

# **An Empirical Analysis of Urban Heavy Rain Storm Emergency Management in the Era of Climate Crisis**

## **7·31 Extreme Heavy Rainstorm in Beijing, China**

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### **Abstract**

In this study, the factors affecting the efficiency of urban storm emergency management are studied, and the improvement plan is put forward. With the intensification of global warming trend, extreme weather events occur frequently, which have serious impact and loss on socio-economic development, people's livelihood and production. Urban weather disasters refer to events that occur in urban areas and cause damage to urban residents' lives, urban facilities and buildings, urban resources and the environment due to abnormal weather conditions. One of the most prominent meteorological disasters in China is heavy rain and flooding. Therefore, taking the process of Beijing rainstorm as an example and combining with the development status of China's urban meteorological disaster emergency management, this paper finds out the problems affecting the efficiency of urban rainstorm.

**Key words:** climate crisis , Emergency management , Urban flood control , Emergency response

### **I. Introduction**

In recent years, extreme weather events have occurred frequently around the world, and natural disasters such as floods and droughts have become more frequent, more frequent, stronger and more widespread. Among the many climate disasters, the effects of climate change on floods are particularly complex. On the one hand, the frequency and intensity of heavy rain change the flood input conditions directly, on the other hand, the urbanization process changes vegetation, soil and other underlying surface types, intensifies soil erosion (Chen, 2018: 16-20). Flooding caused by heavy rain is one of the most important natural disasters in China's cities. In recent years, with the rapid urbanization process in various places, heavy rain and flooding in urban areas have often occurred in many cities in China. According to an article in the Economic Daily in 2021, more than 300 out of more than 500 cities in China have experienced urban flooding disasters.

In recent years, the flood situation in China caused by heavy rain has become more and more serious. In 2020, there

were 33 large-scale rainfall processes across the country, 42 rainfall processes in China in 2021, and 38 regional rainfall processes in China in 2022. Under the background of severe flooding, the main characteristics of the disaster are "three liters and two liters." That is, the number of victims, the number of resettlement and direct economic losses increased, and the number of missing and collapsed houses due to the disaster showed a downward trend. From July 17 to 23, 2021, Henan Province suffered historically rare heavy rains and severe flooding, including 17 prefecture-level cities in Henan Province, 11 of which were severely affected and suffered direct economic losses of nearly 88.5 billion yuan (Zhang 2022:9). It can be seen that the climate crisis, especially the damage caused by heavy rain, not only affects the normal operation of the city, but also seriously affects the life and property safety of the people. Therefore, the emergency management of urban rainstorms is particularly important

Faced with the increasingly severe risk of urban rainstorms, the traditional approach is still government-led, political mobilization and executive orders as the main means of joint response between government departments. Only government departments participate in and deal with urban floods, revealing organizational barriers between government departments, slow emergency response, poor information exchange, perfect emergency linkage system, insufficient emergency material support capacity and low level of emergency management (Ren and Li, 2022: 60-72). Therefore, solving the flood disaster caused by urban heavy rain has become an important task to deal with the climate crisis.

China's research on emergency management started late, and there are few studies on urban rainstorm emergency management, so it is of great significance to use emergency management to solve the flood disaster caused by urban rainstorm. In recent years, in order to cope with urban rainstorms, China has put forward a series of emergency management plans for urban rainstorms, which have achieved certain results in small and medium-sized cities with weak precipitation intensity.

The analysis and research of heavy rain disaster is to find insufficient, learn lessons, sum up experience and optimize the progress process of urban flood control emergency rescue system. The timely start of flood control emergency planning, coordination mechanism, cooperation of relevant units, technical support of professional forces, supply of relief supplies, effectiveness of emergency measures, residents' awareness of flood control and disaster prevention (Wu, et. al., 2023: 1-23 ).

