



How do non-Western authoritarian countries respond to disasters? Structural difference from the pluralistic model

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Abstract

Effective coordination, networking, and voluntary civil engagement are crucial for ensuring effective disaster responses. It should be noted, however, that these recommendations are primarily derived from the experiences of Western pluralistic countries. Thus, there has been insufficient consideration given to the applicability of these recommendations to non-pluralistic countries and the ways in which non-Western authoritarian countries navigate the difficulties of coordinating and establishing networks with civil sector organizations. This study broadens the scope of research by examining non-Western authoritarian countries through an analysis of how China responded to the floods of 2020. The results of the study indicate that the Chinese flood response system was primarily government-driven, centralized, and hierarchical. According to the pluralistic model, this arrangement encounters difficulties in integrating resources and information from partners in different sectors and jurisdictions. Consequently, this poses additional challenges to the Chinese disaster response systems. Nevertheless, the study findings reveal that the Chinese system proficiently resolved problems. This was

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accomplished by flattening the hierarchical structure via innovative interventions and remedying the lack of voluntary civic sector engagement through mass mobilization. Consequently, it would be fallacious to hold that the pluralist model can be effortlessly transplanted to non-Western authoritarian nations without regard for their distinct political, cultural, economic, and social contexts.

Points for practitioners

To improve disaster response, practitioners should consider adapting hierarchical networks and embracing flexibility. This can be achieved by reducing bureaucratic layers, which enhances effectiveness and encourages innovative interventions for streamlined decision making. It is important to emphasize provincial–local support and mass mobilization, as seen in China, which underscores the need for engaging civil sectors in non-pluralistic contexts. Context-specific approaches are crucial and should consider political, cultural, and social factors. Transforming hierarchical structures into modular networks may improve response.

Keywords

2020 China floods, social network analysis, disaster response, emergency management, Chinese emergency management systems

Introduction

Seamless coordination of information and resources is essential for disaster response systems to operate effectively under rapidly changing conditions (Oh and Lee, 2017). The involvement of civil sector organizations is equally important, as they play a critical role in providing information and resources to support government efforts to protect the lives and property of citizens (Simo and Bies, 2007). This issue has sparked debate about effective strategies to facilitate streamlined coordination and engagement among diverse agencies operating across jurisdictions and sectors.

Two primary approaches have emerged from these deliberations. The first strategy is consistent with classic management principles in public administration. It advocates that central governments use command-and-control mechanisms to coordinate authority, information, and resources within systems (Bharosa et al., 2010). The second strategy, known as networking, emphasizes voluntary civil sector involvement in response systems by having governments actively establish and manage collaborative relationships with civil sector organizations. This approach views civil sector organizations as valuable assets rather than liabilities, particularly in times of disaster (Waugh and Streib, 2006).

To implement these strategies, certain prerequisites must be met. There is an urgent need for governments to develop creative solutions that mitigate the harmful effects of bureaucratic inertia embedded in command-and-control systems, such as red tape and territorial behavior (Oh, 2012). In addition, the network approach inherently relies on the

presence of competent civil sector organizations. As a result, extensive research has been conducted to explore various ways to strengthen civil sector organizations and facilitate coordination between governments and other partner organizations operating within established command-and-control structures.

However, most of these studies have focused primarily on Western pluralistic countries and their respective systems. Consequently, whether the conclusions drawn from these studies are applicable to countries with politically and socioeconomically non-pluralistic systems, and how non-Western authoritarian countries deal with the challenges of coordination and engagement, have received little attention in the field of emergency management research. In particular, there has been minimal research and analysis of the structural characteristics of disaster response systems in authoritarian countries.

This study broadens the scope of the field by examining non-Western countries with authoritarian traditions, using the case study of China's response to the 2020 floods. The research aims to uncover potentially different outcomes due to unique local interpretations of engagement and coordination, which will contribute new insights to theorizing about coordination and engagement in disaster response operations.

Theoretical background

Disaster response systems have historically relied on a command-and-control approach to coordinate information and resources across various sectors and jurisdictions (Bharosa et al., 2010). While this strategy is typically effective and reliable in managing complex disaster response operations (Imperiale and Vanclay, 2019), it can also face several challenges, as discussed below.

