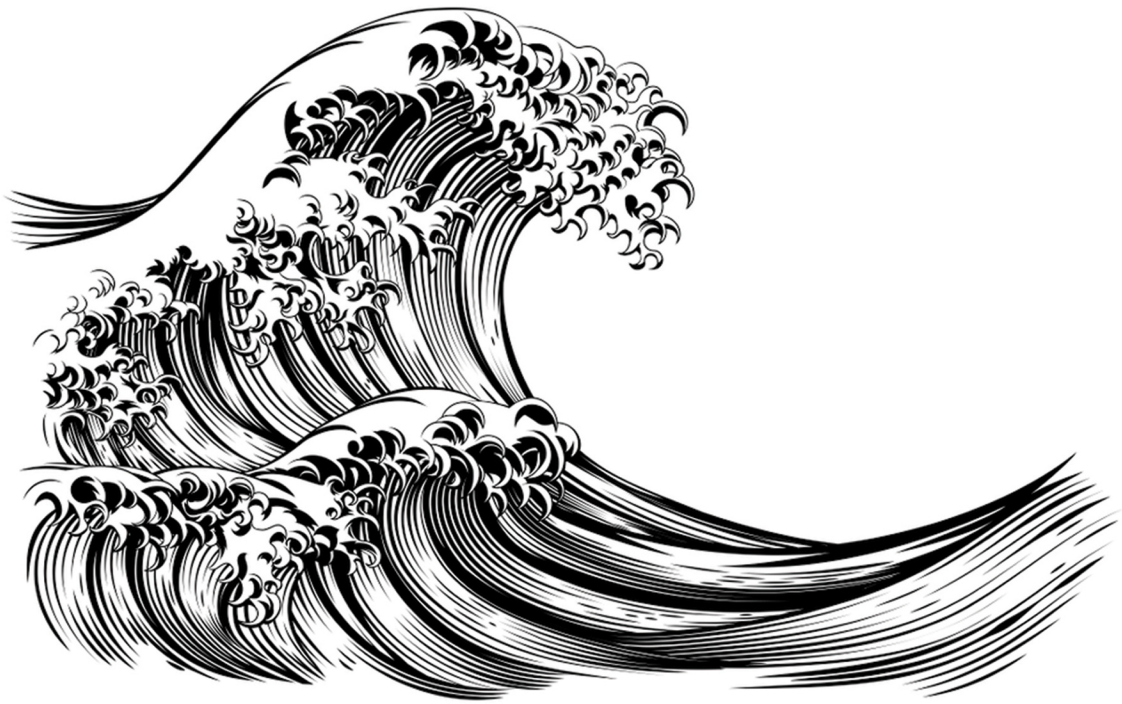
IIAS Public Governance Series Vol. 2

DEALING WITH DISASTER

Public Capacities for Crisis and Contingency Management



David C.G. Brown || Jacek Czaputowicz

Dealing with Disaster

Public Capacities for Crisis and Contingency Management

David C.G. Brown & Jacek Czaputowicz, Editors

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Acronyms

ADRA – Adventist Development and Relief Agency
ADRC – Asian Disaster Reduction Centre
CASoS – Complex Adaptive Systems of Systems Engineering
CBO – Community-based Organizations
CCM – Cluster Coordination Model (United Nations)
CDEMA – Caribbean Disaster and Emergency Management Agency
CENAD – National Center for Risk and Disaster (Brazil)
CEOS – Committee on Earth Observation Satellites
CIDA – Canadian International Development Agency
CMT – Crisis Management Team
COO – Continuity of Operations
CRED – Centre for Research on the Epidemiology of Disasters (European Union)
DM – Disaster Management
DMA – Disaster Management Agency (Japan)
DMS – Disaster Management Support
DRA – Disaster Recovery Approach
DRAMBORA – Digital Repository Audit Method Based on Risk
DRM – Disaster Risk Management
DRR – Disaster Risk Reduction
EADRCC – Euro-Atlantic Disaster Response Coordination Centre (NATO)
ECASC – Civil Protection Training School (France)
EDMH – Extreme Disaster Management Headquarters (Japan)
EMC – Emergency Management Centre
EM-DAT – Emergency Events Database (Université catholique de Louvain)
EMSA – European Maritime Safety Agency
EOC – Emergency Operation Centre
ERC – Emergency Response Center (Czech Republic)
ERCC – Emergency Response Coordination Centre (European Union)
EU-ECHO – European Community Humanitarian Office (European Union)
EU-MIC – European Union Monitoring and Information Centre

FAO – Food and Agricultural Organization
FEMA – Federal Emergency Management Agency (USA)
GCOS – Global Climatic Observer System
GEJE – Great East Japan Earthquake (2011)
GEOSS – Global Earth Observation System of Systems
GFDRR – Global Facility for Disaster Reduction and Recovery (World Bank and partners)
GFMC – Global Fire Monitoring Centre (Freiburg University, Germany)
GRIPWEB – Global Risk Identification Program (UNDP)
HFA – Hyogo Framework Agreement
HRO – High Reliability Organisation
ICBS – International Committee of the Blue Shield (UNESCO)
ICRC – International Committee of the Red Cross
ICTs – Information and Communication Technologies
IFRC – International Federation of Red Cross and Red Crescent Societies
IMO – International Organization for Migration
IMT – Incident Management Teams
INSARAG – International Search and Rescue Advisory Group (United Nations)
IPCC – Intergovernmental Panel on Climate Change (United Nations)
IRS – Integrated Rescue System
ISO – International Standards Organization
MDG – Millennium Development Goals
NADMO – National Disaster Management Organisation (Ghana)
NATO – North Atlantic Treaty Organization
NDMA – National Disaster Management Authority (India)
NDRF – National Disaster Resilience Framework (USA)
NGO – Non Governmental Organization
NPG – New Public Governance
NPM – New Public Management
ODA – Official Development Assistance
OEC – Off-site Emergency Centre
OECD – Organisation for Economic Cooperation and Development
OSOCC – On-site Operations Coordination Centre (UN-OCHA)
PBA – Program Based Approach
PDNA – Post-Disaster Needs Assessment (GRDRR, European Union and United Nations)

