Comparative analysis of emergency relief management system for debris flow and other geological disasters

Gexue Bai, Yunlong Hou, Baofeng Wan

Gansu Institute of Engineering Geology, Lanzhou 730000, China

Abstract. Emergency relief management is the basis of national development. In recent decades, many countries at home and abroad have gradually established a sound emergency relief system, including institutional settings, legal construction and other aspects. China started late. After the 2008 Wenchuan earthquake and the 2010 Zhouqu debris flow geological disaster, China's emergency relief management system developed rapidly and achieved gratifying results. Based on the basic emergency relief management system of Lanzhou City and Longnan City, this paper compares with foreign emergency relief systems, such as the United States, Japan and Australia. Also, this paper analyzes and summarizes the advantages and disadvantages of emergency relief systems in different countries, so as to provide reference for the development of disaster prevention system in China, and effectively improve the management system of disaster prevention and resistance in China.

Keywords: Emergency relief; Geological disaster; Disaster prevention and resistance.

1. Research background

Ensuring the safety of people's lives and property is not only the basic national policy of China, but also the primary goal of emergency rescue and disaster relief. A reasonable disaster relief management system can greatly reduce the adverse effects of various disasters (Yao Yanting etc., 2014).Relatively speaking, the emergency relief of major sudden geological disasters, as a national function, and as a part of the construction of the emergency public safety emergency relief system, was carried out earlier abroad.

Countries, such as Europe, the United States, Japan and Australia, have all established a relatively perfect emergency response system for major emergencies. It has accumulated a lot of valuable experience in institutional setup, legal construction, mechanism construction and other aspects (Du Wen, 2012).

China in the emergency public safety emergency relief system construction started late, after more than ten years of practice exploration, achieved exciting results, and in the 2008 wenchuan earthquake emergency relief (Zhang Peijin, 2010), 2010 zhouqu large debris flow geological disasters (Shan Guangning, 2015) emergency relief emergencies played a role, but there are also deficiencies, so far still did not establish a set of perfect emergency rescue system for major emergency. Therefore, in order to ensure the safety of Chinese citizens' lives and property and social harmony and stability, it is necessary for China to learn from the advanced experience and achievements of the construction of the international emergency response and disaster relief system.

2. Situation and analysis of foreign emergency disaster management

After the 1990s, some developed countries took emergency and disaster relief work as an important government affairs to maintain social stability, ensure economic development and improve people's quality of lives. Emergency relief for major emergencies has become one of the important foundations for maintaining the normal operation of the country, society and people’s production and life. The United States, Japan and Australia and other countries, respectively established in line with their national conditions, good major emergency relief system, mechanism, and on the basis of the emergency relief laws and regulations, organization, emergency relief command system, emergency relief team, emergency relief resources, relatively perfect major emergency rescue system (Wang

Zhihong, etc., 2012).The advanced emergency relief methods and powerful emergency relief capabilities of the emergency relief system of these countries play an important role in reducing and controlling casualties and property losses in emergencies.