It establishes a centralized structure that is susceptible to communication breakdowns caused by technical failures, information overload, or misinterpretation of data. These problems lead to inefficiencies and inaccuracies in situational awareness, resource allocation, and decision making and implementation (Sonnenwald, 2006). Centralized systems also reveal weaknesses in building social capital, which can create bureaucratic hurdles that impede effective coordination and engagement (Rothstein and Stolle, 2008). These limitations reduce the resilience and adaptability of command-and-control structures, making it difficult to deal with unforeseen and rapidly changing circumstances. Moreover, within the domain of naturalistic decision making, this framework may not effectively support first responders at lower hierarchical levels, who often rely on continuously evolving information to make adaptive judgments—an approach that does not fit well with centralized command-and-control models (Groenendaal et al., 2013).

The fundamental challenge is the delayed and corrupted transmission of information and resources. Addressing these issues typically requires a combination of technological advances, procedural adjustments, training initiatives, and a transformational change in organizational ethos to enhance the adaptability, flexibility, and resilience within the command-and-control framework. There are two primary strategies. The first is to flatten the structure by reducing hierarchical layers to minimize potential delays or blockages in the flow of information and resources (Blackstone et al., 2017). The second strategy involves networking with civil sector organizations so that governments have access to redundant information and resources, thereby preventing a domino effect and increasing the reliability

of the entire response system (Oh, 2012). In addition, civil sector organizations can occupy key positions that enable them to proactively identify and address problems in their early stages before they develop into major crises (Skanavis et al., 2005).

Complex interactions for coordination and networking give rise to diverse structures of social networks. Sole and Valverde (2004) introduced a three-dimensional framework (Figure 1, see online) to categorize these structures based on three key properties of networks: heterogeneity (the similarity of connections between nodes), randomness (the likelihood of nodes forming connections at random), and modularity (the degree of clustering within the network).

A mesh network is characterized by the absence of randomness (all nodes are fully connected), heterogeneity (each node has the same number of connections), and modularity (no clustered patterns). Conversely, a scale-free (SF) network is a structure in which nodes are predominantly connected to a limited number of central nodes. The structure of this SF network generates a core-periphery dynamic that follows a configuration established by predefined plans, laws, and rules (low randomness). The distribution of connections within this network follows a power-law model, with central nodes having significantly more connections than peripheral nodes (high heterogeneity) without being clustered (low modularity).

Through conventional interventions such as division of labor and span of control, the SF network evolves into a hierarchical modular network. Here, peripheral nodes cluster based on function, region, or authority, forming a modular structure. In this modular structure, connections to core nodes are made only through intermediary nodes between each hierarchical level. Thus, the competence of these intermediary nodes significantly influences the performance of the entire hierarchical modular network. If the intermediary nodes lack competency or strategically manipulate connections between lower and upper layers to serve their own interests, they disrupt the flow of information and resources, thereby reducing the overall efficiency of the network (Oh and Beckett, 2015). Furthermore, this hierarchical modular network becomes vulnerable to targeted attacks on these intermediaries, which can lead to network fragmentation or coordination breakdowns.

Thus, facilitating the flow of information and resources across hierarchical layers remains a key challenge for hierarchical modular networks. In an ER (Erdos-Renyi) network, nodes establish random connections without forming clusters and hierarchical layers (low heterogeneity/high randomness/low modularity). The ER graph transforms into a modular ER network when nodes begin to share political, social, cultural, and economic attributes. When there are emergent mediating nodes that facilitate more adaptive interactions between nodes, the traditional hierarchical modular network evolves into a modular ER network. This redundancy from emergent mediators increases the resilience of the network against targeted attacks on formal mediating nodes and disruptions from unforeseen disasters (Oh and Beckett, 2015).

However, due to the random nature of emergent intermediaries and the potential costs associated with maintaining redundant connections, it may not be the best structure for emergency management. These issues can be addressed by the Small World Network (SWN), a promising element of Modular ER. In the SWN, nodes are highly interconnected within their own cluster but maintain relatively few connections to nodes in

other clusters through intermediary nodes. Compared to a hierarchical modular network, there are multiple designated and emergent mediators, and these mediators use their strategic positions—structural holes (Burt, 2004)—to provide redundant connections between nodes in different clusters. In this way, the SWN offers the advantage of minimizing unnecessary connections while still allowing nodes to be close to each other due to competent mediators in the structural holes (Burt, 2004).

This discussion examines the strengths and weaknesses of different network structures and provides critical insights for comparing disaster response models of pluralistic and non-pluralistic countries. The pluralistic approach assumes the existence of local government and civil society organizations that act as complementary sources of information and resources. Moreover, with the involvement of civil society organizations, they have a better chance of having more entrepreneurial mediators (Agostino et al., 2013). With the introduction of emergent mediators, the network structure transitions from a hierarchical modular to a more modular ER setup that exhibits SWN characteristics. As a result, the main advantage of the pluralistic model is its ability to maintain adaptability and flexibility through the use of emergent mediators, which reduce the distance and communication channels between network nodes, enabling the smooth and efficient flow of information and resources within the network.

