

# Chapter 6

## Disaster Resilient Future in Korea

**Abstract** The Republic of Korea has not only monumentally progressed socially, economically, and politically since 1948, but has taken the arduous undertaking of reforming the way it reduces disaster risk, mitigates the impact, and prepares for and responds to disasters for a resilient future. The administrative and organizational reforms have not been without its setbacks or obstacles; however, they were not so insurmountable that they could not be overcome by one of Korea's greatest assets: persisting endeavors to build back better and to enhance resilience. Starting with an independent national agency in 2004 to manage natural and human-caused disasters and preparedness, the government quickly realized, through focusing events, it was insufficient to handle the increasing complexity and intensifying of disasters striking the nation. Therefore, through political will and hindsight, it continuously coalesced pertinent disaster management responsibilities into newer and newer agencies until 2016, when it enacted a progressively more ubiquitous and self-propelling agency. However, although the agency is apt for current disasters, it will not be for future disaster, which needs the integration of resilience into Disaster Risk Management (DRM). Therefore, we suggest five tenets on how to make Korea's resilient future as well as for other nations that are and will follow in Korea's footsteps, especially for those nations in Asia and Africa. A future that is resilient against all types of disaster risks, especially being prepared well for "low probability and high impact" focusing events that are located in the long-tail of the Power-law Distribution.

**Keywords** Resilience • Sustainable Development Goals (SDGs) • Climate Change • Ministry of Public Safety and Security (MPSS) • Sendai Framework for Disaster Risk Reduction • Conference of Parties (COP)

### 6.1 Current Disaster Response Institution in Korea

#### 6.1.1 *Background of the Establishment of the Ministry of Public Safety and Security*

Since the establishment of the National Emergency Management Agency (NEMA) in 2004, there has been an institutional development including the revision of the Countermeasures against Natural Disasters Act (2005), which introduced significant

natural disaster prevention policies, and the enactment of the Storm and Flood Insurance Act (2006), which strengthened the private function of voluntary disaster prevention measures. These institutional improvements were governmental activities to meet the increased needs for safety by the public. On the basis of institutional enhancement, the Park Geun-hye Administration, which began in 2013, recognized the importance of integrated disaster and safety management and proposed a goal to strengthen the government's function to protect the lives and safety of the public. To this end, the Ministry of Public Administration and Security was renamed as the Ministry of Security and Public Administration (MoSPA), and the role of coordinating every ministry's disaster and safety policies was authorized to MoSPA. In addition, the tasks dealing with human-caused disasters that NEMA had taken charge of were transferred to MoSPA in 2013. MoSPA revised the Framework Act of Disaster and Safety Management in order to integrate human-caused disaster and social disaster into social disaster in December 2013. Irrespective of these efforts, however, after the successive disasters of the Pangyo collapse accident and the Gyeongju Mauna Ocean Resort Gymnasium collapse accident, the commitment to public safety by the Park Geun-hye Administration was in crisis. It was the Sewol Ferry sinking accident on April 16, 2014, that strongly pushed the Park Geun-hye Administration to innovate the national DRM system.

On April 15, 2014, Sewol Ferry set sail from Incheon carrying 462 passengers, and it was sunk on April 16 near Gwanmae-island, Jindo-gun, Jeollanam-do. When the first report of the accident was received at 8:55 on April 16, the Korea Coast Guard started to operate a rescue center from 9:10 in accordance with the Framework Act of Disaster and Safety Management. At 9:40, the Central Disaster Management Headquarters (CDMHQ), directed by the minister of the Ministry of Oceans and Fisheries, was installed, and at 9:45, the Central Disaster and Safety Countermeasures Headquarters (CDSCHQ), directed by the minister of MoSPA, was set up. However, as there was a communication failure among Rescue Headquarters, CDMHQ, and CDSCHQ, a counting error on the occupants and the rescued occurred. Therefore, a pan-governmental accident control tower, directed by the Prime Minister, was set up on April 17 in order to manage the catastrophic accident. Due to this accident, 295 people out of 476, including the crew and passengers, died and nine people remain missing. The pan-governmental accident control tower was closed on November 18, 2014.

The sinking of Sewol Ferry occurred due to multiple reasons such as unreasonable departure in spite of bad weather, resilience loss due to overloaded luggage, excessive veering, and supervision neglect. Also, problems during rescue operations were revealed:

- Passengers were untrained to escape unassisted;
- Passengers were informed to "Be on standby" instead of "Abandon ship;" and
- Rescue personnel were incapable of spontaneously adjusting their knowledge to the sinking vessel's situation in the fast surface waves and swift current.

As MoSPA revealed the limits in disaster response, such as the insufficient coordination among relevant ministries and agencies, the necessity to improve the National Disaster Corresponding System arose.

### ***6.1.2 Establishment Process***

During the speech related to the Sewol Ferry sinking accident on May 19, 2014, President Park Geun-hye promised the innovation of the national disaster and safety management system: the integration of the disaster and safety functions dispersed throughout the ministries and the establishment of an independent agency to manage and coordinate all types of national disasters. The government then reflected the President's statement on the restructuring of the system and submitted the revision of the Government Organization Act on June 11, 2014, to the National Assembly. This Act was approved at the General Assembly Meeting on November 7 and implemented on November 19, installing the Ministry of Public Safety and Security (MPSS) as a responsible ministry of national disaster and safety management under the Office of Prime Minister (OPM). MPSS's integrated tasks are safety management and social disaster management in the MoSPA; natural disaster management and firefighting in NEMA; and maritime security and prevention of coastal and marine pollution (except for the works on investigations and information of incidents at sea) in Korea Coast Guard. The Minister of the MPSS is authorized to join as a Cabinet member to manage and coordinate the relevant central administrative agencies and to control vice-minister-level directors who are in charge of firefighting works or incidences at sea.

As of March 3, 2017, MPSS has 10,248 employees, including 1053 employees at headquarters. The head of MPSS is minister, and there is one vice minister under the minister. Also, there are vice-minister-level administrators of the Central Fire Service and the Korea Cost Guard. The budget for 2017 is 3.3266 trillion won.

As of March 3, 2017, MPSS manages 39 disaster- and safety-related laws which are shown in Table 6.1.

### ***6.1.3 Implications of the Establishment of MPSS***

The establishment of MPSS, a ministry under the OPM, is meaningful as the first ministerial-level agency to take charge of the overall coordination of natural disaster management, social disaster management, and safety management, and the integration of emergency rescue function on land and sea. The establishment of NEMA in 2004 was meaningful as the first independent agency to deal with natural disaster management, human-caused disaster management, civil defense, firefighting, and emergency rescue on land. However, as a vice-minister level, it had limited power and authorities to coordinate and control all line ministries. As an