PPP – Public-Private Partnership
SDG – Sustainable Development Goals
SFA – Sendai Framework Agreement
SNA – Social Network Analysis
STEEP factors – Social, Technological, Economic, Ecological, Political factors
STICC – Situation, Task, Intent, Concern and Calibrate
UNDAC – United Nations Disaster Assessment and Coordination
UNDP – United Nations Development Program
UNDRO – United Nations Disaster Relief Office
UNEA – United Nations Environment Agency
UNESCO – United Nations Educational, Scientific and Cultural Organization
UNFCCC – United Nations Framework Convention on Climate Change
UNGA – United Nations General Assembly
UNHCR – United Nations High Commissioner for Refugees
UNIASC – United Nations Interagency Standing Committee
UNICEF – United Nations Children's Fund
UNICSMD – United Nations Charter on Space and Major Disasters
UNIDNDR – United Nations International Decade for Natural Disaster Reduction (1990-1999)
UNISDR – United Nations International Strategy for Disaster Reduction/ United Nations Office for Disaster Risk Reduction
UNITAR – United Nations Institute for Training and Research
UN-OCHA – United Nation Office for the Coordination of Humanitarian Affairs
UN-SPIDER – United Nations Platform for Space-based Information for Disaster Management and Emergency Response
USAID – United States Agency for International Development
V4 – Visegrad Group (Central Europe)
WFP – World Food Program
WHO – World Health Organisation
WMO – World Meteorological Organisation

Acknowledgments

An edited book by its nature is the work of many hands, and we would like to recognize those who have supported this project and helped to bring it to a conclusion. The book results from the work of the Project Group on Safety and Security of the International Institute of Administrative Sciences (IIAS), which was mandated by the IIAS Program and Research Advisory Committee (PRAC) to conduct a study of national public capacities for crisis and contingency management, together with related international coordination in addressing disaster situations. The IIAS brings together practitioners and researchers interested in comparative public administration and administrative reform. Reflecting the IIAS's global network, this book contains chapters by authors from all regions of the World, representing a wide range of crisis experiences and institutional perspectives but reflecting a common desire to strengthen national and international capacities for crisis and contingency management.

The core of the project has been the participants in the four meetings of the project group. Most of the papers were presented at the project group meetings, held in association with the IIAS annual Congresses in 2011 (Lausanne, Switzerland), 2012 (Merida, Mexico), 2013 (Manama, Bahrain) and 2014 (Ifrane, Morocco). Earlier versions of several papers were presented at annual meetings of the American Society of Public Administration and the Canadian Association of Programs in Public Administration, as well as at a research workshop organized by Meiji University in Tokyo, Japan. A forerunner of the project group met in Warsaw to consider the public administration implications of the end of the Cold War.[1]

We therefore wish to begin by thanking the authors of the chapters in this book, who served both as contributors and as reviewers, commentators, and advisors. The publication has benefitted greatly from their wisdom and experience.

[1] It is perhaps not entirely coincidental that the chair and rapporteur of the project group were recruited by the IIAS from countries that during the Cold War were respectively in the Warsaw Pact and NATO.

Within the IIAS, we owe particular thanks to the past President of the IIAS, Pan Suk Kim, who helped launch the project and his successor, Geert Bouckaert, who helped to see it through. Thanks also go to Masahiro Horie, the past chair of PRAC and to his predecessor, Akira Nakamura, who has been a strong supporter and wise counsellor, and Robert Fouchet, the IIAS publications director. Anne De Boeck, the IIAS Executive Secretary, served as the project group's Secretary, and Fabienne Maron, the IIAS Scientific Administrator guided us through much of the publication process.

Many of the papers acknowledge financial support provided by funding agencies to the research projects that lie behind individual chapters. We join the authors in thanking those funders, without whom this book would not be nearly as comprehensive. We also wish to thank the University of Ottawa for providing assistance for the editorial process.

Finally, we would like to acknowledge and warmly thank three graduate students at the University of Ottawa who provided invaluable research assistance: Victoria Pijacki at the early stages, Aaida Mamuji during the period of transition to a full-blown book project, and Lauren Touchant, who has played an instrumental role in bringing the publication to a conclusion.

The work of the project group concludes with this publication. At the same time, interest in the topic is if anything growing, reflecting greater public awareness of major natural and human-induced disasters. We would expect the Institute will return to these issues in the future.

A Second Acknowledgement

The manuscript for this book was originally completed in 2017. This coincided with a period of transition in the IIAS, and publication was delayed. Our thanks go to the current Director General of the IIAS, Sofiane Sahraoui, for giving priority to this and other publications in the backlog and in particular to Steve Troupin, the IIAS Executive Secretary, for his untiring efforts to enable the final stages of the editorial process. We also wish to thank the contributing authors for their patience and continued support for the project.

