2019 Global Natural Disaster Assessment Report

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Contents

Preface

Nowadays, it is a common practice for international organizations, research institutions, insurance and reinsurance companies in the field of disasters reduction to publish global disaster assessment reports regularly. These reports are regarded as an important tool in sharing global disaster information, as well as understanding risk and promoting sustainable development.

Over the years, with the rapid social and economic development, China has been strengthening and deepening its efforts in disaster prevention, mitigation and relief, and accumulated considerable disaster data and advanced experience. This report analyzed China's global position in natural disasters and variation characteristics systematically, in order to advance China's disaster management. It can also provide the world with authoritative disaster data of China, to better serve the global disaster reduction and building a community with a shared future for mankind.

The Ministryof Emergency Management-the Ministry of Management, the Ministry of Emergency Management's National Disaster Reduction Center of China and IIEM&CCII have synthesized global disaster data, Chinese disaster data and some insurance company data to form one general report and two thematic reports to analyze and assess the situation of global natural disasters in 2019, global natural disasters from 1989 to 2019, China's position in the world and Asia, and Chinese natural disasters in 2019 in a more systematic manner, hoping to play a positive role in international and Chinese disaster management.

Executive Summary

This report systemically assessed the global natural disasters occurred in 2019 and over the last 30 years, and analyzed the ranking of China in Asia and worldwide, using Global Disaster Database (EM-DAT)[1], China's disaster data, and data collected from insurance industry. Main conclusions had been drawn as follows.

Overview

According to EM-DAT, 290 major natural disasters were recorded worldwide in 2019[2], of which 49% were caused by floods (143), 21% by storms (typhoons and hurricanes, 61) and 11% by earthquakes (30). A total of 11,694 people died in disaster-affected areas. In terms of fatalities, floods killed the largest amount of people, at more than five thousand, followed by extreme temperature events. In 2019, 90.64 million people were affected by natural disaster, of which 35% (31.29 million) were affected by storms. Floods were second only to storms, affecting 29.63 million people. Disaster countries reported direct economic loses valued at US$ 121.9 billion in this year. Storm (US$ 579 billion) and floods (US$ 360 billion) were also the top 2 costliest type of disasters. The whole year of 2019 witnessed a number of severe natural disasters including forest fires in Australia, super typhoon Lekima and Hagibis as well as floods in India.

Overall, global natural disasters occurred in 2019 showed the following features:

Ⅰ In general, global natural disasters in 2019 were less severe.

Compared to the average amount over the last 30 years (1989-2018), the disasters frequency in 2019 decreased by 10%, 79% less people died, 55% less people affected and 7% decrease in direct economic losses. Compared to the average amount over the last 10 years (2009-2018), the disasters frequency in 2019 were decreased by 14% , 74% less fatality, 50% less people affected and 24% decrease in direct economic losses.

Ⅱ The majority of global disasters in 2019 were caused by floods with smaller losses than the average for recent years

A total of 143 floods with significant losses occurred in 2019, representing more than 45% of all disasters, and were accountable for over 40% of total deaths in the year. The frequency of floods in 2019 was similar to the average for the past 10 years and 30 years; the death toll was about the same as the average for the last 10 years and 24% less than the average for the last 30 years; and the number of people affected was 58% and 72% less than the average for the last 10 years and 30 years respectively.

Ⅲ 2019 witnessed only few earthquakes, which was rare in recent years.

The year 2019 witnessed 30 major earthquake disasters, accounting for about 10% of total disasters throughout the year; which killed and affected less than 3% of total disaster-stricken population in 2019; and caused less than 2% of direct economic losses. Compared to the average for the past 10 years and 30 years, the frequency of global earthquake disasters in 2019 had no significant change; the death toll decreased by more than 90%; and the number of people affected and direct economic losses also dropped by more than 70% and 90% respectively.

Ⅳ The impact of bush fires was substantial.

In 2019, 10 bush fires caused enormous losses, a number similar to the average in recent years (an annual average of 9 bush fires for the past 10 years and 11 for the past 30 years). However, 2019 witnessed a higher number of terrible bush fires, especially the bush fires that occurred in Australia, the U.S. California, and the Amazon rainforests, which added the value of losses. Compared with the average for the last 30 years, the global bush-fire-related deaths in 2019 rose by 39%, and the direct economic losses increased more than six times. The Australian bush fires which lasted from July 2019 to February 2020 caused 34 deaths and missing, killed 1 billion animals, and burned over 18 million hectares of land.

[1] Unless otherwise indicated, the global natural disaster loss data covered in this report are from the EM-DAT database. Downloaded on 4 March 2020. EM-DAT is an emergency database created by the World Health Organization (WHO) and the Belgian Centre for Epidemiological and Disaster Research (CEPRED), which contains the main conditions for a disaster event, such as causing at least 10 deaths, declaring a state of emergency, or requesting international assistance.

[2] Data in the EM-DAT database are recorded on a country or region basis; unless otherwise specified, China's loss data are for mainland China only, excluding Hong Kong, Macao and Taiwan, and disasters affecting multiple countries or regions have been combined in this report for global and continental scale disaster frequency.

Ⅴ Developing countries account for a large share of the losses, with the United States and Japan showing significant losses.

The number of developing countries that were among top 10 in terms of frequency of disasters, number of deaths and direct economic losses were 7, 7 and 6, accounting for 68%, 68% and 36% respectively. Among those developing countries, Asian countries like China, India, the Philippines and Indonesia suffered the most from natural disasters. In 2019, the U.S. and Japan were hit by relatively severe floods, typhoons (hurricanes), and extreme temperature events. In terms of the frequency of disasters and direct economic losses, these two countries ranked among top 10 (the U.S. ranked No. 1 in both, Japan ranked No. 7 in frequency and No. 2 in losses), accounting for 24% and 60% of the combined total of top 10 countries, respectively.

Ⅵ China's natural disaster losses were light overall, but still ranked high in the world.

According to the statistics form China[3], in 2019, a total of 130 million people were affected by natural disasters of all types, 909 people died and missing, with direct economic losses of 371.1 billion yuan; among them, floods and geological disasters caused more than 59% of the total number of deaths and direct economic losses. Compared with the average for the past five years, China's natural disaster losses in 2019 were 25% lower in the number of deaths and missing, 57% lower in the number of collapsed houses, and 24% smaller in direct economic losses. According to EM-DAT statistics, in 2019, China was ranked No. 2, No. 6 and No. 3 in the world in terms of frequency of disasters, number of people killed by disasters and direct economic losses. Globally, China remains to be a worst-hit nation.

Global natural disasters in the past 30 years

From 22 December 1989 when the United Nations General Assembly launched the first International Decade for Natural Disaster Reduction to 2019, the United Nations had been taking disaster reduction activities for 30 years. We conducted an analytical assessment of the occurrence of and losses from natural disasters worldwide from 1989 to 2019.

An annual average of 320 major natural disasters occurred worldwide from 1989 to 2019, mostly caused by floods and storms (over 60%). The number of disasters per year climbed to its peak in 2005 before showing a decreasing trend.

According to EM-DAT, there were 9,923 cumulative major natural disasters worldwide from 1989 to 2019, an average of about 320 per year. Overall, the frequency of disasters gradually increased from 172 in 1989 to its peak at 432 in 2005 before showing a decreasing trend. Of all types of disasters occurred per year, over 60% were caused by floods and storms combined, and about 9% by earthquakes. Although geological hazards, extreme temperature hazards, volcanic hazards and forest fires were not frequent in the early period, the number of them slowly increased in recent years.

The global death toll from natural disasters showed a fluctuating down ward trend from1989 to 2019.

According to EM-DAT, the cumulative number of global disaster deaths over the past 30 years was 1,677,000, with an annual average of 54,082 deaths. There was a large inter-annual variation in the number of deaths due to global catastrophes with no apparent pattern of change. The year 2010 witnessed the largest number of annual disaster-related deaths at 320,000, followed by year 2004 at 240,000 deaths. According to statistics, droughts, earthquakes, and storms caused the largest number of deaths in the past 30 years, including more than 200,000 in Haiti in 2010, nearly 230,000 in the Indian Ocean earthquake and tsunami in 2004 and more than 130,000 in the storm in the Bay of Bengal in 1991.

Global direct economic losses and insurance losses from natural disasters showed an increasing trend from 1989 to 2019.

As the value of entities had been driven high by economic and social development over the past 30 years, direct economic losses from disasters (mainly earthquakes, storms and floods) showed a fluctuating upward trend.

Direct economic losses peaked in 2011, mainly as a result of the massive tsunami and Fukushima nuclear accident triggered by the massive 9.0 magnitude earthquake in Japan on 11 March, with losses totaling over US$210 billion (current year prices).

According to Swiss reinsurance companies, global natural disaster insurance losses from 1989 to 2019 were closely linked to direct economic losses due to disasters, showing a fluctuating upward trend. This similar trend of change became more apparent as the insurance industry increased in coverage and depth in recent years. The average global natural disaster insurance loss for the last 10 years (2009-2018) was $67 billion, and global insurance losses accounted for 0.09% of global GDP on average. Storms and earthquakes accounted for a high proportion of insurance losses. Hazards insurance losses reached its peak at $140 billion in 2017 (0.18 % of global GDP) during nearly 30 years. 2019 natural disasters cost $49.6 billion insurance losses, lower than the annual average for the last 10 years.

China improved its ranking both in the world and Asia in terms of comprehensive disaster prevention and mitigation capacity from 1989 to 2019.

Two indicators (deaths per million people and percentage of direct economic losses in GDP) were used to reflect comprehensive disaster prevention and mitigation capabilities of different countries and to indicate China's ranking in the world and Asia in this regard during three periods (1989-1998, 1999-2008 and 2009-2019). In terms of deaths per million people in ascending order, China ranked among top 63%, 78% and 49% globally and 43%, 70% and 39% in Asia during three different periods. In terms of the percentage of direct economic losses in GDP in ascending order, China ranked among top 89%, 80% and 72% globally and 85%, 71% and 63% in Asia during these three different periods.

[3] The source of data is China's natural disaster statistics provided by the Ministry of Emergency Management of National Disaster Reduction Center of China.

General report

Global natural disaster profile for 2019

01

1

Overview of global natural disasters in 2019

According to EM-DAT statistics, there were 290 major natural disasters of all types worldwide in 2019, of which 143 were caused by floods (48.97%), 61 caused by storms (typhoons, hurricanes, 21.03%), 30 caused by earthquakes (10.34%), 21 by landslides, 11 by extreme temperature events, 11 by droughts, 10 by bush fires, and 3 by volcanic eruptions (Table 1 and Figure 1a)

A total of 11,694 people died from the world's major natural disasters in 2019, of which 43.41% died from floods (5,076), 24.87% died from extreme temperature events (2,908), 21.54% died from storms (2,519), 6.15% from landslides (719), 2.21% from earthquakes (258), and less than 2% from other types of disasters.

The world's major natural disasters affected a total of 90.638 million people in 2019, of which 34.53% were affected by storms (31,294,200), 32.7% by floods (29,634,800), 31.16% by droughts (28,239,600), and less than 2% affected by other types of disasters.

Direct economic losses valued at $121.856 billion were reported worldwide in 2019, of which 47.53% were caused by storms ($57.914 billion), 29.52% were caused by floods ($35.972 billion), 21.28% caused by wildfires ($25.931 billion), 1.4% by earthquakes ($1.704 billion), and less than 1% were caused by other types of disasters.

[1]A wildfire is an uncontrolled fire in an area of combustible vegetation occurring in natural areas, which can be classified generally as a forest fire and a grass fire.

Table 1 Frequency of and losses for major natural disasters worldwide, 2019

Type of disaster	Frequency (time)/%	Deaths (person)/%	Population affected (tens of thousands)/%	Direct economic losses (billions of dollars)/%
Flood	143/49.31	5076/43.41	2963.48/32.70	35.972/29.52
Storm	61/21.03	2519/21.54	3129.42/34.53	57.914/47.53
Earthquake	30/10.34	258/2.21	107.70/1.19	1.704/1.40
Landslide	21/7.24	719/6.15	17.29/0.19	0.20/0.16
Extreme temperature	11/3.79	2908/24.87	15.69/0.17	0/0
Wildfire	10/3.45	116/0.99	1.38/0.02	25.931/21.28
Drought	11/3.79	77/0.66	2823.96/31.16	0.135/0.11
Volcanic eruption	3/1.03	21/0.18	4.88/0.05	0/0
Total	290/100	11694/100	9063.80/100	121.856/100

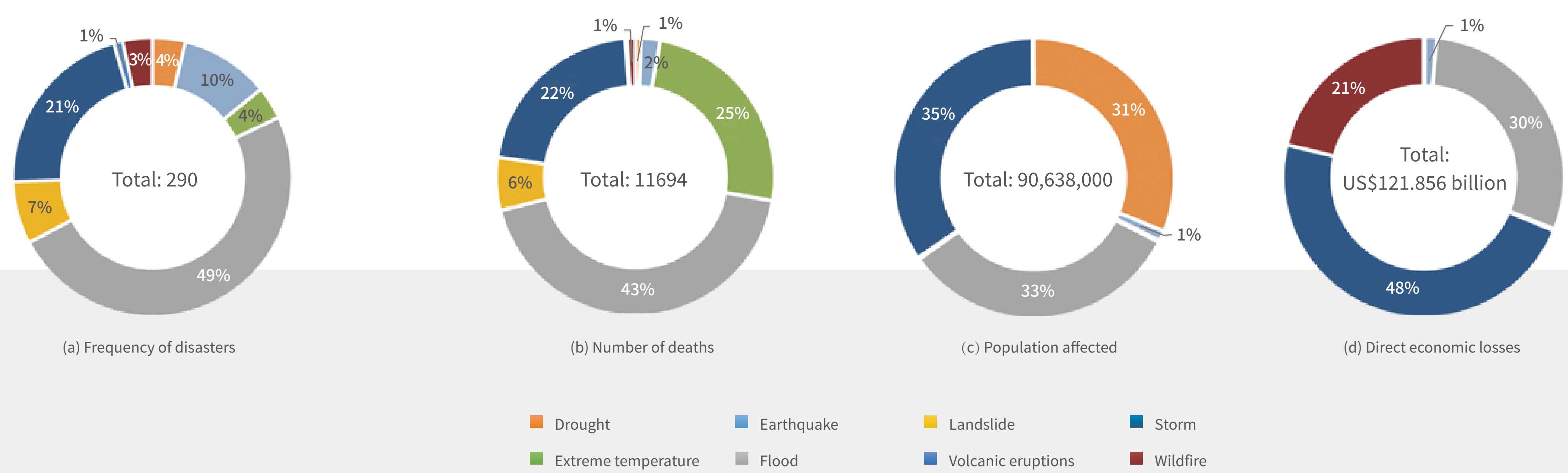


Figure 1 **Breakdown of frequency and losses per disaster type 2019**

2

Characteristics of global natural disasters in 2019

2.1

Global natural disasters were generally less severe in 2019.

In 2019, a total of 290 major natural disasters occurred globally, which killed 11,694, affected 90.638 million people, and caused direct economic losses valued at $121.856 billion. Compared to the average for the last 30 years (1989-2018), major natural disasters in 2019 were 10% less in frequency, 79% lower in deaths, 55% less in the affected and 7% smaller in direct economic losses. Compared to the average for the last 10 years (2009-2018), major natural disasters in 2019 were 14% less in frequency, 74% lower in deaths, 50% less in the affected and 28% smaller in direct economic losses (Figure 2).

Although 2019 witnessed several catastrophic natural disasters, they were generally less severe than those in the past 10 and 30 years, which is the main reason for the overall low level of natural disasters in 2019. In 2019, there was only one natural disaster that killed more than 1,000 people globally, which was lower than the annual average for the last 10 years (1.9 disasters) and for the last 30 years (3.4 disasters), and there was zero natural disaster that killed tens of thousands of people, while over 10 such disasters were recorded in the last 30 years. In 2019, there were four natural disasters with direct economic losses of more than $10 billion globally, which was higher than the annual average for the last 10 years (2.5 disasters) and for the last 30 years (1.7 disasters). However, there was zero disaster that caused direct economic losses valued at over $50 billion in 2019, while there were 8 in the past 30 years, of which 3 caused losses valued at over $100 billion.

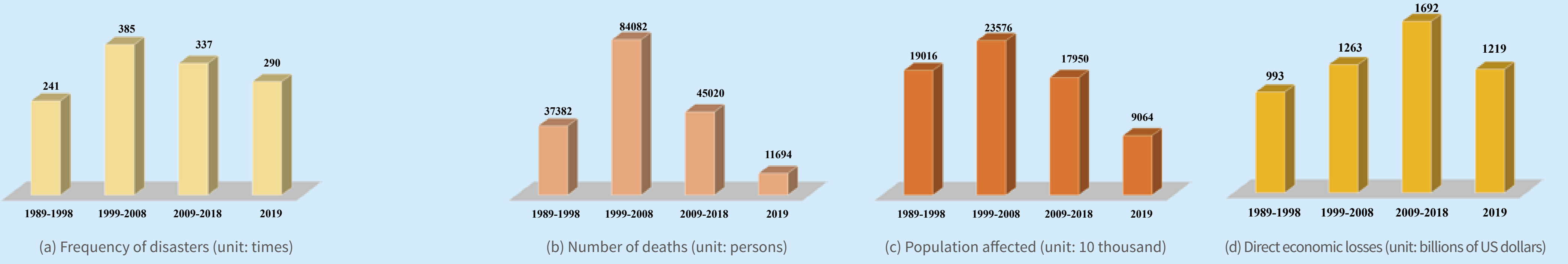


Figure 2 Average annual global natural disaster losses, 1989-2018 vs. 2019

(Note: Direct economic losses are at 2019 price levels)

2

2.2

The majority of global disasters in 2019 were caused by floods with smaller losses than the average for recent years.

In 2019, 143 major floods occurred, accounting for more than 45% of the total major disasters of the year, which killed 5,076 people (43.4%), and affected 29,634,800 (32.8%). Compared to the average for the last 30 years (1989-2018), floods in 2019 were 8% higher in frequency, 24% lower in deaths, 72% less in the affected and 14% higher in direct economic losses. Compared to the average for the last 10 years (2009-2018), floods in 2019 were about same level in frequency, 4% higher in deaths, 58% less in the affected and 9% less in direct economic losses (Figure 3). Although the number of global floods in 2019 that killed more than 1,000 deaths or caused direct economic losses of more than $10 billion was about the same as the annual average for the last 10 years and for the last 30 years, the number of floods in 2019 affecting over 10 million people was way much lower than the annual average for the last 30 years. Several Asian countries (India, Nepal, Bangladesh and Myanmar) have all suffered from severe flooding, with thousands of people died from monsoon flooding, while the United States suffered economic losses of more than $20 billion from flooding in 2019.

143 times
major floods in 2019

5076 deaths
caused by floods

2963.48 million
were affected by floods

8%
higher in the frequency of floods comparing to the average for the last 30 years

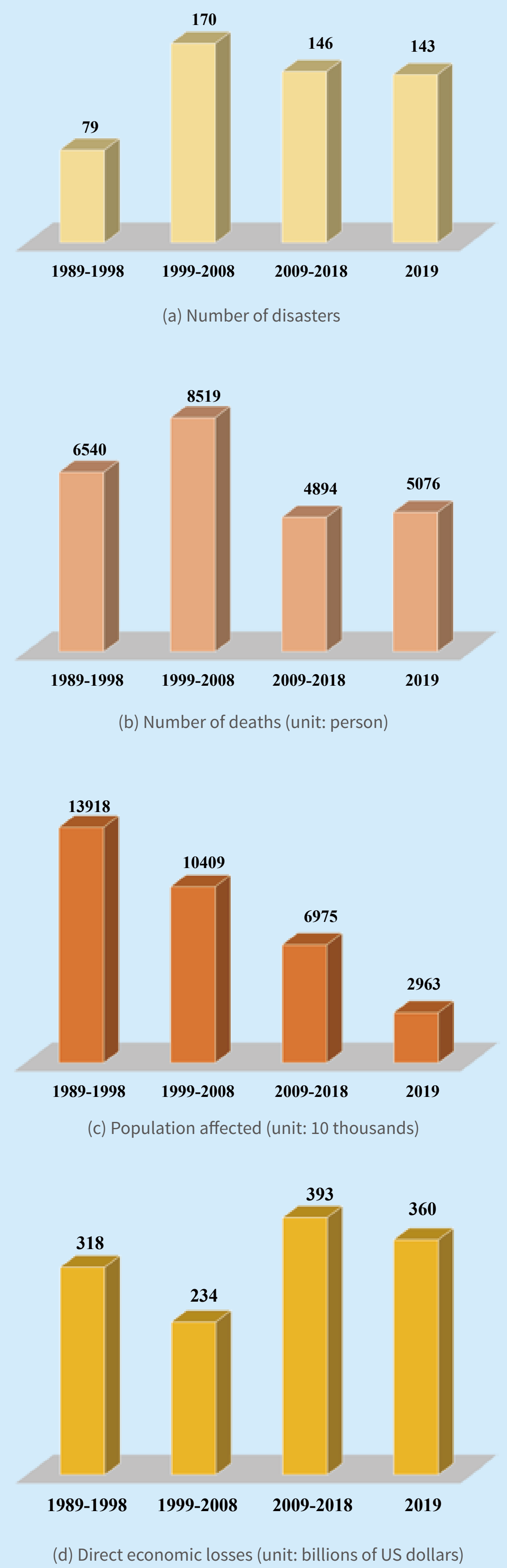


Figure 3 **Global average annual flood hazard losses, 1989-2018, versus 2019**

(Note: Direct economic losses are at 2019 price levels)

Floods in India 2019

In the year 2019, flood, among all whether-related disasters, hit India the most, with high frequency, wide impact, and heavy losses.

This is attributable to the fact that 2019 national precipitation in India was 109% of the annual average for the past few years. The monsoon season in India is from June to September every year, when thunder and lightning, rain storms, floods, and mudslides often occur.

Geographically, precipitation in the central and southern peninsulas of India in 2019 monsoon season was 129% and 116% of the annual average for the past few years respectively. Moreover, the total rainfall across India during the 2019 Northeast monsoon season (October-December) significantly exceeded the normal level, and was 129% of the multi-year average. In India, 2019 floods affected more than 300 regions and 47,950 villages, killed over 4,124 people, resulted in more than 100 people missing, and injured more than 1,610. A total of 46.6742 million people were affected, an estimated 5.082 million people were relocated in 18,156 shelters, 410,440 houses were destroyed completely and 141,320 were damaged partly, about 4.2573 million hectares of crops were damaged and livestock losses exceeded 45,082. Transport infrastructure, such as roads, bridges, railways, and electricity facilities suffered in many places.

Overall, the impact of 2019 floods on India was severe and far beyond that exerted by three floods recorded in EM-DAT (which killed a total of 1,757 and affected 23.83 million people).

Major extreme weather disasters in India in 2019

Extreme disaster type		Region	Time of occurrence	Number of deaths
Flooding and extreme precipitation		Bihar	July 11-October 2	306
		Maharashtra	July 2-September 26	136
		Uttar Pradesh	July 12-September 30	107
		Kerala	The second week of August	86
		Rajasthan	July 26-September 17	80
		Orissa	May 3 May 4	64
		Karnataka	August 11 October 19	43
		Himachal Pradesh	August 18	27
Lightning/ Thunderstorm	Thunderstorm	Jharkhand	March 14-October 19	125
		Bihar	May 3-July 31	71
		Rajasthan	June 23	14
	Lightning	Maharashtra	March 20-October 30	51
		Madhya Pradesh	February 14-July 31	24
Heat Wave		Bihar	June 15-18	292
		Maharashtra	April 2-June 9	44
		Jharkhand	April 12-16	13
Avalanche/ Cold Wave	Avalanche	Jammu and Kashmir	January 2-March 30 November 7-11	33
		Leh	January 18 November 18 November 30	18
	Cold Wave	Uttar Pradesh	The last week of December	28

(Source:
Meteorological data from the Indian Meteorological Department, https://mausam.imd.gov.in/backend/assets/press_release_pdf/ Statement_on_Climate_of_India_during_2019.pdf,
Data on losses from the Indian Disaster Management Authority, https://www.ndmindia.nic.in/situation-report-2019)

2

2.3

Direct economic losses from storms were significant, but 20% less than those in recent year

Global tropical cyclone activity in 2019 was above average, with 72 tropical cyclones in the Northern Hemisphere and 27 in the Southern Hemisphere[5]; 29 typhoons (maximum winds ≥8 near the center) were generated in the Northwest Pacific and South China Sea, 3.5 more than the multi- year average (25.5)[6]. On March 15, 2019, tropical cyclone Idai landed in Mozambique. It was one of the strongest cyclones known to make landfall on the east coast of Africa, which destroyed crops in nearly hundreds of thousands of hectares of farmland, and displaced more than 200,000 people in Malawi, Mozambique and Zimbabwe. On August 10, Super Typhoon Lekima landed on the coast of Chengnan Town, Wenling City, Zhejiang Province, China, with maximum winds of 16 magnitude (52m/s) near the center and local rainfall of over 600mm, making it the fifth strongest typhoon to make landfall in mainland China since 1949. One of the strongest tropical cyclones of 2019, Hurricane Dorian, landed in the Bahamas on September 1 with a Category 5 intensity, causing severe damage due to its unusually slow movement. On October 12, Super Typhoon Hagibis landed in western Tokyo, Japan, causing severe flooding.

In 2019, 61 major storm disasters occurred, accounting for more than 21% of the total major disasters, which killed 2,519 people, effected 31.29 million and caused direct economic losses valued at $57.9 billion (48%). Although these severe storms caused considerable losses, the overall damage from storm disasters in 2019 was still relatively light compared to the average in recent years.

Compared with the average for the last 30 years (1989-2018), storm disasters in 2019 were 36% less in frequency, 82% fewer in deaths, about the same in affected population, and 4% higher in direct economic losses. Compared with the average for the last 10 years (2009-2018), storm disasters in 2019 were 36% less in frequency, 10% fewer in deaths, 6% fewer in affected population,and 20% lower in direct economic losses(Figure 4)..

[5]Quoted from the Statement on the Global State of the Climate 2019 of the United Nations

[6]Quoted from China Climate Bulletin 2019, by the National Climate Center, China Meteorological Administration

Super Typhoon 14 Lekima

Overview

Super Typhoon Lekima landed on the coast of Chengnan Town, Wenling City, Zhejiang Province, China, at 1:45 on August 10, 2019, with maximum winds of 16 magnitude (52m/s) near the center at the time of landfall with local rainfall of more than 600mm,- making it the fifth strongest typhoon to land in mainland China since 1949, causing a total of 70 deaths (missing),14.02 million people affected, emergency relocation of 210 million people and direct economic losses of 51.53 billion yuan.