In contrast, disaster response systems in authoritarian countries adhere to predetermined plans in which central administrations define and strictly enforce the roles and responsibilities of subordinate organizations. The absence of civic participation reduces the likelihood of emergent mediators, unlike in pluralistic countries where alternative mediators can intervene when formal mediators are ineffective or dysfunctional. The difficulty in anticipating adaptive contributions from civil sector organizations perpetuates the presence of a hierarchical modular structure in disaster response systems, rather than a more flexible and flatter modular ER structure. As a result, the problems embedded in the hierarchical modular system, such as delays, degradation, and the blocking of information and resources, can damage the disaster response network of authoritarian countries.

Is it then preordained that the response system of an authoritarian country will falter due to strict adherence to hierarchical command and control without capable civil sector participation? While this question is important, there is little research on the inventive initiatives of authoritarian countries and their impact on the structure of disaster response systems. Similar to their pluralistic Western counterparts, authoritarian countries could draw on their accumulated disaster management experience within a hierarchical modular structure to address these challenges, as suggested by Cheng et al. (2022). Examining how they address these challenges provides an interesting avenue for developing theories of effective response to disasters.

Historical development of Chinese emergency management systems

This study selected China's response to the 2020 floods as a case study to examine the disaster response systems of authoritarian countries. The extensive flooding in the

summer of 2020 in areas surrounding the Yangtze River basin and its tributaries was caused by prolonged, intense rainfall. The cumulative rainfall and the number of rainy days reached unprecedented levels. By September 13, 2020, the floods had affected 63m people in 27 provinces, resulting in the destruction of 54,000 housing units, a direct financial loss of US\$26bn, and the loss of 219 lives (Hu et al., 2020). The hardest-hit provinces were those in the middle and lower Yangtze River regions, including Chongqing, Hubei, Hunan, Anhui, and Jiangxi (Figure 2, see online).

From the perspective of the pluralistic paradigm, China's ability to respond to the 2020 floods may have been seriously compromised by the hierarchical nature of its command-and-control mechanism and the lack of involvement of civil sector agencies. If this is the case, China must consider embracing the pluralistic paradigm and finding ways to enhance the contributions of local governments and the civil sector. Conversely, if China handled the floods effectively, it suggests that non-pluralistic countries can successfully respond to disasters without strictly adhering to the pluralistic model. Before the case analysis, this study reviewed the historical development of Chinese emergency management systems to understand its context.

Over the past two decades, China has reportedly improved the effectiveness of its coordination. After the 1998 Yangtze River flood, when the responsibilities of individual agencies were unclear, the Chinese government reorganized the system by function and established several ministry-level emergency management agencies, such as the Ministry of Civil Affairs and the National Committee for Disaster Reduction, to coordinate the various functional components of the response system (Lu and Han, 2019). However, during the severe acute respiratory syndrome (SARS) outbreak in 2003, it encountered the barrier of information fragmentation. In the early stages, critical information from lower-level governments could not be efficiently transmitted, resulting in a significant delay in the central government's response to the SARS outbreak (Haibo and Xing, 2016). Following the SARS outbreak, the Chinese government mandated that all levels of government make emergency communication plans. These plans were required to be aligned with the national communication strategy and structure, with the purpose of mitigating issues related to information fragmentation. The primary goal of this new directive was to establish a more centralized flow of information, following the national–provincial–county–municipal hierarchy (Lu and Han, 2019).

The Chinese government recognized that the centralized post-SARS system failed to facilitate coordinated responses during the 2008 Wenchuan earthquake. The overemphasis on centralization resulted in the heavy reliance of local governments on higher-level authorities for information and resources, rather than developing local capacity tailored to specific contextual needs (Haibo and Xing, 2016). Furthermore, the focus on centralized coordination, established through responses to past disasters, undermined the effectiveness of local governments and civil society. Local governments had to carry out their responsibilities with resources provided primarily by national authorities. Moreover, the civil sector found itself unable to use donations independently, as philanthropic contributions were integrated into the government's financial system, subject to constraints set by central authorities (Liu and Christensen, 2022).