It bears noting that part of the impetus for bringing the book project to a conclusion was the COVID-19 pandemic, which became a truly global disaster – a "wicked" problem – in 2020. Coincidentally 2020 was also the 90th anniversary

of the IIAS, and five of the book authors participated in a panel presenting the book and its findings at an on-line conference organized by the IIAS in June 2020 to mark the anniversary in a contemporary fashion.

While the book does not address public health crises in any depth, it does recognize the challenges they present. The COVID-19 pandemic has posed unprecedented challenges to individual governments and to the international community, and it has had tragic consequences for too many individuals, but it has also brought home the wisdom and importance of good crisis and contingency management, in every country and in all orders of society.

Chapter 1. Introduction

David C.G. Brown and Jacek Czaputowicz

Natural disasters and man-made accidents or violence usually occur with little or no warning and limited scope for prevention. In this increasingly visible area of public action, many countries, especially in developing regions, are ill prepared for contingencies, lack the necessary personnel and financial resources to respond, and are often more severely exposed than they need be.

Experiences across the World in the last half century in both developed and developing countries – from Three Mile Island in 1979 and Chernobyl in 1986 to the 2010 earthquake in Haiti, the 2011 triple disaster in Japan, and more recent events that continue to occur regularly – have demonstrated repeatedly how inextricably linked are public security and safety to the existence of adequate, clearly delimited and tested governance and public management structures and processes. These involve governments politically, but the responsible public services invariably also face major challenges. In a field that cuts across all aspects of public management, areas where too often there have been failings cover an entire spectrum: from planning and decision-making to organization and leadership; working relationships among levels of government and between state institutions and non-state actors; mobilization and control of financial, human and information resources; informing and supporting the public; dealing with a multiplicity of international dimensions; through to evaluation of crisis events after they are over and policy development for addressing future contingencies.

While there have been real improvements and extensive review of many of these issues over several decades, they have not had significant attention from a comparative public administration and governance perspective. The IIAS project group on Safety and Security was asked to review the state of the art on a selective

and comparative basis, including national and regional case studies and also the role of the international system. The specific dimensions of this broad and emerging topic that the project group has addressed have necessarily also depended on the interests and expertise of participants. Within that constraint, however, the group has sought to contribute to the pool of knowledge on recent crisis experiences and the governance and public administration responses to them and through that to develop a broader awareness among practitioners, researchers and educators. An additional goal has been to encourage further exploration of these issues by IIAS members, by governments and academic researchers more generally, and by regional public administration networks.

This is the first time that the IIAS has tackled the question of non-military crises and how governments prepare for and respond to them. Even then, the project group has gone through an evolution that brings home our rapidly changing understanding of safety and security issues. Its forerunner was originally asked to consider the implications for public administration of 9/11, the terrorist attacks on the World Trade Centre in New York City on September 11, 2001. It can be argued that – at least for public administrations in NATO and the former Warsaw Pact countries – that event, rather than the fall of the Berlin Wall in 1989, was the real end of the Cold War, in terms of the perceived threats to national safety and security and the corresponding institutional arrangements for addressing them. In the meantime, however, emergency management organizations, which previously had a strong civil defence orientation, often linked to the military sphere, were increasingly shifting their primary focus to natural and human-induced hazards and emergencies. It was in this context that the project group was reconstituted and asked by the IIAS to orient its work towards crisis and contingency management.

A Note on Terminology

An underlying project group concern has been terminology. The literature commonly uses five terms in particular: “hazards,” “contingencies,” “emergencies,” “crises” and “disasters.” At least some of these terms are frequently used interchangeably in regular usage, especially to the extent that they all describe circumstances that are outside the normal focus of public administration and public policy. The pragmatic conclusion, based on project

group discussions, is that they describe an escalating spectrum from identifiable risks to extreme events. Hazards can be understood as sources of risk or vulnerability, and contingencies as measures taken in advance based on the assessed risk of hazards becoming emergencies. Emergencies are actual events, defined as "a sudden state of danger requiring immediate action. [1] The circumstances under which an emergency can be considered to have become a crisis – a time of "great difficulty" representing a decisive moment or turning point, derived from the classical Greek word for "decision" – have at least something to do with the adequacy of the State and public response. A disaster is a further escalation – "a great or sudden misfortune," "a complete failure" – or, as characterised by one of the papers in this book, "a loss of meaning" (Tiberghien, Vidal and Arnaud A7[2]). Disaster areas are places where governments have declared a state of emergency, eligible for special relief measures, places "characterized by extreme disorderliness or misfortune."

Disasters, whether arising from natural or human-induced events, are a human construct. As argued by one commentator:

> *"While extreme events often act as a trigger, human decision-making can predetermine whether or not an emergency becomes a disaster. Disasters are the result of interaction between environmental hazards and human vulnerability." (Henstra 2002: 112)*

It is this link to decision-making and its consequences, whether in setting the conditions for anticipating – or not anticipating – emergencies or in responding to them and to their aftermath, which provides the link to governance and public management.

[1] The definitions in this paragraph are taken from the Oxford Canadian Dictionary. A more complete discussion of the terms used in the crisis and disaster management literature is provided by the chapter on "Theoretical perspectives on crisis management" (Touchant and Mamuji A3).

[2] The citation of an author without a date refers to a contribution to this book. The alphanumeric citation refers to the chapter number.