Characteristics

01 High landing wind speed

With the wind speed near its eye reaching 16 (52m/s) at the time of landfall, super typhoon Lekima was the strongest typhoon to land in China in 2019, the third strongest typhoon to land in Zhejiang since 1949 (after Typhoon Wanda in 1956 and Typhoon Saomai in 2006) and the fifth strongest typhoon to land in China since 1949.

02 Long lingering period

Lekima lingered over Chinese land for up to 44 hours at tropical storm level and above, the sixth longest lingering period since 1949.

03 Intense wind and rain

The rainfall brought by Lekima was the highest in Shandong and the second highest in Zhejiang in history. 361,000km² areas had over 100mm rainfall and 66,000km² areas had over 250mm rainfall brought by Lekima. 46 national stations had daily precipitation at or above the extreme thresholds, and the maximum daily precipitation at 19 national stations exceeded the historical extreme values. The wind speed was 12 to 15 level in the eastern coastal islands of Zhejiang and Qingdao, Shandong Province, and reached or exceeded 17 level in some areas.

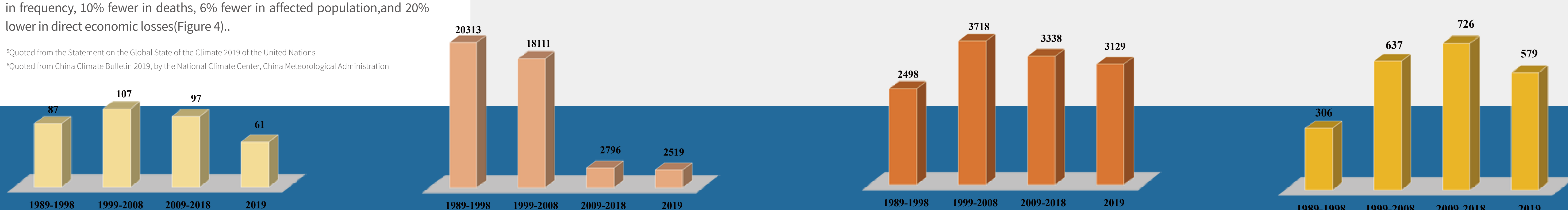
04 Wide impact

After landing in Zhejiang, Lekima went northward, affecting Zhejiang, Fujian, Jiangsu, Shanghai, Anhui, Shandong, Henan, Hebei, Tianjin, Liaoning, and Jilin, among others.

05 Heavy disaster impact

It caused landslides, floods, collapses and other secondary disasters; affected 14.024 million people from 403 counties (cities, districts) in 64 cities in 9 provinces (cities) including Zhejiang, Shandong, Jiangsu, Anhui, Liaoning, Shanghai, Fujian, Hebei and Jilin; killed 66; resulted in 4 people missing and 2.097 million people relocated emergently; destroyed 15,000 residential structures; damaged 133,000 residential structures; affected 1.137 million hectares of agricultural crops; destroyed and 935,000 hectares of agricultural crops; and caused direct economic losses valued at 51.53 billion yuan.

(Source: Ministry of Emergency Management, 2020)



(a) Frequency of disasters (unit: times)

(b) Number of deaths (unit: persons)

(c) Population affected (unit: 10 thousand)

(d) Direct economic losses (unit: billions of US dollars)

Figure 4 Global average annual losses from storm disasters, 1989-2018 vs. 2019

(Note: Direct economic losses are at 2019 price levels)

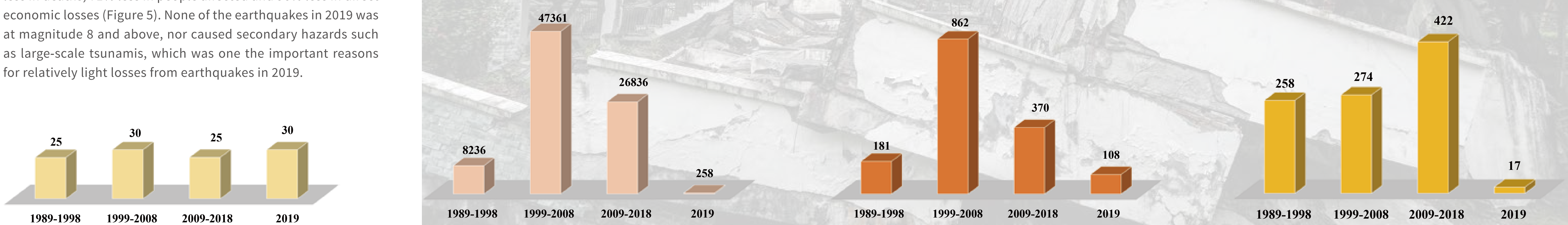
2

2.4

Weaker seismic activities and smaller seismic hazard losses

In 2019, there were 118 earthquakes of magnitude 6.0 and above, of which 9 were of magnitude 7.0 to 7.9, mainly in the Pacific Rim seismic belt. Major earthquakes above magnitude 7.0 occur with low frequency and intensity, with frequencies lower than the average since 1900, with a maximum magnitude of 7.8. The 6.3-magnitude earthquake in Albania on 26 November killed 51 people and was the deadliest of the year. Earthquakes of magnitude 6 and above continued to be active in Indonesia and the Philippines, causing varying degrees of casualties and economic losses, with a high concentration of earthquake hazards.

In 2019, there were 30 major earthquakes worldwide, representing about 10% of the total frequency of major disasters; the number of people killed and affected was less than 3% and the direct economic loss was less than 2%. Compared with the average for the last 30 years (1989-2018), earthquake hazards in 2019 were 12% higher in frequency, 99% less in deaths, 77 % less in people affected and 95 % less in direct economic losses. Compared with the average for the last 10 years (2009-2018), earthquake hazards in 2019 were 20% higher in frequency, 99% less in deaths, 71% less in people affected and 96% less in direct economic losses (Figure 5). None of the earthquakes in 2019 was at magnitude 8 and above, nor caused secondary hazards such as large-scale tsunamis, which was one the important reasons for relatively light losses from earthquakes in 2019.



(a) Frequency of disasters (unit: times)

(b) Number of deaths (unit: persons)

(c) Population affected (unit: 10 thousand)

(d) Direct economic losses (unit: billions of US dollars)

Figure 5 Average annual global earthquake hazard losses, 1989-2018 vs. 2019

(Note: Direct economic losses are at 2019 price levels)

2019 Global Earthquake Hazards Characteristics

A total of 118 earthquakes of magnitude 6.0 and above occurred globally in 2019, including 109 earthquakes of magnitude 6.0 to 6.9 and 9 earthquakes of magnitude 7.0 to 7.9. Major earthquakes above magnitude 7.0 had low intensity and were less frequent than the average (about 18.3 earthquakes per year) since 1900. The maximum magnitude recorded in 2019 was 7.8, while each year between 2004 and 2018 witnessed earthquake(s) of magnitude 8 and above. No earthquakes above magnitude 7 have occurred in and around mainland China since 2019 and the level of seismic activity was weak.

The 2019 earthquake hazards killed at least 286 people and injured more than 6,000 worldwide. Specifically, earthquakes of magnitude 6.0 and above killed 242 people (including missing), of which 15 in China, 227 in the rest of the world; and injured 4,336. Earthquakes below magnitude 6.0 killed 44 people, including 4 in China and 40 in other parts of the world. 6.3-magnitude earthquake that struck Albania on 26 November caused the largest number of deaths (51).

The number of deaths from secondary disasters, such as tsunamis, which did not result from the global earthquake this year, was lower than that of previous years. The Indonesian region and the Philippine region have been active with earthquakes of magnitude 6 and above, causing varying degrees of casualties and economic losses, with more concentrated disasters.

The 2019 Pacific Rim Seismic Zone remained the main area of activity for the 7.0-magnitude earthquake, with the largest earthquake being the 7.8 magnitude earthquake in northern Peru on May 26. The earthquake of magnitude 6.1 and above continued to be active in Indonesia and the Philippines, causing varying degrees of casualties and economic losses. Outside China, there were 28 earthquakes of magnitude of 6.0 and above that caused disasters, a number that was larger than that in 2018 (18 earthquakes).

In 2019, 32 earthquakes of magnitude 5.0 and above occurred in China, including 20 in the mainland and 12 in Taiwan and maritime areas. The largest earthquake was a 6.7 magnitude earthquake on April 18 in the waters of Hualien County, Taiwan. During the year, 13 seismic disasters occurred in mainland China, killing 17 people and injuring 411 others, resulting in direct economic losses of about 5.912 billion yuan. The most severe one was the 6.0 magnitude earthquake in Changning, Sichuan, which killed 13 people, injured 299 and caused direct economic losses of about 5.3 billion yuan.

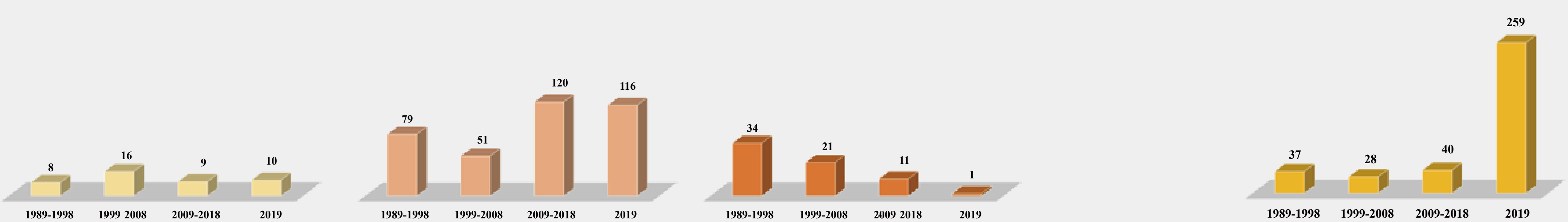
(Source: China Earthquake Administration, 2020)

2

2.5

The impact of bushfires was significant

There were 10 wildfire disasters in 2019 that caused significant losses. Although this number was about the same as the annual average for the past 30 years (11) and past 10 years (9), the proportion of major wildfires was larger, particularly bushfires in Australia, California of the United States and the Amazon rainforests. Compared to the average for the last 30 years, 2019 global forest fires were 39% higher in deaths and six times more in direct economic losses. Compared to the average for the past 10 years, 2019 global forest fires were slightly less in deaths and six times more in direct economic losses (Figure 6). The Australia's bush fires occurred between July 2019 and February 2020 resulted in 34 deaths and missing and killed 1 billion animals (as of February 15, 2020). In October 2019, bush fires in California caused $25 billion in direct economic losses, which made the total direct economic losses from bushfires in 2019 was higher than the annual average for the last 30 years and 10 years respectively.



(a) Frequency of disasters (unit: times) (b) Number of deaths (unit: persons) (c) Population affected (unit: 10 thousand) (d) Direct economic losses (unit: billions of US dollars)

Figure 6 Global average annual losses from wildfire hazards, 1989-2018 vs. 2019

(Note: Direct economic losses are at 2019 price levels; the Amazon rainforest fires and Australian forest fires are not included in the 2019 fire deaths, affected population and direct economic losses)

Australia's Bushfires

Characteristics

High Intensity	Australia's bushfires started to hit the southern part from September 2019. It's two most populous states, New South Wales and Queensland, suffered the most.
Long Duration	The bushfire began in July 2019, spread widely in September and was not extinguished until mid-February 2020.
Heavy Loss	By February 15, 2020, the bushfire had resulted in 34 deaths and missing persons, more than 3,000 homeless people, 1 billion animal deaths, more than 18 million hectares of land burned, $1.33 billion in insurance losses and an estimated $2.4 billion in direct economic losses.
Wide Impact	The smoke spread to Canberra, Sydney and New Zealand. The air quality index exceeded 2,000 in some areas of Sydney. Nearly 10,000 people in Victoria were forced to evacuate and over 600 schools in New South Wales were closed.

Main Causes

Climate anomalies lead to high temperatures, little rainfall and strong winds, increasing the risk of bushfire hazards

Australia has a hot and dry climate with a high incidence of bush fires from late spring to early autumn. Compared to the same period on record, 2019 experienced low precipitation across much of Australia in September-November (with some sites experiencing the lowest September precipitation on record) and high temperatures (with October being the hottest October on record); in September, many parts of New South Wales and southeast Queensland recorded maximum wind speeds of over 22m/s. In the context of global warming, 2019 was one of the driest years on record.

Eucalyptus ecosystems provide natural fuel for fire

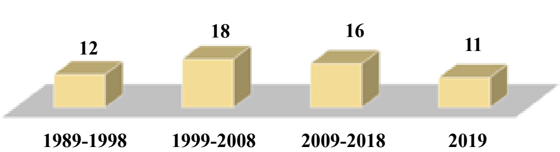
90% of the dense forests on the eastern coast of Australia are eucalyptus trees. Fallen eucalyptus bark, which is rich in eucalyptus oil, create dense carpets of flammable material and can spontaneously ignite at a temperature of 40°C. It can turn a small fire into a terrifying firestorm in a matter of minutes, providing favorable conditions for a fire to occur.

(Source:
Disaster Charity Center. https://disasterphilanthropy.org/disaster/2019-australian-wildfires/)

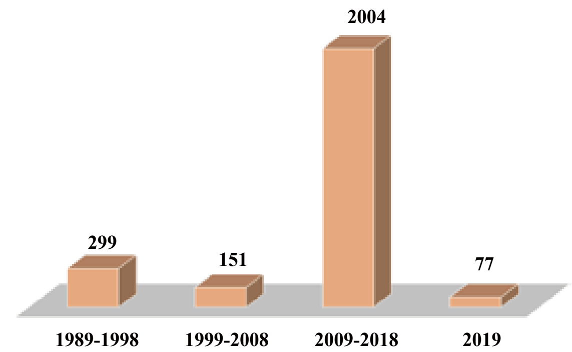
2.6

Drought affected a large population with moderate losses

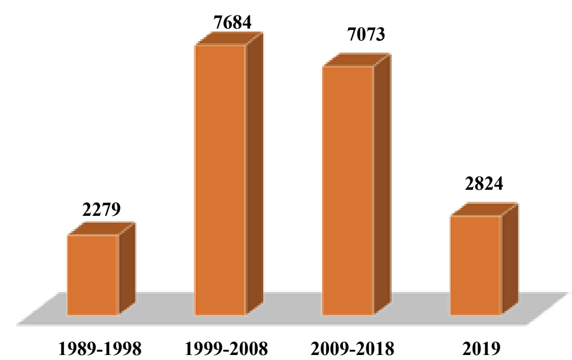
A total of 11 drought-related disasters occurred in 2019, affecting 28.2396 million people (31.16% of the annual total). Compared to the average of the last 30 years (1989-2018), 2019 drought disasters were 28% less in frequency, 91% less in deaths, 50% less in people affected and 98% less in direct economic losses. Compared to the average for the past 10 years (2009-2018), 2019 drought disasters were 32% lower in frequency, 96% fewer in deaths, 60% fewer in people affected and 99% fewer in direct economic losses. The population affected by 2019 drought disasters slightly exceed that in 1989-1998, and the frequency of disasters, deaths and direct economic losses were below the 10-year averages for 1989-1998, 1999-2008 and 2009-2018 (figure 7).



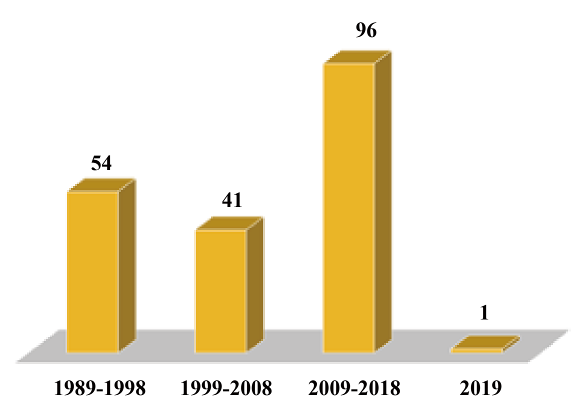
(a) Frequency of disasters (unit: times)



(b) Number of deaths (unit: persons)



(c) Population affected (unit: 10 thousand)



(d) Direct economic losses (unit: billions of US dollars)

Figure 7 Global annual average losses from drought disasters, 1989-2018 versus 2019

(Note: Direct economic losses are at 2019 price levels)

2019 China Meteorological Disaster Characteristics

In 2019, China experienced high temperatures and high precipitation. Meteorological hazards such as typhoons, flash floods, droughts, strong convection, low temperature, freezing and snow disasters, dust storms, etc. were mild. Compared to the average for the last 10 years, the area of crops affected, the number of deaths and missing persons and direct economic losses in 2019 were significantly lower.

In 2019, the national average temperature was 0.79°C higher than normal, making it the 5th warmest year since 1951; temperatures were higher in all four seasons, with significant warming in spring and autumn. The national average precipitation was 645.5mm, 2.5% more than normal; winter, spring and summer precipitation was more than normal and autumn precipitation was less. Annual precipitation was higher in the Northeast, Northwest and South China, lower in North China and the middle and lower reaches of Yangtze River, and slightly lower in the Southwest. Precipitation was higher in the Song Hua River, Yellow River, Liao River and Pearl River basins, lower in the Huaihe River and Haihe River basins, and near perennial in the Yangtze River basin.

In 2019, the South China pre-flood season started early and ended late, with the longest preflood season since 1961 and the second most rainy year since 1961. The southwestern rainy season started and ended late with little rain. The middle and lower reaches of the Yangtze River were late in plum rain season and early out of plum rain, with little rain. The rainy season in North China started late and ended in line with the regular year, with little rain. The Northeast rainy season and autumn rains in West China started early and ended late with heavy rainfall.

In 2019, 29 typhoons were generated in the Northwest Pacific and South China Sea, more than usual (25.5 on average) and 5 landfalls in mainland China (7.2 on average), with overall weak landfall strength. However, typhon Lekima inflicted heavy losses. Although there were a great deal of torrential rain this year, the losses inflicted by flash floods were generally light. Certain regions had a number of high temperature days. Regional and episodic droughts were evident, but disaster losses were light; strong convective weather processes were few and losses were light. Low-temperature freezing and snow damage were significantly lighter. Less dusty weather in the north in the spring, with a lighter impact.

(Source: China Climate Bulletin 2019, National Climate Center, China Meteorological Administration)

3

Patterns of 2019 Global Natural Disaster

3.1

Flood hazards were widely distributed, with earthquakes, storms, droughts and other disaste

Most of 2019 world's major natural disasters were caused by floods (a total of 143), mainly in Asia, the Americas and Africa; followed by storms, with 61, mainly along the Atlantic and Pacific coasts. 30 disasters were caused by major earthquakes, mainly in South-East Asia and western South America; 21 were caused by landslides, mainly in southern Asia, central Africa and north-western South America; 11 by droughts, mainly in southern Africa and South-East Asia; 3 by volcanoes, 2 in South America and 1 in South-East Asia; 11 by extreme temperature events, mainly in Europe and South Asia; and 10 by forest fires, mainly in South America and Oceania (figure 8).

143
Flood disasters

61
Storm disasters

30
Earthquakes

21
Landslide disasters

11
Drought disasters

3
Volcanic disasters

11
Extreme temperature disasters

10
Wildfire disasters

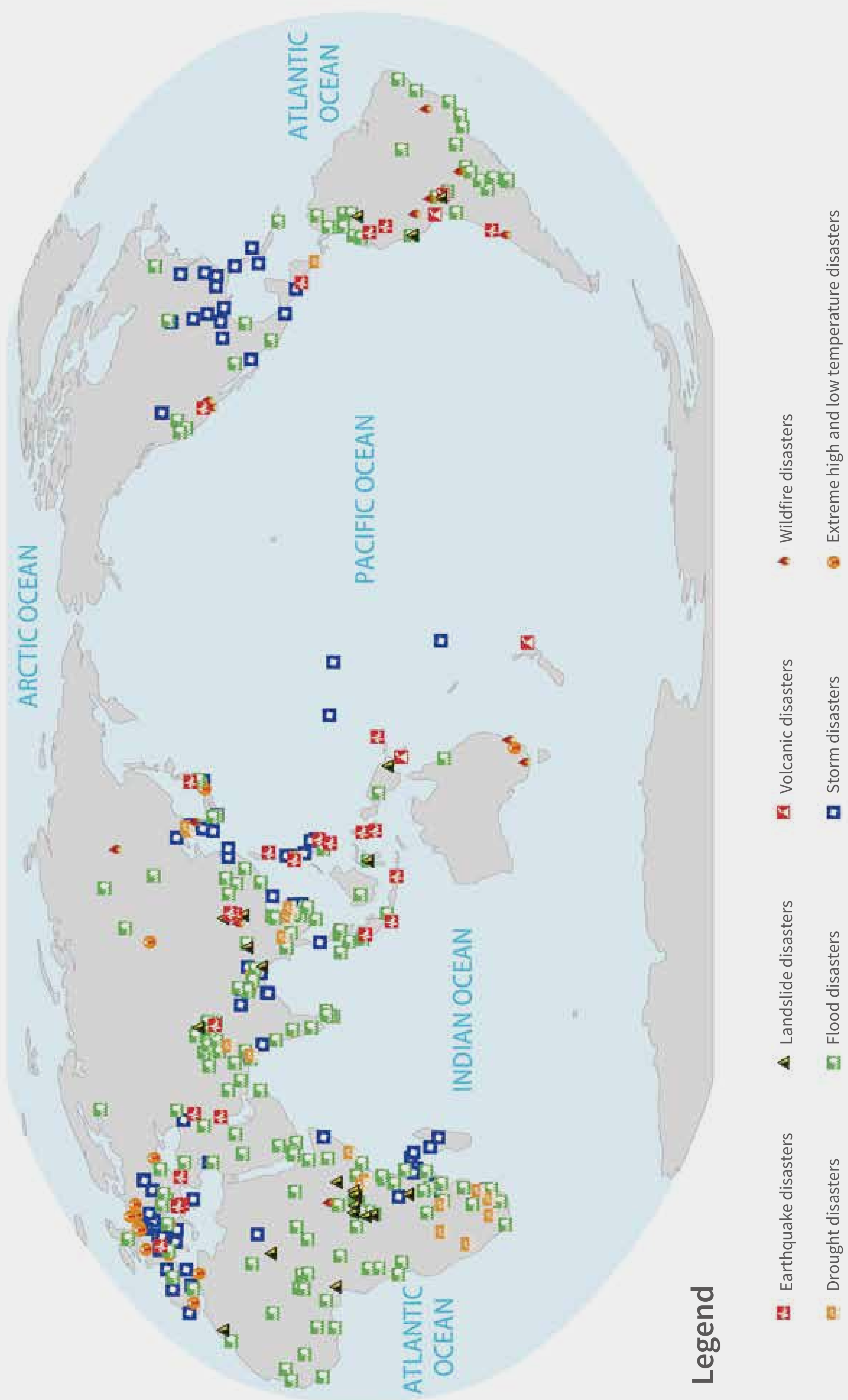


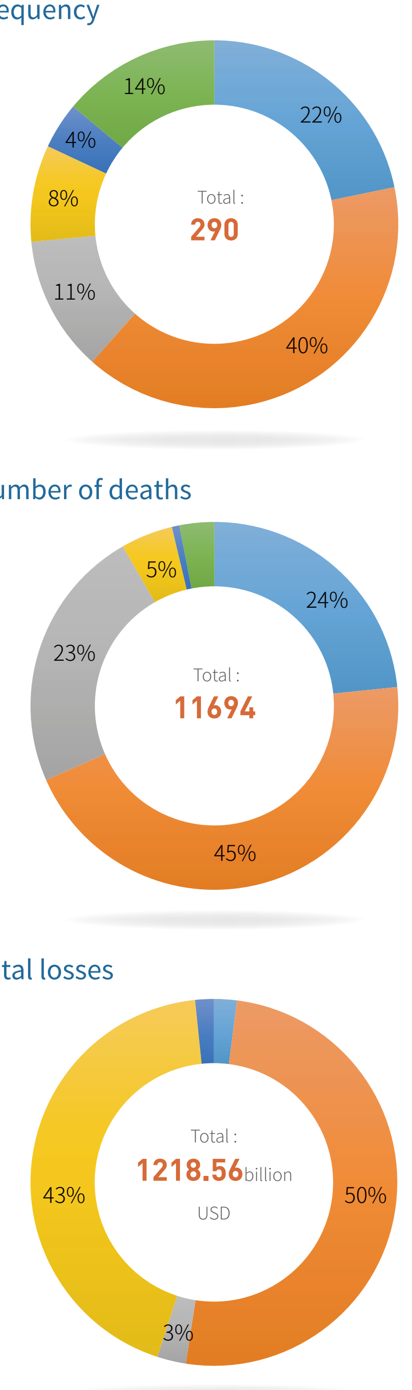
Figure 8 Global spatial pattern of natural disasters, 2019

3

3.2

Asia suffered the most from natural disasters and losses

116 of these 290 major natural disasters recorded occurred in Asia, accounting for 40%, followed by Africa, South America and Europe with 64 (22%), 41 (14%) and 32 (11%), respectively, and Oceania had the lowest number with only 12 (figure 9). In terms of the number of people killed by disasters, Asia had the largest number, 5,241, or 44.99% of the global total, compared to 2,748 (23.59%) in Africa and 2,732 (23.45%) in Europe. There were 14 disasters that killed more than 100 people, including 9 in Asia, 3 in Europe and 1 each in Africa and North America. The highest number of deaths was caused by a flood in India, which killed 1,900 people. In terms of direct economic losses, Asia had the largest number, at $61.475 billion, accounting for 50% of all direct economic losses due to disasters worldwide. In North America, Europe and Africa, the losses were $52.85 billion (43.4%), $3.084 billion (2.5%) and $2.447 billion (2%) respectively. A total of 35 of these disasters caused direct economic losses exceeding $100 million, including 14 in Asia and 13 in North America.