Despite the difficulties associated with centralization, the Chinese government did not change its path to centralization in the aftermath of the Wenchuan earthquake. Instead, it established the Ministry of Disaster Management in 2018 as part of its ongoing centralization initiatives (Liu and Christensen, 2022). In addition, it created a provincial–local support system that facilitated the connection between provincial governments and hard-hit counties and cities surrounding Wenchuan (World Bank, 2020). The effectiveness of this coordination program between provincial and neighboring local governments was evident during the COVID-19 crisis, where local governments negatively impacted by the pandemic benefited from this approach (World Bank, 2020).

During the response to the 2020 floods, the Chinese government continued its innovative efforts by implementing an in-depth on-site command or four-in-one working mechanism, in which the provincial government formed a command group and established direct links with the Chinese Communist Party (CCP), national partners, and emergency and water resources management agencies (Linhong, 2020). As a team, they visited flood sites, communicated with local authorities and frontline organizations, and took adaptive actions in response to changing circumstances. This study paid particular attention to these recent changes during the responses to the COVID-19 pandemic and 2020 floods, as these efforts aimed to make their response systems effective and reliable while maintaining their centralized approach.

Upon review, China has shifted towards a highly centralized disaster response system. Additionally, the dominant power of the CCP in mobilizing resources is a peculiar aspect of its unique authoritarian party-state system (Liu and Christensen, 2022). The CCP possesses extensive authority to compel civil sector organizations to align with collective objectives in emergency management by imposing registration restrictions. Consequently, the autonomy of civil sector organizations has been significantly curtailed, which would have impeded Chinese response systems from effectively pursuing a networking strategy given the lack of competent and autonomous civil sector organizations.

Returning to the original question of this study, could the Chinese response systems fail due to centralization and a lack of competent civil sector organizations? The pluralistic model suggests that high centralization and a lack of civil engagement may impede effective disaster response. However, proponents contend that this centrally organized system has the potential to effectively coordinate responses to disasters in a consistent and innovative manner (Cheng et al., 2022; Lodge and Wegrich, 2014). In the following section, this research employs social network analysis to evaluate these claims.

Research methods and propositions

The study determined the anticipated traits of the Chinese 2020 response systems through an assessment of the emergency management evolution in China, political and social contexts, and network topology presented in Figure 1. The response system's core comprises the CCP and provincial emergency management agencies, indicating a primarily centralized structure. Secondly, the system operates in a hierarchical manner rather than horizontally, as most local governments depend on the command and control of the CCP and provincial governments. Furthermore, organizations are arranged by function, as the

Chinese government established ministry-level emergency management agencies organized by functions and connected them with similar functional units in other jurisdictions. Fourthly, the authoritarian party-state system of the Chinese government presented a challenge to the country's response system in adopting a networking strategy for civil engagement. Based on these anticipations, this research establishes the subsequent propositions for verifying with SNA.

P1: Dynamic interactions of responding organizations created a highly centralized and government-centric network.

P2: Dynamic interactions of responding organizations created a network with a hierarchical modular structure clustered by functions.

P3: Dynamic interactions of responding organizations do not include a significant number of civil sector agencies and their connections to government organizations.

This study utilizes social network analysis (SNA) to examine China's response system structure following the 2020 floods. By leveraging SNA findings, this paper evaluates the coordination pattern through hierarchical layers of the system and the extent of active involvement from the civil sector and local governments, probing the necessity of a pluralistic approach for effective disaster management in China.

For this study's data collection, newspaper articles were gathered from *Anhui Daily*, *Chongqing Daily*, *Hubei Daily*, *Hunan Daily*, *Xinhua Daily* (for Jiangsu province), *Jiangxi Daily*, *Sichuan Daily*, and *Yunnan Daily* between June 7 and September 14, 2020. These dates mark the first and last days of response operations that could be identified within the articles. The authors identified the interactions between organizations and coded them using 0 (without interaction) and 1 (with interaction), creating a one-mode network dataset (organization \times organization). To comprehend the resources and information exchanged between organizations, the authors summarized the substance of these exchanges. All organizations were classified based on their jurisdiction (local, provincial, national) and funding source (public, private, nonprofit).