Therefore, the purpose of this study is to study the factors affecting the efficiency of storm and storm crisis management in Beijing, and to construct a stronger urban storm emergency management system and model. Firstly,

this paper introduces the theoretical relationship between climate crisis era and urban rainstorm, and the crisis management system of China in response to natural disasters and other emergencies. Secondly, taking Beijing rainstorm as an example, the paper introduces the causes of urban rainstorm flood and the theoretical knowledge of urban rainstorm crisis management system. As well as the specific situation and crisis management response to the heavy rain in Beijing on July 31, as well as the successes and problems achieved and the identification of solutions. This paper puts forward a crisis management plan to optimize urban storm crisis management, which not only has practical significance in solving existing problems, but also provides solutions for other similar meteorological disasters.

In this paper, literature research methods and case analysis methods are used to study.

Methods of literature research. Through reading and referring to a large number of domestic and foreign literature on flood prevention, emergency management, emergency response, natural disasters, emergency command system, modern emergency and so on.

Case analysis methodology. Combining with the current situation of emergency management in large cities, this paper analyzes the shortcomings of flood control in cities before, during and after 2023. This method is also the main method studied in this paper.

## **II. Theoretical Discussions**

### **1. Climate crisis and urban rainstorms**

It is well known that sustained greenhouse gas emissions will lead to increased global warming. Global warming will continue to intensify in the coming period (2021-2040), mainly due to an increase in cumulative CO<sub>2</sub> emissions in almost all scenarios considered and simulated paths. As CO<sub>2</sub> emissions continue, the warming of the climate system will continue, the risk of climate change will be further increased, and global warming will increase multiple and concurrent harms (Li, 2023: 19-26).

As global warming intensifies and extreme events increase, global warming is expected to further exacerbate the global water cycle, including global monsoon precipitation, extreme wet and dry weather and climate events ((Zhang, et al, 2018: 251-256). Combined heat waves and droughts are expected to become more frequent, and the frequency of once-in-a-century extreme sea level events is expected to increase significantly by 2100 due to sea level rise.

Notably, many climate-related risks at future levels of global warming are projected to be higher than those estimated in the IPCC's Fifth Assessment Report, noting that the long-term impact is several times higher than currently observed(Zhou & Zhai, 2023: 259-262).The risks and projected adverse effects of climate change, as well as associated losses and damage, will escalate as global warming intensifies, and climate and non-climate risks will increasingly interact to create complex and unmanageable compound and cascade risks.

In recent years, global climate change and rapid urbanization have made mankind face increasingly serious water security problems - water shortages, water pollution, floods and drought disasters(Allen & Ingram, 2002: 224-232). Climate warming and urbanization directly affect the spatial-temporal distribution characteristics of water cycle processes and factors, increasing the intensity of extreme climate events(Zhang, et. al., 2014: 594-605). Among them, extreme precipitation and flooding have caused catastrophic damage to many economically developed and densely populated urban areas around the world.Urban flooding, which is closely related to changes in the climate system, has become an important issue for urban adaptation research, as population and property accumulation continue to increase and flood damage in urban areas is greater than ever.

The main driving factors of urban heavy rain and flooding are persistent rainfall or short-duration rainfall.Climate change has changed the thermal and dynamic environment of the climate system, affecting the energy balance and water cycle of the land-atmosphere system, and extreme precipitation in all regions will not experience significant growth in the future(Deng, et.al.,2024: 1-14). Therefore, understanding and understanding the changing characteristics of these extreme precipitation in the context of climate change is an important content and premise of urban flood research.

## **2. Analysis of Urban Rainstorm Crisis Management in China**

### **2.1 Climate Crisis Policy analysis of a three-system crisis management system**

"One case, three systems" is the core of China's emergency management system."One case" refers to the formulation and revision of emergency plans; "three systems" refers to the establishment and improvement of emergency systems, mechanisms and legal systems.Among them, emergency planning is the foundation, emergency management system is the organization guarantee, emergency management mechanism is the measure guarantee, emergency legal system is the system guarantee.