Africa | Asia | Europe
North America | Oceania | South America

Figure 9 **Statistics on the frequency of natural disasters, population deaths and direct economic losses by continent, 2019**

3.3

Developing countries account for a large share of the losses, with developed countries such as the United States and Japan showing significant losses

While developing countries accounted for a large share of the losses, developed countries such as the United States and Japan sustained significant losses. Figures 10, 11 and 12 showed the spatial distribution of the frequency of disasters[7], the number of fatalities and direct economic losses for each country or area in 2019, respectively. Table 2 listed top 10 countries in terms of frequency of disasters, deaths and mortality rates, direct economic losses and loss rates. In terms of the frequency of disasters, the United States had the highest number at 19, followed by China at 16. In terms of disaster deaths, the top 10 countries all had more than 300 deaths, with India having the highest number at 2307, followed by France at 1448 and China at sixth at 577. The percentage of the population that died in the previous year's total population was less than 0.1% in all countries and areas, with most of the top 10 countries in Africa, Europe and South America, with the Bahamas having the highest mortality rate at 0.09%. In terms of direct economic losses, the United States had the most, at $44.775 billion; Japan was second, at $26.21 billion; China was third, at $18.331 billion; and India was fourth, at $11.81 billion. In terms of the percentage of direct economic losses in GDP of the previous year, Mozambique registered 15.15%, only after the Bahamas at 56.34%; other countries were below 1%.

[7] The frequency of disasters in this section is measured on a national or regional basis.

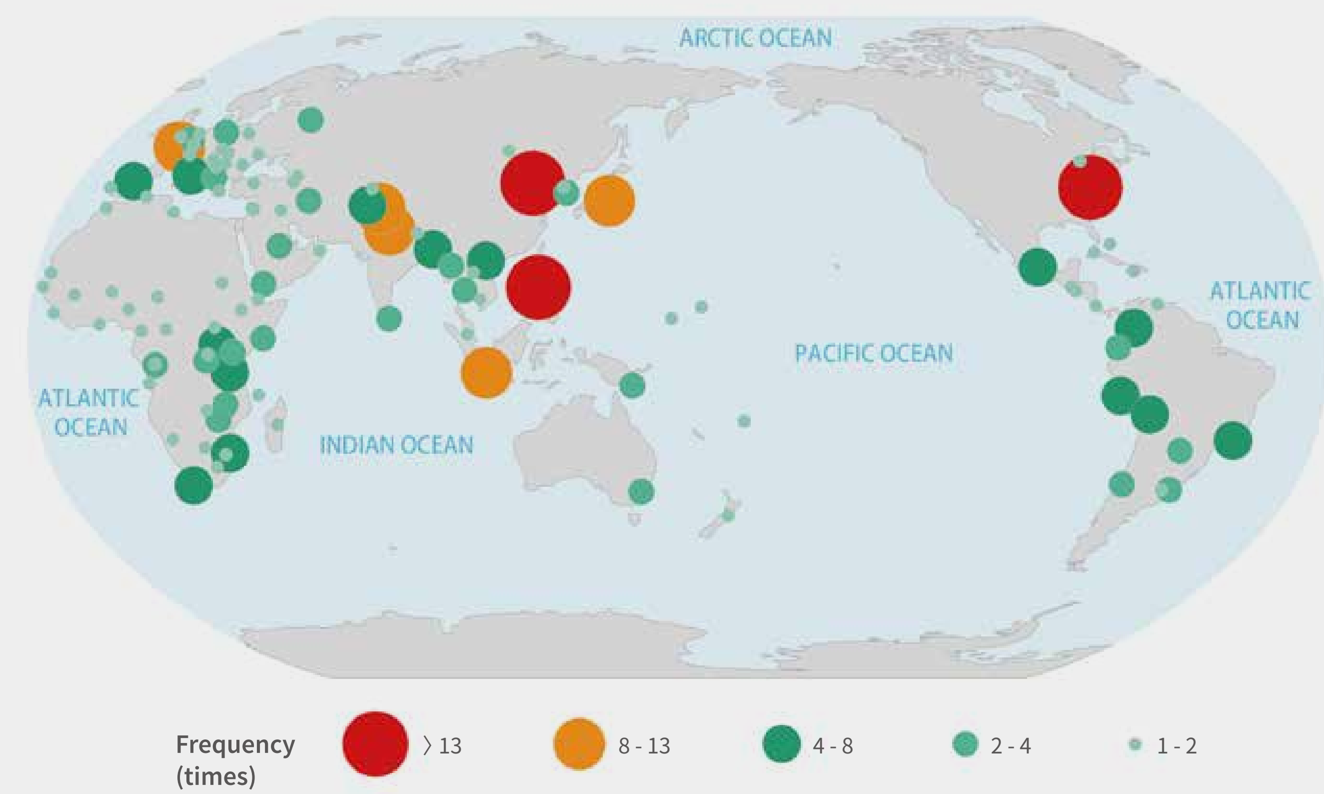
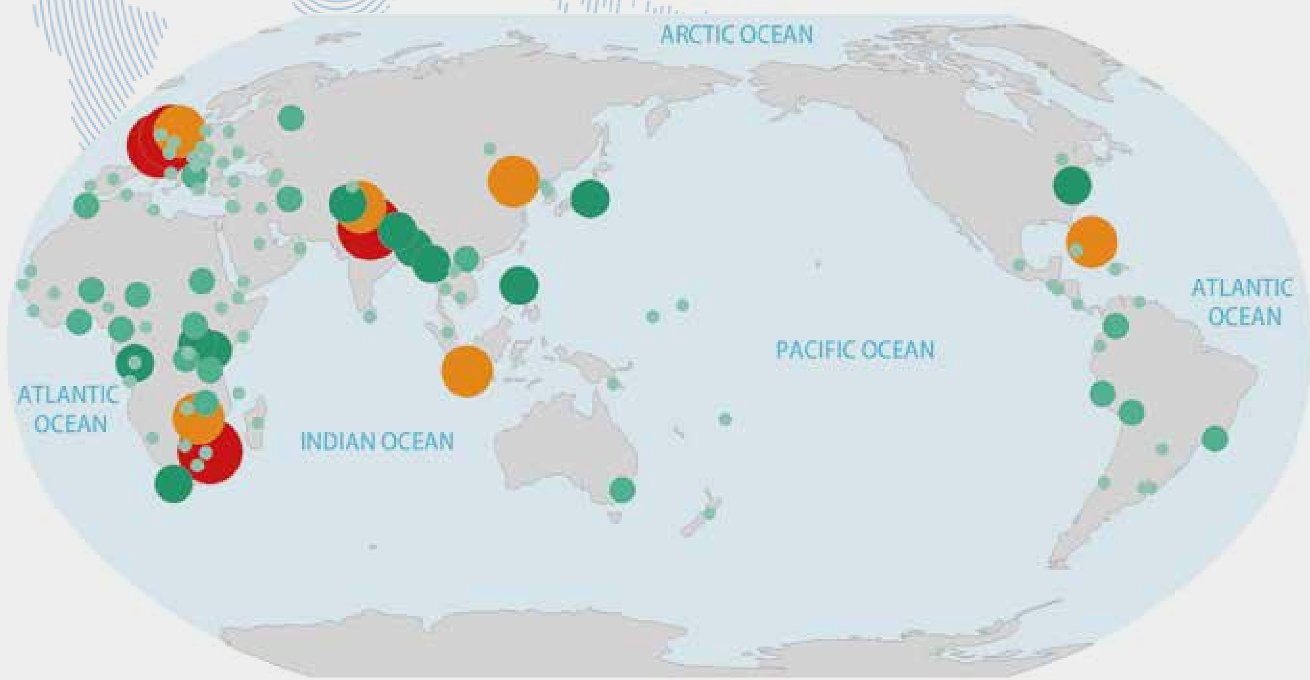
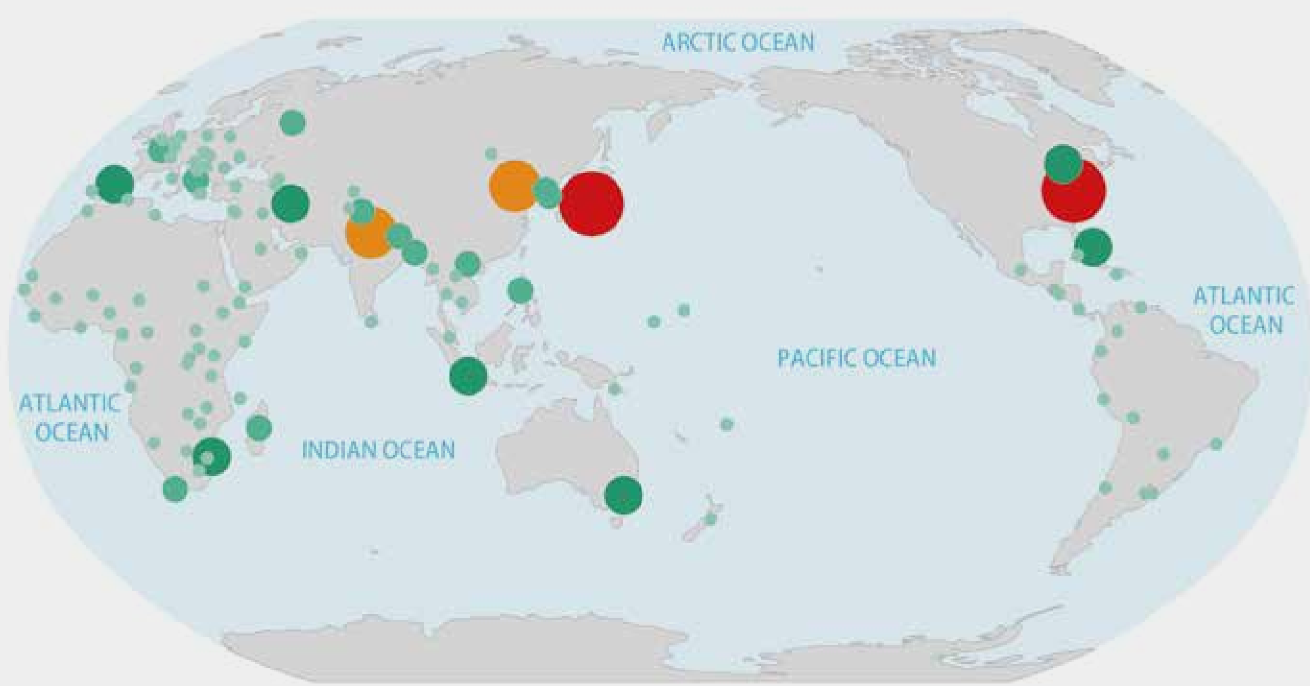


Figure 10 **Spatial distribution of the frequency of natural disasters by country/region, globally, in 2019**



number of deaths (person) 〉700 300 - 700 100 - 300 30 - 100 0 - 30

Figure 11 Spatial distribution of the death toll by natural disasters, by country/region, globally, 2019



Direct economic losses (billions of US dollars) 〉20 10 - 20 1 - 10 0.01 - 1 0 - 0.01

Figure12 Spatial distribution of direct economic losses from natural disasters by country/region, globally, 2019

Table 2 (a) Top 10 countries (or regions) in terms of frequency and losses due to natural disasters globally, 2019

Country	Frequency	Country	Number of deaths	Country	Direct economic losses (US$ billion)
United States	19	India	2,307	United States	44.78
China	16	France	1,448	Japan	26.21
Philippines	15	Belgium	716	China	18.33
Indonesia	13	Mozambique	704	India	11.81
India	11	Zimbabwe	654	Bahamas	7.00
Pakistan	11	China	577	Iran	2.67
Japan	10	Indonesia	444	Spain	2.50
France	9	The Netherlands	400	Mozambique	2.23
Brazil	8	Bahamas	370	Australia	2.00
Afghanistan, Uganda, Vietnam	7	Pakistan	362	Indonesia	1.30

Table 2 (b) Top 10 countries (or regions) in the global natural disaster losses rate, 2019

Country	Share of deaths (per million)	Country	Percentage of direct economic losses (%)
Bahamas	959.44	Bahamas	56.34
Belgium	62.69	Mozambique	15.15
Zimbabwe	45.29	Nepal	0.70
Mozambique	23.87	Japan	0.53
The Netherlands	23.21	India	0.43
France	21.62	Albania	0.30
Albania	17.79	United States	0.22
Comoros	9.61	Madagascar	0.18
Djibouti	9.39	Spain	0.18
Bolivia	7.31	Australia	0.14

Note: The mortality rate in Table 2(b) refers to the number of deaths in 2019 as a percentage of the total population in 2018 and the direct economic losses rate refers to the total direct economic losses in 2019 as a percentage of GDP in 2018. 2018 population and GDP (in current dollars) data are from the World Bank. (https://data.world- bank.org /)

3

Top 10 global natural disasters in terms of deaths and direct economic losses in 2019

Table 3 (a) Top 10 natural disasters in the global death toll in 2019

Rank	Time	Country	Disaster type	Number of deaths (persons)	Deaths as a percentage of population in 2018 (per million)
1	July 14-September 30	India	Floods	1900	1.40
2	July 21-July 27	France	Extreme heat	868	12.96
3	March 14-March 14	Zimbabwe	Storms	628	43.49
4	March 14-March 15	Mozambique	Storms	603	20.44
5	June 24-July 07	France	Extreme heat	567	8.46
6	July 19-July 27	Belgium	Extreme heat	400	35.03
7	July 22-July 27	The Netherlands	Extreme heat	400	23.22
8	September 01-September 04	Bahamas	Storms	370	948.72
9	June 13-July 01	China	Floods	300	0.22
10	March 16-March 18	Indonesia	Floods	206	0.77

Table 3 (b) Top 10 natural disasters in global direct economic losses in 2019

Rank	Time	Country	Disaster type	Direct economic losses (US$ billion)
1	October 10-October 17	United States	Wildfire	250.00
2	October 12-October 17	Japan	Storms	170.00
3	July 14-September 30	India	Floods	100.00
4	August 10-August 12	China	Typhoon Lekima	100.00
5	March 12-March 28	United States	Floods	100.00
6	October 08-October 08	Japan	Storms	91.00
7	September 01-September 04	Bahamas	Storms	70.00
8	June 13-July 01	China	Floods	62.00
9	September 18-September 24	United States	Storms	35.00
10	October 20-October 21	United States	Storms	26.00

4

China's global position on natural disasters in 2019

According to China's statistics, a total of 130 million people were affected by natural disasters of all types in 2019, with 909 people killed and missing and direct economic losses of 327.1 billion yuan. Floods and geological disasters were accountable for more than 59% of all deaths and direct economic losses. In China, the losses caused by 2019 natural disasters were less serious than the average for the last 5 years, as the losses in 2019 were 25%, 57% and 24% lower in terms of the number of deaths and missing, the number of destroyed houses and direct economic losses respectively. The number of people affected by disasters per 100,000 people, the mortality rate per 100,000 people, and the proportion of direct economic losses to GDP were all the second lowest in the last 20 years, with almost all provinces experiencing decreases of varying degrees from the 2000-2018 average.

According to EM-DAT statistics, in 2019, China ranked No. 2, No. 6 and No. 3 globally in terms of the frequency of disasters, the number of people killed by disasters and direct economic losses. Globally, China remains a worst-hit country.

1.3 million people
were affected by various natural disasters in 2019

909 people
dead or missing

3271 billion
direct economic losses

In 2019, temperatures in China were relatively high, with the national average temperature 0.30°C higher than the 2000-2019 average, making it the fifth warmest year since 1951[8]. The national average precipitation was higher than regular, with most of the north receiving more precipitation and the south receiving near average or less. Five typhoons landed in China, 2.2 fewer than in the normal year (7.2). A total of 615 rivers in the Yangtze River, Yellow River, Huai River, Pearl River, Songhua River and Taihu Lake basin were beyond the alert line and 119 rivers were beyond the protection line, which was the most since 1998. Typhoons, torrential floods, droughts, strong convection, low temperatures and freezing hazard and snowstorms, dust storms and other disasters occurred in some areas. A total of 32 earthquakes of magnitude 5.0 or higher occurred throughout the year, including 20 in the mainland and 12 in Taiwan and maritime areas, on the same level as the historical average. There were 26 earthquakes of magnitude 5.0-5.9 and 4 earthquakes of magnitude 6.0-6.9, with the largest one in the Hualien County waters of Taiwan on April 18 at magnitude 6.7. On July 23, a mega landslide disaster occurred in Shuicheng, Guizhou, causing 52 people dead and missing; on March 15, a mega landslide disaster occurred in Xiangning, Shanxi, killing 20.

[8]The meteorological data for this section are all from the China Climate Bulletin 2019, National Climate Center, China Meteorological Administration.

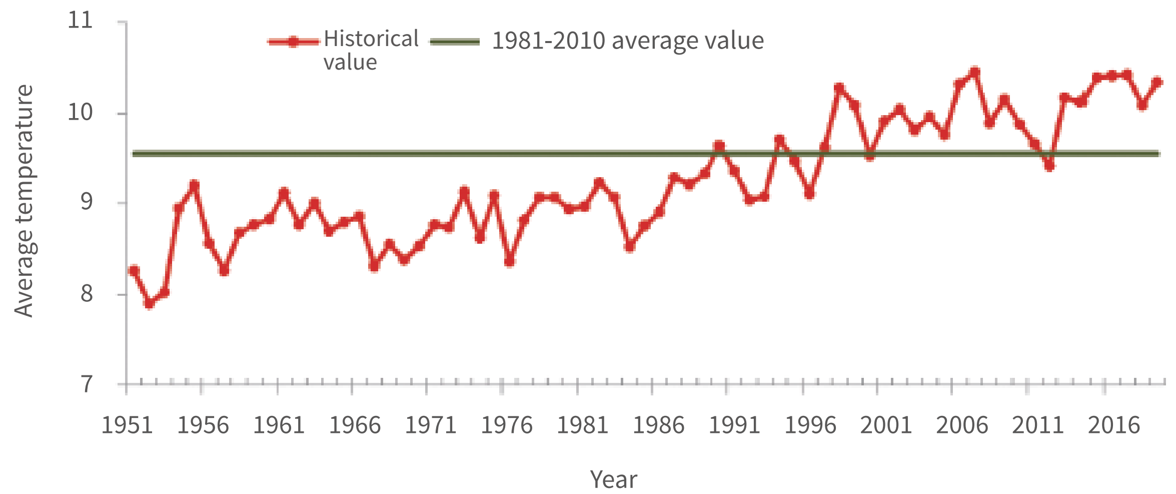


Figure 13 **Annual changes in average temperature in China, 1951-2019 (in °C)**

(Image credit: China Climate Bulletin 2019, National Climate Center, China Meteorological Administration)

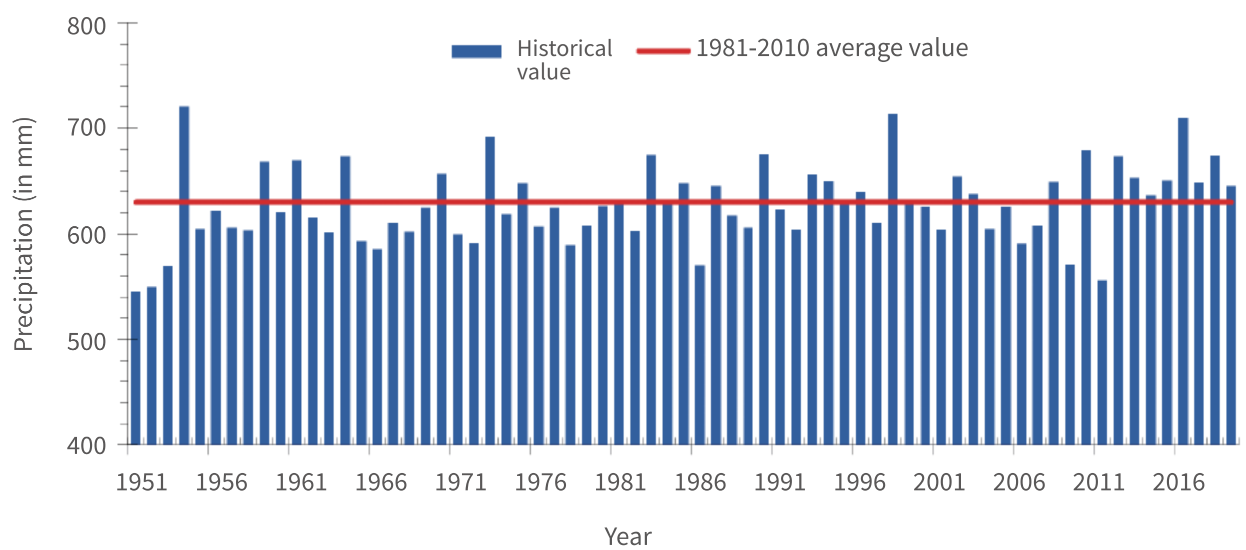


Figure 14 **Annual changes in average precipitation in China, 1951 - 2019 (in mm)**

(Image credit: China Climate Bulletin 2019, National Climate Center, China Meteorological Administration)

Comparison of natural disasters between China and the world in 2019

In 2019, the number of disaster-related deaths per million population in China was 0.41. Of the 99 countries and territories included in the statistics, 67 countries and territories, or 67.68% of the total, had a higher number of deaths per million population than China. Of the 99 countries and territories included in the statistics, China ranked in the top 31.31%. Countries on the same level as China include Russia, Chile, South Korea, etc. (Figure 15).

In terms of the number of deaths per million population in relation to the level of economic development, China ranked in the upper middle of the global range in terms of both number of deaths per million population and economic development in 2019. In terms of countries with per capita GDP comparable to China's, Mexico (0.12), Malaysia (0.06) were all lower than China, Russia (0.41) was roughly comparable to China, and Turkey (0.60) had a higher number of deaths per million population. In comparison with countries on the same level of economic aggregation as China, the United Kingdom (0.09), Germany (0.06) were lower than China, the United States (0.45), Japan (2.28) were slightly higher than China, while France, with more than 1,400 deaths due to extreme heat, had a death toll of 21.61 per million population.

Figure 15 **Comparison of natural disaster deaths between China and the rest of the world in 2019**

Note:

1. 29.29% of the 99 countries/regions ranked in 2019 had higher GDP per capita than China and 31.31% had lower per million deaths than China;

2. The number of deaths per million population were obtained by dividing the number of disaster-related deaths for each country/region in 2019 by the total population of that country/region in 2018; GDP per capita was obtained by dividing the GDP for each country/region in 2018 by the total population;

3. Data on population and GDP (current USD in 2018) are from the World Bank. (https://data.worldbank.org/)

Thematic Report (I)

Global Natural Disaster Assessment, 1989-2019

01. Characteristics of global natural disasters, 1989-2019

02. Comparison of natural disasters between China and the rest of the world, 1989-2019

The United Nations had been coordinating and leading international disaster reduction work for 30 years from 1989 to 2019. With the convening of three world conferences on disaster reduction and the launch of the Yokohama Strategy and Plan of Action, the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters and the Sendai Framework for Disaster Risk Reduction 2015-2030, the three international framework documents for disaster reduction (appendix 1), the global cause of disaster reduction continues to move forward. At the same time, China is making significant efforts in disaster reduction.

02

1

Characteristics of global natural disasters, 1989-2019

According to the EM-DAT database[1] analysis, the characteristics of the world's major natural disasters in 1989-2019 are as follows:

1.1

The number of annual natural disasters tends to increase before decrease, with floods and storms occurring most frequently

Since 1989, there have been a cumulative total of 9,921 major natural disasters worldwide, an average of about 320 per year. Overall, the frequency of natural disasters increased from 172 in 1989 to 432 in 2005, before decreased with fluctuations (Figure 1-1).

To be specific, in terms of the number of world's major natural disasters per disaster type from 1989 to 2019 (figure 1-2), over 60% of annual major natural disasters were caused by floods and storms (up to 78% in 2007 and 2008); and 9% were caused by earthquakes. The frequency of geological hazards, extreme temperature events, volcanic hazards and wildfire hazards, including forest and grassland fires, showed a growing trend in recent years. On average, geological hazards, extreme temperature events, drought hazards, volcanic hazards and wildfire hazards together accounted for about 20 % of all disasters. The frequency of extreme temperature events in recent years increased significantly, peaking at 51 times in 2012, accounting for nearly 15% in the year. The frequency of geological disasters peaked at 32 times in 2010, accounting for 8% of the total frequency in the year; wildfire disasters were the most frequent in 2000, reaching 30 times, accounting for 7% in the year; the frequency of drought disasters decreased in recent years, but it reached 28 times in 2015, accounting for 7% in the year; overally, volcanic disasters were the least frequent, reaching 12 times in 2006, accounting for 3% in the year.

[1]Unless otherwise specified, global natural disaster losses data covered in this report are from the EM-DAT database.

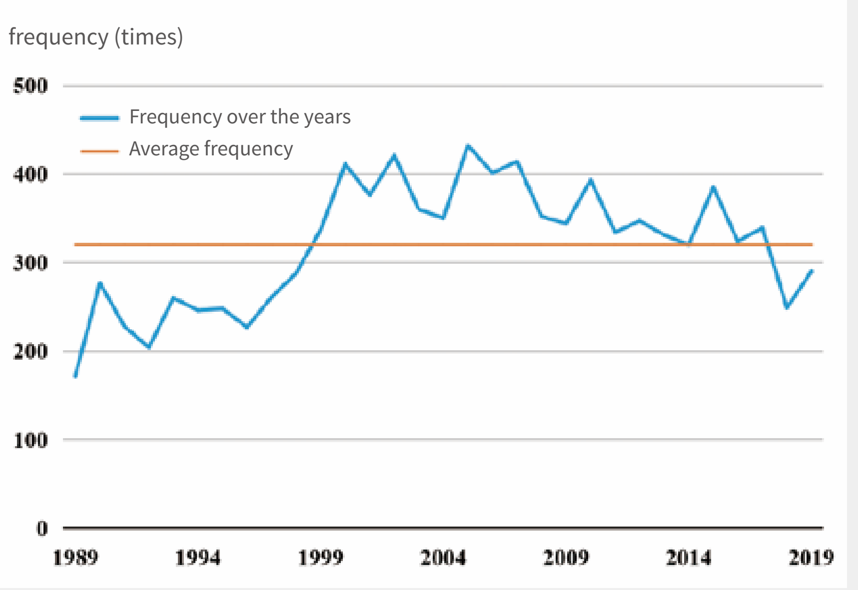


Figure 1-1 Line chart of global natural disaster occurrence frequencies, 1989-2019

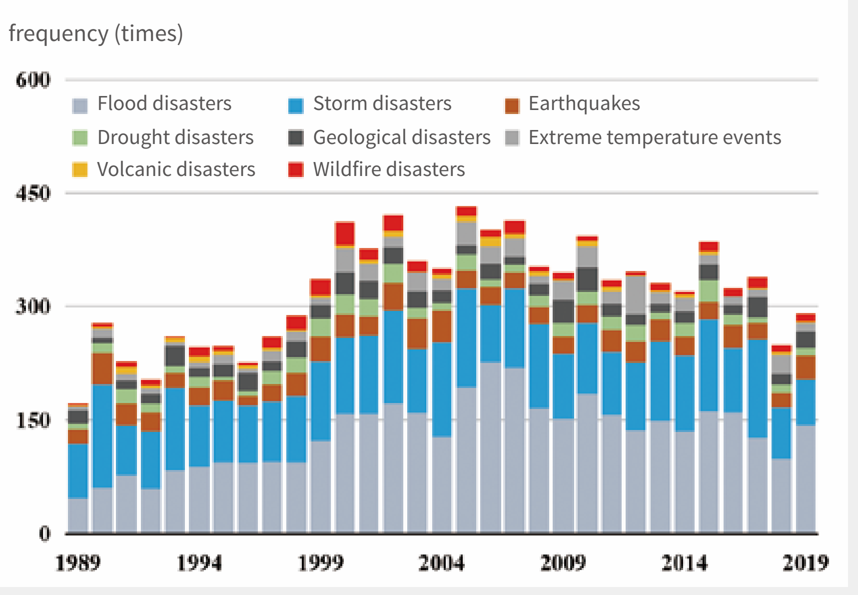


Figure 1-2 Histogram of the global frequency of various natural disasters, 1989-2019

1

1.2

The population killed by natural disasters (mostly earthquakes and storms) varied greatly from year to year, with a downward trend after 2010.