2.1 Emergency Event Emergency Rescue System and Analysis in USA

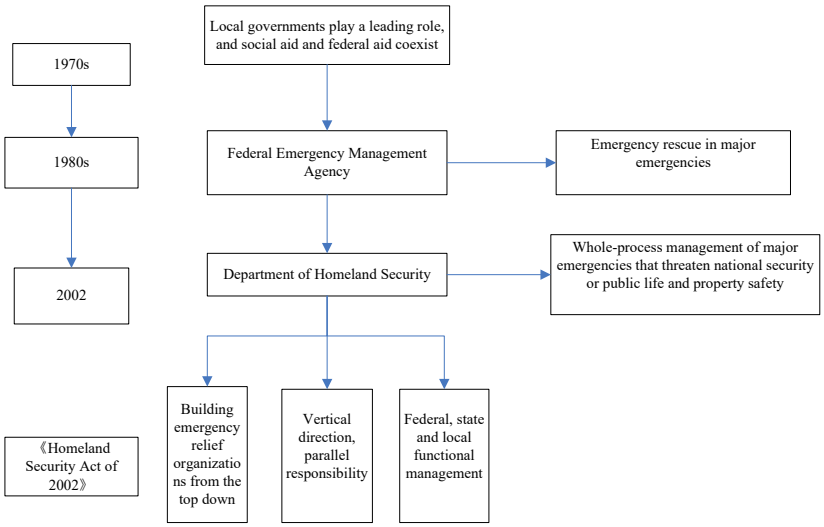

Figure 1. US Emergency Response Organization chart

On the whole, the emergency rescue of major emergencies in the United States mainly adopts the mode of territorial priority and hierarchical responsibility, and the organizational structure has the obvious characteristics of "vertical guidance and parallel responsibility" (Tong Feihong, 2009).Including the following aspects:

① institutions is independent with unified leadership.② has a complete organization and a strict system.③ has clear responsibilities and clear division of labor.④ resources have reasonable allocation and efficient combination of rescue teams. ⑤The collaboration mechanism is relatively complete.

2.2 Emergency Management System and analysis in Japan

Japan is one of the disastrous countries in the world. Under the norms of a series of safety laws, Japan has already established a relatively perfect major emergency emergency rescue system (Gu Jingshu, 2020; Wu Lihui, 2017).After years of construction and development, Japan has formed an emergency rescue system with the remarkable characteristics of a strict network of emergency rescue organizations, a large number of disaster prevention and management personnel, clear responsibilities and tasks, sound personnel and institutions, rich work content and clear work procedures. To sum up, it mainly includes management system, legal system, operation mechanism and information system.

(1) unified command and management system with hierarchical responsibility.

(2) is an authoritative, complete system of laws and regulations.

(3) Emergency response mechanism with efficient operation and the joint participation of the whole society.

(4) is a powerful and responsive information network system.

The Japanese wireless communication network has an important role and significance both nationwide and in Asia. Japan's wireless communication network system mainly includes: central disaster prevention and wireless network, fire prevention and disaster prevention and wireless network, county and city disaster prevention and administrative wireless network, municipal block disaster prevention and administrative wireless network, special wireless network for disaster prevention and mutual communication and other subsystems. The huge wireless communication network has formed a whole communication system that covers the whole country, which can

effectively prevent the disasters caused by large-scale communication line congestion. These criss-rossing communication networks form a comprehensive and nationwide dedicated wireless communication system for emergency response, providing high-tech support for the Japanese government to collect, analyze and process disaster information. The network system also provides support and assistance for disaster information analysis and emergency rescue in other countries or regions in Asia (Mitsutoshi Kikuchi, 2004).