**Table 6.1** Korean disaster- and safety-related laws (MPSS 2017)

Corresponding office	The title of laws	Date of enactment	Latest revision
Safety Policy Office (8)	Safety Education Improvement Basic Act	2016.5.29.	2016.5.29.
		No. 14248	No 14248
	Framework Act on Civil Defense	1975.7.25.	2016.1.27.
		No 2776	No 13915
	Pedestrian Safety and Convenience Enhancement Act	2012.2.22.	2015.7.24.
		No 11339	No 13433
	Emergency Resources Management Act	1984.8.4.	2016.5.29.
		No 3745	No 14184
	Manufacture and Management of Elevators Act	1991.12.31.	2016.1.27
	Elevator Facilities Safety Management Act	No 4482	No 13921
	Safety Management Act for Mobile and Permanent Amusement Parks and Attractions	2007.1.26	2016.1.7
		No 8286	No 13750
	Excursion Ship and Ferry Business Act (Nee: '93.12.27.)	1980.1.4.	2017.1.7.
No 3225		No 14532	
Framework Act on the Management of Disasters and Safety	2004.3.11.	2017.1.17.	
	No 7188	No 14553	
Disaster Management Office (10)	Prevention of Steep Slope Disasters Act	2007.7.27.	2017.1.17.
		No 8551	No 14545
	Small River Maintenance Act	1995.1.5.	2016.1.27.
		No 4873	No 13919
	Safety Management Act for Small Scale Public Infrastructures	2015.7.24.	2015.7.24.
		No 13437	No 13437
	Countermeasures Against Natural Disasters Act (Current Name Since '95.12.06.)	1967.2.28.	2017.1.17.
		No 1894	No 14553
	Act on Assistance to the Autonomous Activities of Enterprises for Disaster Mitigation	2007.7.19	2016.5.29
		No 8530	No 14249
	Disaster Relief Act	1962.3.20.	2016.1.7.
		No 1034	No 13753
	Special Act on Services to Prevent Dangers Resulting From Natural Disasters and Measures for Migration	2007.8.3.	2017. 2.8.
No 8585		No 14569	
Reservoir and Dam Safety Control and Disaster Prevention Act	2008.6.5.	2017.1.17.	
	No 9092	No 14545	
Earthquake Recovery Plans Act	2008.3.28	2017.1.17	
Earthquake and Volcano Disaster Recovery Plans Act (Current Name Since '15.07.24.)	No 9001	No 14532	
	2006.3.3.	2014.12.30.	
Storm and Flood Insurance Act	No 7859	No 12945	

(continued)

**Table 6.1** (continued)

Corresponding office	The title of laws	Date of enactment	Latest revision
Central Fire Service Headquarters (14)	Act on 119 Rescue and Emergency Medical Services	2011.3.8.	2016.1.27.
		No 10442	No 13913
	Special Act on the Safety Control of Publicly Used Establishments	2006.3.24.	2016.1.27.
		No 7906	No 13914
	Korea Fire Officials Credit Union Act	1991.11.30.	2015.1.20.
		No 4404	No 13060
	Korean Society of Retired Fire Officials Act	2012.3.21.	2014.11.19.
		No 11404	No 12844
	Fire Officers Act	1977.12.31.	2014.6.11.
		No 3042	No 12750
	Framework Act on Health, Safety and Welfare of Fire Officers	2012.2.22.	2014.11.19.
		No 11341	No 12844
	Framework Act on Fire Services	2003.5.29.	2016.1.27.
		No 6893	No 13916
	Firefighting Industry Promotion Act	2008.6.5.	2014.12.30.
		No 9094	No 12937
	Firefighting System Installation Business Act	2003.5.29.	2016.12.27.
		No 6894	No 14476
Safety Control of Dangerous Substances Act	2003.5.29.	2016.1.27.	
	No 6896	No 13922	
Act for the Establishment on Conscripted Firefighters Agency	2001.8.14	2016.5.29	
	No 6505	No 14183	
Act for the Establishment and Operation on Conscripted Firefighters Agency	2014.1.28	2014.11.19	
	No 12344	No 12844	
Special Act on Management of Disasters in Super High-Rise Buildings and Complex Buildings With Underground Connections	2011.3.8.	2016.1.27.	
	No 10444	No 13926	
Installation, Maintenance, and Safety Control of Firefighting Systems Act (Nee: 2015.01.19)	2003.5.29	2016.12.27	
Fire Prevention, Installation, Maintenance, and Safety Control of Firefighting Systems Act (Current: 2015.01.20.)	No 6895	No 14476	

(continued)

**Table 6.1** (continued)

Corresponding office	The title of laws	Date of enactment	Latest revision
Coastal Guard Headquarters (7)	Stowaways Control Act	1961.12.13.	2014.3.18.
		No 831	No 12421
	Punishment of Minor Offenses Act	1954.4.1.	2016.1.22.
		No 316	No 13813
	Framework Act on Health, Safety, and Welfare of Police Officers	2012.2.22.	2014.11.19.
		No 11334	No 12844
	Water-Related Leisure Activities Safety Act	1999.2.8.	2016.12.7.
		No 5910	No 14476
	Rescue and Aid at Sea and in the River Act (Nee: 2015.07.23)	1961.11.1	2016.1.27
	Search and Rescue at Sea and in the River Act (Current: 2015.07.24.)	No 761	No 13920
	Prevention Act on Costal Accident	2014.5.21.	2014.11.19.
		No 12657	No 12844
	Coastal Guard Act	2012.2.22	2015.2.3
		No 11372	No 13186

ad hoc solution, the Minister of the Ministry of Interior (MoI) took charge of directing the CDSCHQ, and the director of the NEMA took charge as deputy head, which made it hard for NEMA to coordinate and control disaster countermeasures among the line ministries, using its own discretion. In addition, with a revision of the Disasters and Safety Act in 2013, MoSPA took the responsibility of human-caused disaster management from NEMA, and after then, NEMA took charge of only natural disaster management and fire services, which made integrated disaster management weak. Therefore, the foundation of MPSS has implications in developing an integrated disaster and safety management system to deal with all types of disasters, which could solve problems rooted in 2013 and 2014.

The new ministry of MPSS also made it possible to strengthen incident control towers and to enhance an integrated disaster response. In other words, the balance of the national disaster and safety management system could be maintained by establishing a ministry which could manage and coordinate the disaster and safety management policies, which were meted out to each ministry. MPSS developed the Safety Innovation Master Plan (SIMP), which includes all the areas relevant to public safety, by reexamining the overall disaster safety management system in order to prepare the fundamental safety innovation plan. The SIMP, which contains every ministry plan, prepared the standardized framework of disaster safety management and put the realization of safety autonomy forward by supporting safety management by local governments comprehensively. Also, they strengthened safety welfare regarding disaster vulnerable groups like children and women and focused on the settlement of autonomous safety management through national participation.

### **6.1.4 Main Policies of MPSS**

After its establishment, MPSS set up the vision of “A Safe Country, Happy People,” and three targets of “Practicing safety in their daily lives,” “Embodying a culture of safety,” and “Policies prioritizing safety”. It also developed a “Safety Innovation Master Plan,” proposing the strategic direction for the improvement of the Korean disaster and safety management system. The SIMP was established to embrace the demand of the public whose interest of disaster raised after the Sewol Ferry sinking accident. This was done through various ways and successive participation of the private sector like running an advisory panel of civilian experts, collecting ideas from the general public, having meetings with civil society organizations, and having panel discussions with the general public.

The following five strategies for disaster and safety policy development were suggested by the SIMP:

- Reinforcement of safety management control function;
- Reinforcement of on-site disaster response;
- Spread of safety culture in everyday life;
- Expansion of disaster safety infrastructure; and
- Creative safety management by each sector

In accordance with the Master Plan, MPSS has been improving the national disaster and safety management system with the following policies:

First, MPSS constructed an integrated disaster management system to reinforce the control function and clarified roles and responsibilities of each Headquarters: CDSCHQ, CDMHQ, Local Disaster and Safety Countermeasure Headquarters (LDSCHQ), and Local Disaster Management Headquarters (LDMHQ). It also innovated a disaster response system: i.e., disaster response manuals were enhanced from complicated and paper-centered into simplified and action-oriented.

