

IHDP-Integrated Risk Governance Project Series

Peijun Shi · Carlo Jaeger
Qian Ye *Editors*

Integrated Risk Governance

Science Plan and Case Studies
of Large-scale Disasters



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IHDP-Integrated Risk Governance Project Series

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About this Series

This book series, entitled “IHDP-Integrated Risk Governance Project Series” for the International Human Dimensions Programme on Global Environmental Change—Integrated Risk Governance Project (IHDP-IRG Project), is intended to present in monograph form the most recent scientific achievements in the identification, evaluation and management of emerging global large-scale risks. Books published in this series are mainly collected research works on theories, methods, models and modeling, and case analyses conducted by scientists from various disciplines and practitioners from various sectors under the IHDP-IRG Project. It includes the IRG Project Science Plan, research on social-ecological system responses, “Entry and Exit Transition” mechanisms, models and modeling, early warning systems, understanding regional dynamics of vulnerability, as well as case comparison studies of large-scale disasters and paradigms for integrated risk governance around the world. This book series, therefore, will be of interest not only to researchers, educators and students working in this field but also to policy-makers and decision-makers in government, industry and civil society around the world.

The series will be contributed by the international research teams working on the six scientific themes identified by the IRG Project science plan, i.e., Social-Ecological Systems, Entry and Exit Transitions, Early Warning Systems, Models and Modeling, Comparative Case Studies, and Governance and Paradigms, and by six regional offices of the IRG Project around the world.

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Foreword I

The Millennium Development Goals, which range from halving extreme poverty to halting the spread of HIV/AIDS by the 2015 target date, were established by countries around the world when Heads of State met at the United Nations in New York in 2000 to adopt the UN Millennium Declaration. Any observer, looking back on the first eight years of the new century, can see that many challenges remain if the world truly wants to see these goals met. Beyond the numerous evident obstacles, rapid changes and uncertainties in both ecosystems and societies, as well as in the interactions between the two, present nebulous challenges.

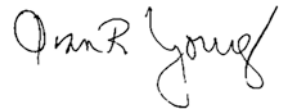
From the “9–11” terrorist attack in the US in 2001 to China’s Wenchuan Great Earthquake in 2008, from the Tsunami in the Indian Ocean to the global sub-prime financial crisis, losses in human lives and properties caused by natural hazards and nefarious human actions have increased dramatically. Although many of these disasters differ in the ways societies have responded and in the specific contexts in which they occurred, they share important commonalities: Their impacts were not confined to political boundaries, and they required multi-scale, multi-actor, cross-sectoral responses to reduce human, economic and environmental losses, which, despite wide-ranging mobilizations, were immense anyway. The scale and intensity of these events took governments by surprise and challenged longstanding institutionalized solutions to disaster planning, response, management and recovery. These losses, which show an upward trend corresponding to the frequency and intensity of large-scale disasters, provide the reasons for urgent action to improve the effectiveness of response systems.

Both experience and lessons learned from IHDP’s first decade efforts strongly demonstrate that to better understand and then effectively respond to these mounting challenges on very large-scales requires not only innovations and technologies from the sciences, including the social sciences, but also new developments in institutions, policies and management mechanism at all levels of government. As identified in the IHDP’s strategic plan for the next decade, we are now facing a challenge of developing a better understanding of the dynamics of coupled socio-ecological systems, which fully integrate the impacts of human actions into analyses of global environmental changes.

First initiated by the Chinese National Committee for the IHDP (CNC-IHDP) in 2006 during the Earth System Science Partnership (ESSP) Open Science Conference in Beijing, a global study of very large-scale risks was formally launched at an international workshop held in Beijing in September, 2007. Under the leaderships of Prof. Peijun Shi, Beijing Normal University (BNU), and Prof. Carlo Jaeger, Potsdam Institute for Climate Impact Research (PIK), a group of scientists and supporting staff from both BNU and PIK worked extensively for the past two years. After the first workshop, the Planning Group met at Beijing Normal University (February 2008), where the initial outline for this project was drafted. Two writing workshops held in Santa Barbara, USA and Potsdam, Germany, were produced a Pilot research plan for the project. The Pilot research plan was then submitted to the IHDP Scientific Steering Committee in New Delhi, India (October 2008) for further comment. Community input was discussed by the Planning Group at a meeting in Beijing (January 2009) and used to guide further revision of the Science Plan. Several anonymous reviewers provided substantive comments, and their input led to the final revision of the final document.

The Plan describes the rationale for an enhanced global scientific research effort on very large-scale disasters over the next decade and poses five key science questions—about socio-ecological systems, about transition-in and transition-out, about models and modeling, about comparative case studies, about governance and paradigms.