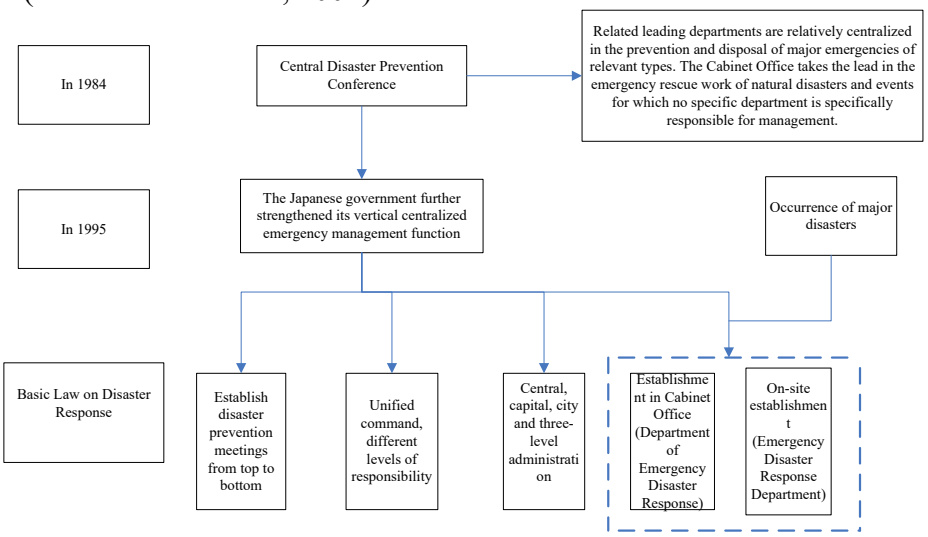

Figure 2. The Japanese Emergency Management System diagram

2.3 Emergency Management System in Australian

The Australian Emergency Management Agency is Australia's most important public safety management body. Its predecessor was the Natural Disaster Organization, established in the Ministry of Defense in 1974.The agency is responsible for coordinating federal material assistance to states and territories when a disaster occurs, helping them strengthen their disaster management capabilities. In 1993, the agency was renamed the Emergency Management Agency (Luo Faju, 2017), and was transferred in 2001 to the Ministry of Justice for the management of various natural disasters, technical disasters and mission disasters. The Emergency Management Agency shall set up relevant agencies to assume their respective responsibilities respectively.

The construction of the Australian emergency management organization mainly adopts the federal and state (local government) levels. At the Australian federal level, there is no unified public safety administration department-level specialized agency, and the relevant functions of public safety management are divided into various departments. Therefore, the National Emergency Management Coordination Center and the National Emergency Management Commission have adopted a cross-departmental collaboration model (Chen Shaoyun, 2017).In state and local governments, state and territorial and local governments have a direct responsibility to protect citizens' lives and property from various major emergencies.

It can be learned from the Australian emergency management system, the Australian emergency rescue adopts an emergency rescue system provided by national agencies, coordination between functional departments and implementation by institutions under the state and region (Zhang Qingyang, 2015).This vertical and horizontal integration and joint office emergency rescue mode not only ensures the unity of command, but also reflects the advantages of coordination and flexibility.

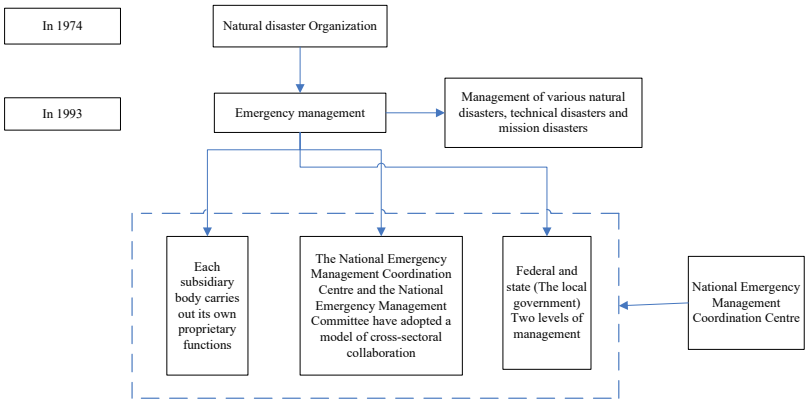

Figure 3. The Australian Emergency Management System diagram

3. Emergency command and organization system in China

In terms of emergency relief management, due to different national conditions, there are many departments in charge of China. After the disaster, a special emergency relief headquarters will be set up, and then the relief tasks will be assigned to the subordinate departments. This paper mainly analyzes the deployment situation and main responsibilities of Lanzhou City and Longnan City in case of major regional disasters.

3.1 Emergency relief and relief command system for major sudden geological disasters in Lanzhou

After the disaster has occurred, Lanzhou first set up "Lanzhou Emergency Geological Disaster Emergency Headquarters" (hereinafter referred to as "Municipal Emergency Headquarters"), The deputy mayor in charge of the municipal government serves as the chief, The deputy secretary general in charge of the municipal government, the director of the municipal Land and Land Bureau and the county (district) director of the county (district) served as the deputy commander, Municipal propaganda department, municipal development and reform commission, municipal education bureau, municipal commission, municipal public security bureau, civil affairs bureau, municipal land bureau, municipal environmental protection bureau, municipal construction bureau, city law enforcement bureau, municipal safety bureau, municipal government administration, municipal water bureau, municipal forestry bureau, municipal tourism bureau, municipal health bureau, Lanzhou meteorological bureau, Lanzhou railway bureau, Lanzhou police, Lanzhou police detachment, Lanzhou power supply company and the county (district) government and other relevant units and departments.

