

Preface

Catastrophes that are beyond the coping capability of current social-ecological systems are occurring at an increasing pace in recent years. Examples are the devastating Hurricane Katrina occurred in the United States in 2005, the extreme low-temperature freezing rain and snow disaster in southern China in 2008, the Wenchuan Earthquake in Sichuan, China in 2008, and the Great Eastern Japan Earthquake and Tsunami in 2011. These catastrophes brought great challenges to existing disaster planning, response, and management, as well as to post-disaster reconstruction efforts. As a result, questions such as how to reduce disaster risks and cope with catastrophes more effectively have caught widespread attention of scientific communities, governments, and societies both at home and abroad.

In order to strengthen the innovation capability of scientific disciplines, the Chinese government, through the Ministry of Education (MOE) and the State Administration of Foreign Experts Affairs (SAFEA), organized and implemented the Expertise-Introduction Project for Disciplinary Innovation of Universities (the “111 Project”) that aims at building capacities of Chinese higher education institutions and facilitating their transformation into world-class universities. The project’s overall goal is to develop about 100 world-class research and education bases for introducing talents of various disciplines through building high-level research teams formed by some 1,000 leading overseas scholars and researchers introduced from the world’s top 100 universities and key research groups of research institutions, and is based on the platforms of national, provincial, and ministerial level key scientific research bases. It focuses on cutting-edge research areas internationally and national key disciplinary development goals, and prioritizes disciplines in universities that have a leading position internationally or disciplines that are priority support areas in national plans. The Hazard and Risk Science Base (HRSB) at Beijing Normal University is one of the projects under the “111 Project.”

In the third batch of the “111 Project,” the Hazard and Risk Science Base of Beijing Normal University was approved officially at the end of 2007 and implemented from the beginning of 2008, with an execution period between 2008 and

2012. Peijun Shi and Roger Kaspersen were appointed as the chief professors for the project. The project involved a large number of renowned scientists in the disaster risk field worldwide, including David Alexander, Joanne Bayer, Colin Green, Guoyi Han, Saburo Ikeda, Carlo Jaeger, Gordon McGranahan, Dennis Ojima, Norio Okada, Nick Pidgeon, Bonnie Ram, Andreas Rechkemmer, Ortwin Renn, Charles Scawthorn, Paul Slovic, Hirokazu Tatano, Kathleen Tierney, Brain Walker, and Qian Ye. Wenjie Dong, Yuan Jiang, Ning Li, Lianyou Liu, Jing'ai Wang, Weihua Fang, Wei Xu, Ying Li, Juan Du, Ming Wang, Saini Yang, Tao Ye, Deyong Yu, Yaojie Yue, and Zhao Zhang also participated in this project. In September 2012, the second 5-year phase of the project (2013–2017) was also approved. We completed this compiled volume, *Natural Disasters in China*, under the scientific framework developed through discussions and field research and investigations jointly performed by Chinese and invited international experts, based on a systematic review of existing research on natural disaster risks by Chinese experts, under the support of this project.

In the course of project implementation, we mainly carried out the following three activities:

First, we organized the Summer Institute for Advanced Study of Disaster and Risk for 5 years, and selected Ph.D. candidates, postdoctoral researchers, and other young scholars who are engaged in the research of disaster risks both in China and internationally to participate. Together with internationally renowned scholars in this field, the summer institute participants discussed the cutting-edge research areas in the field of disaster and risk study, essentials of the discipline, and major theoretical and practical issues in integrated disaster risk governance. The summer institute over 5 years has recruited more than 60 young international scholars and 120 young scholars in China, which helped develop the capacity of young scholars in conducting disaster risk research.