Learning about Crisis and Contingency Management: Book Structure

Every crisis potentially offers insights for later learning and improvement by both the governments involved and by others who are affected or might be in the future. Indeed, this is repeatedly emphasized by the authors in this book as an essential part of crisis and contingency management. Comparative study can provide valuable insights but also presents methodological and terminological challenges. As a practical matter, as well, each national system has its unique features and problems and asks different questions of international experience. The project group has therefore adopted the approach of sketching the territory and understanding its topography rather than prescribing a single model. It has sought to provide a structured account of issues to consider and approaches to dealing with them. Their relevance and utility will depend on the reader and the national or other circumstances that they are working in.

Two central threads run through all discussion of crisis and contingency management: the nature of hazards, vulnerabilities and crises to which governments and societies are asked to respond; and considerations that arise in preparing for and responding to crises from a governance and public administration perspective. Authors of chapters in the book were encouraged to address these issues, to the extent they were considered relevant, from one of four starting points (see below). All authors were asked to conclude their papers with a summary of lessons for an international audience, and these also provide the basis for the concluding chapter of the book.

In order to make international experience more accessible, the book is divided into four sections, each approaching crisis and contingency management from a different starting point: cross-cutting thematic and conceptual issues that are common to many, if not most, political and administrative systems of crisis and contingency management; the role played by the international community in responding to crisis situations and related international institutions; national institutional, legal and administrative environments for addressing crises; and individual cases of crisis and disaster response. A brief introduction of the topic and its relationship to the rest of the book is provided for each of these four sections in the balance of this introductory chapter.

The concluding chapter reflects on the issues and situations discussed in the book and the lessons identified by chapter authors. It also points to areas where

further study is warranted both by practitioners and by academic researchers. A major conclusion of the project is that there is more to be understood in an emerging and evolving field of public administration and its relationship to governance, both in general terms and in any given country. In that sense, the project group's publication is just one step in a continuing exploration.

Part A: Cross-cutting issues in crisis and contingency management

The first section of this volume presents theoretical perspectives, methodological research and cross-cutting issues that complement the institutional and disaster case study-oriented chapters in the later sections of the book. Like the study of crisis management itself, the issues discussed in the section's six chapters combine theory and practice, ultimately growing out of the lived experience of national or international institutions and individual disaster cases. The unifying premise of this section is that the papers present issues, methodologies and insights that are of interest to most, if not all, institutional actors and relevant to a significant number of categories of disasters. They provide common threads for the theory and practice of disaster management as a discipline in its own right, but they also help to situate disaster management within the broader field of public administration.

This approach is one of four complementary starting points for chapters in the book; indeed all chapters touch on issues and experiences of a theoretical or cross-cutting nature. By the same token, many of the chapters in this section illustrate their arguments with examples drawn from individual countries or disaster events. They have been included in this section, however, because their primary focus is on theoretical and methodological concerns, and it is assumed that their insights are potentially of interest to readers from all countries and concerned with a wide range of vulnerabilities.

The section begins with two chapters that introduce issues and concepts in the book as a whole: an overview discussion of the public administration and governance dimensions of crisis management and response (Brown A2); and a discussion of major themes that emerge from a review of the crisis management literature (Touchant and Mamuji A3). These are followed by four chapters submitted by participating authors, on: managing uncertainty in regions of risk

(Comfort A4); the challenge of organizational learning in a regulatory context (Valiquette L'Heureux A5); the use of scenario-building techniques in developing disaster response systems (Hur A6); and the nature and implications of different management models for responding on the ground to natural disasters, using the example of wildland firefighting (Tiberghien, Vidal and Arnaud A7).

The chapter by Brown begins by exploring a theme repeated throughout the book: that disasters are by their nature the product of the interaction between human actions and natural forces. Human actions contribute to accentuating hazard risks and vulnerabilities to the point that they exceed human capacity to deal with them for a significant time and space, but they also provide the basis for anticipating disasters and for responding to them effectively when they occur. A particular concern is implications for public administration, focusing on four sets of issues: institutional and governance capacity; management of internal and external relationships in a crisis, extending beyond the usual boundaries of the State and society; implications for classic disciplinary concerns of public administration; and the importance of political and organizational culture.

Touchant and Mamuji (A3) provide a commentary on the disaster management literature. They begin by considering evolving answers to the question of what constitutes a disaster and how disasters have been interpreted, from earliest times to the present and through the lenses of different academic disciplines. A second section summarizes the progression of thinking about management of vulnerability, which lies at the heart of disaster management as a discipline. The third section offers suggestions about possible elements of a comprehensive disaster management model.

The section's other four chapters present individual theoretical or methodological concepts, in some cases growing out of structured research and in others based on research and reflections arising from disaster events. In all four cases, the analysis draws on observation of events and activities in one or two countries, but the authors make clear they believe there is potentially much wider relevance.

Comfort (A4) addresses the question of how to build capacity for global risk assessment and response in increasingly complex environments characterized by growing costs and interdependence, compounded by secondary and tertiary ripple effects. These are particularly acute in large urban environments located in areas that present natural hazards such as seismic risk. The human capacity to learn and adapt to changing conditions is a major asset, but organizing in a

complex systemic environment presents a major challenge. Illustrated by action research into an underground mining disaster in Soma, Turkey in 2014, Comfort argues for a systematic "whole community" approach to managing both risk and response.