After the occurrence of a sudden geological disaster or disaster, the municipal emergency headquarters shall notify all or part of the member units immediately according to the scale or harm degree of the disaster to organize, coordinate and command the emergency disposal work uniformly. The specific responsibilities of emergency relief are: cooperate with the emergency work under the leadership of the provincial government; organize, command and coordinate the emergency work of major sudden geological disasters. In emergency cases, report to the provincial Party committee and provincial government to coordinate the troops, armed police, reserve forces and militia to participate in the disaster relief work.

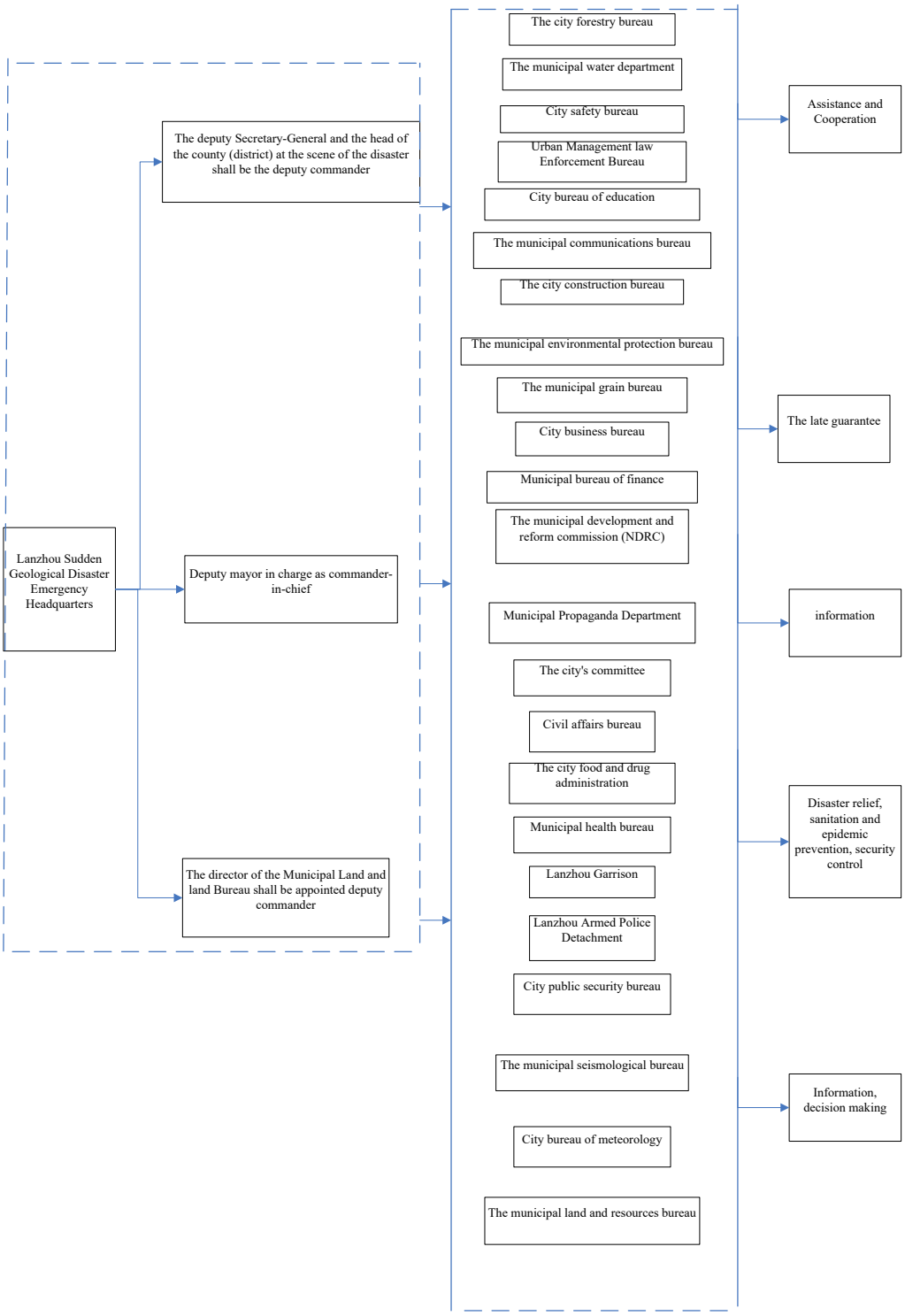

Figure 4. The Geological Disaster Emergency System of Lanzhou City

3.2 Emergency relief command system for major sudden geological disasters in Longnan

After the disaster occurs, the relevant departments shall immediately establish the emergency command and working institutions for geological disasters, and implement the system of linkage between emergency departments, on-site technical guidance and consultation of emergency experts. In accordance with the principle of responsibility at different levels and territorial management, the people's governments of cities and counties shall set up corresponding emergency command and working organs respectively.