Since 1989, 1,676,532 people have died as a result of the world's major natural disasters, an average of 54,082 people per year. Overall, there was greater inter-annual variability in the number of deaths from natural disasters worldwide. Of these, the highest number was in 2010, at 320,000, followed by 240,000 in 2004. Since 2010, the number of people killed by natural disasters globally has averaged 45,075 per year, showing a fluctuating downward trend (figures 1-3).

In terms of the number of deaths(including missing) per disaster type 1989-2019, earthquakes were accountable for 824,589 deaths, accounting for 49%; followed by storms and floods, with 414,723 and 204,592 deaths, respectively, accounting for 25% and 12% of the total. The number of deaths from extreme temperature events was 175,454, or about 10%. Among them, the Indian Ocean earthquake and tsunami on 26 December 2004 caused 238,000 deaths and missing in Indonesia (see Figure 1-5 for a comparison of before and after the Indian Ocean tsunami); the 7.0 magnitude earthquake in Haiti at 05:53 (Beijing time) on 13 January 2010 killed 222,500 people; the Wenchuan earthquake in China on 12 May 2008 caused nearly 90,000 deaths and missing; tropical storm Nargis killed more than 130,000 people in 2008; the Bay of Bengal storm killed more than 130,000 people in 1991; high temperatures in Europe killed more than 70,000 people in 2003; and the floods in Venezuela on 15 December 1999 killed more than 30,000 people. Relatively fewer deaths were caused by droughts, geological disasters and volcanic activities.

Figure 1-3 Global natural disaster deaths, 1989-2019

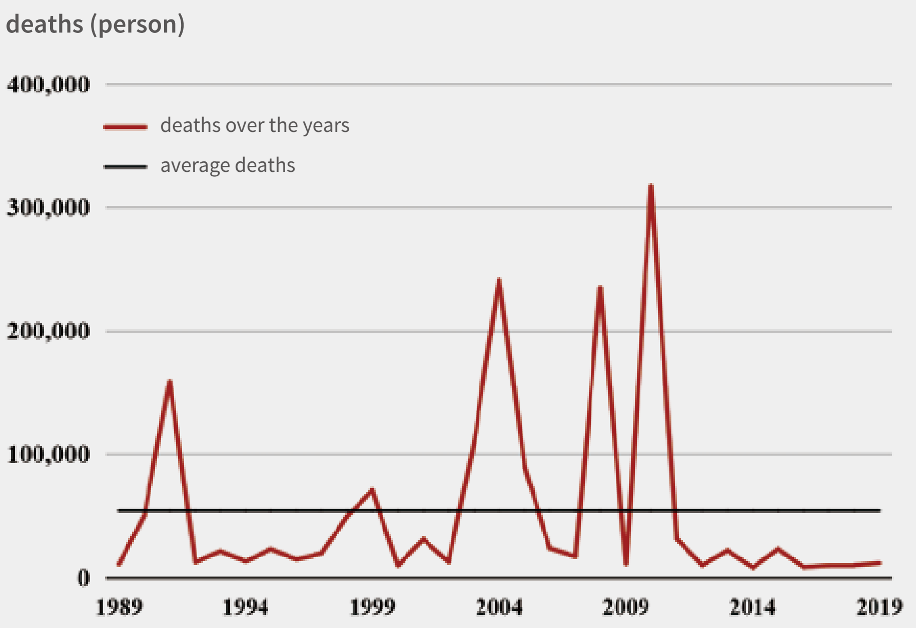


Figure 1-4 Histogram of the global population dying from various natural disasters, 1989-2019

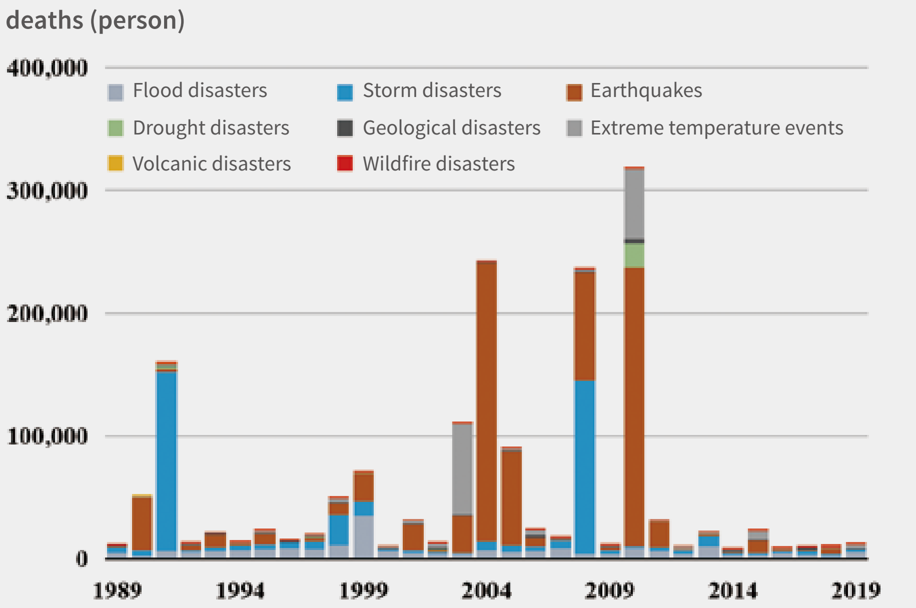


Figure 1-5 Before-and-after comparison of Indian Ocean earthquake and tsunami hazards, 2004

1

1.3

Direct economic losses from natural disasters show a fluctuating upward trend, with storm disasters accounting for the largest share of losses.

Since 1989, there has been a fluctuating trend of increasing direct economic losses due to the world's major natural disasters, with the exception of the frequent natural disaster factor, the increase in this value being more related to increased wealth exposure due to economic growth and social development. Since 2010, direct economic losses due to disasters have exceeded $100 billion in all years except 2015 and 2018, peaking at over $400 billion in 2011 for nearly 30 years. The losses exceeded $350 billion in 2017 and $200 billion in 1995, 2005 and 2008. The value of direct economic losses in these years was larger, which was directly related to the occurrence of major natural disasters during the year.

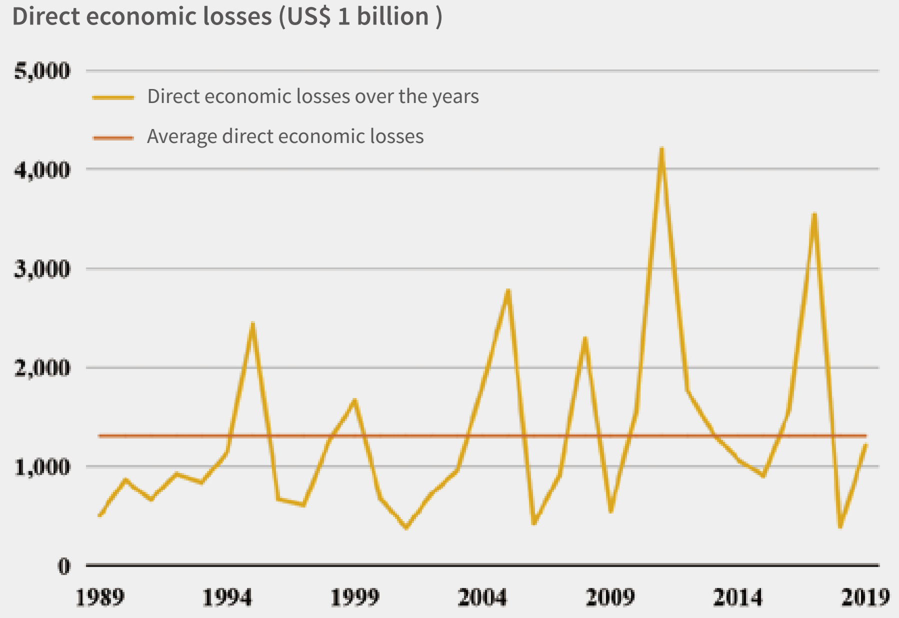


Figure 1-6 **1Global direct economic losseses from natural disasters, 1989-2019**

(2019 price level)

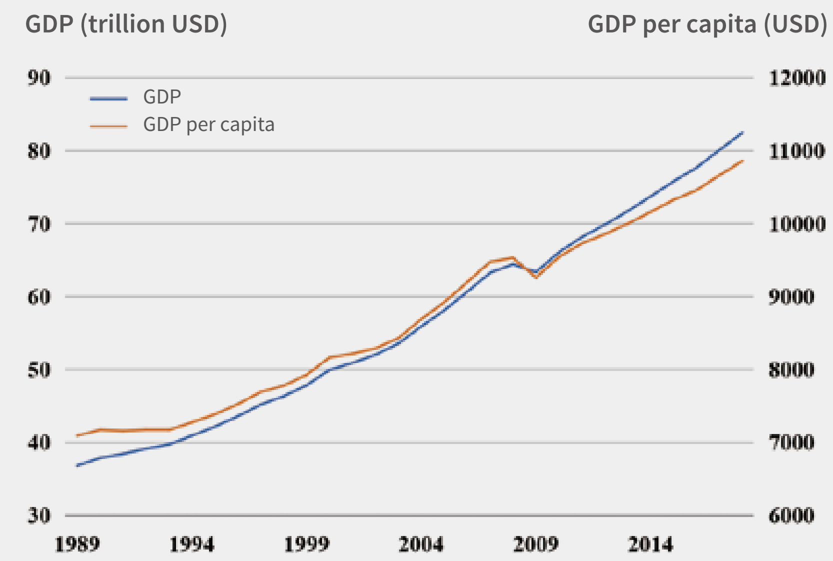


Figure 1-7 **Line chart of Global GDP and GDP per capita changes, 1989-2019 (constant 2010 prices)**

(Note: data from the World Bank)

From 1989-2018, global GDP and per capita GDP showed an increasing trend; Global GDP increased from $36.80 trillion in 1989 to $82.46 trillion in 2018, a 1.24-fold increase. GDP per capita increased from $7,089 in 1989 to $10,858 in 2018, a 53% increase.

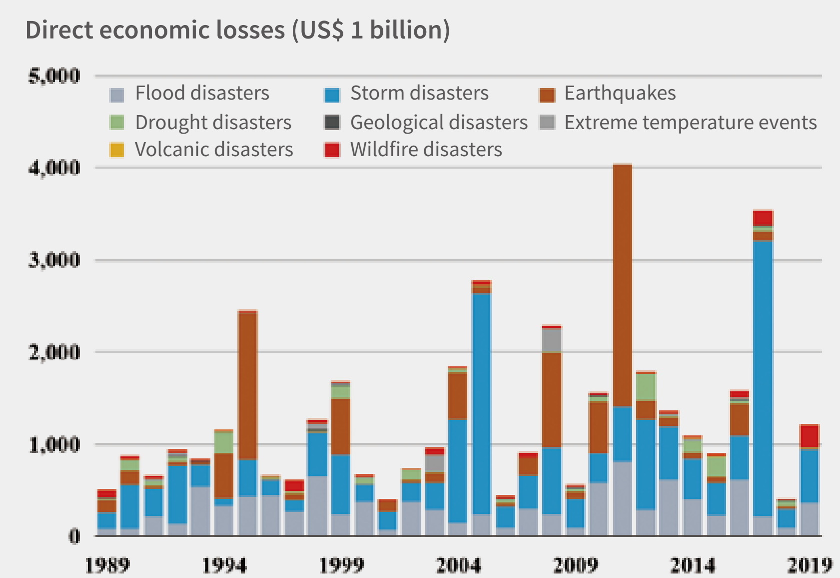


Figure 1-8 **Histogram of direct economic losses from major global natural disasters, 1989-2019**

(2019 price level)

In terms of annual direct economic losses per disaster type 1989-2019, 42%, 24% and 23% of annual direct economic losses were caused by storms, floods and earthquakes respectively. The year 2011 experienced the largest direct economic losses among all these years, which were mainly caused by the massive 9.0 magnitude Richter earthquake and tsunami it initiated in the Tohoku region of Japan on 11 March, resulting in a series of equipment failures, nuclear meltdowns and releases of radioactive materials from the Fukushima I Nuclear Power Plant, with total direct economic losses in excess of $210 billion (current year prices). The 2017 hurricane in the United States and the Caribbean caused $170 billion (current year prices) in losses, and the 2005 Katrina caused approximately $160 billion (current year prices) in losses. In addition, the damage resulting from major disasters such as the 1995 Hyogo-ken-Nanbu earthquake and the 2008 Wenchuan earthquake was around $100 billion (current year prices).

1.4

Increasing trend in natural disaster insurance losses

Figure 1-9 shows the annual insurance losses from natural disasters worldwide, 1989-2019. Since 1989, there has been a fluctuating increase in global insurance losses, and this increase, in addition to frequent natural disaster factors, was more related to the increase in property insurance coverage worldwide.

Natural disaster insurance losses were $49.6 billion in 2019, down from $83.8 billion in 2018 and below the average for the past 10 years ($67 billion). In 2019, weather-related disaster insurance losses accounted for 99.8% of total natural disaster insurance losses. Insurance losses were closely linked to direct economic losses due to disasters and were very similar in terms of trends. Disaster insurance losses were larger in 2005, 2011 and 2017, at $135.4 billion, $135.7 billion and $144.8 billion, respectively, when the U.S. Hurricane Katrina, the Japan 311 earthquake - tsunami, and the U.S. and Caribbean hurricane, respectively, caused severe natural disasters and insurance losses. This similar trend of change became more apparent as the insurance industry continued to increase in coverage and depth.

In terms of global insurance losses per disaster type 1989-2019 (Figure 1-10), on average, weather-related disasters were the leading type of insurance losses, with the share of insurance losses due to weather-related disasters reaching 92% and increasing in recent years. In addition, insurance losses from earthquake/tsunami disasters amounted to 8%, and these losses were concentrated in years with stronger tsunami/earthquakes (311 earthquake/tsunami disasters in Japan in 2011, earthquake in Haiti in 2010 and the Great Los Angeles Earthquake in the United States in 1994).

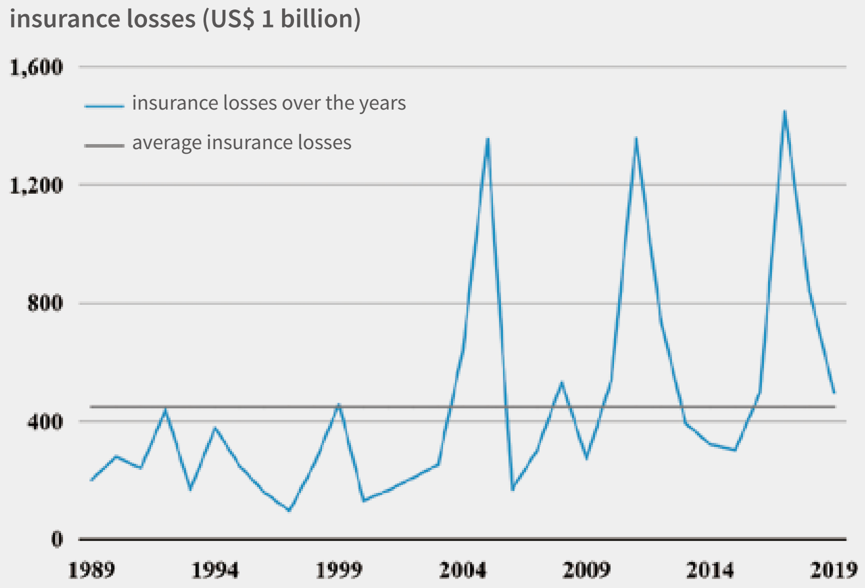


Figure 1-9 Line chart of Global Natural Disaster Insurance Losses, 1989-2019

(Note: Data from the Swiss Re sigma report)

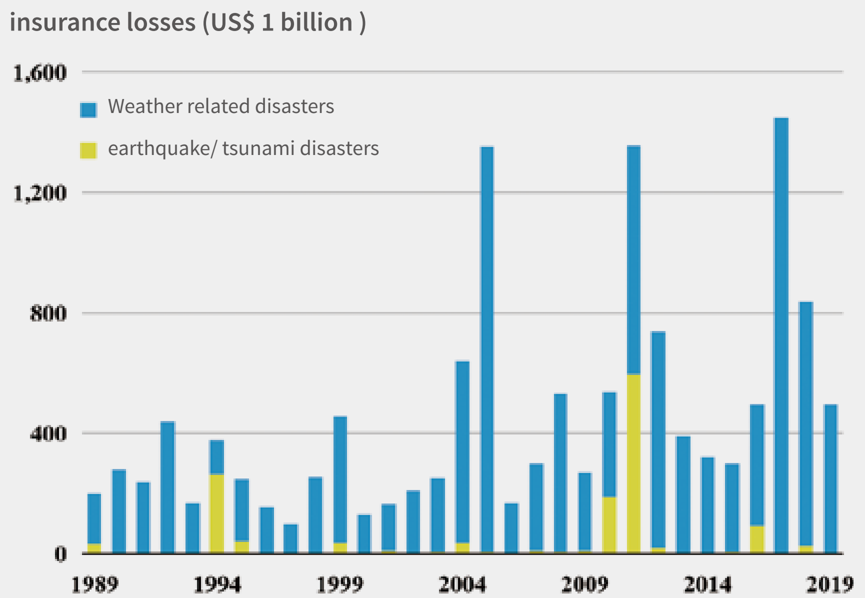


Figure 1-10 Global insurance losses per disaster type, 1989-2019

(Note: Data from the Swiss Re sigma report)

2

Comparison of natural disasters between China and the rest of the world, 1989-2019

2.1

Changes in natural disaster losses in China, 1989-2019

1989-2019 is divided into three periods: 1989-1998, 1999-2008, and 2009-2019, and the average annual deaths and direct economic losses for each period are calculated separately.

Over the past 30 years, the annual average deaths in China, Asia and the world generally experienced increase before decrease (Figure 1-11, Table 1-1). With the exception of 1999-2008, the annual average deaths in China were less than 3,000, less than 10 % of the global average. The 2008 Wenchuan earthquake in China resulted in an annual average deaths of nearly 10,000 between 1999 and 2008, more than 10 % of the global average. China's annual average deaths accounted for less than 10% of the Asian average from 1989 to 1998, and accounted for more than 10% during the remaining two periods.

Over the past 30 years, the global annual average direct economic losses have been increasing, with Asia first equalizing and then increasing, and China first increasing and then equalizing (Figure 1-12, Table 1-2). China's direct economic losses from 1999 to 2008, affected by the 2008 Wenchuan earthquake, amounted to US$23.5 billion, or 45% of the average for all Asian countries, with losses of around 34% in the remaining two periods. In all periods, China's annual average direct economic losses did not exceed 20 % of the world's total; the lowest was 14.1 % in 2009-2019.

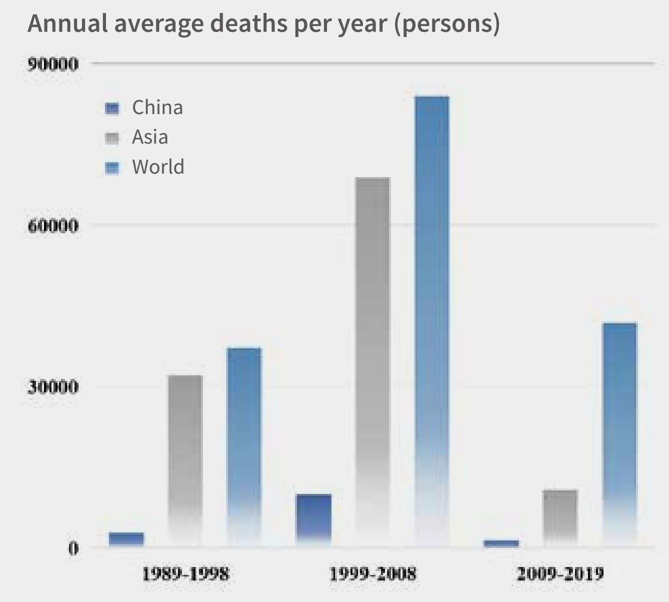


Figure 1-11 Global annual average deaths from natural disasters, by period, 1989-2019

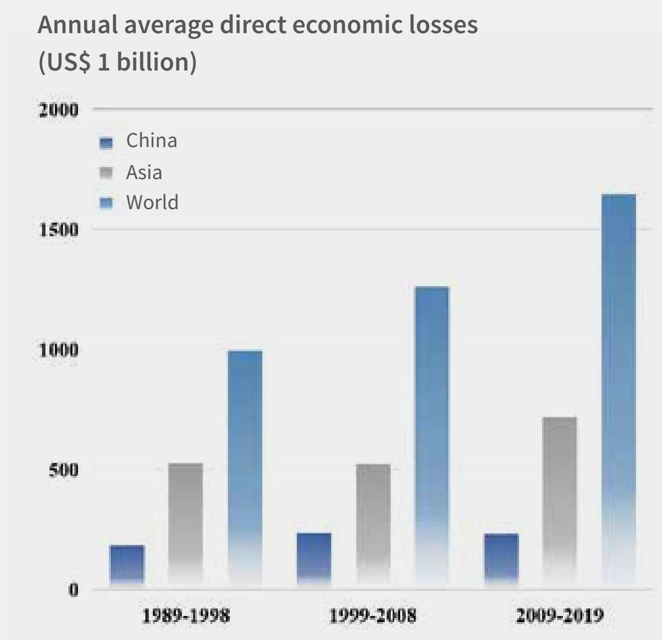


Figure 1-12 Global annual average direct economic losses from natural disasters, by period, 1989-2019

(2019 price levels)

Table 1-1 Global annual average deaths from natural disasters, by period, 1989-2019

Time period	Annual average deaths per year (persons)			China's annual average deaths as a percentage of	China's annual average death rate in the world (%)
	China	Asia	World		
1989-1998	2920	32204	37382	9.1	7.8
1999-2008	9939	68874	84082	14.4	11.8
2009-2019	1404	10869	41990	12.9	3.3

Table 1-2 Global annual average direct economic losses from natural disasters, by period, 1989-2019 (2019price level)

Time period	Annual average direct economic losses (US$ 100)			Annual average direct economic losses in China as a percentage of Asia (%)	Annual average direct economic losses in China as a percentage of the world (%)
	China	Asia	World		
1989-1998	185	527	993	35.1	18.6
1999-2008	235	522	1263	45.0	18.6
2009-2019	232	719	1649	32.3	14.1

2

2.2

Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as the number of deaths per million population) between China and the rest of Asia and the world and the changes

The number of deaths per million population is an important indicator that is used in this section to make comparisons of comprehensive natural disaster prevention and mitigation capacity between China and the rest of the world as well as between China and Asia from 1989 to 2019.

Annual average number of deaths from natural disasters per million population in China, the United States, Japan and the United Kingdom per period, 1989-2019

	1989-1998	1999-2008	2009-2019
China	(2.46 persons)	(7.53 persons)	(1.04 persons)
The US	(1.24 persons)	(1.51 persons)	(0.96 person)
Japan	(4.88 persons)	(0.65 person)	(15.67 persons)
The UK	(0.39 person)	(0.65 person)	(1.14 persons)

Note:
1. The 2008 Wenchuan earthquake caused nearly 90,000 deaths and missing persons, resulting in an annual average of 7.53 deaths per million population in China from 1999 to 2008;
2. The 1995 Hyogoken-Nanbu earthquake caused more than 5,000 deaths, resulting in an average of 4.88 deaths per million population in Japan from 1989 to 1998.
3. The 2011 earthquake and tsunami caused nearly 20,000 deaths and missing persons, resulting in an annual average of 15.67 deaths per million population in Japan from 2009 to 2019.

Comparison and changes in the world

Figure 1-13 and Table 1-3 indicate the number of deaths per million population caused by major natural disasters in each country and region from 1989 to 2019. From 1989 to 1998, China ranked in the top 63% of the world in terms of comprehensive disaster prevention and mitigation capacity expressed in the number of deaths per million population (in ascending order) and 71% of the world in terms of GDP per capita (in descending order), with the number of deaths per million population ranking higher than GDP per capita. From 1999 to 2008, China ranked in the top 78% of the world in terms of comprehensive disaster prevention and mitigation capacity and 59% of GDP per capita, with the number of deaths per million population ranking lower than GDP per capita. From 2009 to 2019, China ranked in the top 49% of the world in terms of comprehensive disaster prevention and mitigation capacity and top 39% of GDP per capita, with the number of deaths per million population ranking lower than GDP per capita.