"One case" refers to the formulation and revision of emergency plans to achieve response plans and plans based on the research on occurrences and possible emergencies. "Three systems" refers to a sound emergency system, mechanism and legal system. (1) A sound and improved crisis management system should be established. Mainly to establish a sound centralized, unified, strong and powerful organizational leadership institution, give full play to China's political organizational advantages, and form a strong social mobilization system. (2) It is necessary to establish a sound crisis operation mechanism. We will establish and improve monitoring and early warning mechanisms, information reporting mechanisms, crisis decision coordination mechanisms, hierarchical responsibility and response mechanisms, mass communication and mobilization mechanisms. (3) A sound and improved crisis system should be established. We will strengthen the legalization of crisis management, integrate the whole emergency management into the track of the rule of law and system, establish and improve personnel, administer according to law and regulations, and implement emergency measures according to law (Zhong, 2009: 77-83). According to Article 63 of the National Security Law of the People's Republic of China, in the event of a major incident endangering national security, relevant departments and localities shall formulate emergency plans and take control measures according to law.

## 2.2 "One case, three systems" as the core of the urban waterlogging emergency management system

"One case, three systems" is the core of the emergency management system of Chinese characteristics, and it is also the core of the emergency management of heavy rain and waterlogging in Chinese cities. Since 2003, urban managers in China have gradually formed an organization system for urban flood emergency management centered on the government's flood prevention and drought prevention headquarters (Cheng, 2008: 191-198).

(1) Urban waterlogging emergency management organization system (Guo, et. al., 2013: 29-33+76). China's urban flood emergency management organization system is the center of the construction of the government flood control and drought prevention headquarters. "Block" mainly refers to the horizontal linkage between flood control and drought control headquarters and other member units at the municipal, district and street levels, and "Article" mainly refers to the vertical linkage between the three levels. In the absence of urban flooding, the flood control and drought prevention headquarters as the command center mainly do some basic management work. The main members such as the Meteorological Bureau do a good job of weather trend analysis. When the meteorological rainfall warning level reaches the emergency response level in the city, the emergency plan is initiated by the general commander of flood

prevention and drought relief in charge of decision-making.

(2) Urban flood emergency planning system(Guo, et. al., 2013: 29-33+76). At present, many cities in China have prepared general emergency plans for urban waterlogging, and district-level, street-level and enterprise-level urban waterlogging emergency plans. The basic plan mainly includes several aspects such as detection and early warning, division of responsibilities in emergency response, basic emergency response plan, resource security and disaster recovery. Under the guidance of the basic plan, around the maximum prevention and mitigation of urban flood damage, member units, district, street level and some key risk enterprises will also prepare emergency plans to form an urban flood emergency plan system.

(3) Emergency management mechanism for urban waterlogging(Guo, et. al., 2013: 29-33+76). At present, most cities in China have established emergency management mechanisms for urban stormwaterlogging, including forecasting, emergency response, emergency rescue, emergency treatment, disaster recovery and so on. Forecasting and early warning is mainly carried out by the Meteorological Administration, which reports the climate forecast trends to the flood control and drought control headquarters every year during the flood season and produces weather forecasts day by day. When rain is forecast and waterlogging may occur in the city, the Meteorological Bureau reports to the general command and member units of drought resistance during flood season through early warning. The emergency response mechanism is mainly led by the flood control and drought control headquarters, which is usually divided into 1, 2 and 3 levels, of which the first level response is the highest level. When the General Command starts the emergency plan, the member units start the emergency response according to the division of responsibilities, and operate the emergency rescue, emergency treatment and disaster recovery mechanism.

### 2.3 Current status of multi-agent participation in urban waterlogging emergency management

At present, the theme of participation in urban flood emergency management is still the government and government member departments, and the requirement for emergency interaction is high. According to the division of functions, departments have mastered some of the urban flood emergency management resources, such as planning departments have mastered the distribution of municipal pipe networks, water departments have mastered drainage facilities(Gu and Zhang, 2013: 15). Although these units belong to the dispatching command of the general flood

control and drought control headquarters, it is difficult to share information and respond quickly in urban flood control.

In addition to the participation of government departments and some municipal state-owned enterprises in urban flood emergency management, the main aspects of media participation in urban flood emergency management are reflected in news reports. As the main responsible person for urban waterlogging management, some government leaders lack strategic vision and realize the urgency and importance of urban waterlogging emergency management.