Second, MPSS has reinforced on-site response capabilities in order to secure the golden time, 30 min on land and 1 h at sea, and strengthened the disaster management capabilities of the local government, which is the priority at the disaster scene. To secure the golden time, MPSS divided the land into four areas with independent 119 Special Rescue Teams in each area and divided the sea into five areas, covered by three Special Marine Rescue Teams, along with a prompt call out system. For strengthening the disaster management capabilities of local governments, MPSS supported local governments to strengthen their official’s disaster management capabilities through providing education and training opportunities and to set up an exclusively professional disaster and safety management office. It also developed the Local Safety Index to induce local governments to check safety levels by themselves objectively, and to implement improvement measures for the disaster vulnerable parts autonomously. Moreover, MPSS enhanced disaster preparedness training by putting stress on the organizational capacity for on-site response. Accordingly, the 2016

Safe Korea Exercise was designed for strengthening the interconnectivity and cooperation among the CDSCHQ, the CDMHQ, and the LDMHQ to prepare for large-scale disasters and catastrophic events. Also, emergency rescue capabilities of the first responders were also tested and improved through drills.

Third, strengthening public safety education, establishing public-private cooperation governance involving communities, and strengthening safety welfare for disaster vulnerable groups have been implemented in order to settle down the safety culture in daily life. To build up the capability to prepare for disaster autonomously, lifetime safety education is implemented as to provide safety education, which is tailored to their age and environment. To establish local governance, a website and a mobile application, coined “Safe People,” were developed and are being operated to involve residents in pre-examining the accident factors, and good examples from “Safe People” are promoted online and offline. For citizen’s proactive participation in “Safe People,” MPSS run On-site Safety Report Joint Campaigns where they visit the education organizations and event sites, and support the promotion of National Safety Inspection. Also, they are expanding supporting projects for disaster vulnerable groups like the disabled, senior citizens, and children. In particular, they put efforts to make a safe environment for children at the level of developed countries.

Fourth, MPSS has developed a prompt situation management and dissemination system, with a real-time link of disaster sites with national disaster situation rooms. To this end, MPSS established a real-time on-site monitoring system by installing a GIS-based disaster situation board, and strengthened the management of disaster vulnerable areas. In addition, MPSS developed a long-term plan to establish a disaster safety communication network to reinforce first response capabilities, an integrated response system, and an on-site commanding system. In 2016, the pilot projects started in three areas (Pyeongchang-gun, Gangneung-si, and Jeongseon-gun) in Gangwon-do, and the system will be installed nationwide within a few years.

Fifth, MPSS is promoting creative disaster and safety management policies in each ministry in order to develop appropriate countermeasures against special disasters, such as aviation influenza, marine accident, energy infrastructure accidents, hazardous materials, communications infrastructure failure, and nuclear power plant accidents, which need a different approach from traditional disaster management method. It also prepares for newly emerging risks like climate change (CC), aging, and globalization. Therefore, they put efforts on improving safety policies by identifying social issues and the needs of the public based on big data, by providing pre-emptive public service, and by establishing on-site disaster and accident symptom monitoring systems by utilizing intelligent Closed-Circuit Television (CCTV) and Internet of Things (IoT). Also, they are enhancing the resident securing system to correspond to various security threats, managing nuclear safety, and strengthening the food and drug safety net with relevant ministries.



## 6.2 Global Trend and Policy Implications

Three important global agreements were achieved in 2015 in the fields of disaster risk reduction (DRR), climate change, and sustainable development, while Korea was enhancing its DRM system through active citizenry participation, since the establishment of MPSS in November 2014. The three agreements are meaningful in that all countries, irrespective of their development status, worked together to reach the agreement. We will review the philosophical background, main contents, and implementation system of the three agreements.

### 6.2.1 *Sendai Framework for Disaster Risk Reduction 2015–2030*

As an UN Office for Disaster Risk Reduction (UNISDR) review paper was submitted at the World Conference on Disaster Risk Reduction in Kobe, Japan in 2005, the Hyogo Framework for Action (HFA) 2005–2015 was established. The main purpose of the HFA is to address the relationship between poverty and disaster reduction and development, the primary responsibility on disaster reduction of the states, the necessity to support developing countries on natural disaster, and the implementation of the HFA, in which these can drive cooperation of the international society for reducing disasters (UNISDR 2007). Three strategic goals and five Priority Actions were proposed in the HFA, and the final expected outcome is to reduce loss of lives and social, economic, and environmental assets locally and nationally when hazards strike.

As the HFA expired in 2015, the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030 was adopted at the 3rd World Conference on Disaster Risk Reduction in Sendai, Japan, in 2015 to propose new strategies and goals that can replace the goals of the HFA.

The SFDRR includes action-oriented factors that are different from the existing HFA, and it was constructed based on the evaluation and examination on the HFA, which had been implemented from 2005 to 2015 (UNISDR 2015). The present Framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters caused by natural or human-caused hazards, as well as related environmental, technological, and biological hazards and risks. It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors.

Also, disasters are exacerbated by climate change and increased in frequency and intensity, and as DRR requires that responsibilities be shared by central governments and relevant national authorities, sectors and stakeholders, the SFDRR emphasizes the fact that each State has the full engagement and responsibility at international, regional, sub-regional, and transboundary levels. The SFDRR declared their expected outcome as “The Framework on Disaster Risk

**Table 6.2** Seven targets for SFDRR

Targets	Contents
A	Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020–2030 compared to the period 2005–2015.
B	Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020 ~ 2030 compared to the period 2005 ~ 2015.
C	Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
D	Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
E	Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
F	Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030.
G	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

Reduction from 2015 aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.” The seven targets to achieve the goal of the SFDRR are shown in Table 6.2 (UNISDR 2015).

Member states in the Conference also decided that the definition and evaluation method of the core indicators to evaluate the performance of the seven objectives should be developed through the Open-ended Intergovernmental Expert Working Group meeting that representatives of member states would take part in. Three meetings to discuss core indicators and evaluation method were scheduled: the first one in September 2015; the second in February 2016; and the last one in the latter half of 2016. The final core indicators will be applied to evaluate the performance of each country in the period of 2020 ~ 2030.

The SFDRR is taking into account that there is a need for focused action within and across sectors by States at global, national, and regional levels in the following four priority areas (UNISDR 2015). Priority 1 is understanding disaster risk. DRM should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics, and the environment. Priority 2 is strengthening disaster risk governance to manage disaster risk. Disaster risk governance at the national, regional, and global levels is very important, and this should be ensuring the consistency with domestic laws, regulations and policies of national and local framework. Priority 3 is investing in DRR for resilience. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health, and cultural resilience of persons, communities,

countries, and their assets, as well as the environment. Priority 4 is enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation, and reconstruction. Having experience is to strengthen disaster preparedness and to have effective recovery. In their approach to DRR, States, regional, and international organizations and other relevant stakeholders should take into consideration the key activities listed under each of these four priorities and should implement them, as appropriate, taking into consideration respective capacities and capabilities, in line with national laws and regulations. In the context of increasing global interdependence and concerted international cooperation, developing the knowledge sharing, capacities and motivation for DRR are needed. The SFDRR is guided by following 13 principles

1. Primary responsibility of States to prevent and reduce disaster risk, including through cooperation.
2. Shared responsibility between central government and national authorities, sectors and stakeholders as appropriate to national circumstances.
3. Protection of persons and their assets while promoting and protecting all human rights including the right to development.
4. Engagement from all of society.
5. Full engagement of all State institutions of an executive and legislative nature at national and local levels.
6. Empowerment of local authorities and communities through resources, incentives, and decision-making responsibilities as appropriate.
7. Decision-making to be inclusive and risk-informed while using a multi-hazard approach.
8. Coherence of disaster risk reduction and sustainable development policies, plans, practices, and mechanisms, across different sectors.
9. Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk.
10. Addressing underlying risk factors cost-effectively through investment versus relying primarily on post-disaster response and recovery.
11. “Build Back Better” for preventing the creation of, and reducing existing, disaster risk.
12. The quality of global partnership and international cooperation to be effective, meaningful, and strong.
13. Support from developed countries and partners to developing countries to be tailored according to needs and priorities as identified by them.