Valiquette L'Heureux (A5) echoes the theme of systemic complexity and interdependence to address the challenge of organizational learning by regulatory authorities in the rail transportation industry in Canada. Reflecting on a crash by a train carrying crude petroleum that resulted in a major loss of life, Valiquette L'Heureux considers the role that organizational structure and culture, as well as the effects of deregulation and privatization, played in the failure of responsible public sector authorities to learn from earlier disasters in the rail industry and to prepare effectively for future such events. Rather than strengthening their capacity to anticipate and respond to crisis events, risk management regimes can face forms of regression following a crisis, often a result of regulatory capture. They thereby risk contributing to the conditions for future diasters.

The papers by Hur (A6) and by Tiberghien, Arnaud and Vidal (A7) address methodological issues and draw on empirical research. Hur starts from the growing interconnectedness of modern society, especially the complexity that comes with economic and social development, and points to the related increasing risk and reality of mega- or catastrophic disasters involving mass casualties and severe damage to infrastructure, the environment and social and State capacity. As part of building systemic preparedness for such hybrid disasters, he presents the results of a study in the Republic of Korea that used a combination of methodologies to forecast potential catastrophic disasters and to identify the range of responses required to deal with them, including legislation, institutions, governance processes, operational procedures and ultimately public education and training for all societal actors.

Tiberghien, Vidal and Arnaud shift the focus to management of emergency response situations. Using the example of large wildland fires in France and the United States, and drawing on both field and laboratory observations, they address the dynamic tension in managing such emergencies between planning and improvisation, which can also be understood as a tension between control (by a central authority) and mindfulness (ability to adjust on the ground). Again pointing to the growing frequency and complexity of catastrophic disasters – wildland fires encroaching on urban areas being a case in point – the authors

reflect on the differences they observed in doctrine and practice among elite firefighters in the two countries but also the lessons that they can learn from each other in creating high reliability emergency response organizations.

Part B: International collaboration and institutional capacity

International and regional cooperation is a central feature of crisis and disaster management and is the subject of the second section of the book. It is potentially a vast topic and in the longer run warrants attention on its own. Although disaster management is in the first instance focused on institutions, actors and dynamics within countries, it can safely be said that the international environment will take an interest and plays a role in every disaster event. This is due both to the range of interests that the international community, in all its diversity, has in any given disaster event and to the crisis management and response capabilities that collectively it is able to mobilize. A particular set of issues also arises when an event transcends national boundaries (for example, flooding in rivers shared by two or more countries) or when it in some other way affects neighbouring countries, whether at much the same time (such as an earthquake) or in sequence (a typhoon or hurricane moving through a geographical region).

International collaboration raises many of the same issues that governments and societies face at the national level but with the added layer of complexity that the international governance regime is less well developed and has considerably weaker authority than nation States and indeed is based on them to a large degree. The four chapters in this section present a composite picture of some key aspects of this situation. The first (Touchant B8) discusses the evolving role in the past generation of the United Nations system in disaster risk management, focusing on the series of international agreements in this area, the changing thinking about disasters that they represent, and the role of the United Nations, notably its Office of Disaster Risk Reduction (UNISDR) in disaster prevention and the Office for the Coordination of Humanitarian Affairs (UN-OCHA) in disaster response. The second paper (Mamuji B9) considers the public administration issues faced by a donor country (Canada) in bringing together the government organizations involved in a disaster response in a developing country, notably the international development assistance agency and the military. The third paper

(de Cooker B10) has a slightly different focus, presenting the growing use of space technologies in terrestrial crisis management. The fourth discusses the national and regional response to flooding in four neighbouring countries in central Europe (Brazova, Matczak and Takacs B11).

In the area of disaster management and response, the international community encompasses a highly diverse range of actors, which will vary considerably according to the nature of a disaster event and where it occurs. The United Nations system plays a central role, encompassing a variety of international agreements, institutions and capacities. Two pivotal UN agencies are discussed: UNISDR and its role in supporting national governments in their ability to manage disaster risks, starting with organizing their disaster response capacity but increasingly oriented towards preparedness and mitigation; and UN-OCHA, concerned with coordination among the multiplicity of UN agencies and national aid-donor governments that potentially can be involved in responding to a disaster event but also with the interaction between international actors and the national government and other groups and institutions within the affected country.

From this starting point there is a potentially wide range of United Nations agencies that get involved, ranging from the World Health Organization and World Meteorological Organization, which bring sectoral expertise and capacity, to the United Nations Development Program and the World Bank, which have a major role in addressing and financing post-disaster recovery in particular. Other multilateral and regional agencies also play significant roles. National and regional space agencies collaborate to report and monitor disaster events, making this information widely available to international and national actors. A valuable longer-term use of their data is the cumulative inventory of natural disaster events maintained by EM-DAT, a facility sponsored by a partnership of agencies as a global resource. Regional multilateral collaboration is less developed, but one chapter in this section discusses emerging cooperation in central Europe (Brazova, Matczak and Takacs B11) in response to the complex issues of coordination and consistency that arise when physical features and natural disasters cross jurisdictional boundaries. Additional examples are cited in other chapters of the book, including NATO's Euro-Atlantic Disaster Response Coordination Centre (EADRCC), and the Asian Disaster Reduction Center (Mishra and Potaraju C13). The latter chapter also presents a country (India) that has built into its national disaster planning a capacity to respond to disaster events in

neighbouring countries. In addition, all OECD countries have incorporated a capacity to respond to humanitarian and other disasters into their international development agencies, and as a rule most if not all are among international responders to a given disaster event.