### **3. prior research**

#### **3.1 Integrated and coordinated efficiency**

Chen (2009) conducted an in-depth study to assess the effectiveness and implementation of contingency plans. Scholars agree that contingency planning drives emergency response and that the effectiveness of contingency planning has a significant impact on the entire rescue process. There is an urgent need to assess all aspects of contingency planning implementation in order to effectively improve the effectiveness of contingency planning and further improve the efficiency of emergency response. This paper analyzes what a mature emergency system is, establishes a performance evaluation index system, puts forward a method of evaluating the effectiveness of emergency plan combined with AHP and fuzzy theory (Chen and Zhang, 2009: 125-132.). Wei (2001) takes Shanghai as an example, puts forward the importance of disaster prevention, and the norms and perfection of the legal system also helps to improve the emergency capacity, thus maximizing the benefits (Wei, 2001: 21-24). Dong (2005) combined with practice, more detailed and accurate analysis of flood disaster, through further analysis, determined the more scientific and reasonable analysis and treatment methods (Dong and Liu, 2015: 494-504). Zhu (2010) compares the emergency management system of the US Emergency Management Agency (FEMA) with China's emergency management system, further elaborates the advantages of FEMA, and puts forward the people-oriented concept as the basic basis (Zhu and Zhao, 2010: 32-34). Li and Jiang (2014) discussed the optimization of the operating environment for synergistic linkage, and the construction of a decision-making system, guarantee system, command system and control system integrated into the whole process (Li and Jiang, 2014: 156-162). Wu (2003) studied the emergency rescue system and the emergency plan, introduced the basic requirements of the emergency plan, the grading of the emergency plan, the types and basic elements of the emergency plan (Wu and Liu, 2003: 47-100). Gao (2008) put forward the means of improving the framework system of emergency planning in China, and constructed the

evaluation index system of emergency planning in China by qualitative analysis(Gao, 2008: 39-40). Chen Peng put forward a multi-scenario simulation risk assessment framework to provide early warning strategies for flooding disasters in Guannan District of Changchun City(Chen, 2017: 89-94).

### 3.2 Information release management mechanism

Keeley Townsend (2010) analyzes the federal government's approach to public health emergencies, demonstrating that public health emergency services need to be integrated with platform applications, and concludes that public health data resources need to be scaled up(Keeley Townsend, 2010: 56-65). LanAyres (2011) et al. pointed out that GIS is an excellent integrated platform for public safety emergency management with data management, planning and analysis, field support and situational awareness, and uses big data analytics to analyze effective data(LanAyres, 2011 : 42-43). Yang (2010) discusses how to communicate information effectively in the Internet+ era and the government's emergency management(Yang, 2010: 147-156). Zeng (2013) studied how to detect situations in advance through big data methods and provide decision support in the event of a disaster(Zeng, 2013: 15-23). Wang (2016) shared the basic experience of how a city can share information in real time between meteorology, transportation, traffic police and other cross-sectoral departments, and realize the emergency coordination mechanism(Wang, 2016:157-165).

### 3.3 Flood control and emergency capacity of local governments

Zhao (2008) conducted a detailed analysis of emergency rescue cases, summarizing the successful experiences and lessons learned from the failure of emergency rescue(Zhao, 2008: 43-46). Liu (2020) proposed that strengthening community emergency mobilization capacity-building requires multiple actors to participate in crisis management. Fully mobilize social forces and build a coordinated emergency response pattern. It is also necessary to establish and improve a coordinated emergency response mechanism, provide institutional support and action framework for community emergency management, and improve community emergency management capabilities(Liu, 2020:43-46). Fan (2009) constructed the basic framework of emergency management from the perspective of government capability by analyzing the real dilemma of emergency management(Fan and Long, 2009: 84-87).