### ***6.2.2 The 21st Conference of the Parties***

The UN Framework Convention on Climate Change (UNFCCC) was adopted at the “Rio Convention” in 1992, and the international political response to climate change began at the Rio Earth Summit. This convention set out a framework for action aimed at stabilizing atmospheric concentrations of greenhouse gases (GHGs)

to avoid “dangerous anthropogenic interference with the climate system.” In the decision of the UNFCCC, it is specified that the ultimate objective of the Convention is to stabilize greenhouse gas concentrations, but the specific individual reduction target was not specified.

The main objective of the annual Conference of Parties (COP) is to review the Rio Convention’s implementation. The first COP took place in Berlin in 1995 and significant meetings since then have included COP3 where the Kyoto Protocol was adopted, COP11 where the Montreal Action Plan was produced. To overcome a barrier between developed countries and developing countries, the necessity of new international law where all states can participate in arose, so an agreement was to be decided in COP15 in Copenhagen, but it was unfortunately not realized in the conflict between developed countries and developing countries. The Green Climate Fund was created in COP17 where it took place in Durban, South Africa.

The Kyoto Protocol specifies specific and individual reduction target, and the target is to reduce the greenhouse gas emissions of 5.2% below their 1990 levels by Annex-1 countries (developed countries which are Organization for Economic Cooperation and Development (OECD) members and Eastern European countries at that time). The Kyoto Protocol was the first to set binding greenhouse gas emission reduction targets for each state in international society, and if the state could not implement the duty, there was a sanction. This compliance mechanism was evaluated as experimental and innovative, but this made the parties weaken their will to participate. Therefore, Japan, Russia, Canada, and several countries decided against participating in the second commitment period (2013 ~ 2020), the first commitment period (2008 ~ 2012) under the Kyoto Protocol in Durban, 2011. In 2016, Canada, Japan, Russia, and New Zealand decided not to participate in, and the parties who are participating in the Kyoto Protocol are only European Union (EU), Eastern European countries, and Australia (Park 2016).

COP21 took place in Paris, France, in December 2015, and Paris Agreement which reflected the vision of 195 parties was adopted (Climate Council 2016). The Paris Agreement was to replace the Kyoto Protocol regime since it will be expired in 2020 (Rhodes 2016). In terms of the international mechanism to correspond to climate change, the Kyoto Protocol enforced some parties to participate in with compulsion and no mechanism, whereas the Paris Agreement relies on the mechanism where most of the parties participate in and achieve voluntary reduction targets, and where transparency is emphasized (Park 2016). Therefore, if the Paris Agreement is ratified, all the parties should participate in corresponding to global climate change in the light of the leading role of the developed countries.

The Paris Agreement got 195 countries including both developed countries and developing countries involved, covering more than 90% of global greenhouse gas emissions. The three goals specified in Article 2 of the Paris Agreement are the following (Park 2016). First, holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C. Second, increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience. Third, making finance flows consistent with a pathway toward low greenhouse gas emissions and climate

resilient development. Also, this Agreement states that it will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances. The year and key agenda of previous COPs are laid out in Table 6.3 (UNFCCC 2014).

### 6.2.3 Sustainable Development Goals

At the United Nations Sustainable Development Summit in September 2015, world leaders adopted the Sustainable Development Goals (SDGs) to replace the Millennium Development Goals (MDGs), as to be implemented in the next 15 years. Different from the MDGs, which was decided by a group within the United Nations (UN) headquarters, the SDGs was born at the United Nations Conference on Sustainable Development (Rio+20) in 2012 by an open working group. The open working group, with representatives from 70 countries, had its first meeting in March 2013, published its final draft, with its 17 suggestions, and the draft was presented to the UN general assembly in September last year. The goals, targets, and the document of the UN General Assembly based on the final draft were added in the SDGs, and this was agreed by all UN member states in August 2015 (UN 2016).

The new SDGs contain 17 goals with 169 targets, while the MDGs had eight goals. Ending poverty, achieving gender equality, empowering all women and girls were reselected for the SDGs, and ensuring quality education, sustainable economic growth, reducing inequality within and among countries, sustainable consumption and production added to the existing goals.

In the MDGs, governments focused on eradicating poverty and developing programs which can improve the lives of the poor and programs related to official development assistance by using climate change logics of the 1990s. Also, they enabled Non-Governmental Organizations (NGOs) to ask for responsibilities from governments. These two were positively evaluated. Eight goals of the MDGs are as follows:

1. To eradicate extreme poverty and hunger.
2. To achieve universal primary education.
3. To promote gender equality and empower women.
4. To reduce child mortality.
5. To improve maternal health.
6. To combat HIV/AIDS, malaria, and other diseases.
7. To ensure environmental sustainability.
8. To develop a global partnership for development.

However, the MDGs were criticized for not taking the relationship among fundamental problems of poverty, gender equality, and development into account and ultimately ended in failure. Rights were not mentioned, and there was no precise explanation on economic development in eight goals. It was mentioned

**Table 6.3** COP year and key agenda

COP	Place	Key agenda
COP1	Berlin, Germany (1995)	Activities Implemented Jointly First joint measures in international climate action
COP2	Geneva, Switzerland (1996)	Accepted the scientific findings on climate change proffered by the <a href="#">Intergovernmental Panel on Climate Change (IPCC)</a> in its second assessment (1995) Rejected uniform “harmonized policies” in favor of flexibility Called for “legally binding mid-term targets”
COP3	Kyoto, Japan (1997)	Adopted the <a href="#">Kyoto Protocol</a>
COP4	Buenos Aires, Argentina (1998)	Adopted a 2-year “Plan of Action” to advance efforts and to devise mechanisms for implementing the Kyoto Protocol, to be completed by 2000
COP5	Bonn, Germany (1999)	It was primarily a technical meeting, and did not reach major conclusions
COP6	The Hague, Netherlands (2000)	A high level negotiation over such as a major controversy over the United States’ proposal to allow credit for carbon “sinks” in forests and agricultural lands
COP6-2	Bonn, Germany (2001)	<a href="#">Flexible mechanisms</a> <a href="#">Carbon sinks</a> Compliance Financing
COP7	Marrakech, Morocco (2001)	Operational rules for international <a href="#">emissions trading</a> among parties to the Protocol A compliance regime that outlined consequences for failure to meet emissions targets Accounting procedures for the flexibility mechanisms; A decision to consider at COP 8 how to achieve a review of the adequacy of commitments
COP8	New Delhi, India (2002)	Adopted the Delhi Ministerial Declaration
COP9	Milan, Italy (2003)	Agreed to use the Adaptation Fund established at COP7 in 2001 primarily in supporting developing countries
COP10	Buenos Aires, Argentina (2004)	To promote developing countries better adapt to climate change, the Buenos Aires Plan of Action was adopted
COP11/ CMP1	Montreal, Canada (2005)	First Meeting of the Parties (CMP 1) to the Kyoto Protocol The Montreal Action Plan was an agreement to extend the life of the Kyoto Protocol beyond its 2012 expiration date
COP12/ CMP2	Nairobi, Kenya (2006)	Adopted a 5-year plan of work to support climate change adaptation by developing countries
COP13/ CMP3	Bali, Indonesia (2007)	Agreement on a timeline and structured negotiation on the post-2012 framework (the end of the first commitment period of the Kyoto Protocol) was achieved with the adoption of the Bali Action Plan