Disaster response does not just involve national governments and multilateral agencies, however. International non-governmental organizations have had a major and longstanding role in all aspects of disaster management, and disaster response and relief in particular. Perhaps the oldest of these are the International Red Cross and Red Crescent Societies, whose internationally recognized role dates back to the mid-19th century, but also a wide variety of religious organizations. Since World War II – and in many cases growing out of its aftermath – a vast array of civil society organizations has emerged, covering a spectrum from major international institutions to small charities based in individual countries. Collectively they represent a massive capacity to act in response to disaster events, but they also present major coordination challenges to national governments as well as to multilateral agencies such as UN-OCHA that seek to ensure coherence in the international response to disaster events.

Yet another dimension is provided by individuals, families and communities living outside a country where a disaster has occurred but who have connections with that country and the affected localities. Their particular concern is with family members and friends who are living in a disaster zone or simply visiting, whether as tourists or on business, potentially involving national governments in consular roles. Even more than in the case of NGOs, these interests and contacts are generally outside official channels and present logistical and coordination challenges. At the same time they can also serve to generate support within donor countries for disaster relief activities, especially in the case of high profile events.

All of these perspectives present challenges for governments of disaster-affected countries, especially developing countries with weak administrative and governance capacity. These occur especially at the national level – is central government able to integrate international disaster response into the national efforts? – and at the local level, where the international response can serve to compensate for temporary or structural weaknesses in capacity on the ground. While potentially providing significant benefits in the post-disaster short run they pose major challenges for longer term recovery.

Part C: National institutional capacity for crisis response

Every country has a structure of emergency planning and response institutions, legislation and processes that is part of its larger system of governance and public administration. Accordingly, every national system has insights to offer an international audience. In order to enhance the possibilities for mutual learning, contributors to the third section of the book were asked to provide accounts of institutional arrangements in their country that were structured around a number of common elements. These include: the national disasters agenda and other formative influences on national institutional capacity to address this agenda; national public sector crisis management institutions; established processes for managing crises; the role and interaction of key actors, including those outside government; the relationship with and role of the international system; and public administration issues, including finances, accountability and countering corruption, skills and training, information management, and issues of development and administrative capacity-building.

Every country is a potential subject for such a study. The book includes chapters on national crisis management institutional arrangements in five countries: Ghana (Adusah-Karikari and Tandoh-Offin C12), India (Mishra and Potaraju C13), Japan (Kikuchi C14), Poland (Matczak and Czaputowicz C15) and Taiwan, China (Jan, Li, Wang and Chang C15). Each country has combinations of characteristics that shape its public institutions generally and its crisis management institutions in particular. A wide range of influences was identified that affect the design and operation of crisis management systems, but recurring themes include geography and related natural hazards, the system of governance, and the state and dynamics of economic and social development. These factors combine to create an ecology of institutions and processes that is unique to each country but that also reflects a growing experience and sophistication in thinking internationally and within countries about the role of public administration in crisis management.

Institutional arrangements are addressed in other sections of the book as well. In particular they are the sub-text of several of the crisis case studies (Part D of the book). Those discussions cast particular light on how crisis events have influenced the evolution of the institutional environment. They also bring home that the institutional environment can have a significant influence on how crisis situations unfold as they arise, in some cases making them worse, in more

successful situations helping to minimize loss of life and damage to property and to enhance the speed of recovery.

A common thread in this section is that national crisis management is a multi-dimensional ecosystem reflecting choices and challenges along several axes. All countries define crises as situations that exceed the capacities of public governance and administrative institutions and that have impacts that cut across the established boundaries within and between government and society. This raises tensions that cumulatively shape the national approach to crisis management. The most basic is the vertical relationship and division of labour among levels of government. This creates a need to reconcile the perspective of national government, which has the responsibilities of the State but also exercises its powers and resources to protect the public and property, at one end of a spectrum, with that of local government, which is at the front line when a crisis occurs, at the other. Intermediate levels of government, and how they fit into the larger whole, are also an important part of the picture.

A second dichotomy within government is the tension between sectoral capacity and responses to crises, reflecting the particular nature of the hazard and event to which a response is required, and a whole-of-government, all-hazards, set of institutions and processes calling for across-the-board mobilization, coordination and effective use of public resources. Floods, industrial accidents and epidemics each require different technical and logistical capabilities to understand and address, but all can have similar effects including loss of life, displacement of population, and social and economic disruption. As with the vertical challenges, these horizontal dimensions pose major challenges to public administration.

A third dichotomy arises from the fact that almost invariably crises and disasters – their acute form – cross boundaries between the public and the non-governmental spheres, bringing into play businesses, voluntary organizations and civil society in all its dimensions and ultimately individual communities and residents. As a rule, it is in this domain, where the population are and daily life happens, that crises occur – or at least where they have their major impact – and where they must be addressed. By definition, a crisis exceeds the ability of government to respond on its own, both in terms of the scale of resources required and the ability to act in a timely way. Societal actors will always be among the first responders and often they will for an initial period be the only responders. At the other end of the cycle, a crisis is only truly over when social

actors have been fully restored to their daily lives and circumstances. Coming to terms with this reality is a central challenge for crisis management, and some of the most fundamental elements of the crisis management system are built around assumptions about how state and societal actors interact in crisis situations and how to build resilience into society.

A fourth tension that all governments face is time, the fact that the requirements of crisis management will change as a crisis situation unfolds, requiring continuous adjustment in the capacities and combinations of resources that need to be deployed, coordinated and overseen. This places enormous pressure on public institutions that in other circumstances are founded on principles of stability, continuity and consistency and is why crisis management needs to be both integrated with the larger system of governance and public administration and able to operate separately from it. In recent decades an important insight has been that advance planning and mitigation measures can provide invaluable flexibility when crises occur, but experience has also demonstrated the importance of effective response capability, on the one hand, and sustainable recovery and renewal on the other. To compound the challenge, at each stage, and as a crisis moves from one phase to another, governments need to be able to monitor and learn from what is happening as it happens; this is for reasons of responsiveness as a situation unfolds but also to meet the needs of accountability for use of public resources and of longer term institutional and societal learning.

