, and Z. Han. 2025. How did the Chinese public discuss the 2023 Türkiye-Syria earthquake and the humanitarian response on social media? A topical and sentimental analysis. *International Journal of Disaster Risk Science* 16(3): 361–375.
- Sierra, F. 2018. Cyberactivism and social movements: The oppositional public space in contemporary technopolitics (*Ciberactivismo y movimientos sociales: El espacio público oposicional en la tecnopolítica contemporánea*). *Revista Latina de Comunicación Social* 73: 980–990 (in Spanish).
- Snow, D.A., and S.A. Soule. 2010. *A primer on social movements*. New York: W.W. Norton & Company.
- Solsona, R. 2024. Outrage over insufficient aid in Spain after the DANA: The government is doing nothing (*Indignación por la insuficiente ayuda en España tras la DANA: El Gobierno no está haciendo nada*). *La Nación*, 2 November 2024. <https://www.lanacion.com.ar/el-mundo/indignacion-por-la-insuficiente-ayuda-en-espana-tras-la-dana-el-gobierno-no-esta-haciendo-nada-nid02112024/>. Accessed 24 Mar 2025 (in Spanish).
- Sosa Valcárcel, A., E. Galarza Fernández, and A. Castro-Martínez. 2019. Collective cyberactivist action by “Las periodistas paramos” (We journalists strike) for the feminist strike on March 8 in Spain (*Acción colectiva ciberactivista de ‘Las periodistas paramos’ para la huelga feminista del 8M en España*). *Comunicación y Sociedad*. <https://doi.org/10.32870/cys.v2019i0.7287>.
- Sued Palmeiro, G.E., and M.C. Loureda. 2020. Authoritative voices on Twitter during the COVID-19 pandemic: Actors, lexicon, and sentiments as an interpretive framework for ordinary users (*Voces autorizadas en Twitter durante la pandemia de COVID-19: Actores, léxico y sentimientos como marco interpretativo para usuarios ordinarios*). *Revista de Comunicación y Salud* 10(2): 549–568 (in Spanish).
- Tilly, C. 2004. *Social movements, 1768–2004*. Boulder, CO: Paradigm Publishers.
- Turner, F. 2021. At the origins of digital utopia: From counterculture to cyberculture (*Aux sources de l'utopie numérique: De la contre-culture à la cyberculture*). Rennes, France: C & F Éditions (in Spanish).
- Viché, M. 2018. The practice of cyberanimation (*La praxis de la ciberanimación*). *Quaderns d'Animació i Educació Social* 28: 1–12 (in Spanish).
- Victoria-Mas, M. 2020. Report: News consumption patterns and misinformation perceptions during the COVID-19 crisis in Spain. <https://www.charlemagneprizeacademy.com/en/publications/Working-Paper-News-Consumption-Patterns-and-Misinformation-Perceptions-during-the-COVID-19-Crisis-in-Spain-Part-I>. Accessed 26 Mar 2025.
- Williams, D. 2006. On and off the net: Scales for social capital in an online era. *Journal of Computer-Mediated Communication* 11(2): 593–628.