(continued)

**Table 6.3** (continued)

COP	Place	Key agenda
COP14/ CMP4	Poznan, Poland (2008)	Agreed on principles for the financing of a fund to help the poorest nations cope with the effects of climate change
COP15/ CMP5	Copenhagen, Denmark (2009)	The overall goal was to establish an ambitious global climate agreement for the period from 2012 when the first commitment period under the Kyoto Protocol expires
COP16/ CMP6	Cancun, Mexico (2010)	The outcome was an agreement adopted by the states' parties that called for the 100 billion USD per annum "Green Climate Fund," and a "Climate Technology Centre" and network.  It recognizes the <a href="#">IPCC Fourth Assessment Report</a> goal of a maximum 2 °C global warming and all parties should take urgent action to meet this goal
COP17/ CMP7	Durban, South Africa (2011)	Agreed to start negotiations on a <a href="#">legally binding</a> deal comprising all countries, to be adopted in 2015
COP18/ CMP8	Doha, Qatar (2012)	Produced a package of documents collectively titled The Doha Climate Gateway
COP19/ CMP9	Warsaw, Poland (2013)	
COP20/ CMP10	Lima, Peru (2014)	
COP21/ CMP11	Paris, France (2015)	The adoption of the <a href="#">Paris Agreement</a> on 12 December, governing climate change reduction measures from 2020
COP22/ CMP12/ CMA1	Marrakech, Morocco (2016)	A focal issue was that of <a href="#">water scarcity</a> , water cleanliness, and water-related <a href="#">sustainability</a> , a major problem in the <a href="#">developing world</a>

that the MDGs were applicable to all countries in the context, but poor countries had to receive subsidies from rich countries to achieve the goals in practice. However, it is worthy to notice that the SDGs are writing a global policy framework, which includes not only developed countries but also developing countries.

UN member states are continuing a consultation on the 169 targets currently proposed in May 2016. The main contents of the SDGs, which should be followed by the countries in the next 15 years, are the following. The SDGs have 17 goals with 169 targets (or indicators), which the countries should follow. It is emphasized that to achieve these goals and targets it is very important for humanity and the Earth itself. The objectives of the SDGs can be summarized as 5P: People-centered, Planet-protected, Prosperity-ensured, Peace-fostered, and Partnership-revitalized.

To sum up, the SDGs have its objective to complement the parts that the MDGs did not achieve until 2015. For example, the MDGs emphasized the duty of the developing countries, whereas the SDGs include not only developed countries and developing countries but also the relevant stakeholders.

In essence, by the year 2030, the SDGs are (1) to end poverty and hunger everywhere; (2) to combat inequalities within and among countries; (3) to build

peaceful, just, and inclusive societies; (4) to protect human rights and gender equality and the empowerment of women and girls; (5) to ensure the lasting protection of the planet, and its national resources; and (6) to create conditions for sustainable, inclusive and sustained economic growth, with shared prosperity and decent work for all.

In addition, climate change and DRR were discussed in the 7th conference of the SDGs. At the conference, the following elements were decided to be included in the SDG discussion in order to cope with increasing risk due to climate change and urbanization.

Target 1.5 – By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social, and environmental shocks and disasters.

Target 11.5 – By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

Target 11.b – By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans toward inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the SFDRR 2015–2030, holistic DRM at all levels.

#### ***6.2.4 Significance of the Global Agenda for Resilience***

The global agreements about DRR, climate change, and SDGs shows that the global society shares a common understanding about the importance of DRR for sustainable development and climate change adaptation. In addition, resilience building was strongly emphasized as core elements for DRR. Resilience building was clearly mentioned as a key element for sustainable development, and strengthening resilience against climate change. Resilience is also core element in the SFDRR.

The term “Resilience” has been used in various fields. For example, in physics, resilience is described as “the ability to return to one’s former shape after being deformed” (Gerbode 2009). In psychology, resilience is defined as “flexibility in response to changing situational demands, and the ability to bounce back from negative emotional experiences” (Block and Block 1980; Block and Kremen 1996; Lazarus 1993). In ecology, resilience has been defined in two different ways. The first definition is “the time required for a system to return to an equilibrium or steady-state following a perturbation,” and the second definition is “the magnitude of disturbance that can be absorbed before the system redefines its structure by changing the variables and processes that control behavior” (Gunderson 2000). In the field of business, resilience is defined as “the ability to rapidly adapt and



respond to business disruptions and to maintain continuous business operations, be a more trusted partner, and enable growth.” (IBM 2009).

In the field of DRR, resilience can be defined as “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.” (UNISDR 2009)

In other words, disaster resilience means the ability to “resile from” or “spring back from” a shock. The resilience of a community in respect to potential hazard events is determined by the degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need. In conceptual terms, vulnerability and disaster resilience are closely related. Some authors see vulnerability as the opposite of disaster resilience, while others view vulnerability as a risk factor and disaster resilience as the capacity to respond (Manyena 2006).

The key question is how disaster resilience of a society can be measured. Resilient society can effectively save people’s lives, protect national infrastructures, and maintain livelihoods from disasters. Building resilience can allow sustainable development by reducing the relief and recovery costs. Governance and Social Development Resource Centre (GSDRC) described that disaster resilience is determined by the degree to which individuals, communities, and public and private organizations are capable of organizing themselves to learn from past disasters and reduce their risks to future ones, at international, regional, national, and local levels (GSDRC 2014).

Although the concept of disaster resilience is unfamiliar to many disaster management stakeholders, it has recently become a debated issue for various international societies as the necessity to integrate resilience into disaster management has become apparent.

### **6.3 Disaster Resilient Future**

The authors would like to give special thanks to all readers who patiently and successfully finished this inspirational journey from the ancient times to modern times and all across the world. Now, we would like to propose ten principles for a disaster resilient future based on our findings and invaluable lessons from previous disasters, which will work for Korea and can be tailored for other developing countries.

### ***6.3.1 Intensive Risk Aligned with the Power-Law Distribution***

The statistical analysis of the disasters from 1948 to 2015 in Korea shows that their distribution follows the Power-Law, which means that catastrophic events causing severe human or physical damage can occur at any time.<sup>1</sup> Therefore, the national DRM system should be improved to deal with those extreme events based on a clear understanding of such characteristics. Those extreme events having intensive risk are mostly located in the long-tail of the Power-law Distribution.