### 3.4 Residents' awareness of flood prevention

Chen put forward that effective crisis management requires consensus and strong sense of crisis management. Crisis consciousness is the starting point of public crisis management and the premise of improving the government's public crisis management capability(Chen, 2010: 55). Qin proposed incorporating local government emergency education for natural disasters into the performance evaluation system to increase the local government's emphasis on natural



disaster emergency management(Qin, 2024: 1-9). Wang (2014) summarizes the progress of urban flood control in China, analyzes the main problems of urban flood control emergency management, and puts forward countermeasures to strengthen urban flood control emergency management(Wang, 2014:28-30). Xie (2014) analyzes the consequences and influencing factors of rainstorm disaster in order to improve the level of emergency management of sudden rainstorm disaster and reduce the losses caused by rainstorm disaster(Xie and Zhu, 2014: 22-24 ). Liu (2014) based on the review of the basic situation and analysis of the problems in dealing with heavy rain emergencies in Beijing and other large cities, based on useful experience abroad, put forward suggestions to improve citizens' ability to cope with heavy rain(Liu, 2014: 11-14). Hou (2015) has established an extreme weather monitoring and diagnosis system and an early warning system for crowd distribution, adhering to the correct principles and standards to guide urban construction, raising awareness of disaster prevention and punishment(Hou, 2015: 5-9).

### **III. Case Study**

#### **1. Basic Situation of "7·31" Heavy Rainstorm Disaster in Beijing, China**

From July 29 to August 2, 2023, Beijing-Tianjin-Hebei region experienced unprecedented torrential rains and severe flooding, especially in Mengtougou District, Fangshan District, and Zhuozhou City, Hebei Province. During this round of extreme rainfall, 14 national meteorological observatories in Beijing and Hebei Province broke through the historical extreme daily rainfall. The average rainfall in Beijing was 331 mm, exceeding the average rainfall of 250 mm in "1963.8" 7 d and 192 mm in "July 21" 2 d in 2012, the highest since 1951; the highest rainfall in Beijing occurred in Changping Wangjia Reservoir Station. Influenced by extreme rainfall, the basin flood occurred in the Haihe River basin. Yongdinghe Lugouqiao Station's flood peak flow rate rose from 1,000 m<sup>3</sup>/s to 4,650 m<sup>3</sup>/s in just 2 h, the largest flood peak since 1925.

Precipitation The following information is compiled by reference to the official information released by the Beijing Meteorological Administration:

Rainfall: From 20:00 to 20:00 on July 29, 2023, the average rainfall in Beijing was 109.3mm and 122.7mm; the maximum rainfall was 351.7mm in Fangshan North Cellar; and the maximum hourly rainfall was 50.8mm/h in Fangshan New Village on July 30. From 20:00 to 22:00 on July 29, 2023, the average rainfall in Beijing was 236.3 mm and 223.4 mm; the maximum rainfall was 690.6 mm; the maximum hourly rainfall was 111.8 mm/h in

Qianlingshan Mountain, Fengtai, on July 31. From July 29, 2023 to August 1, at 11:00, the average rainfall in the city is 263.8 mm, and the average urban area is 239. mm; maximum rainfall in Changping Wangjiayuan Reservoir 744.8, maximum hourly precipitation intensity Fengtai Qianlingshan 111.8 mm / h (31 days 10:00-11:00)

<Table 3-1> Beijing 7-31 Heavy Rainfall

Time	Average Rainfall	Maximum rainfall	Maximum hourly rainfall
7.29(20h)-7.30(20h)	109.3mm	351.7mm	50.8mm/h(30 days 16 <sup>时</sup> -17 <sup>时</sup> )
7.29(20h)-7.31(22h)	236.3mm	690.6mm	111.8mm/h(31 days 10 <sup>时</sup> -11 <sup>时</sup> )
7.29(20h)-8.1(11h)	263.8mm	11	111.8mm/h(31 days 10 <sup>时</sup> -11 <sup>时</sup> )

Information: <http://bj.cma.gov.cn/>

On August 9, 2023, the Information Office of the Beijing Municipal People's Government held a press conference on flood prevention and disaster relief in Beijing. Xia Linmao, executive vice mayor of Beijing Municipal Government, said at a press conference on flood prevention and relief in Beijing that the flood disaster caused nearly 1.29 million people to suffer, 59,000 houses collapsed, 147,000 seriously damaged.