The Longnan Municipal Emergency Geological Disaster Emergency Headquarters (hereinafter referred to as the "Municipal Geological Disaster Emergency Headquarters") shall be established, and, under the unified leadership of the Municipal Emergency Management Committee, shall be specifically responsible for the response to sudden geological disasters at III or above the command level.

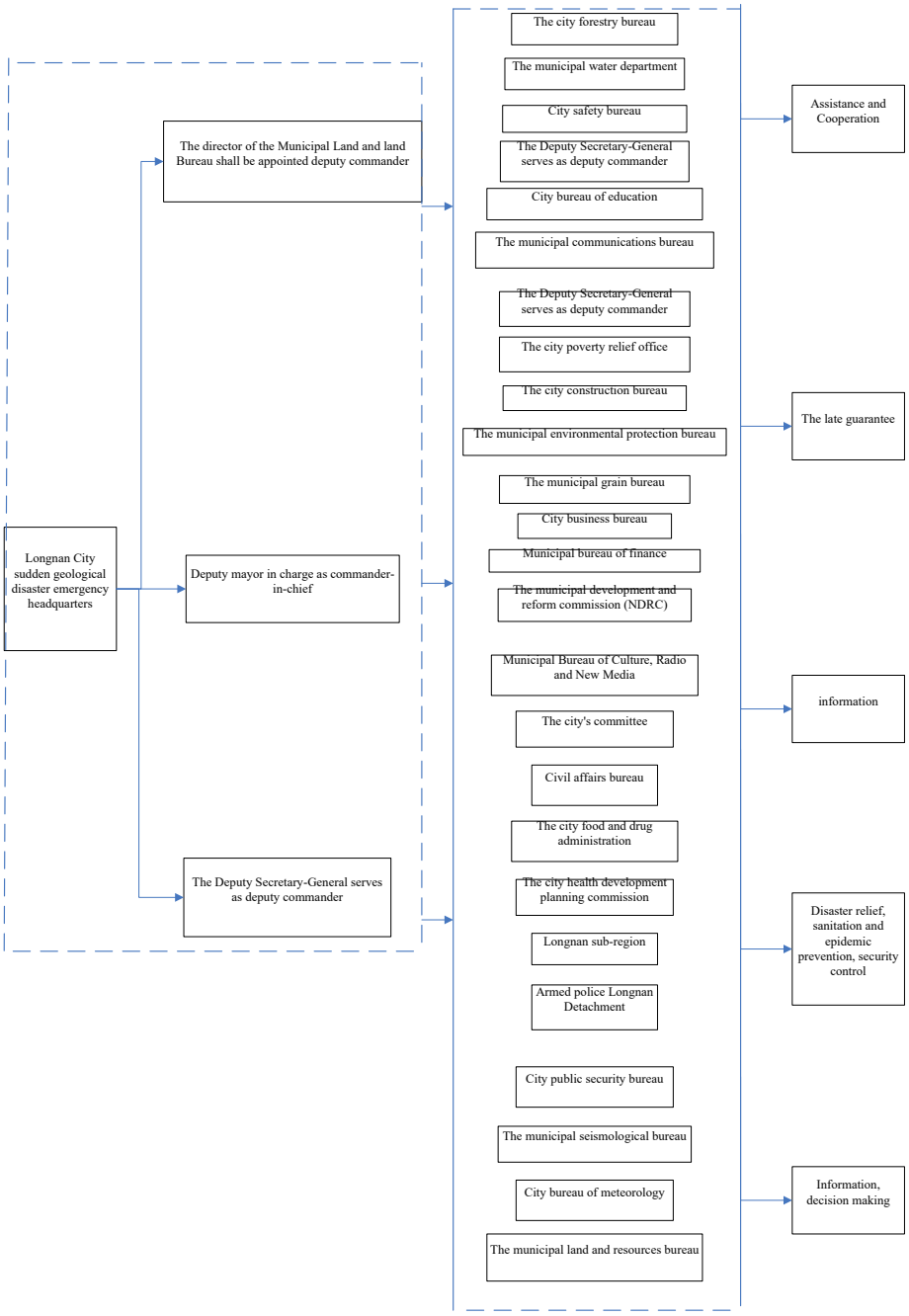

Figure 5. Emergency Organization Map of sudden geological disasters in Longnan City

The office of the Municipal Geological Disaster Emergency Headquarters is located in the Municipal Bureau of Land and Resources. The director of the office is the director of the Municipal Bureau of Land and Resources, and the deputy director is the deputy director of the Municipal Bureau of Land and Resources. The liaison officers of the Longnan Military Sub-region, the emergency linkage departments and units of the Municipal People's Government are members of the office.

The main responsibilities of each department are to organize, command and coordinate the emergency work of sudden geological disasters. Analyze and judge the cause of the disaster, determine the emergency prevention and disaster relief work plan; organize relevant departments and

counties to provide emergency rescue; report to the municipal government to consult with the Longnan military subdivision and armed police detachment to participate in the emergency work; guide the county emergency headquarters to do the emergency prevention and rescue work of sudden geological disasters, and handle other important work of emergency prevention and disaster relief.

4. Comparative analysis conclusions

4.1 Advantages in the construction practice of foreign emergency and disaster relief system

After years of efforts, developed countries such as the United States, Japan and Australia have successively established an emergency emergency management system or emergency relief system in line with the characteristics of their respective national conditions. Through their analysis, we can see that the government emergency management or emergency relief leadership agencies are established to achieve unified national leadership over emergency management; have passed relevant laws and regulations for emergency management or emergency relief; the central government and local government have excellent emergency relief equipment and adequate emergency relief team; have relatively perfect system operation mechanism (Jia Qian etc., 2016).Compared with the reality of emergency public safety management in China, the advantages are mainly summarized as: unified management organization, perfect emergency relief organization, complete emergency relief operation mechanism, excellent emergency relief equipment, abundant material, wide distribution and strong force, high participation of NGO and public social forces (Wang Shijun, 2012; Yan Enhui et al., 2016).