While most public policy concerning social issues, such as welfare and education, is developed by focusing on average events because those average events reflect most of the needs, dealing with disaster requires a different approach from most social areas: extreme events, sometimes being considered outliers, is more important than average events because those events affect the society severely. These events, which used to be considered as extreme phenomena due to their “low frequency,” can no longer be ignored as they have become less extreme and more reoccurring. Perrow’s Normal Accident Theory, Beck’s Risk Society Theory, and the Power-law Distribution of Complexity Theory show that massive catastrophes can happen at any time. Through the analysis of disasters that have led to a change in disaster response policy, we were able to find that most of them, which can be labeled as “focusing event,” have a common characteristic of “low frequency and high impact.” The events, such as the Seongsu Bridge collapse in 1994, the Sampoong Department Store collapse in 1995, Typhoon Rusa in 2002, the Daegu Subway Fire in 2003, the Sewol Ferry sinking accident in 2014, and Middle East respiratory syndrome coronavirus (MERS-CoV) in 2015, are typical examples of focusing events that are located in the long-tail of the Power-law Distribution and that have “low frequency and high social impact.” Therefore, a future disaster response system should be developed to thoroughly prepare for the disasters that are located in or have possibilities of being located in the long-tail of Power-law Distribution, based on the condition that such disasters can occur at any time. To this end, on the first hand, those responsible for safety at high-risk facilities should reduce the probability of disaster by thoroughly performing safety checks and diagnostics. The next step is to strengthen the initial response capacity so that even though an accident occurs, it does not evolve a national emergency. Rapid identification of risky situations, prompt reporting, and appropriate action by first responding agencies are essential capacities for this purpose. Finally, it is necessary to develop a “national catastrophic scenario” in preparation for a national

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<sup>1</sup>If an event follows a normal distribution, the occurrence probability of the event becomes smaller as the event gets farther from the average. As a result, the occurrence probability of the event at both ends is close to zero. However, if an event follows the Power-law Distribution, the occurrence probability of the event located in the long tail is low but does not converge into zero. It means that this event can happen at any time. (See Chap. 2)

emergency that can occur with very little probability, and to establish a system in which all related stakeholders form a collaborative network for an efficient response.

### **6.3.2 *Comprehensiveness***

The future DRM system should aim to be an integrated system on the basis of the principle of comprehensiveness: dealing with all types of disaster risk; facilitating a unity of efforts of all stakeholders, such as central governments, local governments, and civil groups; and covering the entire cycle of disaster management processes.<sup>2</sup>

Regarding the all-hazards approach, organizations in developed countries, such as Federal Emergency Management Agency (FEMA) and Department of Homeland Security (DHS) in the United States (USA), and Civil Contingencies Act (CCA) in the United Kingdom (UK), aim to develop an Integrated Emergency Management System (Waugh 2000).<sup>3</sup> Korea has also tried to integrate all-disaster management through the establishment of NEMA in 2004, as the first independent emergency management agency, and MPSS in 2014, as the first ministerial-level disaster response institution. However, MPSS still has limited authorities and insufficient human and financial resources to control and coordinate pan-government response against all types of disasters, which was proven in recent disasters, including MERS-CoV in 2015.

Responding to national emergencies requires strong authority and leadership to coordinate and control all line ministries and provincial/local governments; therefore, it is necessary to promote the MPSS minister to the level of Vice Prime Minister, to allocate enough budget for the implementation of effective prevention and preparedness projects, and to enhance the expertise of MPSS by recruiting professional officials with DRM knowledge and expertise. In addition, it is necessary and imperative for the Korean government to clearly and comprehensively delineate MPSS's role, responsibility, and accountability in line with comprehensiveness principles, and to require key-line ministries to internally strengthen comprehensive disaster-risk management.

A balanced investment in the entire phases of disaster, prevention-preparedness-response-recovery, and a unity of efforts of all stakeholders are also required to secure effective DRM. In particular, the investment for disaster prevention and preparedness should be strengthened at all levels: national, regional, and local. Most governments' investment for disaster prevention and preparedness had

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<sup>2</sup>Among various definitions about comprehensiveness, this book will use the term comprehensiveness as the meaning of all-hazard approach, all-disaster phase, and unity of efforts of all stakeholders.

<sup>3</sup>IEMS proposed by McLoughlin and other professionals have been the rationale for the integrated emergency management system. (See Chap. 1)

increased after the shock of catastrophic disasters; however, the investment started to decrease after no major disaster struck 2 or 3 years later. Therefore, political leaders should note that the investment for prevention and preparedness is a critical step toward a safe society.

In contemporary society, the increased difficulty of predicting disaster occurrence and the emergence of new types of disaster request the national government to strengthen nation-wide preparedness in order to respond to any type of disaster effectively. As the USA has been putting priority on strengthening the capacity for national disaster preparedness after the failure of responding to Hurricane Katrina, the Korean government should put more stress on improving preparedness at national and local levels. Leonard and Howitt (2008) insisted that effective response modes should be developed and exercised to fit for the two types of emergencies: routine emergencies and crisis emergencies<sup>4</sup>. For routine emergencies that have been experienced in the past, a detailed response plan, repetitive field training, and joint exercise among response agencies are essential for an effective response. For crisis emergencies that are generally new types of disasters, it is important to develop an “adaptive response capacity” of all responding organizations so that they can cope with any unforeseen circumstance.

In the event of a disaster, the site response agencies, LDSCHQ, all ministries in CDMHQ and CDSCHQ, and MPSS should efficiently mobilize all resources in accordance with the principles of standardization. They should also be flexible for an effective response to rescue victims, support survivors, restore damaged facilities, and prevent the diffusion of disaster damage. While the principle of standardization means that all responsible agencies and support agencies should perform their roles in accordance with the pre-delineated standard and operational manual, the principle of flexibility means that as the situation in the field is not proceeding as planned, the various response agencies consult each other to make decisions quickly and CDSCHQ should be able to make effective adjustments to quickly resolve any conflicts of interest that may arise during the response of multiple agencies in the urgent moments. To this end, the most important elements that MPSS should acquire are the authority to coordinate the disaster response between the relevant ministries, the local governments and the public institutions, the ability to make rapid and appropriate decisions, and the recruitment of experts to support decision-making and coordination.

For disaster recovery, it is critical to establish a system to find the root cause of the event and fundamentally eliminate the cause of the damage. In particular, it is

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<sup>4</sup>On July 16, 2016, a cruise ship, including the captain and 19 others, was stranded on the Yeongrang-dong coast in Sokcho, Gangwon-do. The coast guard and firefighters were forced to rescue the passengers in 30 min after the initial rescue boat could not be brought close to the cruise ship. As a result of the life-saving rescue exercise among maritime police, civilian scuba divers, and firefighting rescue teams, it was proven that separate entities could cooperate in emergency. In addition, the integrated emergency phone system developed after the establishment of MPSS also contributed to the successful joint response of the fire department and the maritime police immediately after the emergent situation was reported to the emergency phone service.

important not only to punish the responsible person after various disasters or accidents, but also to accurately analyze the cause of the disaster and to prevent the recurrence.

### ***6.3.3 Government's Role as Facilitator***

National government's role in DRM should be shifted from direct service provider to a facilitator, supporting all stakeholders for developing their capacities in coping with disasters. As suggested by Alexander (2002), it is necessary to move from civil defense to civil protection. To this end, a collective network in which each player in various sectors voluntarily participates should be established.<sup>5</sup>

Business sectors should aim to cope with a crisis by themselves through Business Continuity Management (BCM) contingency plans. The case of "Morgan Stanley," just after the 9/11 USA terror attack, is an excellent example of how a company can successfully overcome the shock of a catastrophic event using BCM. After Morgan Stanley's success and following other successful cases, interest in disaster mitigation action plans has increased. In 2007, the Korean government passed legislation to support businesses that implemented BCM schemes into their business practices, providing education and financial support for companies to autonomously plan disaster relief activities. However, as of March 3, 2017, only one company has been certified to have achieved an enterprise disaster management standard. Additionally, in 2012, the International Organization for Standards (ISO) published the ISO 22301 certificate as a proposal of international standard for business continuity.