## 2. Key measures and results

### 2.1 Main measures

(1) Advance deployment. The Beijing Municipal Committee and the municipal government are highly vigilant in flood prevention and planning and early deployment. On July 28, the meteorological station issued an orange warning signal for heavy rain: it is expected that from the night of July 29 to the night of August 1, Fengtai District will experience heavy rain to heavy rain, local heavy rain. The main rainfall occurred between 08:00 on the 30th and 08:00 on the 31st. The risk of secondary disasters such as floods, mountain floods and geological disasters induced by heavy precipitation in shallow mountainous areas is high. On July 29, the National Defense General Administration launched a secondary emergency response to flood prevention in Beijing, Tianjin, Hebei, and Henan, and sent five working

groups to assist in guiding prevention and response in the northern key areas. On July 30, the Ministry of Emergency Management organized a video conference on flood control, pointed out that it is necessary to fully consider the extremes and uncertainties of the heavy rainfall process, refine the key directions and important parts of defense. The Ministry of Water Resources raised the emergency response of Beijing-Tianjin-Hebei flood prevention to Grade II at 12:00 on the 30th, requiring relevant provinces and cities to immediately enter the emergency response state.

(2) respond to the incident. From the evening of August 3, the coordinating forces of Mendougou District, fire fighting, medical and other related rescue forces, along the 27 villages and communities trapped in the mountains along the route, Lopaling is one of the earliest communities to move out. Reservoir Drainage: On July 30, 2023, the upper reaches of the Yongding River in Beijing were pre-emptively discharged, and after the flood peak was formed on July 31, Beijing used the 1998 delayed flood reservoir to maximize the peak storage. The river controls the discharge flow of 700 cubic meters per second downstream to minimize the impact on the downstream area. [23] Communication support: As of July 31, 2023, Fangshan District has dispatched 309 communication support personnel, 114 emergency vehicles, 8 emergency communication vehicles, 57 oil engines, 180 satellite phones. [5] Air flights: At 06:00 on July 30, 2023, the North China Airlines Administration launched the first-level response mechanism of the Capital Airport Transportation and Management Commission. As of 11:20, the North China Aviation Administration has guaranteed 366 flights in and out of the capital airport, 242 flights in and out of Daxing Airport, and two flights of human organs transportation will be on time. [5]

(3) Repair afterwards. Overall planning, comprehensive recovery and reconstruction: the general idea is one year of basic recovery, three years of comprehensive improvement, long-term sustainable development. "One year basic restoration" is to basically repair flood-damaged water conservancy facilities, complete the repair and reinforcement of damaged houses and reconstruction of rural residents' own housing sites. "Three years of comprehensive improvement" means that it will take about three years to complete the post-disaster recovery and reconstruction work, and the disaster prevention and mitigation capacity in the disaster-stricken areas will be significantly improved. "Long-term sustainable development" is to focus on long-term and overall planning, optimize the functional layout of the affected areas, comprehensively improve the level of infrastructure and basic public services, and continuously improve the quality and efficiency of economic development. Four links and one guarantee: On August 9, 2023, the Information Office of the Beijing Municipal People's Government held a press conference on flood prevention and

relief in Beijing. Xia Linmao, a Standing Committee member of the Beijing Municipal Party Committee and deputy mayor of the municipal government, said that after the disaster, the municipal government constantly "struggled for danger, repair and communication". (Four links and one guarantee refers to roads, bridges, water conservancy, electricity and security, meaning that infrastructure construction, to ensure traffic roads, bridges are safe and stable, water conservancy facilities perfect, reliable power supply). Focus on the psychological and emotional problems of the masses and strengthen the psychological guidance of the masses in the disaster areas: organize a team of 24 municipal mental health experts into the disaster areas.

## 2.2 Achieving results

The first is to implement the pre-discharge capacity dispatching of reservoirs, rivers, lakes and pipeline networks 36 hours in advance to free up 18 million cubic meters of flood storage space.

Second, in accordance with the principle of "upper storage, middle storage, lower discharge and effective storage of rainwater and stagnant flood", the upstream and downstream, left and right banks and dry tributaries are coordinated. The flood is restricted by embankment in the channel of Yongding River plain. The flood caused the Yongding River flood control system to undergo a comprehensive inspection, realized the upstream large reservoir flood control, the midstream reservoir flood control peak, the plain reservoir flood control, and the downstream embankment flood.