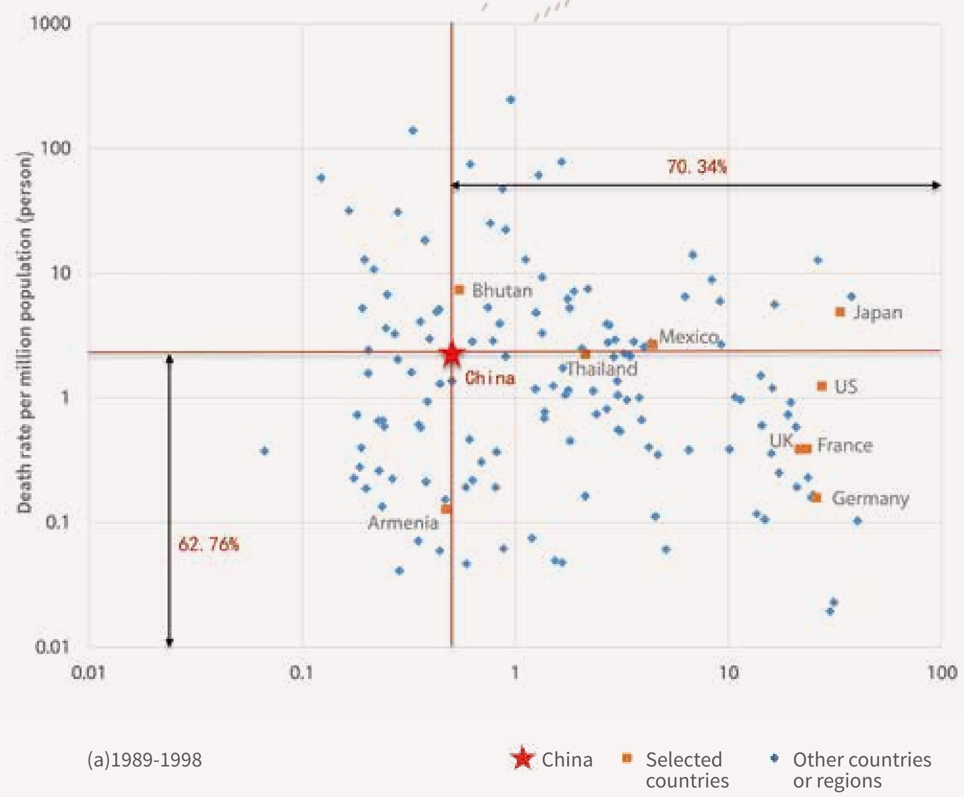
In 1989-1999, China's annual average number of deaths per million population was 2.46, ranking 92nd in the world (in ascending order, 145 countries and territories in total), i.e. China was in the top 63% of the world in terms of comprehensive disaster prevention and mitigation capacity expressed in the number of deaths per million population, with Mexico, Colombia, Thailand and Chile among the countries on the same level as China. In terms of countries with per capita GDP comparable to China's, Armenia (0.13), Sudan (1.36) and Mauritania (0.19) all had lower number of deaths per million population than China; Bhutan, which lost 39 people to storms and floods in 1994, had a total population of about 530,000, resulting in an annual average of 7.33 deaths per million population, higher than China's. In terms of countries with the same economic aggregates as China, the United Kingdom (0.39), Germany (0.16) and the United States (1.24) were lower than China. As a result of the 1995 earthquake that killed more than 5,000 people, Japan's annual average death rate per million population (4.88) was higher than that of China.

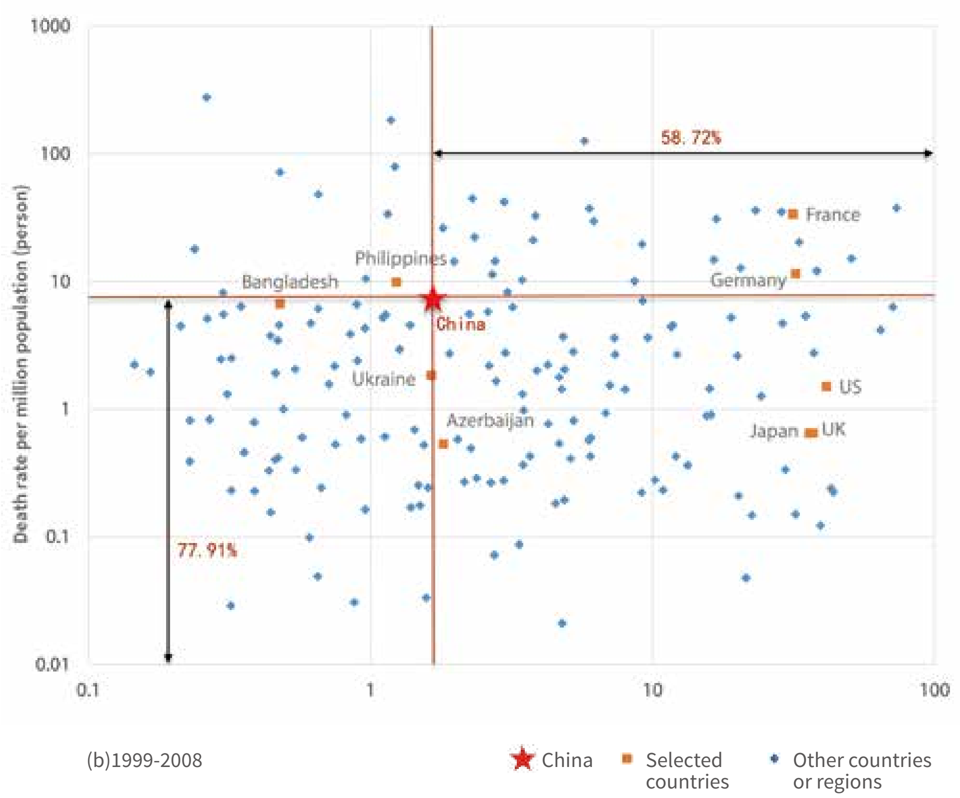
In 1999-2008, China's annual number of average deaths per million population was 7.53 (0.94 if nearly 90,000 people who died and missing as a result of the 2008 Wenchuan earthquake were excluded), ranking 135th in the world (172 countries and regions, in ascending order), i.e. China was in the top 78% of the world in terms of comprehensive disaster prevention and mitigation capacity expressed in the number of deaths per million population, with Bangladesh, Nepal and the Philippines among the countries on the same level as China. In countries with per capita GDP comparable to that of China, Ukraine (1.84), Azerbaijan (0.53) and Angola (1.85) all had lower number of deaths per million population than China's. In terms of countries with the same economic aggregates as China, the United Kingdom (0.65), Japan (0.65) and the United States (1.51) were lower than China; the 2003 and 2006 heat waves caused nearly 20,000 and 1,300 deaths in France, respectively, and the 2006 heat wave caused more than 9,000 deaths in Germany, resulting in an annual average of 33.92 and 11.52 deaths per million population in France and Germany, respectively, from 1999 to 2008, both higher than China.

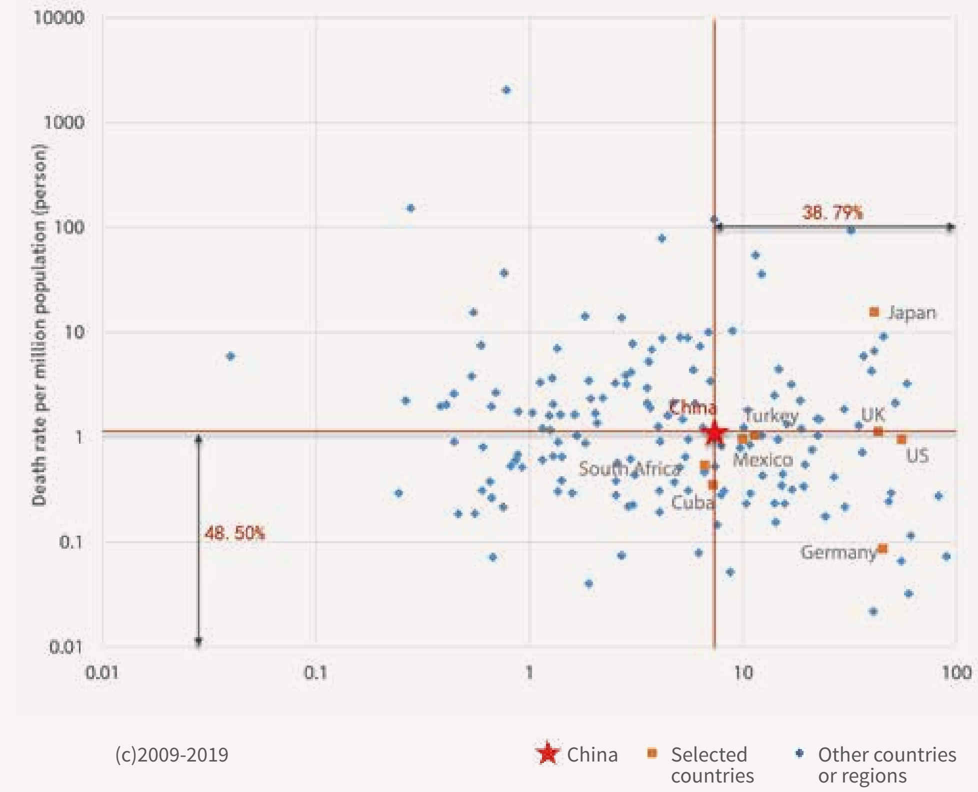
In 2009-2019, China's annual average number of deaths per million population was 1.04, ranking 82nd in the world (in ascending order, 167 countries and territories in total), i.e. China was in the top 49% of the world in terms of comprehensive disaster prevention and mitigation capacity expressed in the number of deaths per million population, with the United Kingdom, the United States, Turkey and Mexico among the countries on the same level as China . In countries with per capita GDP comparable to that of China, Cuba (0.35), South Africa (0.54) and Mexico (0.97) all had lower number of deaths per million population than China. In terms of countries with the same economic aggregates as China, Germany (0.09) and the United States (0.96) were both lower than China and the United Kingdom (1.14) was higher than China. As a result of the 2011 earthquake and tsunami that killed nearly 20,000 people, Japan's annual average number of death per million population reached 15.67, much higher than that of China.

2

Figure 1-13 **Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed in the number of deaths per million population) between China and the rest of the world, 1989-2019**







Note:

1.The average number of deaths per million population and GDP per capita for each country/area for each period of time is obtained by dividing the number of deaths from disasters and GDP by the total population of people in that year for each country/area (total population and GDP for 2019 are replaced by total population and GDP for 2018, respectively).

2.Data on population, GDP (current US dollars) for each country/area are from the World Bank (https://data.worldbank.org/).

Table 1-3 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as the number of deaths per million population) between China and the rest of the world, 1989-2019

Time period	Total number of countries (regions) participating in the ranking	The rank of China's number of deaths per million population in ascending order/the percentage of rank	The rank of China's per capita GDP in descending /the percentage of rank
1989-1998	145	92/63%	103/71%
1999-2008	172	135/78%	102/59%
2009-2019	167	82/49%	65/39%

Comparison and changes in Asia

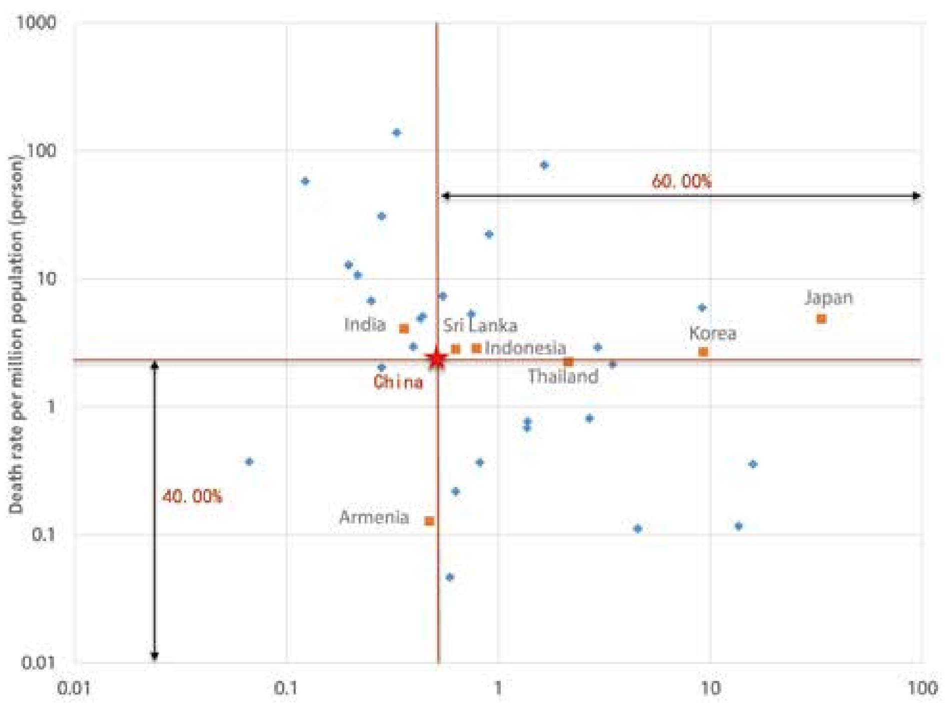
Figure 1-14 and Table 1-4 show the number of deaths per million population caused by major natural disasters in major Asian countries and regions from 1989 to 2019. In 1989-1998, China's comprehensive disaster prevention and mitigation capacity, expressed by the number of deaths per million population, was in the top 43% of Asia (in ascending order), and its per capita GDP was in the top 63% of Asia (in descending order), with the number of deaths per million population ranking higher than the per capita GDP. In 1999-2008, China's comprehensive disaster prevention and mitigation capacity was in the top 70%, and its per capita GDP was in the top 43%, with the number of deaths per million population ranking lower than the per capita GDP. In 2009-2019, China's comprehensive disaster prevention and mitigation capacity was in the top 39%, and its per capita GDP was in the top 31%, with the number of deaths per million population ranking lower than the per capita GDP.

In 1989-1998, China ranked 15th in Asia (35 countries and territories in ascending order) with an annual average of 2.46 deaths per million population, i.e., China ranked in the top 43% of Asia in terms of comprehensive disaster prevention and mitigation capacity expressed in the number of deaths per million population, with Malaysia, Thailand, Sri Lanka and the Republic of Korea among the countries on the same level as China. In terms of per capita GDP, Armenia (0.13) and Uzbekistan (0.05) had lower number of deaths per million people than those of China; Bhutan had 39 deaths from storms and floods in 1994, Pakistan had three floods that killed more than 1,000 people, and Sri Lanka had more than 300 deaths from floods in 1989, resulting in 7.33, 5.11 and 2.82 deaths per million population in those three countries, respectively, which were higher than China. Compared to other larger economies, Korea (2.68), India (4.08, mainly due to nine natural disasters that killed more than 1,500 people, especially the 1993 earthquake that killed nearly 10,000 people) and Japan (4.88, mainly due to the 1995 earthquake that killed more than 5,000 people) were higher than China.

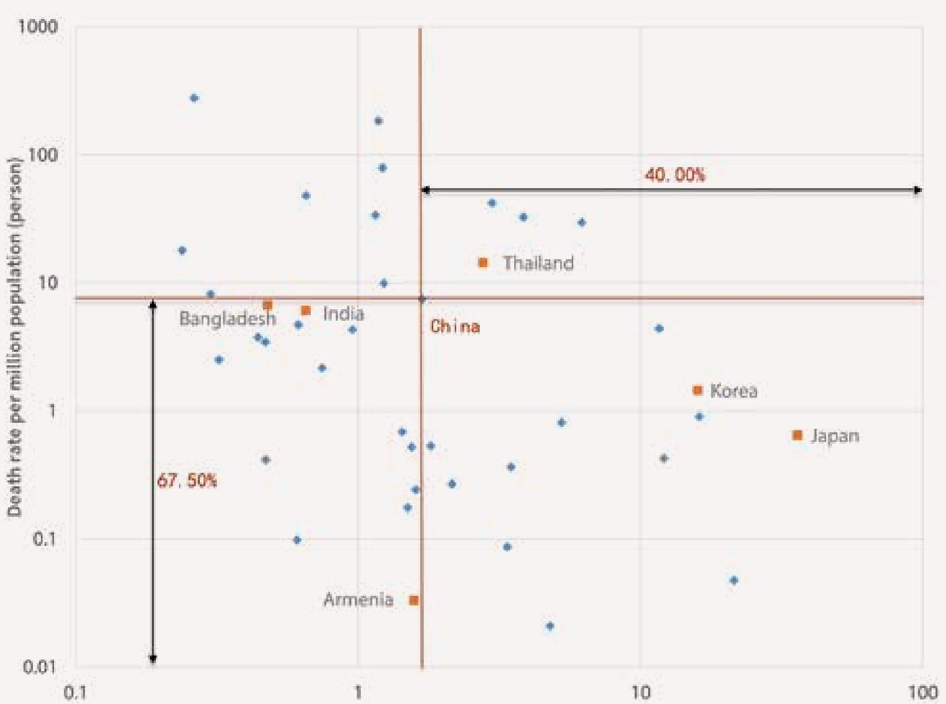
In 1999-2008, China had an annual average of 7.53 deaths per million population (nearly 90,000 people were killed and missing as a result of the 2008 earthquake), ranking 28th in Asia (in ascending order, 40 countries and regions), i.e. China ranked in the top 70 % of Asia in terms of comprehensive disaster prevention and mitigation capacity expressed in the number of deaths per million population, with Bangladesh, Nepal, India and the Philippines among the countries on the same level as China. In terms of per capita GDP, Armenia (0.03) and Azerbaijan (0.53) had lower number of deaths per million population than those in China, and the 2004 earthquake killed 8,345 people in Thailand, resulting in an annual average of 14.45 deaths per million population in Thailand, higher than China. Compared to other countries with larger economies, Korea (1.45), India (6.14) and Japan (0.65) all had lower numbers than China.

In 2009-2019, China ranked 14th in Asia with an annual average of 1.04 deaths per million population (36 countries and territories in ascending order), i.e. China ranked in the top 39% of Asia in terms of comprehensive disaster prevention and mitigation capacity expressed in terms of the number of deaths per million population, with countries such as Turkey and Saudi Arabia on the same level as China. In terms of countries with per capita GDP comparable to that of China, Thailand (2.09) and Iran (1.24) all had a higher number of deaths per million population than China. Compared to other countries with larger economies, both India (1.65) and Japan (15.67, mainly due to the 2011 earthquake and tsunami that killed nearly 20,000 people) were higher than China, while South Korea (0.42) was lower.

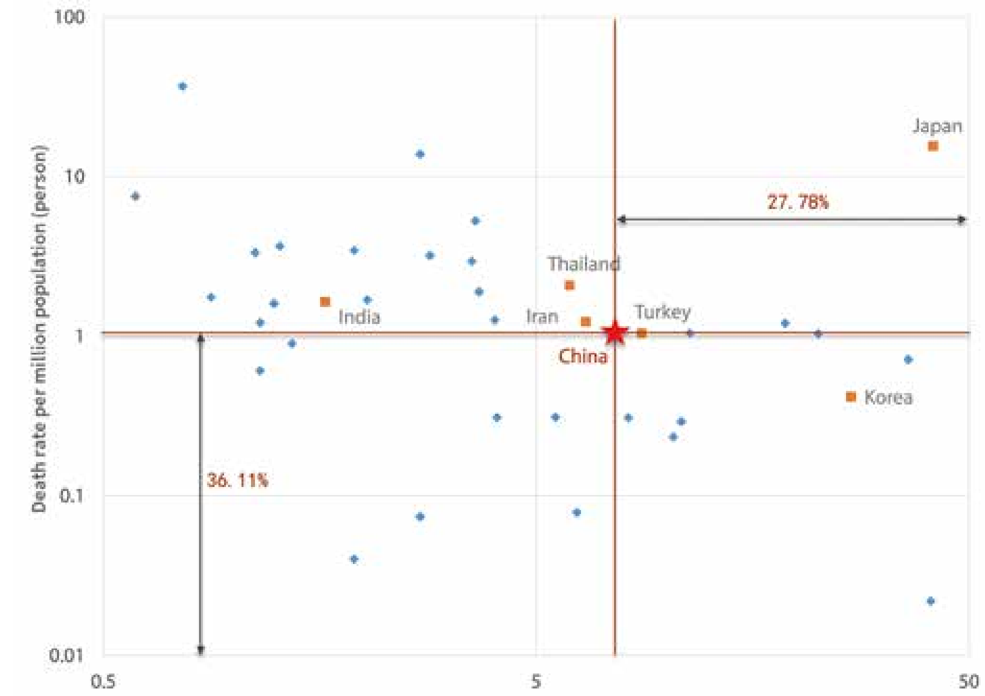
Figure 1-14 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as the number of deaths per million population) between China and the rest of Asia, 1989-2019



(a)1989-1998 ★ China ■ Selected countries ◆ Other countries or regions



(b)1999-2008 ★ China ■ Selected countries ◆ Other countries or regions



(c)2009-2019 ★ China ■ Selected countries ◆ Other countries or regions

Note:

1.The average number of deaths per million population and GDP per capita for each country/area for each period of time is obtained by dividing the number of disaster-related deaths and GDP by the total population in that year for each country/area (total population and GDP for 2019 are replaced by total population and GDP for 2018, respectively).

2.Data on population, GDP (current US dollars) for each country/area are from the World Bank (https://data.worldbank.org/).

Table 1-4 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as the number of deaths per million population) between China and the rest of Asia, 1989-2019

Time period	Total number of countries (regions) participating in the ranking	The rank of China's number of deaths per million population in ascending order/the percentage of rank	The rank of China's per capita GDP in descending /the percentage of rank
1989-1998	35	15/43%	22/63%
1999-2008	40	28/70%	17/43%
2009-2019	36	14/39%	11/31%

2

2.3 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as percentage of direct economic losses in GDP) between China and the rest of Asia and the world from 1989 to 2019, and the changes

The percentage of direct economic losses in GDP is another important indicator that is used in this section to make comparisons of comprehensive natural disaster prevention and mitigation capacity between China and the rest of the world as well as between China and Asia from 1989 to 2019.

Comparison and changes in the world

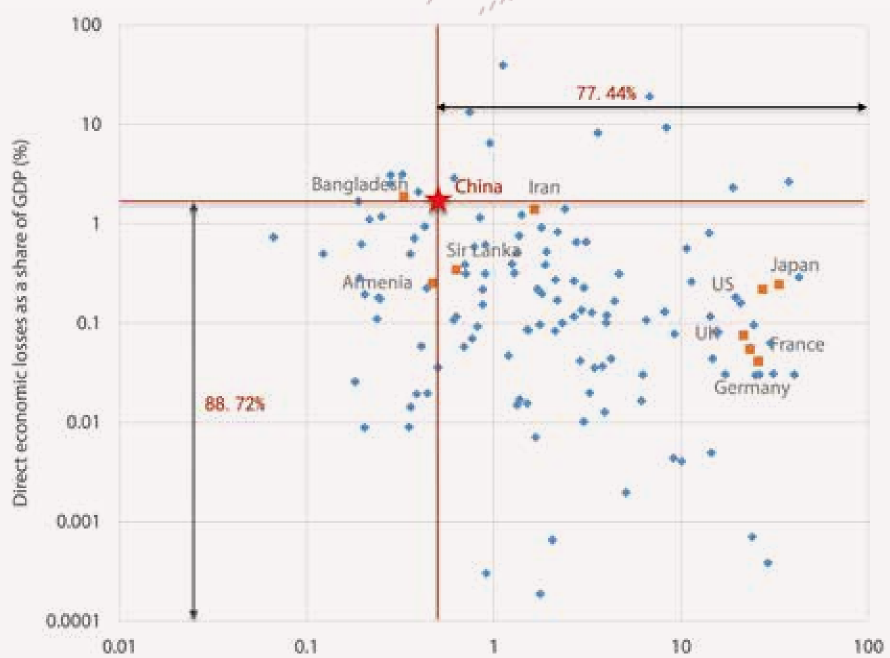
Figure 1-15 and Table 1-5 indicate the direct economic losses of GDP from major natural disasters in major countries and regions worldwide from 1989 to 2019. In 1989-1998, expressed by percentage of direct economic losses in GDP, China ranked in the top 89% of the world (in ascending order), per capita GDP ranked in the top 78% of the world (in descending order), direct economic losses GDP ranked lower than per capita GDP. In 1999-2008, China's comprehensive disaster prevention and mitigation capacity ranked in the top 80%, per capita GDP ranked in the top 68%, direct economic losses GDP ranked lower than per capita GDP. In 2009-2019, China's comprehensive disaster prevention and mitigation capacity ranked in the top 72%, per capita GDP ranked in the top 40%, and direct economic losses GDP ranked lower than per capita GDP.

In 1989-1998, China ranked 119th in the world (133 countries and regions in ascending order) with an average annual percentage of direct economic losses in GDP as 1.79%, i.e. China's comprehensive disaster prevention and mitigation capacity, expressed in terms of direct economic losses as a share of GDP, ranking in the top 89% of the world, with Iran, Cambodia, and Bangladesh among the countries on the same level as China. In terms of GDP per capita, Armenia (0.25 %) and Sri Lanka (0.34%) had a lower share of direct economic losses to GDP than China. In terms of economic aggregates at the same level as China, Germany (0.04%), France (0.05%), the United Kingdom (0.08%), the United States (0.22%) and Japan (0.25%) all had a lower share of percentage of direct economic losses in GDP than China.

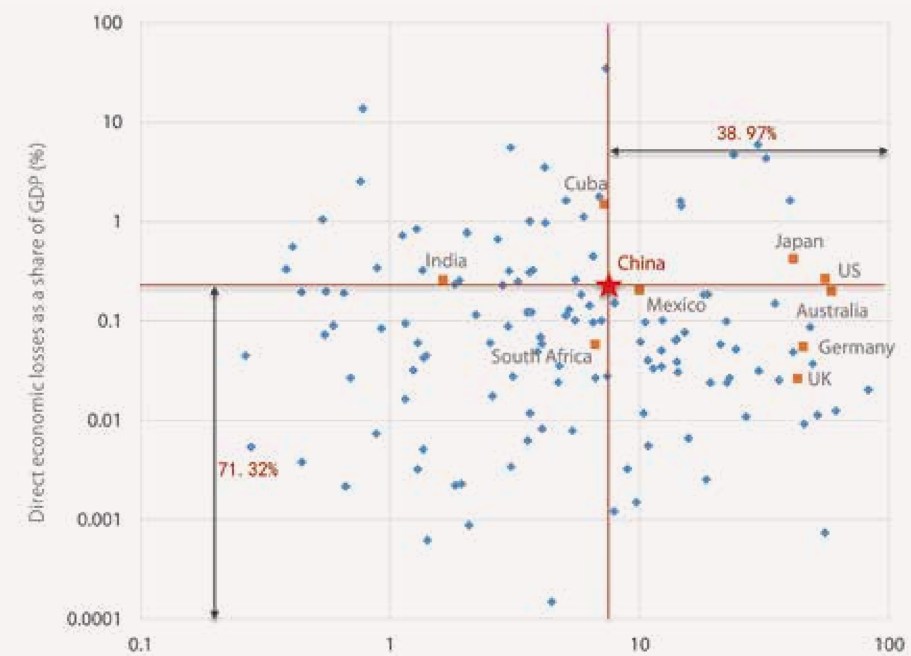
In 1999-2008, China ranked 113th in the world (141 countries and regions in ascending order) with an average annual percentage of direct economic losses in GDP as 0.66%, i.e. China's comprehensive disaster prevention and mitigation capacity, expressed in terms of percentage of direct economic losses in GDP, ranking in the top 80% of the world, with Cambodia, Sri Lanka, Pakistan, and Mongolia etc. among the countries on the same level as China. In terms of GDP per capita, Ukraine (0.13%) and Azerbaijan (0.3%) had a lower share of direct economic losses to GDP than China. In terms of economic aggregates, France (0.13%), Germany (0.11%), the United Kingdom (0.08%), Japan (0.17%) and the United States (0.27%) all had lower direct economic losseses as a share of GDP than China.