Following classification, the authors analyzed and measured the network characteristics of the response systems formed in each province. Those network characteristics include the number of nodes, the number of edges, the diameter (the longest distance between two nodes), the distance (the number of edges required to reach a target node), and the average number of edges per node. To verify the first proposition, network centralization was also measured as it reflects the degree to which a network's connections are concentrated on a single actor or group of actors. This measure ranges from 1 when a single node connects to all other nodes, while the remaining nodes remain unconnected to each other, and 0 when all nodes have an equal number of connections. Next, this study performed a clique analysis and measured the number of clusters to examine the second proposition. A clique is a subset of a network where some actors are more closely connected than other nodes. After identifying members of cliques, the authors analyzed the interactions' content to ascertain if organizations clustered according to planned functions. The authors tested the third proposition by examining the number of nonprofit and private agencies and their interaction contents with

governments. Finally, the authors evaluated the 2020 flood response system's effectiveness with the qualitative reviews of some government reports.

The authors followed the established coding guidelines independently, and they carefully reviewed and updated the resulting network dataset to enhance inter-coder reliability. To ensure content validity, three Chinese experts in emergency management verified the integrity of the coded interactions.

Results and discussion

Table 1 provides a detailed description of response network characteristics in each province. It includes network size, participant composition by jurisdiction and sector, density, degree of centralization, and the number of cliques. Depending on the severity of flood damage, the number of organizations varies from 86 (Hunan) to 149 (Jiangxi). The percentage of local organizations varies from 31.1% in Yunnan to 57.1% in Jiangxi, while provincial agencies range from 32.2% in Jiangxi to 54.1% in Yunnan. Anhui has the lowest average ties per node of 1.228, while Yunnan has the highest of 2.370. These low average ties suggest the presence of a hierarchical structure in the networks. Public agencies make up over 90% of all provinces, except Jiangxi with 88%.

This study used network measures to examine its propositions. Specifically, the study tested whether the dynamic interactions of responding organizations resulted in more centralized and hierarchical modular networks than those in pluralistic countries. According to SNA, the level of degree centralization ranges from 0.156 (Jiangxi) to 0.659 (Chongqing). It is uncertain whether this degree of centralization exceeds that of pluralistic countries' networks and is sufficient to claim that the Chinese response system is more centralized. As SNA lacks critical determination points, such as *p*-values in statistical analysis, assessing the significance of network centralization proves to be challenging.

However, previous research serves as a useful reference point. The authors of this study collected and analyzed newspaper articles about disasters in pluralistic countries using identical procedures and methods. While detailed findings of these analyses cannot be provided due to word count constraints, a summary of those studies provides the following results. Comfort et al. (2009) measured the centralization levels of Hurricane Katrina ($=0.128$) and Hurricane Gustav ($=0.207$) in the United States. Another point of reference comes from studying the Japanese response network in the aftermath of the Fukushima nuclear disaster in Japan, which showed a centralization degree of 0.264 (Oh and Lee, 2017). They also reported on the centralization degree of the response network following the 2011 earthquake in Haiti, which was found to be 0.243. The response system during Hurricane Katrina was fragmented due to coordination problems, as explained by Comfort et al. (2009). Therefore, the low centralization of 0.128 should not be taken as a benchmark. Instead, the response networks for Hurricane Gustav and Fukushima provide appropriate reference points for network centralization, ranging between 0.20 and 0.30. The study found that except for Jiangxi, the levels of centralization in the Chinese provinces were two to three times greater than those of disaster response networks found in pluralistic nations, indicating that the Chinese response system is highly centralized.

Table 1. Social network measures for the China 2020 floods response systems.

	Anhui	Yunnan	Chongqing	Hubei	Hunan	Jiangsu	Jiangxi	Sichuan
Number of organizations (1 + 2 + 3)	136	73	100	110	86	92	149 ^a	88
(1) Local (%)	57 (41.9%)	23 (31.1%)	43 (43.0%)	45 (40.9%)	35 (40.7%)	47 (51.1%)	85 (57.1%)	46 (52.3%)
(2) Provincial (%)	60 (44.1%)	40 (54.1%)	46 (46.0%)	39 (35.5%)	43 (50.0%)	37 (40.2%)	48 (32.2%)	38 (43.2%)
(3) National (%)	19 (14.0%)	10 (14.8%)	11 (11.0%)	26 (23.6%)	8 (9.3%)	8 (8.7%)	16 (10.7%)	4 (4.5%)
Number of public organizations out of total organizations (%)	128 (94%)	73 (98%)	98 (98%)	107 (97%)	84 (97%)	91 (99%)	131 (88%)	87 (99%)
Number of ties	167	173	153	161	170	134	258	127
Average number of edges per node	1.228	2.370	1.530	1.463	1.976	1.473	1.755	1.460
Density	0.009	0.033	0.015	0.014	0.024	0.016	0.012	0.017
Degree centralization	0.358	0.647	0.659	0.435	0.452	0.451	0.156	0.525
Average distance	2.189	1.495	1.494	2.757	2.161	2.587	1.791	2.271
Diameter	7	4	4	5	5	6	4	5
Number of cliques (min size = 4)	4	12	6	4	8	11	22	4

^a 1 international organization in Jiangxi province was not counted.