Finally, each citizen removes the risk factors around his/her daily life, establishes a safety culture that keeps safety rules in the course of daily activities, and raises his/her response capability through evacuation drills to cope with disaster situations.

### ***6.3.4 Third-Party Inspection and Professionalism***

The Korean government should develop a check and balance system in the field of disaster and safety management based on the principle of the third-party inspection and nurture professional officials to implement the check and balance system in all relevant ministries and agencies. As of March 3, 2017, among the 32 types of disaster regulated by the Crisis Management Standard Manual, MPSS is primarily responsible for 6 types of disasters, and other ministries, such as the Ministry of Land, Infrastructure and Transport, the Ministry of Trade, Industry and Energy, and

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<sup>5</sup>See Chap. 2.

the Ministry of Oceans and Fisheries, are handling 26 types of disasters. In other words, disaster prevention and response responsibilities in various areas, such as facility safety, industrial safety, and marine safety, are assigned to relevant ministries in accordance with individual laws and regulations. The problem is that these ministries are also in charge of industrial promotion in the same areas. While industry promotion aims to generate economic profit according to the market principle, disaster and safety management aims to securing safety through regulation in the area of high market failure, which will cause a lot of contradictions between industry promotion and disaster and safety management.<sup>6</sup> Therefore, the Korean government should consider the transfer of the disaster and safety management duties of the industry promotion ministries to the disaster management coordination ministries, such as MPSS, or to establish a measure to ensure independence and transparency of disaster and safety management duties. Again, a check and balance system must be urgently secured based on the third-party inspection principle. At the same time, the important thing is to train professional officials who can implement the check and balance system. Actually, there are a few Korean universities or colleges that have a specialized program in DRM. Engineering departments dealing with floods, earthquakes, and facility collapses; firefighting departments dealing with fire and rescue service; and business management dealing with process management are covering their own areas in DRM; however, interdisciplinary study on DRM is still in its early stages. The Korean government should proactively support universities or colleges establishing graduate or undergraduate courses majoring in DRM. In addition, the recruitment process of government officials specialized in the DRM field should be set up and strengthened by linking the government with academia.

### ***6.3.5 Risk-Based Policy Prioritization and Resource Allocation***

Risk analysis has recently become an important discipline in DRM, which provides a useful basis for developing mitigation policies, emergency preparedness, and response and recovery plans. In fact, FEMA called for emergency managers to use sound risk-management principles when assigning priorities and resources (FEMA 2007).

The Korean government should also develop a reasonable policy prioritization and resource allocation system based on risk analysis<sup>7</sup> at the national level, and

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<sup>6</sup>According to *Kyunghyang Daily News* (2016), there is a lot of criticism of the AI coping process that occurred in 2016; the Ministry of Agriculture, Food and Rural Affairs, which is in charge of livestock industry promotion, was handling AI, and there was a case that AI was spread rapidly throughout the country because bold disposal was not done from the beginning.

<sup>7</sup>In general, the risk analysis system uses past damage data, current vulnerability, and future hazard trends as parameters, consisting the process of hazard identification, vulnerability assessment, and risk assessment. In recent years, the process of capacity assessment and building has been added.

should support the local government to improve disaster management capacities following voluntary hazard identification and vulnerability assessment. Additionally, national disaster management strategies must include risk-informed decisions to further disaster resilience. In order to improve disaster resilience, it is essential to have a sound tool to closely investigate the capabilities required by the whole country in all phases of prevention, preparedness, response, and recovery, and Threat and Hazard Identification and Risk Assessment (THIRA) in the USA and National Risk Assessment (NRA) in the UK are typical examples of such a tool. Both systems aim to assess the risks of the country or a community and to measure whether they can cope with their current response capabilities and to increase their capacity.

In Korea, there have been efforts to predict damage and analyze risk in some disaster types such as flood, drought, and earthquake. However, these prediction and analysis technologies are in the early stage of development; it will take time to put them into practical usage. Moreover, the development of a system for assessing the risk of disasters across the country or community has not even been attempted. But time is not on Korea's side; therefore, it is imperative to establish a disaster capacity enhancement system: collect accurate data on existing or potential threats, analyze overall disaster risk, calculate capacities to cope with risk, find gaps between the capacity level and the disaster risk level, establish a plan to supplement the capacity gap, allocate resource for implementation, training and exercise, upgrade capacity, and get the benefit by reducing the disaster risk.

### **6.3.6 Risk Governance**

Risk governance should be improved in order to strengthen the accountability of all sectors and to enhance the cooperation among all stakeholders. The Korean government has focused on improving organizations and laws to deal with increasing disaster risk. However, just strengthening disaster response organizations and laws is not enough to deal with disasters in a contemporary society that is becoming more complex and intensified. All stakeholders need to be engaged in building resilience at all levels and "good governance" should be embedded into the social safety system. Institutional and policy systems for DRM are important components of "good governance," and should be guided by the same basic principles: i.e., accountability, participation, rule of law, effectiveness and sustainability, and should be set up through norms and policies of DRM policies.

In order to improve risk management, sound public-private partnerships are needed; however, risk governance can only be found at the national level in earnest. There are a few examples at the local level that involve stakeholders, but these still remain in pilot stages due to insufficient resources and limited links to national strategies. To get these examples beyond the pilot stage, MPSS needs to emphasize three things: good practices need to be documented and replicated, strong

partnerships between all stakeholders need to be built, and specialized funds for nation-wide risk governance need to be popularized and obtainable.

### ***6.3.7 Field-Based Response with Network Governance***

An effective disaster response system should be developed on the basis of the field-based approach, which means that answers to all occurring problems can be found in the field and the problem-solving process of all disasters must start in the field. Through the lessons learned from catastrophic events, we found that correcting a small mishap during the early stage can prevent a major disaster from occurring or becoming a national crisis.<sup>8</sup> Through the failure to respond to the Gumi Hydrofluoric Leak accident, the Gyeongju Mauna Ocean Resort Gymnasium collapse accident, and the Sewol Ferry sinking accident, we became well aware of the need for prompt and appropriate actions by the on-site response agencies and the cooperation among them. In particular, strengthening disaster response capabilities of local government officials is one of the most urgent tasks because their response capacities are weak compared to those of the first responders, such as fire fighters and police.

Since the establishment of the MPSS, there have been continuous efforts to strengthen capacity and collaborate with on-site response agencies such as fire fighters, coast guard, police, and military; and thanks to the development of a standard response framework and repetitive training, their capacities have improved significantly. However, the disaster response capacity of local government officials is still low; this is surprising and troublesome, considering their importance and roles for an effective disaster response. In the event of a disaster, local government officials should take care of most of the functions except search and rescue, which consist of evacuation of dangerous areas, emergency recovery for damaged facilities, communication with bereaved families, and funeral support. However, a lack of expertise due to job rotation, insufficient education and training, and talented officials avoiding DRM tasks because they will be punished once a disaster occurs are key obstacles against strengthening disaster response capacity of local public officials. Therefore, it is urgently required to strengthen the system of auditing exemption for the people who actively worked on disaster response but failed to prevent the damage, and to expand the recruitment of disaster specialists for the improvement of local governments' disaster response capabilities.