In 2009-2019, China ranked 98th in the world (136 countries and regions in ascending order) with an average annual percentage of direct economic losses in GDP as 0.22%, i.e. China's comprehensive disaster prevention and mitigation capacity, expressed in terms of percentage of direct economic losses in GDP, ranking in the top 72% of the world, with Australia, the United States, India and Mexico etc. among countries on the same level as China. In terms of GDP per capita, Cuba (1.50%) had a higher direct economic losses in GDP than China, while South Africa (0.06%), Mexico (0.21 %) were lower than China. Among countries with similar economic aggregate to China, the UK (0.03%) and Germany (0.06%) were below China, while the US (0.27%) and Japan (0.42%) were above China.

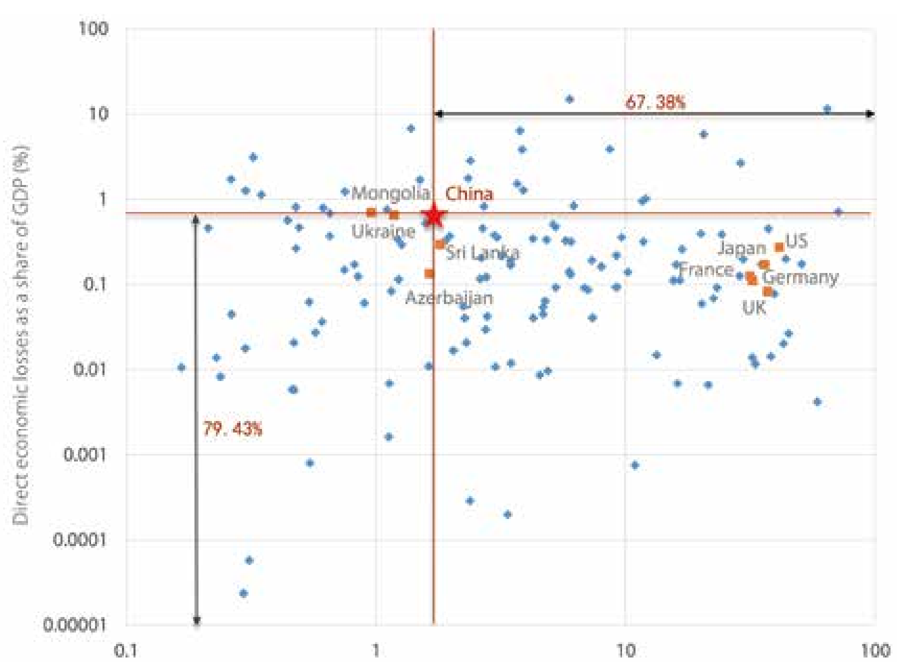
Figure 1-15 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as percentage of direct economic losses in GDP) between China and the rest of the world, 1989-2019



(a)1989-1998 ★ China ■ Selected countries ◆ Other countries or regions



(c)2009-2019 ★ China ■ Selected countries ◆ Other countries or regions



(b)1999-2008 ★ China ■ Selected countries ◆ Other countries or regions

Note:

1. The ratio of direct economic losses to GDP for each country/area for each period is calculated using the average of the respective years of the period, where the value of the respective years' direct economic losses due to disasters in each country/area is divided by the current year's GDP (the GDP for 2019 is replaced by the GDP for 2018). Per capita GDP for each country/area is also used as the average of the respective year, calculated by dividing the GDP (in current dollars) of the participating countries/areas by the current year's total population (total population and GDP for 2019 are replaced by total population and GDP for 2018, respectively).
2. Data on population, GDP (current US dollars) for each country/area are from the World Bank (https://data.worldbank.org/).

Table 1-5 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as percentage of direct economic losses in GDP) between China and the rest of the world, 1989-2019

Time period	Total number of countries (regions) participating in the ranking	The rank of China's percentage of direct economic losses in GDP in ascending order/the percentage of rank	The rank of China's per capita GDP in descending /the percentage of rank
1989-1998	133	119/89%	104/78%
1999-2008	141	113/80%	96/68%
2009-2019	136	98/72%	54/40%

2

Comparison and changes in Asia

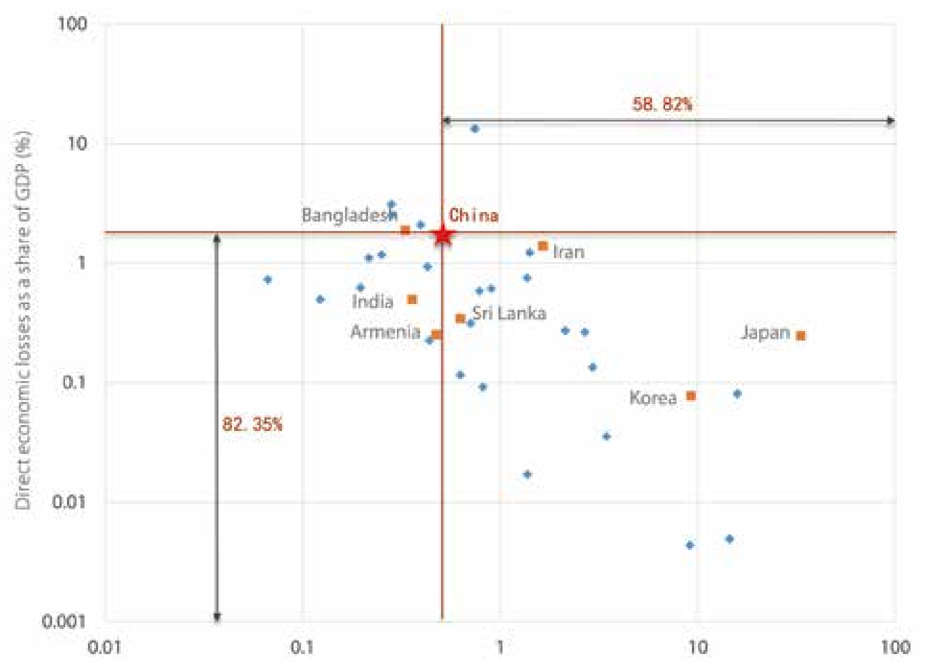
Figure 1-16 and Table 1-6 show the percentage of direct economic losses in GDP due to major natural disasters in major Asian countries and regions, 1989-2019. In 1989-1998, China's comprehensive disaster prevention and mitigation capacity expressed in terms of percentage of direct economic losses in GDP was in the top 85% of Asia (ranked in ascending order) and per capita GDP was in the top 62% of Asia (ranked in descending order), with percentage of direct economic losses in GDP ranked lower than per capita GDP. In 1999-2008, China's comprehensive disaster prevention and mitigation capacity was in the top 71% and per capita GDP was in the top 38%, with percentage of direct economic losses in GDP ranked lower than per capita GDP. In 2009-2019, China's comprehensive disaster prevention and mitigation capacity was in the top 63% and per capita GDP was in the top 30%, with percentage of direct economic losses in GDP ranked lower than per capita GDP.

In 1989-1998, China's average annual percentage of direct economic losses in GDP was 1.79%, ranking 29th in Asia (34 coun- tries and regions in ascending order), i.e. China was in the top 85% of Asia in terms of percentage of direct economic losses in GDP, with Cambodia, Iran and Bangladesh, etc. among the countries on the same level as China. In terms of GDP per capita comparable to China's, both Armenia (0.25%) and Sri Lanka (0.34%) had a lower percentage of direct economic losses in GDP than China. Compared to other countries with larger economies, Japan (0.25%), South Korea (0.08%) and India (0.5%) all had lower percentage of direct economic losses in GDP than China.

In 1999-2008, China’s average annual percentage of direct economic losses in GDP was 0.66%, ranking 24th in Asia (34 countries and regions in ascending order),, i.e. China was in the top 71% of Asia in terms of percentage of direct economic losses in GDP, with Cambodia, Sri Lanka, Pakistan and Mongolia, etc. among the countries on the same level as China. In terms of GDP per capita comparable to China's, Armenia (0.52%) and Thailand (0.12%) had a lower percentage of direct economic losses in GDP than China. Compared to other countries with larger economies, Japan (0.17 %), South Korea (0.17 %) and India (0.37 %) all had lower direct economic losses as a percentage of GDP than China.

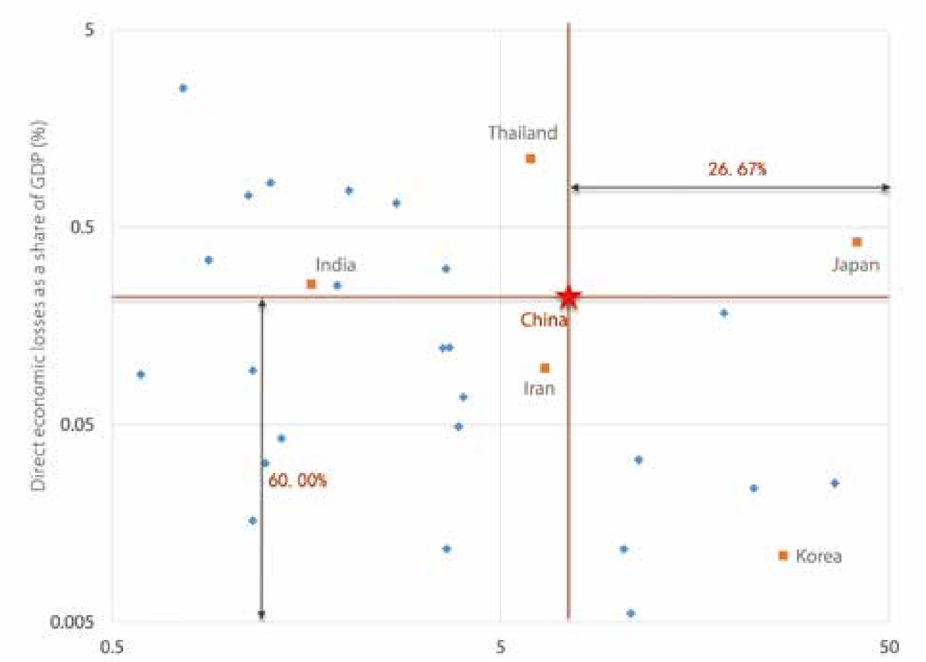
In 2009-2019, China’s average annual percentage of direct economic losses in GDP as 0.22%, ranking 19th in Asia (30 countries and regions in ascending order), i.e. China was in the top 63% of Asia in terms of percentage of direct economic losses in GDP, with Oman, Laos and India, etc. among the countries on the same level as China. In terms of GDP per capita, Thailand (1.12 %) and Iran (0.10 %) had a lower percentage of direct economic losses in GDP than China. Compared to other countries with larger economies, South Korea (0.01%) had a lower percentage of direct economic losses in GDP than China, while India (0.26%) and Japan (0.42%) were slightly higher.

Figure 1-16 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as percentage of direct economic losses in GDP) between China and the rest of Asia, 1989-2019



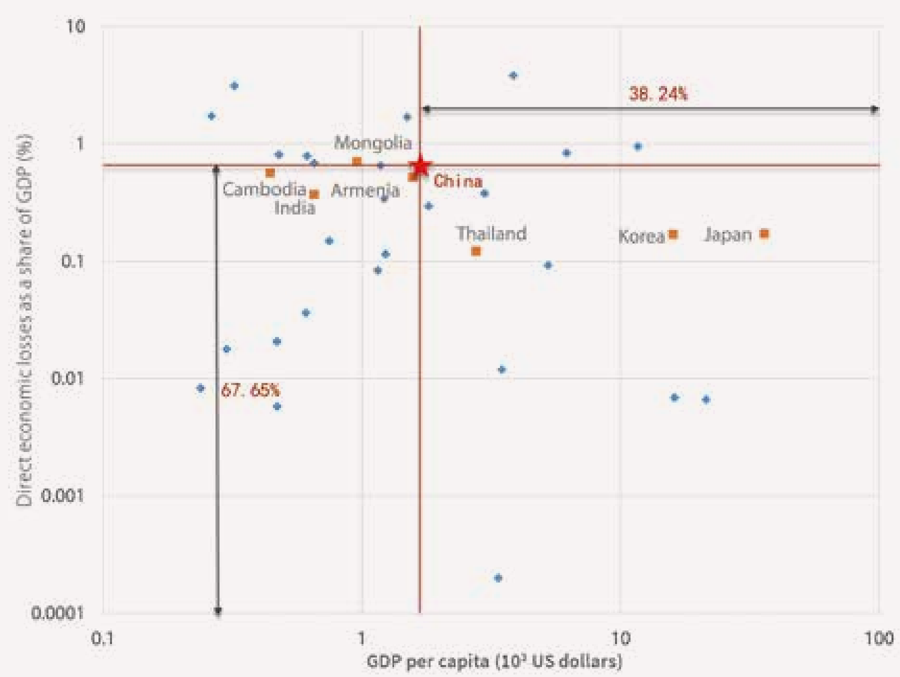
(a)1989-1998

China Selected countries Other countries or regions



(c)2009-2019

China Selected countries Other countries or regions



(b)1999-2008

China Selected countries Other countries or regions

Note:

1. The ratio of direct economic losses to GDP for each country/area for each period is calculated using the average of the respective years of the period, where the value of the respective years' direct economic losses due to disasters for each country/area participating in the statistics is divided by the current year's GDP (the GDP for 2019 is replaced by the GDP for 2018). GDP per capita for each country/area is also calculated using the average of the respective year, where the annual value is obtained by dividing the GDP (in current dollars) of the participating countries/areas by the total population in that country for the year (total population and GDP for 2019 are replaced by total population and GDP for 2018, respectively).
2. Data on population, GDP (current US dollars) for each country/area are from the World Bank (https://data.worldbank.org/).

Table 1-6 Comparison of comprehensive natural disaster prevention and mitigation capacity (expressed as percentage of direct economic losses in GDP) between China and the rest of Asia, 1989-2019

Time period	Total number of countries (regions) participating in the ranking	The rank of China's percentage of direct economic losses in GDP in ascending order/the percentage of rank	The rank of China's per capita GDP in descending /the percentage of rank
1989-1998	34	29/85%	21/62%
1999-2008	34	24/71%	13/38%
2009-2019	30	19/63%	9/30%

2019 Global Natural Disaster Assessment Report

Special Report (II)

Natural disasters in China in 2019

03

1

Natural disasters in China in 2019

In 2019, China were mainly affected by natural disasters including flood, typhoon, droughts, earthquake and geological hazards and also suffered certain impact from hail, low temperature and freezing hazard, snowstorms and forest and grassland fires. Critical disaster events, including the Yushu snowstorm in Qinghai, the Sichuan Muli forest fire, the Xiangning landslide in Shanxi, the Shuicheng landslide in Guizhou, the Changning Ms. 6.0 earthquake in Sichuan, the super typhoon Lekima, the severe rainstorm and floods in southern China during the main flooding season, and the summer-autumn drought in the middle and lower reaches of the Yangtze River. Disaster losses caused by all kinds of natural disasters in this yea read an affected population of 130 million people, 909 people died or missing, 5,286,000 people relocated in emergency, collapsed housing of 126,000 rooms, severely damaged housing of 284,000 rooms, moderately damaged housing of 984,000 rooms, affected crops of 19,256,900 hectares, destroyed crops of 2,802,000 hectares, and direct economic losses of 327.09 billion CNY.[1]

[1]Statistics in this part are from the China Disaster Database, which is a constructed by the National Disaster Reduction Centre of China (NDRCC), the Ministry of Emergency Management. This database in a comprehensive collection of loss statistics for all types of natural disasters, and its statistical calibre is the total number of natural disaster events in China (excluding Hong Kong, Macao and Taiwan) that caused damage.

In terms of the occurrence of the various disasters, floods and geological disasters were the main causes for deaths and missing people and direct economic losses in 2019.

Floods and geological hazards accounted for 72.4 % of the total death toll (including both dead and missing), followed by hail and typhoons at 10.1% and 8.1% respectively. Floods and geological hazards accounted for 58.8 % of direct economic losses, followed by typhoons and droughts with 18 % and 14 %, respectively. Hail, earthquake, low temperature and freezing hazard and snow disasters accounted for a relatively small share (Figures 2-1, 2-2).

1.3 million people

affected by natural disasters of all types throughout the year

909 people

dead or missing

3270.9 billion CNY

direct economic losses

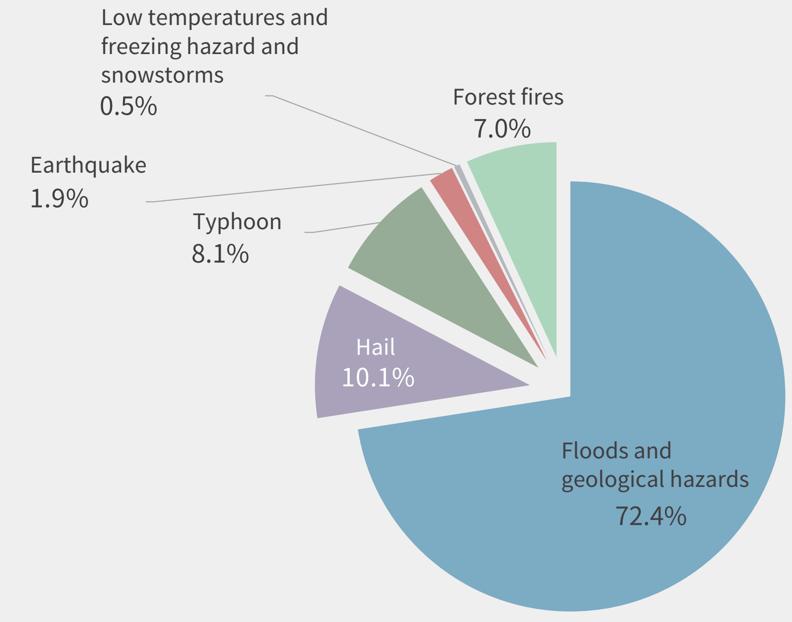


Figure 2-1 Percentage of dead and , missing persons by disaster type in China, in 2019

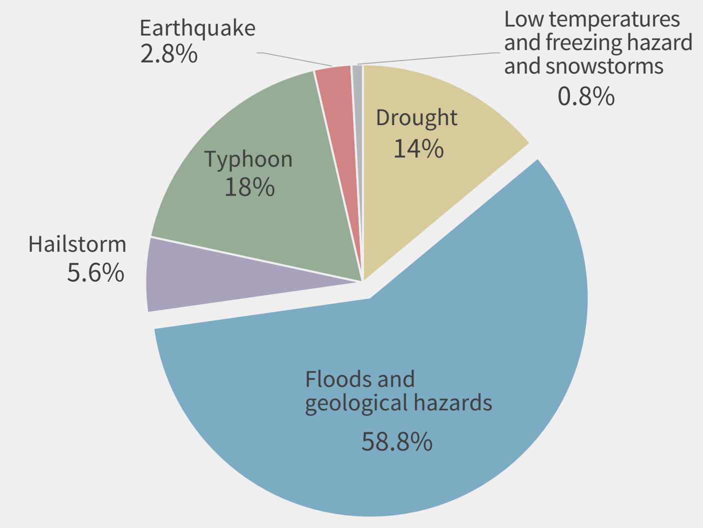


Figure 2-2 Percentage of direct economic losses by disaster type in China in 2019

Table 2-1 Top 10 natural disaster events in China in 2019

Events	dead and missing people(person)	direct economic losses(100 million CNY)
(1) Super Typhoon Lekima	70	515.3
(2) Flood in 6 southern provinces (autonomous regions), including Guangdong, Guangxi, Jiangxi, et al., in early and mid June.	98	231.8
(3) 7-23 catastrophic landslide in Shuicheng, Guizhou	52	1.9
(4) 8-20 heavy rainfall in Sichuan with severe flash floods and mudflow	45	158.9
(5) Floods in the middle and lower reaches of the Yangtze River in early and mid mid-July	40	324.3
(6) Summer-autumn-winter drought in southern China		189.9
(7) Ms. 6.0 earthquake in Changning, Sichuan	13	56.2
(8) 3-30 forest fire in Muli, Sichuan	31	
(9) 3-15 landslide in Xiangning, Shanxi	20	0.21
(10) Snowstorm in Yushu and other places in Qinghai		2.1
Total losses from the top 10 events	369	1480.6
Percentage of losses from the top 10 events	41%	45%

1

From an overall view in 2019, Jiangxi, Hunan, Shandong, Sichuan, Zhejiang, Hubei, Yunnan, Shanxi, Guangxi and Anhui , as many as 10 provinces (autonomous regions), suffered relatively more severe impact from natural disasters, where Jiangxi, Hubei, Shandong and Sichuan suffered more than other provinces (Figures, 2-4 and 2-5).

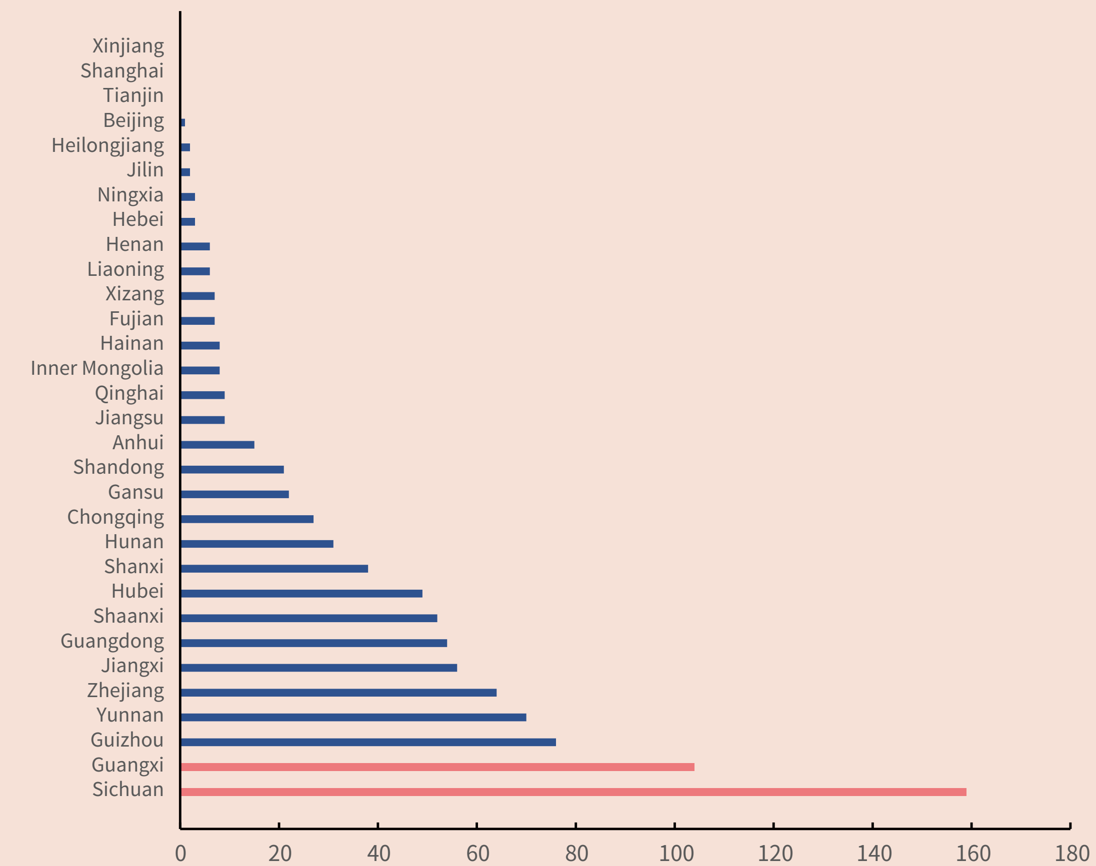


Figure 2-4 **Deaths and missing persons caused by natural disasters by province in China in 2019 (unit: persons)**

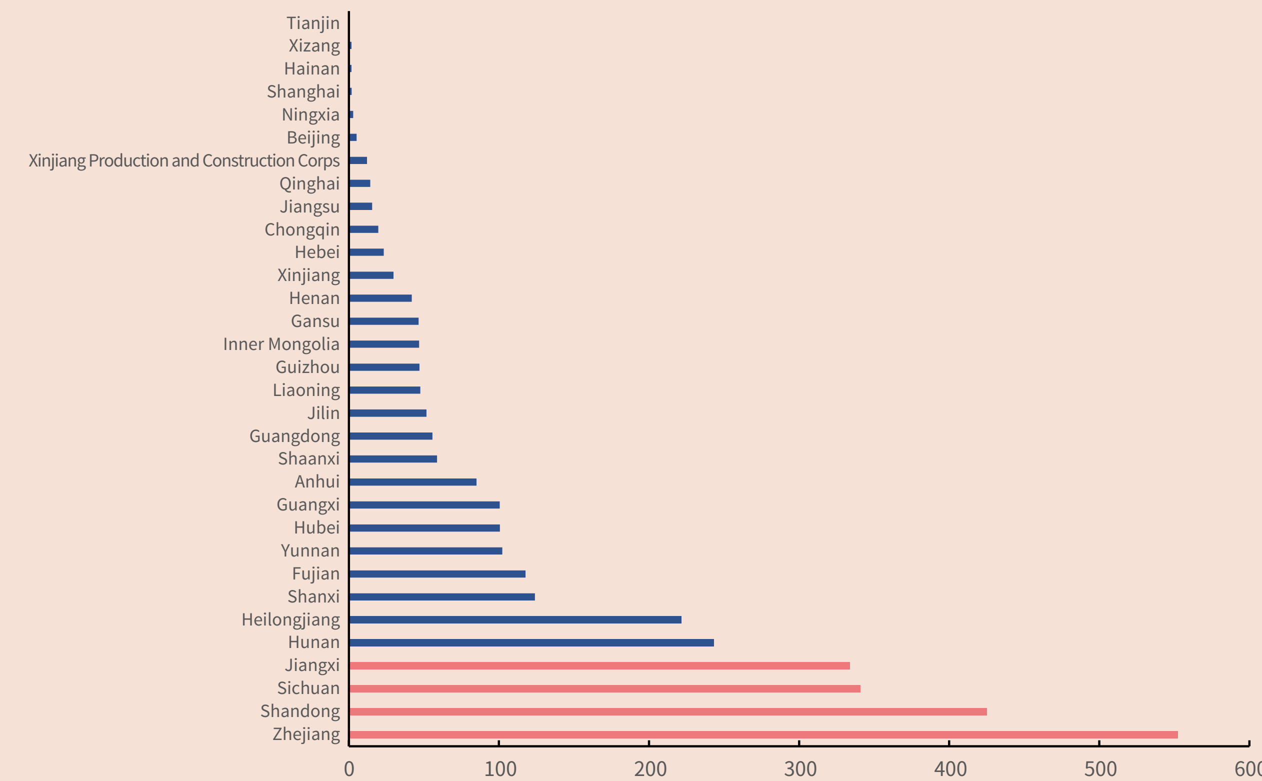


Figure 2-5 **Direct economic losses caused by natural disasters by province in China in 2019 (unit: 100 million CNY)**

1

1.1

More floods in south and north China while less in the central region. Frequent occurrence of geological hazards in central-south and southwest China.