Third, Beijing also used the upstream reservoirs of various watersheds to block floods, and 25 reservoirs in the city exceeded the flood limit during the period, blocking more than 400 million cubic meters of flood, effectively playing a role in cutting peaks. It can be said that the flood control project built in Beijing has played an important role in the response to the heavy rain and flood.

## 3. Analysis of causes

As global warming intensifies, abnormal climates become more frequent. On July 21, 2012, Beijing was hit by two unprecedented torrential rains, which killed 79 people and affected 1.9 million people. The heavy rain caused severe water accumulation in the city. In the face of the heavy rain disaster in Beijing in 2012, China's planning, construction, infrastructure, and emergency management have exposed many problems. China has stepped up emergency management measures over the past 11 years, and the heavy rains in 2023 have caused little casualties, but they have

caused huge economic losses. In this chapter, taking the rain of Beijing 7·31 in 2023 as an example, first analyzes the current situation of urban rainstorm emergency management in China, and elaborates on China's "one-an-three-system" crisis management system. Next, the author analyzes the disaster situation, main relief measures and successful situation of the heavy rain in Beijing on July 31.

Information release management mechanism: As early as before the storm, citizens received a series of risk reminders. On July 29, the Beijing Flood Prevention Command launched the city's flood prevention red (level 1) early warning response, and the city's flood prevention first-level response, issued to the community "non-essential not to go out, non-essential not to work". A valuable window of time has been secured in response to the heavy rain. The Beijing Flood Prevention Office issued a red warning on the 30th, and pointed out that there will be a red warning standard flood in the Dashi River Basin in Fangshan District, asking citizens to stay away from the river and ensure their safety. In order to ensure the safety of the people's lives in the heavy rain as much as possible, preparations in advance, coordination and coordination, Beijing's multi-sectoral measures and joint efforts to fight floods.

In terms of flood prevention and emergency disposal capacity at the grassroots level: deploy in advance and allocate materials to ensure grassroots needs. On July 29, the District Emergency Management Bureau issued an emergency notice, requiring all towns and towns to immediately prepare disaster relief materials in advance in accordance with flood prevention emergency plans. The staff of the District Emergency Bureau and the District Commercial Bureau, who are on standby at the District Disaster Relief Stockpile two days in advance, immediately start the transfer of disaster relief materials. Because of the preparation in advance, the first batch of relief supplies were successfully released. Subsequently, the transfer needs of the town streets arrived one after another, and the war on material security began.

In dealing with the process of resettlement of the affected people, adhere to the concept of "proper resettlement of the affected people". The city has moved more than 82,000 people, and the village committee, schools, gymnasiums, supportive housing and other places have concentrated on the victims. In addition to sufficient basic living materials, the settlements are equipped with medical personnel and related medicines, and provide services such as psychological guidance. At the same time, Beijing has also increased its material security efforts to basically solve the shortage of materials in severely affected areas.

In terms of overall coordination efficiency: Before the rain began, the Beijing Emergency Management Bureau proposed guidelines for "early research, early deployment, early preparation, implementation of flood control

measures, and proactive prevention". On July 21, after Typhoon Dursy was formed, Beijing closely followed the trend and held weather consultations six times. On the morning of July 28, the typhoon just landed in Fujian, and in the afternoon, Beijing immediately held a special meeting again, and deployed overnight. "Close, stop, seal, withdraw" and other emergency measures were also issued in advance, evacuating more than 42,000 people in advance. Pre-positioned fire and rescue teams and all kinds of professional rescue forces and flood relief materials. 123,000 cadres sank in all districts of the city, entering villages and low-lying points in the mountains in advance, carpeted inspection of urban waterlogging risk points, encrypted water, electricity, gas, heat, communication and other city lifelines.

In terms of information distribution management mechanism: Beijing Meteorological Administration based on the forecast results through mobile phone software and short-term interest, broadcast, news, etc. At the same time, the Meteorological Administration and the Beijing Municipal Hydrological General Station issued a series of forecast warnings to avoid harm without knowledge or preparation, thus minimizing the damage caused by harm. At the same time, contact the grassroots cadres to communicate the disaster relief situation verbally to the disaster-stricken areas, so as to soothe the mood of the masses.