The Science Plan was advocated by the Scientific Committee of IHDP in Bonne, Germany on October 2010 and launched formally in Beijing, China on May 10, 2011. I firmly believe that this plan will provide an excellent cooperated platform for integrated large-scale disasters (LSD) risk governance under the global climate change and make up a net of global LSD risk researches quickly. I also expect that this plan can provide scientific evidence and strategic advices to policy makers of LSD risk governance. Based on IHDP-IRG Project, the fruits of research presented in this book illuminate the practical value and research meaning of IHDP-IRG Project and promote the substantial development of areas and global.



May 11, 2011

Former Chairman of IHDP Scientific Committee
Chairman of IHDP-IDGE Core Science Project
Professor of College of Environmental Science and Management
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Foreword II

Rapid economic development in the world, especially in countries with emerging markets and large populations; the exponential increase of computer and Internet users; innovations in multi-media and telecommunication technologies; findings in genetic and nano-technologies—these among numerous other examples illustrate the emergence of human societies into a new age. Along with the benefits of this emergence, however, come certain costs, such as how the impacts of man-made and natural disasters, which in previous ages were confined to one country or region, are now, through the globalization of economic processes and the reach of mass media outlets, amplified, influencing every corner of the world.

At least on some spatial and temporal scales, the development of human societies on a global scale has clearly begun to have an inordinate influence on complex planetary environmental systems, which themselves have considerable variability. In fact, some international organizations and research institutions, such as the IPCC, have indicated that human activities are now the major driving factor behind global environmental change. But human influence is not limited to the abstract, statistical trends of climatic processes of interest only to atmospheric and environmental scientists. On the contrary, recent research indicates that the frequency, intensity and impacts of natural weather hazards are strengthening, a portentous change that should worry individuals in all societies.

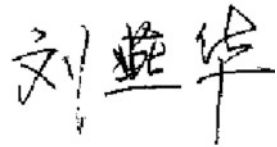
Research on catastrophes in the past has shown that, although such events impacted all countries, the attributes of natural and social catastrophic risk in different countries strongly depended on differences in social and political systems during different periods of the catastrophe. Mechanisms, policies, and laws for hazard prevention, response and reconstruction, on the one hand, differ for different cultures. On the other hand, however, human societies, for their own evolutionary needs, must all develop secure social and natural environments, which should be a primary and universally recognized responsibility of all governments. In the context of economic globalization, a contribution and dispersal mechanism to mitigate impacts of large-scale disasters (LSD) is also necessary.

Motivated by these understandings, the Chinese National Committee for the IHDP proposed an International Research Cooperative on Risk Governance to the

IHDP in 2006. We were so glad that IHDP Scientific Steering Committee accepted the proposal and took the lead to organize and form a task group which is consisted of a group of internationally distinguished scientists. In the past two years, this group, supported by both Beijing Normal University and Potsdam Institute for Climate Impact Research, conducted a thorough, cooperative survey of catastrophes in the context of global environmental changes. Altogether, more than 100 individuals have participated in planning workshops/meetings and/or have contributed written material to the planning process. Although it is not possible to thank each individually, their collective contributions are gratefully acknowledged.

It is my hope that this Science Plan can be used to stimulate not only more scientific research in the field of risk governance to work cooperatively for the purpose of better understand great challenges from the changing Earth environment but that it can also assist government at all levels to better understand and respond more efficiently and effectively to threats, so the real people who compose the abstract society can benefit most from this project.

The fruits of research presented in this book, based on IHDP-IRG Project, illuminate that the response strategy of integrated LSD risk governance has a very wide application and important innovative academic value. The comparative case studies on LSD risk governance represent the different experiences and lessons which can be learned by us in varied countries and areas during the risk governance process. Under this scientific plan, I expected that scientific workers can create more LSD risk governance strategies for human society, and also the Chinese companions who involves in this subject can summarize the response's experiences and lessons of China and absorb the advanced experiences of risk governance in order to develop the enterprise of LSD and make more contributions to LSD risk governance discipline.



May 11, 2011

State Council Adviser of the People's Republic of China
Former Vice Minister of Ministry of Science
and Technology of China
Chairman of Chinese National Committee for IHDP
Researcher of Geographical Science and Resources Institute
The Chinese Academy of Sciences

Preface

About IHDP-IRG Project

Integrated Risk Governance Project (IRG Project) is an international science project sponsored by International Human Dimensions Programme for Global Environmental Change (IHDP). IRG Project was proposed in 2006 by Risk Governance Group (RG) of Chinese National Committee for International Dimensions Programme on Global Environmental Change (CNC-IHDP). Designated by IHDP Scientific Committee, IRG Project Scientific Planning Committee was formed to prepare the IRG Project science plan. IHDP Scientific Committee finally approved the IRG Project as the pilot project in 2009. Later on, upon further revision by IRG Project Scientific Planning Committee in view of the reviews and comments of various anonymous commentators, IRG Project was officially approved as one of the 8 core science projects of IHDP at Bonn Meeting of IHDP Scientific Committee in October 2010. On May 10, 2011, the IHDP-IRG Project was formally launched in Beijing, China. As a ten-year international cooperative research project, the IRG Project's mission is to improve the governance of new risks that exceed current human coping capacities by focusing on the transitions in and out of the occurrence of relevant risks in the context of global climate changes.