The second proposition to be examined is whether dynamic organizational interactions create a hierarchical modular network that is clustered by functions. Province-specific network maps displayed in Table 2 suggest that the networks have characteristics of both a scale-free (SF) and hierarchical modular structure. Notably, the networks in Chongqing, Yunnan, Sichuan, and Jiangsu share similarities with the SF network type, while the Jiangxi network displays more hierarchical modular characteristics, with a higher number of cliques and resulting mediator connections than the others.

The floods endangered several dams and reservoirs located along the river, with considerable focus on the Three Gorges Dam, recognized as the most extensive facility for energy generation and flood control (Acosta and Rust, 2020). Consequently, the decision on whether to open the gates to release water became critical in monitoring conditions and making adaptive decisions in response to changing situations. There was apprehension that if the gates were opened, it could exacerbate the situation for the provinces downstream (Gan, 2020). Several provincial organizations, such as the Provincial Department of Water Resources, the Provincial Flood Control and Drought Relief, the Provincial CCP Secretary, and the Provincial Emergency Management, formed groups and contacted both the national and local governments for search and rescue, cultural property protection, financial aid, and evacuee support (see Table 3). The water management cluster formed by the National Department of Water Resources and Meteorological Administration, in partnership with hydropower plants and water facility management organizations in each province, is a prevalent group across provinces. This cluster collaborates to monitor and coordinate water levels in lakes, dams, and reservoirs, including

Table 2. Floods response network of each province.

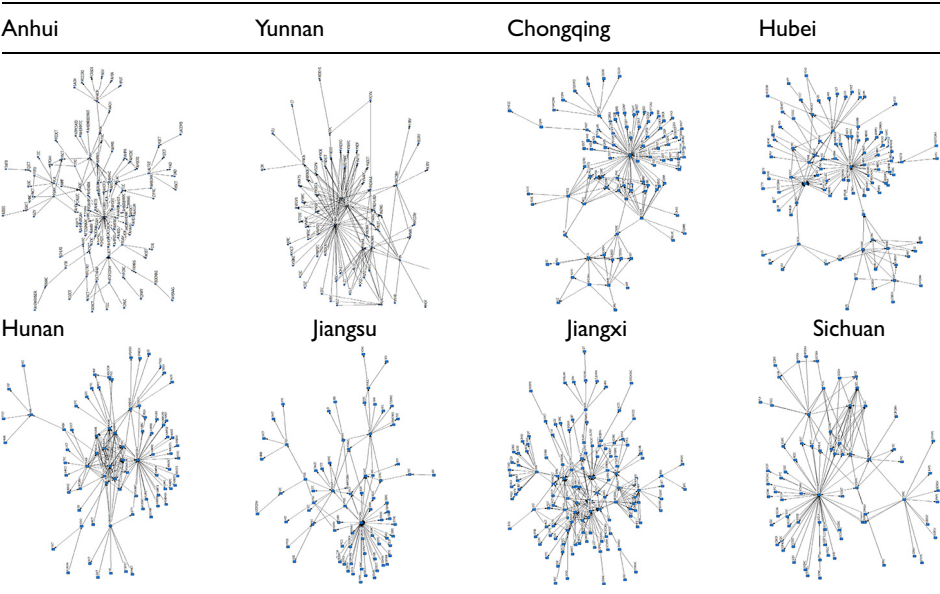


Table 3. Common central organizations by provinces.

Province	Provincial Department of Water Resources	Provincial Flood Control and Drought Relief	Provincial CCP Secretary	Provincial Emergency Management	Changjian Water Resources Commission	Provincial Governor's Office
Anhui	X	X				
Yunnan	X		X			X
Chongqing	X	X	X			
Hubei	X	X	X		X	
Hunan	X	X	X			X
Jiangsu	X	X		X		
Jiangxi	X	X		X		
Sichuan	X	X		X	X	

decisions about opening sluice gates, with particular attention to the Three Gorges Dam. The findings from the SNA provide evidence for confirming the second proposition: a hierarchical modular structure based on functions.