In order to promote the popularization of emergency risk avoidance knowledge on campus, we also fully tap the potential of "community under party members" action, and play a leading role in advocating "safety flood, everyone participates".

#### **4. Improvement programmes**

##### **4.1 Strengthening flood awareness and education**

In order to strengthen the emergency response skills, we should integrate flood prevention knowledge education into the warning education and learning content of Party members and cadres, especially grassroots Party leaders, and strictly require it. It also combines case study with flood control exercises. The purpose of learning is to practice in real life, to increase the requirements of the government, enterprises, communities, schools and other flood control drills, so as to achieve full participation and full teaching.

##### **4.2 strict norms for flood emergency information management**

To build a solidarity of media, accurate and authority. To develop the improve risk integrated monitoring system

construction programmes, strengthen monitoring forecasting warning system and maintenance of warning facilities for flood disaster forecasting early warning facilities. The use of broadcast, television, newspapers, network, network, television, media, and informally, and children, and women, such as elderly, disabled and pregnant women, children, children, disabled and pregnant women. At the same time, early warning issued the head of the head of the Gu shall notify the head of the Guiding Officer and notify the public security of the Guiding Party and ensure that the flood control of the publication of the public

Good news-oriented work for flood prevention. Further strengthening information audit system, the Government official information review system, and the government's work malicious songs, and create harmonious health-oriented network environment. At the same time, we must play a good social force, cooperation and win the breakthrough.

#### 4.3 Strengthening the prevention capacity of grass-roots prevention capacity

The grass-roots rescue forces play a crucial role in emergency relief. Further strengthening mechanisms, the "a-hand" responsibility system, the main leadership of the grass-roots and social rescue team, and social rescue team, and social rescue team-building standards, and social rescue teams. In addition, wages, wages, wages, work welfare and welfare, work welfare, and welfare, and welfare, and welfare, and welfare services, and benefits are effective solutions to their concerns.

Strengthening the construction of asylum-seekers. Through the visit, some public officials were trapped in the absence of government organizations, some public security, supplies, and shelter building conditions, shelter building conditions, shelter facilities, shelter facilities, asylum-seekers. Strengthening the construction and advocacy efforts should be strengthened to promote the "human defense command system integration information system integration of human defense command system

## IV. Conclusions

Heavy rain, floods, earthquakes, typhoons, high temperatures, extreme... The destructive power of words that have appeared occasionally only recently has hit people's minds. The number of extreme weather disasters worldwide is on the rise, with greater losses to urban systems.

This paper takes Beijing 7/31 heavy rain as an example, analyzes the emergency management measures in case of extreme weather caused by climate crisis, draws lessons from urban rainstorm crisis management.

This paper first introduces the causes of extreme weather, and systematically summarizes the causes of the climate crisis and the positive response to the global climate crisis. Based on this, this paper expounds the causes of urban rainstorm and China's crisis management in detail, and hopes to find the appropriate urban rainstorm crisis management system and means from the perspective of crisis management.

China's crisis management research started late, the current crisis management system is not perfect. This paper expounds in detail the crisis management system of "one case, three systems" adopted by China in dealing with urban rainstorms. In the system, "one case" refers to the formulation and revision of crisis plans, and "three systems" refers to the establishment and improvement of crisis systems, mechanisms and legal systems. Crisis planning is an important foundation of crisis management, and it is the first task of China's crisis management system construction. The crisis management system countries have established a crisis management system based on unified leadership, comprehensive coordination, classification management, hierarchical responsibility and territorial management. Crisis management mechanism refers to various institutionalized and procedural crisis management methods and measures throughout the crisis process. Based on the in-depth summary of the actual experience of the masses, the crisis management system formulated a crisis plan step by step, and finally upgraded to a series of laws and regulations.

Beijing is also actively responding to extreme weather conditions in the July 30 heavy rain, but case studies show that China's crisis management system is insufficient due to severe damage. A series of solutions have been proposed.

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