Second, five annual international seminars on the integrated disaster risk governance in China were held in Beijing, and three short field research and investigations were conducted during the project period. These activities aimed at thoroughly understanding the status of integrated disaster risk research and systematically reviewing the achievements obtained from such research in China, understanding the spatiotemporal trends of disaster risks in the process of rapid economic growth, and introducing the Chinese experiences in and lessons learned from integrated disaster risk governance to the colleagues from other countries. The short field research and investigations in different years focused on integrated approaches for combating drought and sandstorms in Ordos, Inner Mongolian Autonomous Region and Yulin, Shaanxi Province; integrated approaches for mitigating flood risks in the Dongting Lake area, Hunan Province and the area along the Yangtze River main stream in Hubei Province; and integrated approaches for mitigating risks of typhoon and rainstorm in Shenzhen, Guangdong Province. Based on these, we compiled the book *Integrated Risk Governance: Science Plan and Case Studies of Large-scale Disasters* and the *World Atlas of Natural Disaster Risk*. These works contribute to improving the research of integrated natural disaster risk governance and enriching the academic resources for education and

scientific research. *Integrated Risk Governance* and *World Atlas of Natural Disaster Risk*, are also part of the book series of the International Human Dimension Programme on Global Environmental Change/Future Earth—Integrated Risk Governance Project (IHDP/FE-IRG) Core Science Program.

Third, we developed a close cooperation with the IHDP/FE-IRG Core Science Program Committee in the field of integrated risk governance research. A number of “111 Project” experts are also members of the IHDP/FE-IRG Core Science Program Committee. In order to improve the IHDP/FE-IRG Core Science Program, we conducted in-depth academic research—an important topic of discussion in the “111 Project” annual meeting was the design of the IHDP/FE-IRG Core Science Program. Based on the English edition of the journal *Disaster Reduction in China*, the “111 Project” and IHDP/FE-IRG Core Science Program co-founded the *International Journal of Disaster Risk Science (IJDRS)*. By 2015, the *IJDRS* has published six volumes. It creates a global network for academic exchange for promoting the development of disaster risk science.

Compiling this book is not only an important part of the effort of the “111 Project” on producing academic resources of disaster risk science, but also a key component of the “111 Project” participation in the IHDP/FE-IRG Core Science Program. It facilitates the understanding of the essence of social-ecological systems that are the central concern of the IHDP/FE-IRG Core Science Program, improving the “transition in and transition out” theory and models of integrated risk assessment, developing disaster risk early-warning systems, conducting comparative study of catastrophic disaster responses among different countries, and establishing integrated risk governance paradigms.

In order to achieve the goal of this book, we attempt to introduce the spatiotemporal patterns, formation mechanisms and processes, vulnerability, risk levels, and disaster reduction strategies of major natural disasters in China from the perspective of science. Furthermore, we seek to summarize integrated disaster risk governance in China, especially the experiences and lessons learned from disaster reduction and prevention. From the global perspective, we attempt to learn from achievements of integrated disaster risk governance in other countries and regions, to propose strategies for integrated disaster risk governance in China.

We carried out a systematic study of major natural disasters and disaster risks in China based on our understanding of the development of international disaster risk research and the structure and function of “regional disaster systems.” The scientific framework of this book was formed through a series of discussions after carefully evaluating a number of research outputs of Chinese colleagues, including *Atlas of Natural Disasters of China*, *Atlas of Natural Disaster System of China*, *Spatiotemporal Patterns of Natural Disasters of China*, *Atlas of Natural Disaster Risks of China*, among others. This framework includes two parts.

Part one is “Natural Disaster System of China” (Chap. “[Natural Disaster System in China](#)” of this book). In a nutshell overview, it introduces China’s disaster-formative environment, that is, the human-environmental system in which natural disasters occur; natural hazards; exposure units; natural disaster situation; and natural disaster risks.

Part two is “China’s Major Natural Disasters” (Chaps. “[Earthquake Disasters in China](#)”—“[Storm Surges in China](#)” of this book). It covers the spatiotemporal patterns and formation processes of earthquakes, landslides and debris flows, typhoons, floods, droughts, snowstorms, frost and hails, sandstorms, storm surges, and other natural hazards in China; disaster situations; vulnerability and risks; risk governance; and typical cases of coping with catastrophic disasters.

In the book, we summarize the characteristics of China’s natural disaster system, reveal natural disaster formation mechanisms and processes, quantify natural disaster situation and vulnerability, evaluate natural disaster risk levels, summarize the key strategies of integrated natural disaster risk governance (especially the institution, mechanism, and legal system of integrated disaster prevention and reduction), analyze catastrophic natural disaster response models, and propose integrated natural disaster risk governance strategies in China.

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