The third proposition to examine is the extent of civil sector involvement in responding to the 2020 floods. Except for the isolated participation of individual citizens, non-profit and for-profit organizations showed minimal involvement. Additionally, the analysis could not identify any self-organization on the part of civil sector actors. There is a possibility that data collection limitations might account for these findings. Governments and the CCP have control over China's media and communications sectors (Luo, 2015). This could lead to potential under-reporting of civic sector organizations' response efforts. However, the Chinese government has continuously stressed the need to improve disaster management capabilities in civil sector organizations, indicating that their participation should not be underreported (Liu and Christensen, 2022). After conducting data analysis, the study confirms the content integrity of newspaper articles with three Chinese disaster response professionals.

A stronger rationale would be China's distinct status as a communist nation. The Chinese government owns utility and transportation firms such as China Telecom and the China National Railway Group, which are commonly private businesses in pluralistic countries. Similarly, the Red Cross Society of China is not affiliated with the International Committee of the Red Cross. Instead, funding is provided by central governments, and staff members are selected by the national council. Another reason is the CCP's effectiveness in mobilizing residents during emergencies. For example, local members of the CCP were recruited to establish 543 branches, 2557 demonstration posts, 1189 vanguard teams, and 3567 responsibility zones in Jiangxi Province to aid in flood control and disaster relief efforts (Luo and Tang, 2020).

According to Lu and Han (2019), nonprofit organizations in China are still in their early stages of development and lack the necessary resources, experience, and skills to

collaborate with the government for disaster relief efforts. The Chinese government during President Hu's tenure from 2002 to 2012 allowed temporal diversification and pluralization, thereby achieving a delicate balance between the public and civil sectors (Froissart, 2017). However, following the reinstatement of orthodoxy by the Xi administration in 2012, nonprofit organizations were required to provide support to the authoritarian government and deliver services only in situations where the state was incapable of doing so (Froissart, 2017). Consequently, the involvement of the non-governmental sector during the 2020 floods in China was scarce.

The results of SNA confirm the propositions presented in this study. The Chinese system was highly centralized, with dominant government control and minimal involvement from civil society. The pluralistic model suggests that this hierarchical and centralized structure, coupled with limited civil society engagement, may lead to decreased access to critical information and resources, ultimately undermining the system's effectiveness. However, various sources have reported the efficacy of the systems in the response to the floods of 2020 (Hu et al., 2020; Linhong, 2020; Luo and Tang, 2020; Pang, 2020).

This study has identified three reasons for the evaluation. Firstly, the strategies of provincial–local support after the COVID-19 pandemic and in-depth on-site command following the 2020 floods significantly flattened the hierarchical structure of the system. The provincial–local support strategy decreased the hierarchical layer between local and provincial governments. Similarly, the in-depth on-site command mechanism reduced bureaucratic barriers between provincial and national governments. This in-depth on-site command approach has been recognized as a significant success factor in several provinces, including Anhui (Linhong, 2020), Yunnan (Pang, 2020), Hunan (Luo and Tang, 2020), and Hubei (Hu et al., 2020). Its effectiveness lies in its ability to facilitate the dissemination of flood warnings, organize patrols, and deploy responding units based on fresh information. Table 1 shows that this approach led to decreased bureaucratic layers with an average distance range of 1.494–2.757. This means that any node could establish connections with other nodes that are within three or fewer distances from those in other regional, jurisdictional, and functional clusters.

With an in-depth on-site command mechanism, the system could also reduce red tape, a prevalent problem in emergency management even in pluralistic countries (Jung et al., 2020). The CCP and provincial agencies responsible for emergency and water resource management established command groups to oversee frontline operations while communicating directly with local governments. However, frontline organizations tend to be wary of collaborating with unanticipated partners due to concerns about repercussions from unforeseen outcomes (Nohrstedt et al., 2018). This apprehension results in a lack of entrepreneurial initiatives for adaptive responses to disasters. The main incentive of frontline organizations is to complete everyday duties, which hinders their ability to foresee inventive solutions (Nohrstedt et al., 2018). Utilizing an extensive in-depth on-site command mechanism, the provincial governments and the CCP effectively coordinated the dissemination of information, allocation of resources, and delegation of authority. National governments issued directives, while provincial governments and the CCP were responsible for daily communication, logistics, and flood management

operations. These direct controls and decision making eased local governments' concerns about collaboration (Myers, 2020).