In 2019, most parts of China's had higher precipitation than usual years, with an overall characteristic of "more in the north and south, less in the middle".Six major river basins, including the Yangtze River, the Yellow River, the Huai River, the Pearl River, Songliao, and Taihu Lake, had total 14 numbered floods, and counts of rivers beyond the warning line or the protection line were the highest since 1998. Between June and August,several rounds of rainfall in the south were concentrated and overlapping, with the main rainfall belt staying within Guangxi, Jiangxi, Hunan and nearby places, resulting in severe floods in five provinces (autonomous regions) of Guangxi, Jiangxi, Hunan, Guizhou and Sichuan, Floods in these regions caused heavy casualties and serious direct economic losses, whose direct economic losses accounted for 46% of the total national flood losses. From July to August, continuous heavy rainfall hit the northwest and northeast, and many rivers, such as the Heilongjiang and Songhuajiang, exceeded the warning level, causing extensive damage to crops. The amount of rainfall in Shaanxi and Gansu exceeded 50 to 80 percent to the same period in history, and direct economic losses from floods flooding in Heilongjiang, Shaanxi and Gansu provinces accounted for 12% of the country's total flood losses. Rainfall during the flooding season in Jiangsu, Anhui, Hubei, Henan, Shandong and other provinces north of the Yangtze River to the Yellow River was significantly lower than usual during the same period, and flood losses were at a low level, compared with recent years. In addition,total 6,117 geological hazard events occurred nationwide due heavy rainfall and related factors, which decreased by 21% to the average level for the past five years. Specifically, central and southern regions of China had the most geological disaster events while southwest China suffered the most losses and fatalities, where the Shuicheng catastrophic landslide in Guizhou caused severe losses of lives. From a macro view, losses caused by floods and geological hazards demonstrate a decreasing trend in 2019, where the death toll (including both dead and missing) dropped by 50% compared to the annual mean since 2000.

1.2

Less typhoons made landfall than usual year while super typhoon Lekima caused severe impact.

In 2019, total 29 typhoons were generated in the Northwest Pacific and South China Sea, with 2.2 more counts than the annual average (26.8). Among them, 5 made landfall in China,2 less than the annual average (7), with an average landing wind speed of 30.6 m/s (grade 11),less than the annual average of 32.6 m/s (grade 12). Although typhoons that made landfalls were generally weaker than usual years, super typhoon "Lekima" (no. 1909) demonstrated clearly extreme characteristics, which was the 5thstrongest typhoon among all typhoons that made landfalls in mainland China since 1949. Lekima had a maximum wind speed of 52m/s (grade 16) near its center at the time of its landing, and it brought extremely heavy rainfall to Zhejiang, Anhui, Jiangsu and Shandong, where precipitation in some local regions reached 350 to 600 mm, far beyond their historic extremes. Affected by Lekima, 2.097 million people in these 9 provinces were relocated in emergency and collapsed housing reached 149,000 rooms. In addition, this year had fewer typhoons that moves westward and inland. Except super typhoon Lekima in August and typhoon Mitag in October which brought heavy rainfall to Zhejiang and Jiangsu, no other typhoons moved deep into the middle and lower reaches of the Yangtze River, which exacerbated drought in this region due to the lack of typhoon rainfall.

1

1.3

Regional drought occurred in periods. Summer-autumn drought hit the south severely.

Two successive droughts occurred regionally in periods, that were, the winter-spring one and the summer-autumn one. From February to May, northeast China suffered spring drought, and most parts of Yunnan and southern part of Sichuan suffered winter-spring drought, where Yunnan had a peak statistics of over 1.7 million people in need of relief due to drought. From May to August, the Jianghuai and Huanghuai regions sustained high temperature and little rain, and Shanxi and Henan had severe seasonal summer drought, where Shanxi had a peak statistics of 1.95 million people in need of relief. Since late July, precipitation in eastern Hubei, central-east Hunan, most of Jiangxi, southern Anhui and north-central Fujian droped by 50 to 90 percent to the same period since 1961, while temperature in these areas was higher, which resulted in the most severe summer-autumn drought in Hubei, Hunan, Jiangxi and Anhui within recent 40 years. The peak statistics of these four provinces read a population of 6.5 million people in need of relief and direct economic losses of 18.2 billion CNY, which accounted for 51% and 40% of the country's total drought losses, respectively. In general, although drought caused a reduction in the production of cash and food crops in some areas, the overall precipitation and reservoir storage situations nationwide were relatively well (the total storage capacity of 6,920 reservoirs was 473.3 billion cubic meters, 13% higher than the same period in history). Specifically, mid-term and late rice, which had irrigation conditions and was not been affected, had an increase on production that can make up for drought losses due to well light conditions, low pest and disease occurrence and high fertility rates. Compared with the annual mean of the past five years, people in need of livelihood relief due to drought increased by 65% in 2019, while area of affected crops and direct economic losses decreased by 22% and 4%, respectively.

Hubei, Hunan, Jiangxi and Anhui had sustained the most severe autumn-winter continuous drought in the recent 40 years.

6.5 million

people in need of livelihood relief

18.2 billion

direct economic losses

1.4

Seismic activity was more active in the western region, with heavy losses in Sichuan.

Total 20 earthquakes of magnitude above Ms. 5.0 occurred in mainland China in 2019, which increased by 4 quakes to the annual mean of the recent five years (16). However, the overall intensity was weak, and there were only two earthquakes of magnitude between Ms. 6.0 and Ms. 7.0 and no quakes of magnitude above Ms. 7.0. West China sustained over 85% of quakes of magnitude above Ms. 5.0 in mainland China. Among all earthquakes in this year, the Ms. 6.3 Medog County earthquake on April 24 in Xizang had the highest magnitude and caused a few houses slightly cracked and damaged. The Ms. 6.0 Changning County earthquake on June 17 in Sichuan (followed by 4 successive aftershocks of magnitude above Ms. 5.0) caused the most severe impact, with 13 fatalities, collapsed housing of over 3,500 rooms, and damaged housing of 223,000 rooms. The Ms. 5.4 Weiyuan County earthquake on September 8 in Sichuan also caused certain casualties and losses. In addition, some earthquakes also caused certain impact, including the Rong County earthquakes of Ms. 4.7, Ms. 4.3 and Ms. 4.9 from February 24 to 25 in Sichuan, the Songyuan earthquake of Ms. 5.1 on May 18 in Jilin, the Xiahe earthquake of Ms. 5.7 October 28 in Gansu, the Jingxi earthquake of Ms. 5.2 on November 25 in Guangxi, and the Yingcheng earthquake of Ms. 4.9 on December 26 in Hubei. Overall, Sichuan suffered the most severe earthquake impact, with 16 fatalities and direct economic losses of 6.4 billion CNY, which accounted for 94% and 70% of national losses, respectively.

2019 Sichuan Earthquake

16 Persons

Death Toll

6.4 billion CNY

Direct Economic Loss

1.5

Hail demonstrated relatively concentrated temporal-spatial pattern, and disaster impact for low temperature and freezing hazard and snowstorm was significantly lighter.

Total 37 strong convective weather processes occurred nationwide in 2019, less than the annual mean of the recent five years. Hail disaster demonstrated a pattern of concentrated temporal-spatial distribution. Most events took place between April and August, which accounted for 88% of the total losses, and their distribution concentrated within East China, Central China and North China. Inner Mongolia, Hebei, Tianjin, Beijing, and Liaoning had sustained strong wind of grade over 10, resulting in heavy losses in local areas. For example, a tornado killed 6 people on July 3 in Kaiyuan Economic Development Zone , Tieling City, Liaoning. Most losses for low temperature & freezing and snow disaster occurred in early 2019, and the eastern part of northwest China, northeast China, Huang-huai, Jianghuai, and Jianghan were affected. Crops in parts of Qinghai, Shanxi, Inner Mongolia, Shaanxi, Hunan and Yunnan were affected by low-temperature & freezing and snow disaster. Compared to the annual means of the recent five years, disaster impact of low-temperature & freezing and snow were significantly lighter, with decreases by 70% and 84% for affected crops and direct economic losses, respectively.

Decrease of areas for disaster affected crops.

Decrease of direct economic losses

1.6

Disaster impact of forest and grassland fires remained stable.

Total 2,345 forest fires occurred nationwide in 2019, including 8 serious ones and 1 catastrophic one, and 13,505 hectares of forest was damaged. Compared to statistics in 2018, the number of forest fires dropped by 133 and decreased by 5.4 %, and the area of affected forests dropped by 2804 hectares and decreased by 17.2 %. Total 45 grassland fires occurred nationwide, including 1 serious one and 2 catastrophic ones, which both were triggered by fires outside China. The area of affected grassland was about 66,705 hectares.

Reduction in the number of forest fires

Reduction in the area of damaged forests

2

Trend analysis of disaster indicators in China

2.1

Significant decline on the death toll

Disaster caused death toll in 2019 decreased by 60% compared to the annual mean of 2000 to 2018. Since 2000, China has witnessed a significant decline of disaster caused death toll (including both dead and missing). The annual mean of death tolls of 2000 to 2018 was 2,289, while the death toll in 2019 was 909, which decreased by 60% to the former mean value.

[2] The annual mean of national death toll (including both dead and missing) excluded statistics of the catastrophic year of 2018.

2.2

Significant decline in the number of affected population per 100,000 people

In 2000-2018, the annual mean of China's affected population per 100,000 people3 was 25,871, while in 2019 China's affected population per 100,000 people was 9,860, which decreased by 62% to the annual mean.

[3]The annual mean of affected population per 100,000 people excluded statistics of the catastrophic year of 2018.

25871

Annual mean of affected population per 100,000 people of 2000 to 2018 in China

9860

Affected population per 100,000 people in 2019 in China

62%

Decrease to the annual mean of 2000 to 2018

Figure 2-6 Death toll (including both dead and missing) by year from 2000 to 2019 (unit: person)

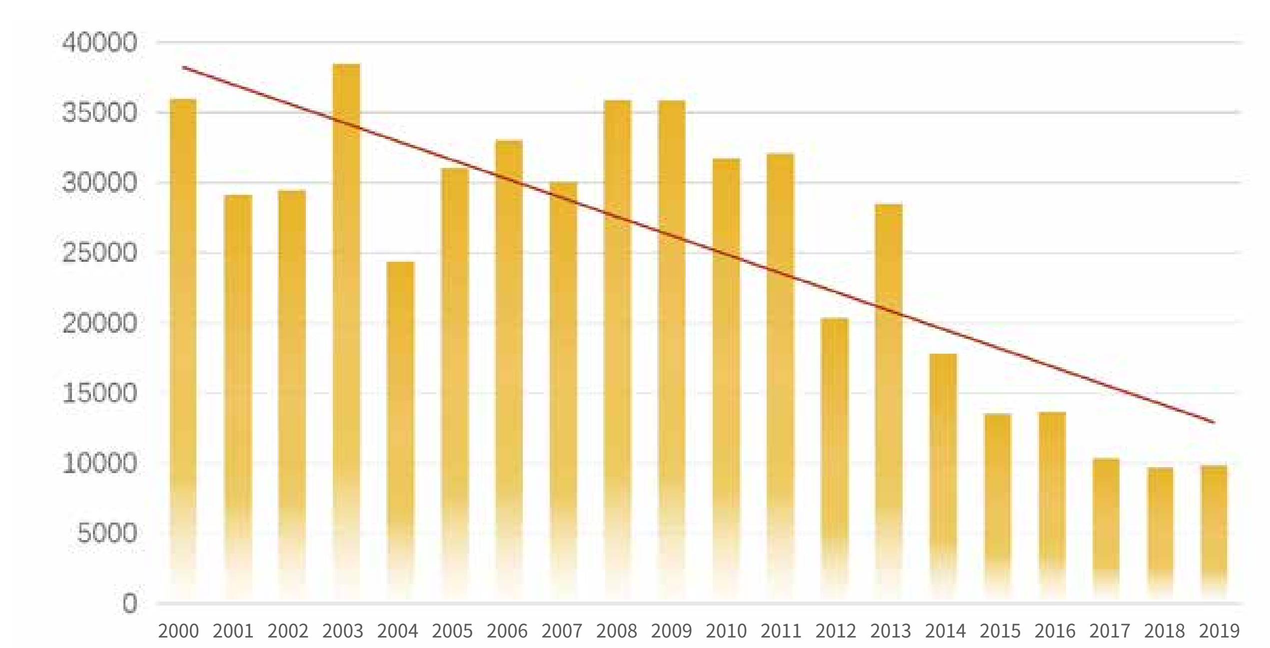


Figure 2-7 Affected population per 100,000 people by year from 2000 to 2019 in China (unit: persons per 100,000 people)

2.3

Significant decline on fatalities per 100,000 population

During 2000 to 2018, China's annual mean of fatalities per per 100,000 population[4] was 0.172, while such ratio in 2019 was 0.065, which decreased by 62% to the annual mean.

[4]The annual mean of fatalities per 100,000 population excluded statistics of the catastrophic year of 2018.

2.4

Significant decline on ratio of direct economic losses over GDP

During 2000 to 2018, China's annual mean of ratios of direct economic losses over GDP[5] was 0.95%, while such ratio in 2019 was 0.33%, which decreased by 65% to the annual mean.

[5]The annual mean of ratios of direct economic losses over GDP excluded statistics of the catastrophic year of 2018.

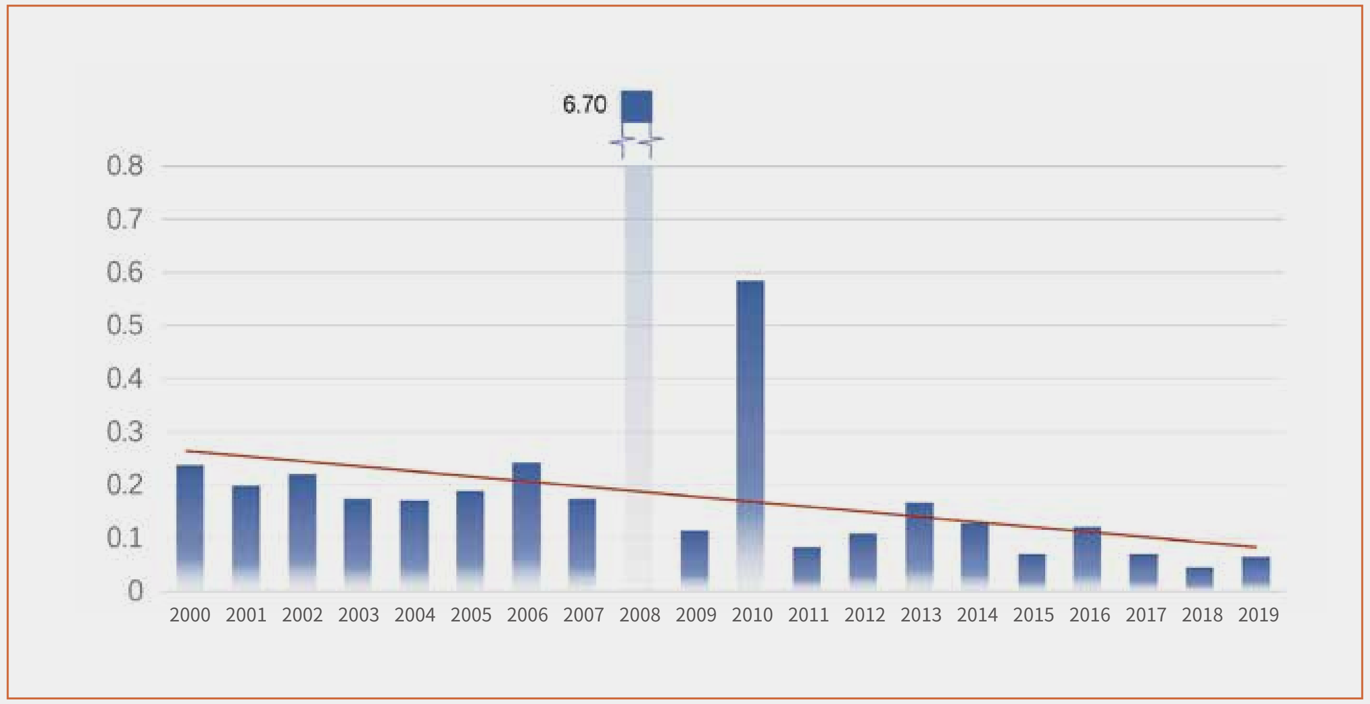


Figure 2-8 Fatalities per 100,000 population by year from 2000 to 2019 in China (unit: person per 100,000 population)
(unit: person per 100,000 population)

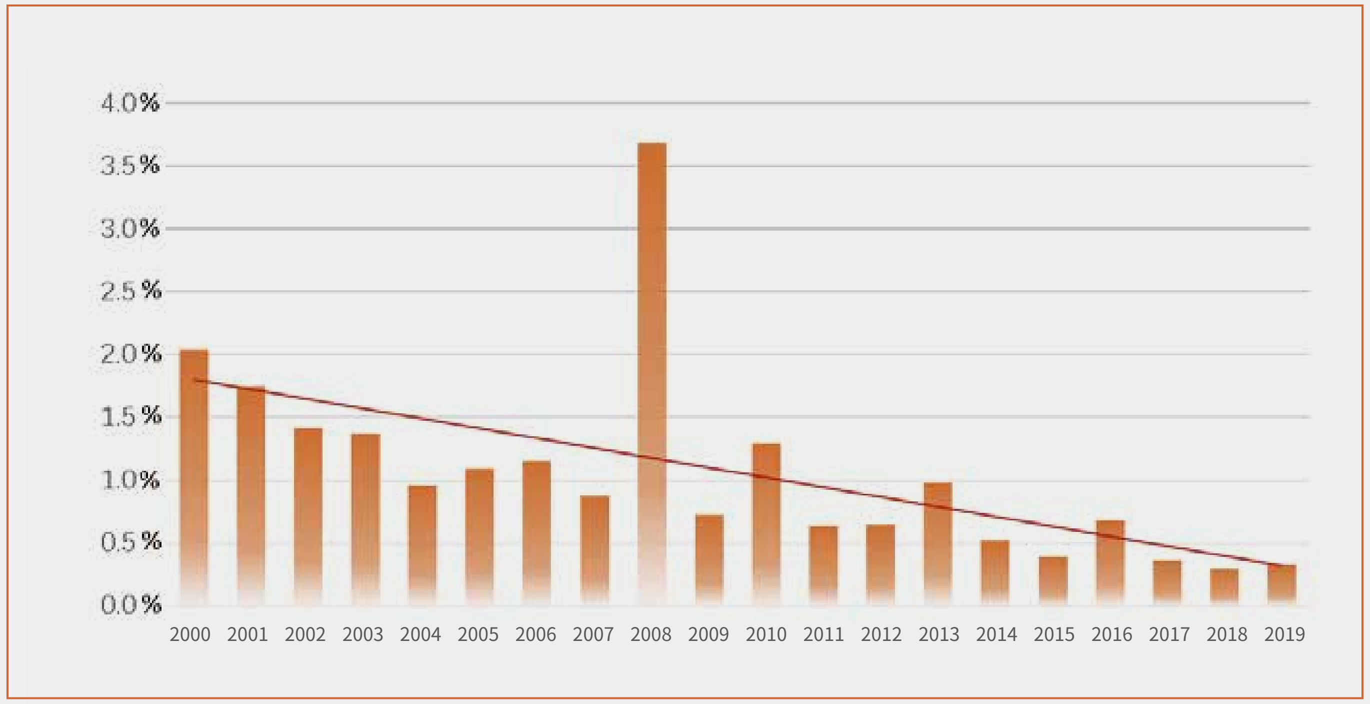
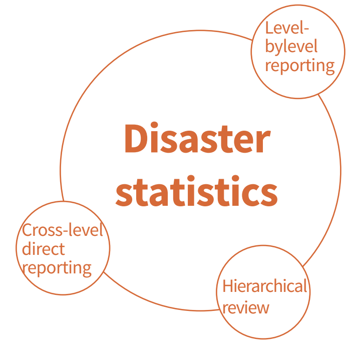


Figure 2-9 Ratio of direct economic losses over gross domestic products (GDP) by year from 2000 to 2019 in China (unit:%)

3

Disaster statistics in China

Disaster statistics play a fundamental role for disaster emergency response and risk management as information support, which can provide an important basis for decision and policy making. The Chinese government attaches great importance to natural disaster statistics and has established a six-level disaster statistics system, namely, "nation-province-city-county-township-village", through long-term and sustainable construction. Besides, China has set up a team of disaster information officers and staff, covering over 750,000 people in urban and rural communities nationwide, and built an efficient "Internet+Disaster information" statistics and service support platform. Moreover, an institutionalized, systematic and IT-based disaster statistics system has been established, which plays a fundamental role in China's governance system of disaster prevention, mitigation and relief.



3.1

Brief introduction

The Chinese government has long attached great importance to disaster statistics as a basis for disaster response and risk management. In 1995, in compliance with the Statistical Law of the People's Republic of China, the Ministry of Civil Affairs and the National Bureau of Statistics promulgated the Regulation of Natural Disasters Statistics, which was a milestone for the establishment of institutionalization, standardization and systematization of disaster statistics in China. The regulation defines the subject, process, content and time limit for disaster information reporting, and designs a comprehensive, complete and logical system of statistical indicators and forms. The regulation is regularly revised in accordance with changes in the pattern of disaster occurrence and economic and social development in China, in order to adapt to the development of disaster prevention and mitigation. Meanwhile, national standards for natural disaster statistics have been promulgated in series, which further promotes the standardization of disaster statistics. In 2020, the Ministry of Emergency Management and the National Bureau of Statistics promulgated the newly revised Regulation of Natural Disasters Statistics and Investigation to fully adapt to the new era of disaster statistics.

In terms of statistical procedure, China constructed a system of "level-by-level reporting, hierarchical review and cross-level direct reporting". The emergency management departments at four levels, namely, ministry, province, city, and county, are subjects responsible for the disaster statistics, and under the framework of the disaster reduction committees at their respective levels, they should review disaster statistics with the disaster-related departments of meteorology, hydrology and natural resources, etc.. The town and village levels should arrange full-time disaster information officer and staff to perform disaster statistics. Ordinary disaster events (or cases) should be reported level by level under the regulation and follow defined time limit, where each level needs to review data reported from its lower levels. Critical event will active the cross-level direct reporting mechanism, which can be reported directly from the county and township level to the ministry and provincial level. Such procedure is illustrated in the figure below.

Six-level operational framework

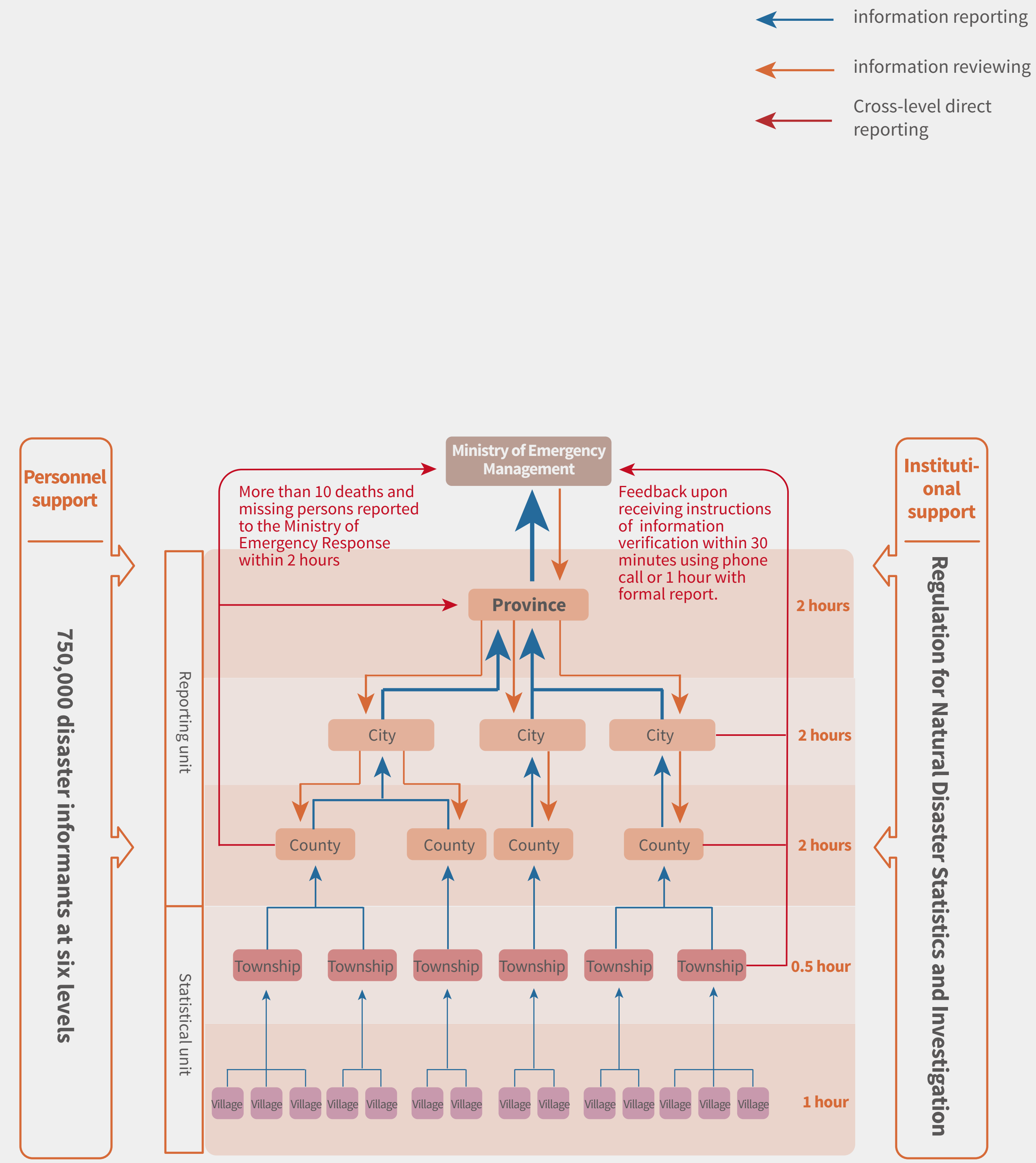


Figure 2-10 The hierarchical system of disaster statistics in China.