4.2 The deficiencies in the construction practice of foreign emergency and disaster relief system

Restricted and influenced by the political system and other factors, the United States, Japan, Australia and other countries also have some shortcomings in the construction of the emergency management system. First of all, due to its political system, the leading role of the central government is not enough for local governments have great autonomy in the emergency relief system, and the unified command and leading role of the central government in the emergency relief system cannot be fully played. Second, the emergency disaster relief social mobilization is still insufficient, although the United States in emergency disaster relief social mobilization compared with China, but due to its domestic political system of relatively loose public-private relations (between the public and people), public relations (between people) and father-in-law (between governments at all levels), make the whole society mobilization, affect the action speed and emergency relief efficiency.

4.3 Reference value of foreign emergency and disaster relief system construction

On the whole, the United States, Japan, Australia and some other developed countries have provided many reference places for China in the construction of the emergency and relief system.

(1) Establish and improve the government laws and regulations system for emergency management.

(2) Comprehensive permanent command agency for emergency response and relief of major emergencies.

(3) Strengthen departmental coordination and cooperation so as to maximize resource utilization and work performance.

(4) Build a smooth and transparent information system platform. In the process of dealing with various major emergencies, the importance of information is becoming more and more prominent.

(5) Expand public participation. In the emergency and relief work of major emergencies, governments have their own limitations in resources, personnel, teams and organizations. In order to make up for these deficiencies, it is necessary to give full play to the individual forces of the affected public, non-governmental organizations and other public forces to expand public participation.

(6) Combined with China's national conditions. Our country has established including emergency plan, emergency system, emergency system and emergency system "case three system" as the core, the framework of emergency management system, form a unified leadership, comprehensive coordination, classification management, hierarchical, territorial management of emergency management system, establish a scientific, standardized and efficient major emergency emergency relief mechanism and system.