Secondly, according to cluster analysis in Table 3, the Chinese government implemented functional coordination by assigning local governments responsibility not just to provincial governments, but also to their functional counterparts in upper-level governments. In the United States, the state emergency management office represents state agencies, while the Federal Emergency Management Agency (FEMA) represents federal agencies. As a result, the state emergency management office and FEMA play a gatekeeping role in facilitating coordination between local, state, and federal governments, instead of enabling local governments to connect directly with federal agencies with comparable functions. The use of a supplementary channel enhanced functional coordination beyond the formal jurisdiction-based command-and-control system, unveiling the Small World Network feature of the response network by utilizing extra intermediary nodes, particularly for water management purposes. As a result, the Chinese response system could have three redundant coordination channels consisting of formal hierarchical layers of jurisdictions, the CCP, and response functions.

Thirdly, the CCP and governments mobilized the participation of civil sector organizations and citizens rather than relying on the voluntary efforts of a pluralist model. However, it appears that China's mobilization in response to national disasters was more extensive than in pluralistic countries and enabled effective responses to the 2020 floods. According to Fu (2021), the Chinese government used mass mobilization for almost all elements of civil society, with grassroots volunteers and businesses most closely aligned with state mobilization efforts and the CCP's agenda. The lack of civic participation in the 2020 response system provides further empirical support for the conventional Mao-style mass mobilization in Chinese responses to disasters (Fu, 2021). Notably, the government and civic organizations have long used this mass mobilization in their responses to previous disasters, thereby already building social capital among other members and local governments through previous experiences in addressing local concerns and disasters (Li and Tan, 2019). This social capital may have strengthened collaboration and communication to share resources and information across sectors and jurisdictions during the 2020 floods in China.

An interesting finding is the structural difference in Jiangxi Province. Jiangxi was the hardest-hit province, with an affected population of 9 million, eight deaths, and economic losses of US\$60.1bn (Figure 1). However, from the perspective of the pluralistic model, Jiangxi had different network characteristics than others, as it was less centralized ($=0.156$), had considerable local and nonprofit involvement, but had a small average distance ($=1.791$) and diameter ($=4$). There were 11 functional clusters and nodes in one cluster could connect to nodes in another in less than two transactions. This demonstrates the decentralization of the Jiangxi system, while also demonstrating the ability of key coordinating agencies to coordinate effectively. Anhui, the second hardest-hit province in terms of economic losses, also shows less centralization ($=0.358$) than other provinces. These findings suggest that the type of network may depend on the severity and scale of disasters, and thus there is a possibility of structural isomorphism between pluralistic and authoritarian countries in cases of extreme disasters, opening a need for further case studies.

Conclusion

The results of this study show that China's 2020 flood response has created a largely government-centric, centralized, and hierarchical system. According to the pluralistic model, this structure has shortcomings in coordinating resources and information from partners in different sectors and jurisdictions, which makes the system more difficult to use to respond to disasters. However, the results of this study show that the Chinese system was able to effectively address the problems of a hierarchical modular network. It reduced bureaucratic layers through some innovative interventions of provincial–local support and in-depth on-site command strategies and overcame the lack of voluntary civil sector participation through mass mobilization, which has been implemented for many years under the strong leadership of the CCP.

These findings show how the adaptive modifications of conventional hierarchical networks can improve the effectiveness of disaster response in non-pluralistic and authoritarian countries. In light of this, disaster response systems in non-pluralistic countries may not necessarily need to adopt a pluralistic approach to effective disaster response. A lesson to be learned from this case study is that a response system can effectively respond to disasters if it can mobilize the necessary information and resources, regardless of whether it adheres to the pluralistic model. As a communist country, China has a tradition of “the party builds the state” (Lieberthal et al., 2014). In this tradition, the CCP exercises dominant power over civil society and has the authority to make policy decisions and push them through centralized and hierarchical layers of command-and-control channels. Therefore, it would be another myth in emergency management to believe that the pluralist model can be simply transplanted to authoritarian countries without considering the country's particular political, cultural, economic, and social circumstances.

According to Beck et al. (2001), the effectiveness of governance relies on enhancing working practices rather than planning the administrative components and their interaction structure. Therefore, debating the superiority of centralized versus decentralized structure without considering contextual factors in diverse countries would be futile. Organizing information for effective decision making in response systems is not an issue of centralization versus decentralization, as demonstrated by the Chinese case study. The key is to ensure the efficient flow of necessary resources and information. This case analysis demonstrates how non-pluralistic countries can handle disasters without adhering to the pluralistic disaster response paradigm. This is achieved through the transformation of the hierarchical modular structure into a modular ER network with SWN traits, as well as by avoiding bureaucratic impediments to collaboration and initiative. Further cases should be examined to assess the soundness of the findings and arguments presented in this study.


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Supplemental material

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