From the view of statistical range, the regulation covers two dimensions, namely, disaster losses and relief inputs, and disaster statistics are divided into three categories, that are, briefing report, annual report, and winter-spring relief report. The briefing reports are designed for statistics of disaster cases that result in losses, no matter major ones or minor ones, and they cover a wide range of disaster types, including flood, drought, typhoon, hail, low temperature & and freezing hazard, snowstorm, dust storm, earthquake, geological disasters, marine disasters, forest and grassland fires and major biological disaster. The annual report is designed as a survey of all losses within the year, and the winter-spring relief report is used for statistics of people in need of relief and people issued with relief. Such three reports summarize the contents of disaster emergency response, disaster relief and risk management, and provide basic information to support the above works.

In terms of statistical content, the regulation designed a complete system with 7 forms and 3 rolls, including Form of briefing report of natural disaster losses, Form of briefing report of natural disaster relief inputs, Roll of dead and missing people caused by natural disaster, Roll of damaged housing caused by natural disaster, and so on. On the basis of the standardized collection of reports on disaster losses and relief inputs, detailed information is supplemented by rolls, such that indicators death toll and damaged houses are detailed to individual information. The regulation defines a complete series of near 130 indicators, which cover disaster losses on population, crops, housing, and economy and disaster relief inputs on supplies, funds, and people in need of relief. They provide a comprehensive and objective measure of disaster losses. In addition, in response to the dynamic characteristics of natural disasters, the regulation designed a procedure of process reporting, which is composed of first report, update report, and final report. The first report should be reported from the town level to the county level within 1.5 hours after a disaster event happened. The update report is updated every 24 hours until no more losses are caused by this disaster event. The final report is generated after the event is over as a final review of all losses.

Disaster Types

Flood disaster
Drought disaster
Typhoon disaster
Hailstorm disaster
Low temperatures and freezing hazard
Snowstorm disaster
Sandstorm disaster
Earthquake disaster
Geological disaster
Marine disaster
Forest and grassland fires
Biological disaster

Periodical disaster statistics

Annual disaster statistics

Winter-Spring relief statistics

Relief in need
Relief received

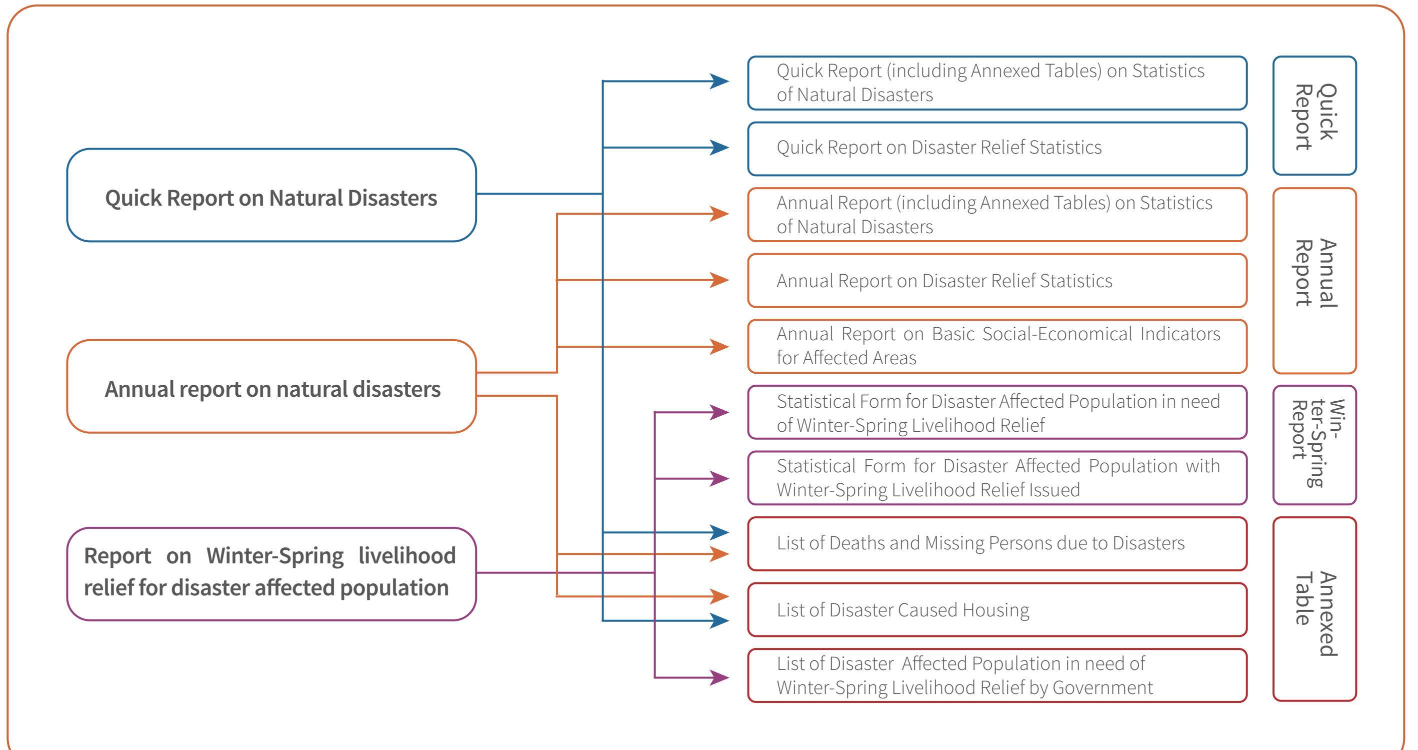


Figure 2-11 System of forms for disaster statistics

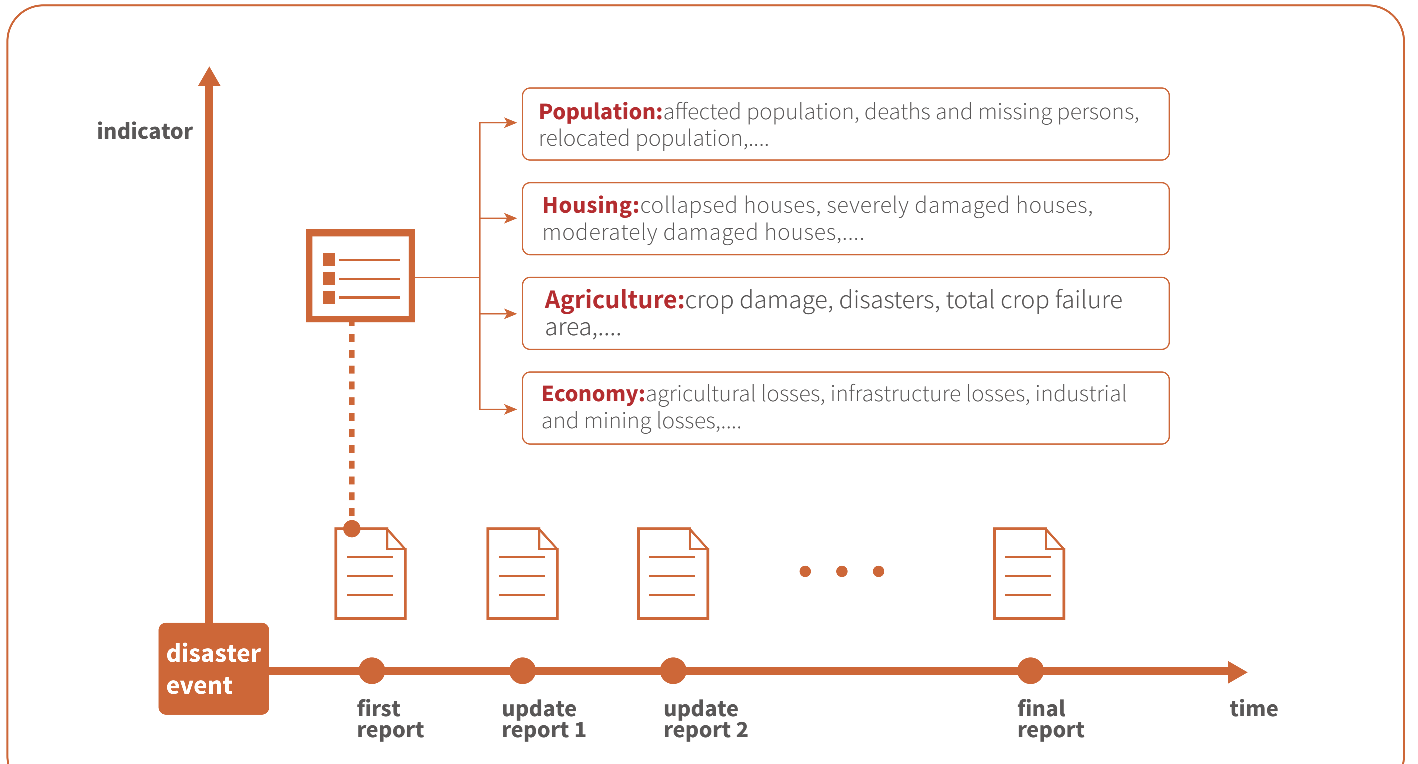


Figure 2-12 Diagram for statistics of disaster process

3.2

System support

In order to systematically support timely, standardized and accurate statistics of various natural disasters throughout the country, China has constructed a complete system for disaster statistics through dimensions of both human and technical resources.

In terms of human resources, China has built a team of disaster information officers and staff, which cover all six administrative levels, namely, ministry, province, city, county, town, and village. They distribute in urban and rural communities nationwide and are responsible for statistics, reporting and verification of disaster information at all levels. Among them, disaster information officers at the ministry, province, municipal and county levels are from emergency management departments at corresponding level, and those at the town and village levels are local government staff. To ensure that disaster information officers and staff at all levels are familiar with disaster statistics and information systems, China has established a level-by-level training mechanism that includes both on-site and online models. The Ministry of Emergency Management conducts training for provincial and municipal levels, and provinces and cities are responsible for training officers and staff at the county, town and village levels. By such mechanism, a total of more than 750,000 disaster information officers and staff could receive at least one time of training per year. At the same time, the Ministry of Emergency Management has built a national database of disaster information officers and staff, which achieves online management and dynamic update of all registered contact information, as well as verticalized and flattened command and dispatch capabilities in sudden major disasters.

In terms of technical resources, China has built a National Natural Disaster Information Management System(NNDIMS) covering all administrative units of town level and above, which has formed a six-level of "ministry-province-city-county-town-village" for informational, networked and online disaster statistics. The system provides online operational support by private cloud service for more than 50,000 users to conduct disaster statistics and management at all levels. It provides continuum service on both desktop and mobile platforms with 7×24-hour uninterrupted supports, with access to fiber-optic broadband network, mobile Internet and satellite network. The system could receive more than 100,000 disaster cases, 2TB of data and more than 10 million form items per year on average. Besides, through Beidou satellite technology, the system also supports to receive Beidou short message information for emergency in case of interruption of regular communication.

Figure 2-13 China's "Internet+Disaster" statistics information support structure

3.3

Achievement

Through continuous improvements of regulation, measure and granularity for disaster statistics, China has accomplished significant achievement on disaster information collection and reporting, which plays an important and supporting role in disaster prevention, mitigation and relief governance system. China has established a six-level system of "nation-province-city-county-town-village" for disaster statistics, and established a team of disaster information officer and staff, which covers 750,000 people in urban and rural communities across the country, with basic information managed in networked database. China has also established a comprehensive national disaster information management system across various networks and terminals, which can realize regularized, operational and integrated disaster reporting in all administrative units of townships and above. By such actions and systems, China has built up the so-called "Internet+Disaster" information support platform for statistics and service. By now, more than 90% of disasters incidents (including floods, earthquakes, typhoons, geological hazards, etc.) can be reported within 24 hours upon occurrence in China, even for Xinjiang, Tibet and other remote border areas. Among them, the proportion of timely reports within six hours is nearly 50%. For sudden major events, on-site information can be obtained within 30 minutes through emergent dispatch and communication of disaster information officers and staff. Additionally, long-term, serial, high-resolution case database of disaster events has been built, forming "Space-Air-Ground" integrated disaster on-site information acquisition capability.

Appendixes

04

Appendix I

Top 50 natural disasters in terms of global deaths and direct economic losses, 1989-2019

Top 50 natural disasters in terms of global deaths, 1989-2019

Number	Time	Countries or regions affected	Disaster type	Number of deaths (persons)	Direct economic losses (US$ 1 billion , current year prices)
1	2010/1/12	Haiti	Earthquakes	222570	80
2	2004/12/26	Indonesia	Earthquakes	165708	44.516
3	1991/4/29-5/10	Bangladesh	Storm	138866	17.8
4	2008/5/2-3	Myanmar	Storm	138366	40
5	2008/5/12	China	Earthquakes	87476	850
6	2005/10/8	Pakistan	Earthquakes	73338	52
7	2010/6/-2010/8/	Russia	Extreme heat	55736	4
8	1990/6/21	Iran	Earthquakes	40000	80
9	2004/12/26	Sri Lanka	Earthquakes	35399	13.165
10	1999/12/15-12/20	Venezuela	Floods	30000	31.6
11	2003/12/26	Iran	Earthquakes	26796	5
12	2003/7/16-8/15	Italy	Extreme heat	20089	44
13	2001/1/26	India	Earthquakes	20005	26.23
14	2010/2/-2011/11/	Somalia	Drought	20000	0
15	2011/3/11	Japan	Earthquakes	19846	2100
16	2003/8/1-8/20	France	Extreme heat	19490	44
17	1999/8/17	Turkey	Earthquakes	17127	200
18	2004/12/26	India	Earthquakes	16389	10.228
19	2003/8/1-8/11	Spain	Extreme heat	15090	8.8
20	1998/10/25-11/8	Honduras	Storm	14600	37.936
21	1999/10/28-10/30	India	Storm	9843	25
22	1993/9/29	India	Earthquakes	9748	2.8
23	2003/8/-2003/8/	Germany	Extreme heat	9355	16.5
24	2015/4/25	Nepal	Earthquakes	8831	51.74
25	2004/12/26	Thailand	Earthquakes	8345	10

Top 50 natural disasters in terms of global deaths, 1989-2019

Number	Time	Countries or regions affected	Disaster type	Number of deaths (persons)	Direct economic losses (US$ 1 billion, current year prices)
26	2013/11/8	Philippines	Storm	7354	100
27	2013/6/12-6/27	India	Floods	6054	11
28	1991/11/5-11/8	Philippines	Storm	5956	1
29	2006/5/26	Indonesia	Earthquakes	5778	31
30	1995/1/17	Japan	Earthquakes	5297	1000
31	1998/5/30	Afghanistan	Earthquakes	4700	0.1
32	2018/9/28	Indonesia	Earthquakes	4340	14.5
33	2007/11/15-11/19	Bangladesh	Storm	4234	23
34	1997/11/2-11/4	Vietnam	Storm	3682	4.7
35	1998/7/1-8/30	China	Floods	3656	300
36	1998/10/25-11/8	Nicaragua	Storm	3332	9.877
37	2015/6/29-8/9	France	Extreme heat	3275	0
38	2010/4/14	China	Earthquakes	2968	5
39	1998/6/9-6/11	India	Storm	2871	4.69
40	1996/6/30-7/26	China	Floods	2775	126
41	2004/9/17-9/18	Haiti	Storm	2754	0.5
42	2003/8/-2003/8/	Portugal	Extreme heat	2696	0
43	2004/5/23-6/1	Haiti	Floods	2665	0
44	1998/5/26	India	Extreme heat	2541	0
45	1992/12/12	Indonesia	Earthquakes	2500	1
46	1990/7/16	Philippines	Earthquakes	2412	3.696
47	1998/2/4	Afghanistan	Earthquakes	2323	0.1
48	1997/10/19-11/17	Somalia	Floods	2311	0
49	2003/5/21	Algeria	Earthquakes	2266	50
50	1999/9/21	China	Earthquakes	2264	141

Top 50 natural disasters in terms of global direct economic losses, 1989-2019

Number	Time	Countries or regions affected	Disaster type	Direct economic losses (US$ 1 billion , current year prices)	Number of deaths (persons)
1	2011/3/11	Japan	Earthquakes	2100	19846
2	2005/8/29-9/19	United States	Storms	1250	1833
3	1995/1/17	Japan	Earthquakes	1000	5297
4	2017/8/25-8/29	United States	Storms	950	88
5	2008/5/12	China	Earthquakes	850	87476
6	2017/9/20	Puerto Rico	Storms	680	64
7	2017/9/10-9/28	United States	Storms	570	58
8	2012/10/28	United States	Storms	500	54
9	2011/8/5-2012/1/4	Thailand	Floods	400	813
10	1998/7/1-8/30	China	Floods	300	3656
10	2010/2/27	Chile	Earthquakes	300	562
10	2008/9/12-9/16	United States	Storms	300	82
10	1994/1/17	United States	Earthquakes	300	60
14	2004/10/23	Japan	Earthquakes	280	40
15	1992/8/24	United States	Storms	265	44
16	2019/10/10-10/17	United States	Wildfire	250	3
17	2016/6/28-7/13	China	Floods	220	289
18	2008/1/10-2/5	China	Temperature extremes	211	129
19	1999/8/17	Turkey	Earthquakes	200	17127
19	2016/4/16	Japan	Earthquakes	200	49
19	2012/6/-2012/12/	United States	Drought	200	0
22	2010/5/29-8/31	China	Floods	180	1691
22	2004/9/15-9/16	United States	Storms	180	52
24	2019/10/12-10/17	Japan	Storms	170	99
25	2018/11/8-11/16	United States	Wildfire	165	88
26	2014/9/	India	Floods	160	298
26	2018/10/10-10/11	United States	Storms	160	45

Top 50 natural disasters in terms of global direct economic losses, 1989-2019

Number	Time	Countries or regions affected	Disaster type	Direct economic losses (US$ 1 billion , current year prices)	Number of deaths (persons)
26	2005/9/23-10/1	United States	Storms	160	10
26	2004/8/13	United States	Storms	160	10
30	2012/5/20	Italy	Earthquakes	158	7
31	2011/2/22	New Zealand	Earthquakes	150	181
31	1995/8/1-9/8	Korea	Floods	150	68
33	2005/10/24	United States	Storms	143	4
34	1999/9/21	China	Earthquakes	141	2264
35	2011/5/20-5/25	United States	Storms	140	176
35	2018/9/12-9/18	United States	Storms	140	53
37	1994/1/-1994/12/	China	Drought	138	0
38	2017/10/8-10/20	United States	Wildfire	130	30
39	2013/5/28-6/18	Germany	Floods	129	4
40	1996/6/30-7/26	China	Floods	126	2775
41	2018/9/4-9/5	Japan	Storms	125	17
41	2007/7/16	Japan	Earthquakes	125	9
43	1993/6/24-8/23	United States	Floods	120	48
44	2002/8/11-8/20	Germany	Floods	116	27
45	2011/4/22-4/29	United States	Storms	110	354
45	2004/9/5	United States	Storms	110	47
47	2013/11/8	Philippines	Storms	100	7354
47	1991/9/27	Japan	Storms	100	66
47	2016/10/7-10/9	United States	Storms	100	49
47	2008/6/9-6/30	United States	Floods	100	24
47	2016/8/9-8/16	United States	Floods	100	13
47	2019/8/10-8/12	China	Storms	100	72
47	2019/7/14-9/30	India	Floods	100	1900
47	2019/3/12-3/28	United States	Floods	100	5

2

Appendix II

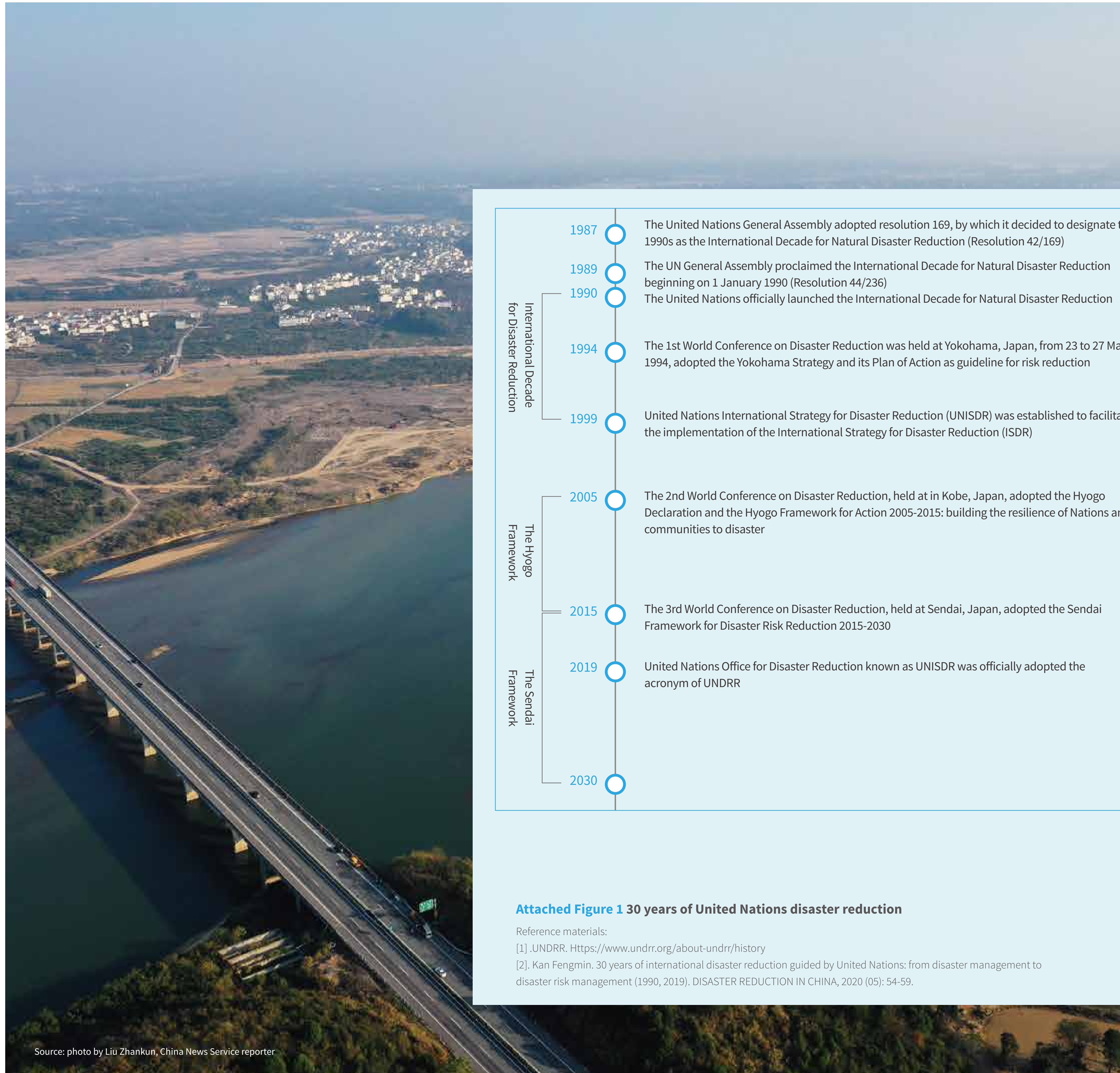
30 years of United Nations disaster reduction

As the United Nations General Assembly recognized the importance of reducing the impact of natural disasters for all people, and in particular for developing countries, an International Decade for Natural Disaster Reduction, beginning on 1 January 1990, was launched by the United Nations, following the adoption of Resolution 44/236 (22 December 1989). The Decade was intended to reduce, through concerted international actions, especially in developing countries, loss of life, poverty damage and social and economic disruption caused by natural disasters.

In 1994, the first World Conference on Disaster Reduction was held at Yokohama, Japan. adopted the Yokohama Strategy and its Plan of Action. To facilitate the implementation of the International Strategy for Disaster Reduction (ISDR), United Nations International Strategy for Disaster Reduction (UNISDR) was established in 1999 as a focal point for the coordination of disaster risk reduction within the United Nations system.

In January 2005, the Hyogo Declaration and the Hyogo Framework for Action 2002-2015: building of disaster-resilient countries and communities to disasters were adopted by the second World Conference on Disaster Reduction, held at Kobe, Hyogo, Japan.

The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the third UN World Conference in Sendai, Japan, on March 18, 2015, which identified four priority areas, seven global goals and 13 guiding principles for disaster risk management. Many commentators have identified the most significant shits as a strong emphasis on disaster risk management from disaster management. In May 2019, the United Nations Office for Disaster Risk Reduction known as UNISDR was officially adopted the acronym of UNDRR.



Source: photo by Liu Zhankun, China News Service reporter

International Decade for Disaster Reduction

- 1987 The United Nations General Assembly adopted resolution 169, by which it decided to designate the 1990s as the International Decade for Natural Disaster Reduction (Resolution 42/169)
- 1989 The UN General Assembly proclaimed the International Decade for Natural Disaster Reduction beginning on 1 January 1990 (Resolution 44/236)
- 1990 The United Nations officially launched the International Decade for Natural Disaster Reduction
- 1994 The 1st World Conference on Disaster Reduction was held at Yokohama, Japan, from 23 to 27 May 1994, adopted the Yokohama Strategy and its Plan of Action as guideline for risk reduction
- 1999 United Nations International Strategy for Disaster Reduction (UNISDR) was established to facilitate the implementation of the International Strategy for Disaster Reduction (ISDR)

The Hygo Framework

- 2005 The 2nd World Conference on Disaster Reduction, held at in Kobe, Japan, adopted the Hygo Declaration and the Hygo Framework for Action 2005-2015: building the resilience of Nations and communities to disaster

The Sendai Framework

- 2015 The 3rd World Conference on Disaster Reduction, held at Sendai, Japan, adopted the Sendai Framework for Disaster Risk Reduction 2015-2030
- 2019 United Nations Office for Disaster Reduction known as UNISDR was officially adopted the acronym of UNDRR
- 2030

Attached Figure 1 **30 years of United Nations disaster reduction**

Reference materials:

[1] .UNDRR. Https://www.undrr.org/about-undrr/history

[2]. Kan Fengmin. 30 years of international disaster reduction guided by United Nations: from disaster management to disaster risk management (1990, 2019). DISASTER REDUCTION IN CHINA, 2020 (05): 54-59.