The institutional case studies in this section describe how five governments have addressed these issues. In many cases they present ongoing issues and debates relating to the operations of the national system. Both the successes and the problems and issues they face can be of value to international readers.

Part D: Disaster case studies

Case studies presented in the fourth section of the book provide concrete illustrations of what can happen in an emergency or disaster situation. The lessons learned can be particularly compelling, especially when there has been loss of life or severe property damage. The case studies complement and highlight other starting points in the book, but they also offer insights into the particular requirements of different types of disaster situations. The authors of

case study chapters were asked to provide a narrative account of the disaster in question. As appropriate, they were also asked to contextualize the response to these events by describing and assessing national disaster management institutional arrangements, to discuss the role and interaction of key domestic and international actors, and to conclude with a presentation of administrative issues that arose and lessons learned, including when State institutions were themselves affected by the disaster.

Disaster case studies in this section of the book include: an earthquake in Italy that raised questions about the responsibility of scientific experts in anticipating the event (Kudo D 17); a massive mudslide in Rio state in Brazil (Amorim and Busch D 18); and two aspects of the Japanese triple disaster in March 2011 – planning and response at the national, whole-of-government level (Shimizu and Yasui D19) and challenges faced by municipal governments in the disaster's aftermath (Kawai D20).

The majority of the events presented in this section were natural disasters, reflecting the fact that these are the most pervasive disaster events to which governments and societies are asked to respond. Every country has its particular set of natural disaster hazards, and experience over time can equip them to understand the nature of the risks and the most effective forms of preparation and response. In some societies, this experience goes back to ancient times and, more than other categories of disasters, involves society as a whole as well as government. And yet, even the best prepared countries can be severely tested by natural forces, as the Japanese triple disaster of 2011 illustrated.

The categories of natural disasters discussed in this section illustrate two of the major hazards that are found World-wide: earthquakes (Kudo D17) and landslides provoked by torrential rains (Amorim and Busch D18), while flooding is the subject of a chapter in Part B, on international and regional dimensions of disaster management (Brazova, Matczak and Takacs B11). In the Japanese case (Shimizu and Yasui D19, Kawai D20), two natural hazards interacted when an under-sea earthquake triggered a tsunami that caused significant coastal damage, in turn triggering a major industrial accident, the meltdown of a nuclear power generation facility, with widespread effects on neighbouring areas. In every case the impact of and response to the disaster was affected by human factors. These are even more central in the case of industrial and mining accidents (Comfort A4) or transportation accidents (Valiquette L'Heureux A5),

which frequently are compounded by natural forces, for example severe weather contributing to an air navigation disaster.

These events provide useful insights into the characteristics of the various types of disasters and issues in addressing them. Floods and earthquakes, for example, generally occur in very different timeframes and in any case they require different response capabilities. The case studies also provide compelling illustrations of public policy and administrative issues that arise from the institutional context of the countries concerned but are of wider relevance. In every case, pre-existing administrative and regulatory arrangements conditioned the effectiveness of the government's response. The L'Aquila earthquake case (Kudo D17) illustrates legal and policy issues relating to the role and responsibility of technical experts in preparing for disasters. The Rio landslides (Amorim and Busch D18) highlight problems that can arise from weak regulation of human use of geologically unstable areas. The two chapters on the Japanese case bring home the challenges at the two ends of the administrative telescope – coordination of response across a wide range of governmental and non-governmental actors at the national government level (Shimizu and Yasui D19), and the issues faced by local government (Kawai D20) in disaster situations in obtaining the scarce human resources needed in response and recovery.

Chapters in other sections of the book also present major disaster event types, although these serve to illustrate administrative issues that are the primary concern of the respective chapters. They discuss the impact of a range of disaster events on administrative arrangements for dealing with disasters, including: a case of administrative and regulatory failures in Canada, in the context of rail disaster involving a major spill of crude petroleum (Valiquette L'Heureux A5); a comparative discussion of wildland firefighting in France and the United States (Tiberghien, Vidal and Arnaud A7); and issues relating to one donor's response to an earthquake in Haiti (Mamuji B9). The experience of the Japanese triple disaster of 2011 was influential in shaping this book, and several chapters add to the understanding of that event; in addition to the two event case studies in this section, it is a major part of the context for chapters on Japanese disaster management institutions (Kikuchi C14) and the influence of the tsunami on a neighbouring jurisdiction (Jan, Li, Wang and Chang C16). The section of the book on national institutional capacity case studies underscores the fact that administrative capacity in individual countries has been heavily influenced by their experience over time of responding to – and learning from – an

accumulation of disaster cases and increasingly also from international experience.

The case studies in the final section offer a rich vein of lessons for public administration and governance that are rooted in hard experience. This is a focus of other sections of the book and of the conclusion, but some also deserve mention here: the quality of advance preparations has a major influence in shaping the capacity and effectiveness both of the immediate response to a disaster and of the recovery and restoration that follows; the critical importance, but also the vulnerability, of local and societal institutions and of individuals and families; the vulnerabilities created when land use, building and other regulations are poorly enforced, or not enforced at all; coordination and effectiveness challenges of multi-level governance and of operating across jurisdictional and sectoral boundaries; the critical importance of communications during disaster response within government and between it and society; and the influence of cultural factors in disaster planning and response, including the effects on community resilience.