About the Book Series for IHDP-IRG Project

In order to timely represent and report the progress of IHDP-IRG Core Science Project, the Project Office decided to irregularly edit and publish the achievements of this international research project. In addition to disseminate regularly the relevant information of IRG Project via the project official website and the newsletter of IHDP-IRG Project, as well as its official peer-reviewed journal, International Journal of Disaster Risk Science (IJDRS), an agreement of publishing a book series both in Chinese and English, which covers the systematic research achievements of IHDP-IRG Core Science Project, was made between the IRG Project and Springer, through Beijing Normal University Press, China.

The Book Series for International Human Dimensions Programme on Global Environmental Change—Integrated Risk Governance Project (IHDP-IRG Project) is to present in monograph form the most recent scientific achievements in the identification, evaluation and management of emerging global large-scale risks. The books published in this series are mainly collected research works in theories, methods, models and modeling, and case analyses conducted by scientists from various disciplines and practitioners from various sectors under the IHDP-IRG Project. The Book series include IRG Project Science Plan, research on social-ecological system response, “Entry and Exit Transition” mechanism, models and modeling early warning systems in the integrated risk governance as well as case comparison studies of large-scale disasters and integrated risk governance paradigm. This book series, therefore, will be not only of interest to researchers and students working in this field but also to policy and decision makers in the government, industry and civil society around the world.

Integrated Risk Governance IHDP-IRG Project Science Plan and the case studies of large-scale disasters is the first book of the book series for IHDP-IRG Project. This book consists of two parts: Part I: Integrated Risk Governance Project Science Plan which outlines the challenge, research programme, outcomes, and implementation strategy of IRG Project; Part II: Case Studies of Large-scale Disasters, including case analyses of experience, lessons learned and recommendations on various large-scale disasters around the world, such as Tangshan and Wenchuan Earthquake and Great Ice-storm in China, European Heat Waves, and Hurricane Katrina in USA. The Community Model of Integrated Natural Disaster Risk Governance and Paradigm of Catastrophe Risk Governance in China are also presented.

The editorial office of the book series is hosted by International Project Office (IPO) (Beijing) of IHDP-IRG Project, with Peijun Shi (the co-chair of the project and professor of Beijing Normal University) and Carlo Jaeger (the co-chair of the project and professor of Potsdam Institute for Climate Impact Research) as its chief editors and Professor Qian Ye (the executive director of IPO and professor of Beijing Normal University) as its technical editor.

Professor Shi Peijun is the executive vice-president of Beijing Normal University. He got his Ph.D. degree of paleogeography at Beijing Normal University. He is the vice chairman of the Expert Committee of the National Disaster Reduction Commission of China. He is also a member of OECD’s High Level Advisory Board on Financial Management of Large-scale Catastrophes. Prof. Shi’s research focuses on natural disaster theories and risk governance. He has been the principal investigator of many national and ministerial research programs and has published numerous journal papers and books.

Carlo Jaeger is Professor for modeling social systems at Potsdam University in Germany, chair of the research domain “Transdisciplinary Concepts and Methods” at the Potsdam Institute for Climate Impact Research, and chair of the Global Climate Forum. He holds degrees in economics (Ph.D., Frankfurt University), sociology (diploma, University of Bern), and human ecology (habilitation ETH Zurich) and has worked extensively on interactions between technological

progress and environmental problems, in particular the role of information technologies for urban development. He is member of the Scientific and Technical Council of IRGC (International Risk Governance Council), and has served on the boards of various scientific organizations. He has considerable research experience in the field of stakeholder dialogues. His current research interest is focused on the role of financial markets in managing climate change.

It is expected that the book series will be contributed by the international research teams working on the six scientific themes identified by the IRG Project science plan, i.e., Social-Ecological Systems, Entry and Exit Transitions, Early Warning Systems, Models and Modeling, Comparative Case Studies, Governance and Paradigms, as well as six regional offices of IRG Project around the world.

May 20, 2012

IHDP-IRG Project IPO

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- International Human Dimensions Programme on Global Environmental Change (IHDP);
- Oran Young (former chair), Andreas Rechkemmer (former executive director), Falk Schmidt (former officer) of IHDP;
- The Integrated Risk Government Council (IRGC);
- The International Disaster and Risk Conference (IDRC);
- Beijing Normal University (BNU);
- The Potsdam Institute for Climate Impact Research (PIK);
- The Global Climate Forum (GCF).

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