In addition, it is necessary to establish network governance among on-site response agencies such as local government officials, fire fighters, coast guard, police, and military. Unlike the USA, the UK, and Japan in which fire fighters and police belong to the local government, Korea has a system that the police and fire fighters are under the provincial government. It is controversial which system is

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<sup>8</sup>The Heinrich's law of 1:20:300 shows this principle very well. (See Chap. 2).



good for disaster response, but what is important is that these organizations should build a “network governance (Moynihan 2009)” in the event of a disaster and carry out the two tasks of mutual collaboration and coherent response that are seemingly contradictory to each other. Under the current Korean system, the most feasible means is to set up a system by which response agencies work together in case of emergencies based on the principle of disaster response and cooperation regulated in the Disasters and Safety Act.<sup>9</sup> In accordance with this objective, all related organizations in the region should jointly identify hazard and assess the vulnerability and intensive risk, and then work together to establish a collective network through joint training and exercise. The participation of volunteer groups should also be secured to this collective network. To achieve this goal, MPSS should develop a standard response framework, which is comprehensive enough to encompass all related agencies and flexible enough for each local government and field agencies to tailor the framework for its own condition.

### ***6.3.8 Science, Technology, and Innovation for DRM***

The Korean government should actively utilize science, technology, and innovation (STI) to enhance its DRM system. In what is being touted as the upcoming fourth industrial revolution, STI may provide enhanced DRM tools such as real-time hazard detection using multi-sensors or intelligent CCTV monitors, big data analysis to accurately predict and minimize damage, and enhanced Unmanned Aerial Vehicles (UAV) and imaging equipment as effective on-site response and recovery aids. STI was also emphasized at the 3rd UN Conference for Disaster Risk Reduction in Sendai, Japan, during March 14–18, 2015, by UNISDR for its future role in DRM.

In accordance with this trend, Japan is focusing on the development of robots capable of operating in extreme environments such as the Fukushima nuclear accident, and the USA and Europe are using core technology for ICBM (IoT, Cloud, Big Data, Mobile) for effective disaster response. This global trend reflects each nation’s willingness to effectively promote decision-making and resource allocation based on evidence.

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<sup>9</sup>The article 16 of the Disasters and Safety Act regulates that for the disaster, place or stage in which ‘emergency search and rescue’ is needed, fire fighter and coast guard will command and control the site and other institutions will support it, and in the case that emergency rescue activity is terminated or is not required, local government will control and coordinate all response activities. (See Chap. 2)

### ***6.3.9 Accordance with the International Agenda***

Korea should work together with other nations to achieve common goals in line with the SFDRR, SDG, climate change, and other international agendas. Korea should contribute in establishing a joint-response system against global risk, suggested by Ulrich Beck (Beck 2008). The paradigm of disaster management is beyond the age in which one nation can sort out its own problem and survive. Due to the increasing interconnectivity of each nation, it is being witnessed in many situations that the shock of a disaster in one nation affects other countries, which in turn affects the global economy. In an era of “global risk,” global cooperation should be developed among developed countries, developing countries, and less/least developed countries. In particular, developed countries have to move away from the concept of development aid that has helped Least Developed Countries (LDCs) invest in only economic growth to the disaster resilient growth in line with sustainable development goals. In accordance with this objective, the Korean government should keep pace with other developed countries in achieving the targets of sustainable development and the SFDRR that all countries should jointly address by 2030. It is important to recognize the significance of the global agenda and note that the international community lives in an important age in which DRM should work as a medium for safer and sustainable world.

### ***6.3.10 Prioritization of DRM in the National Strategy***

Last, but not least, the national policy framework should recognize the importance of DRM as an important tool in the achievement of the strategic national growth goal. Sustainable and resilient national growth is not achievable without securing safety from disasters. Therefore, an innovative approach for an effective disaster response should be the priority of national policy, which is toward integrated organization, comprehensive planning, and an all-hazard approach.

In accordance with this, MPSS needs to stress to developers the importance of implementing sustainable development based on DRR, the national risk assessment, and climate change adaptation as a viable national concern that all must consider.

With what were once considered extreme events becoming a possibility of the norm in the “New Normal Age,” we wanted to raise key burning questions concerning focusing events against a resilient and safe society and show a way to minimize their destructive paths for our generation and those to come. This is not only the task of policymakers, organizational leaders, or researchers, but also the common citizen or the readers of this book; together we can find innovative methods to finally be able to tame the Gods or see what “tomorrow will bring,” so that all of us can be assured that a resilient future against disaster is brought to fruition. We would like to thank you for reading our findings and conclusions and

hope you are able to take the information we have put forward on to bigger and brighter things that will benefit you personally and the greater and safer community for all of us. We hope you will not stop here and take the journey with us as our findings evolve toward a resilient future.

## References

- Alexander D (2002) From civil defence to civil protection – and back again. *Disaster Prev Manag: Int J* 11(3):209–213
- Beck U (2008) Ulich Beck’s public lecture at Seoul University, Seoul, Korea
- Block JH, Block J (1980) The role of ego-control and ego-resiliency in the origination of behavior. In: Collings WA (ed) *The minnesota symposia on child psychology*, vol 13. University of Minnesota Press, Minneapolis, pp 39–101
- Block J, Kremen AM (1996) IQ and ego-resiliency: conceptual and empirical connections and separateness. *J Pers Soc Psychol* 70:349–361
- Climate Council (2016) Paris COP21: key issues for the new climate agreement
- FEMA (2007) Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and Related Authorities
- Gerbode FA (2009) A theory of resilience. *Recover Self J Hope Heal* 1(1):13–20
- GSDRC (2014) GSDRC topic guide
- Gunderson LH (2000) Ecological resilience-in theory and application. *Annu Rev Ecol Syst* 31:425–439
- IBM (2009). Business resilience: the best defense is a good offense
- Kyunghyang Daily News (2016, December 20). AI disaster plagued by government’s failure of first response, procrastination, and diability
- Leonard HB, Howitt AM (2008) ‘Routine’ or ‘Crisis’ – the search for excellence. *Crisis/Response J* 4(3):32–35
- Lazarus RS (1993) From psychological stress to the emotions: a history of changing outlooks. *Annu Rev Psychol* 44:1–21
- Manyena SB (2006) The concept of resilience revisited. *Disasters* 30(4):434–450
- Moynihan DP (2009) The network governance of crisis response: case studies of incident command systems. *J Public Adm Res Theory* 19:895–915
- MPSS (2017) Organization chart. Available at: <http://www.mpss.go.kr/en/mpss/orgmpss/>. Accessed on 2 July 2017
- Park SW (2016) Paris agreement, post-2020, and prelude of climate change, environmental law and policy, vol 16, pp 285–322. (in Korean)
- Rhodes CJ (2016) The 2015 Paris climate change conference: COP21. *Sci Prog* 99(1):97–104
- UN (2016) UN sustainable development knowledge platform – The SDGs
- UNISDR (2007) Hyogo framework for action 2005–2015: building the resilience of nations and communities to disasters
- UNISDR (2009) Terminology on disaster risk reduction
- UNISDR (2015) Sendai Framework for disaster risk reduction 2015–2030
- UNFCCC (2014). Background on the UNFCCC: the international response to climate change. Available: [http://unfccc.int/essential\\_background/items/6031.php](http://unfccc.int/essential_background/items/6031.php). Accessed on 2 July 2017
- Waugh WL (2000) *Living with hazards, dealing with disasters: an introduction to emergency management*. Routledge, London/New York