5. Conclusions

The achievements and experience of developed countries in the emergency relief mechanism, legal system and system construction of major emergencies are worth learning and learning from in China. Its construction experience mainly includes several aspects: unified management organization, relatively perfect legal guarantee, complete emergency relief organization, relatively perfect emergency relief operation mechanism, excellent emergency relief equipment, abundant material, wide distribution and strong force, high participation of non-governmental organizations, people and other social forces. Of course, due to the constraints and influence of the political institutional factors of various countries, some countries also have problems such as the insufficient strengthening of the leading role of the central government and the lack of emergency social mobilization in the emergency management system.

China's theoretical exploration and construction practice in the emergency and relief system of major emergencies started late, and is asymmetric with the overall situation of major emergencies in China (Huang Yanfei, 2007).Our country has completed from the central to local construction unified, comprehensive, top-down emergency management agencies and comprehensive rescue team, but our emergency management agencies and comprehensive rescue team construction in a short time, therefore, to strengthen major emergency relief management, our country must learn on the basis of foreign advanced experience, the construction of in line with our national conditions of major emergency emergency relief system.

References

[1] Yao Yanting, Chen Wanming, Wang Shengli. Comparative study and enlightenment of emergency response systems in China, the United States and Japan [J]. Shandong Social Sciences, 2014, 000(008):128-131.

[2] Du Wen. Research on emergency rescue system for catastrophe-type emergencies [D]. Henan Polytechnic University 2012.

[3] Zhang Peijing. Study on adaptability of earthquake relief materials supply [D]. Southwest Jiaotong University, 2010.

[4] Shan Guangning. Ethnological study on reconstruction of Zhouqu Debris flow disaster [D]. Lanzhou University, 2015.

[5] Wang Zhihong, Wang Binhui, Chen Siling. Reference and thinking of foreign emergency management system [J]. Science and technology research management, 2012, 32(16):209-212.

[6] Tong Feihong. Perspective on American airport emergency rescue system [J]. Modern occupational safety, 2009(12): 86-87.

[7] Gu Jingshu. Practice and enlightenment of Disaster emergency language service in Japan [J]. Journal of Zhejiang Normal University (Social Science Edition), 2020, 45(04): 10-18.

[8] Wu Huina, Bao Sarina. Japan earthquake disaster emergency management system construction [J]. Journal of Disaster Prevention Science and Technology Institute, 2017, 19(04): 54-63.

[9] Mitsutoshi Kikuchi. Disaster communication systems in Japan [A]. The United Nations International Decade for Natural Disaster Reduction [C]. China Association for Disaster Prevention, 2004:2.

[10] Luo Faju.Australian Emergency Management Centre [J]. Chinese Disaster Relief Medicine, 2017, 5(03): 181.

[11] Chen Shaoyun. Characteristics and enlightenment of Australian emergency management system [J]. China Emergency Management, 2017(02): 73-74.

[12] Zhang Qingyang. Australia's advanced concepts and principles of disaster prevention and mitigation [J]. Disaster preparedness expo, 2015(01): 62-67.

[13] Jia Qian, Yu Fang, Cao Guozhi, Zhou You, Zhu Wenyong. Comparative analysis of Disaster emergency system between China and Japan [A]. Disaster and Emergency Toxicology Committee of Chinese Society of Toxicology. Abstract of the first national academic exchange meeting of the Disaster and Emergency Toxicology Professional Committee of the Chinese Society of Toxicology [C]. Disaster and Emergency Toxicology Committee of Chinese Society of Toxicology: Chinese Society of Toxicology, 2016:1.

[14] Wang Shijun. What the United States Disaster Relief System Has Taught Our Country [D]. Hebei Normal University, 2012.

[15] Yan Enhui, Yang Rui, Zhang Jinhui, Long Haiyun. Japan's Emergency Response System [J]. International seismic dynamics, 2016(01):14-23.

[16] Huang Yanfei. Research on the emergency management system of major meteorological disasters in China [D]. Shanghai Jiao Tong University, 2007.