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Part A.

Cross-cutting Issues in Crisis and Contingency Management

Chapter 2. Governance and Public Administration Capacities for Dealing with Disaster

David C.G. Brown

Introduction

The purpose of this chapter is to help situate crisis and contingency management in the wider context of public administration and governance. In that respect it is intended to serve as part of the substantive introduction to the book as a whole. In its most basic terms, the paper seeks to link together questions asked by public administration as a discipline and as a field of practice with those asked by crisis and contingency management, which in many ways is a multi-disciplinary field of study in its own right but one that has numerous points of intersection with public administration.[1]

There are two starting points in approaching the governance and public administration dimensions of crisis and contingency management. The first has to do with the wider societal environment in which public administration acts in general and especially when that environment is under stress. A particular focus, then, is the types of natural and human-shaped hazards that in certain circumstances can become emergency events and even escalate into disasters (using the terminology discussed in the Introduction to the book).

[1] An earlier version of the chapter served as a background discussion paper for the IIAS Project Group on Safety and Security, and the current text has benefitted from the group's discussions as well as from the insights provided by the other authors in this book.

The second starting point is the capacity to deal with crises and disasters – typically through a combination of institutions, processes and working relationships within and across jurisdictions, both in theory and in practice. A recurring theme, however, is that crisis and disaster management come into play specifically when the established capacity of the State and its "routine" operation is under pressure and in at least some respects is overwhelmed, if only for a period of time. In this circumstance a question then arises: to what extent does public administration need to work within the framework of its regular institutions and processes in order to address crisis situations and to what extent are specialized mechanisms required?

In order to situate this discussion, the chapter's first section considers the types of hazards that can create crisis situations and the challenges that governments face in anticipating and responding to them. It then looks at crisis and emergency management from the perspective of governance and public administration. The latter discussion starts with a brief review of the emergence of crisis and contingency management as a field of public administration, followed by a more detailed consideration of the elements of a national crisis and emergency management capacity. A cautionary note throughout is that just as every country has its unique combination of hazards and vulnerabilities every country also has its unique system of governance and public administration. As a result, the discussion is weighted in the direction of opening up issues and alternatives rather than drawing firm conclusions. The intention, however, is to provide a broader context that will orient readers as they go through the main body of the book.

The Challenges of Crisis and Contingency Management

The management of crises and disasters is challenging due both to the diversity of occurrences that can arise and to the complexity and open-ended nature of the possible management responses. A central characteristic is uncertainty and risk: these are events and phenomena that arise outside the ordinary government administrative cycle, and the only certainties are that every government will face crises, they will occur frequently (but rarely predictably),

they will be both natural and human-induced, and at least some carry the potential to become full-blown disasters. Typically, crises push the boundaries of daily life and they can overwhelm established institutions and routines. Generally speaking, the emergencies or crises in question are civilian, and the book's scope of enquiry does not include military conflicts or their direct effects. Collateral effects of military conflicts are within the scope of this discussion, however, as are the response and recovery dimensions of post-conflict situations. More generally, the relationship between civilian and military authorities is a major issue in emergency and crisis management and is discussed at the end of this chapter.

This section begins by summarizing some of the important types of crises that are known to occur. It then discusses some common characteristics of the public sector response to crises – in particular by national governments – recognizing that one of the most daunting features of major crises is that it is difficult to generalize about them. This provides the context for the discussion in the second part of the paper of the governance and public management issues that governments face in preparing for contingencies and responding to crises.

A diversity of potential crises

Crisis management is in many ways a form of societal risk management. The better that potential risks – the hazards that present themselves and the vulnerabilities of populations in the face of those hazards – are identified and understood, the more focused advance preparation can be for the possibility of the risks being realized and the more effective will be the response when a crisis event occurs. Considerable effort has therefore been put by researchers and by governments into the categorization of crises as a basis for determining appropriate preventative measures and response. This section considers the larger issue of categorization and then looks at the characteristics of some of the major categories of crises.

In this respect, an important international resource is EM-DAT, the Emergency Management Database maintained by the Centre for Research on the Epidemiology of Disasters (CRED). Based in a Belgian university but supported by the World Health Organization and other international institutions, CRED has since the 1970s maintained a database of disaster events around the World. It

divides disasters into two generic categories: natural and technological, with 8 sub-groups between them and a total of 30 disaster types and, in the case of natural disasters, another 30 sub-types (CRED 2017 – see explanatory notes sub-page). These definitions are widely used by governments and researchers, and have also been harmonized with those used by the insurance industry (Below, Wirtz and Guha-Sapir 2009). Complementing these perspectives is the increasingly important information provided by growing networks of Earth observation satellites and other Space-based tools (de Cooker B10[2]). In addition, every country has its own accumulated historical experience of disasters and how they are described and understood by both government and society, often entering into the national culture. Societies' understanding of the nature of disasters has been evolving over time and in recent times has also drawn on the insights of a wide range of academic disciplines (Touchant and Mamuji A3).

Many disasters are a consequence of geography, and every country has a distinctive combination of natural hazards that have been known to occur in recorded history or can be predicted from its mix of topography and climate. To take one example, the Canadian government's disaster database (Canada 2015) tracks twenty types of significant natural disasters that have occurred since 1900 in identifiable parts of the country and for which some kind of ongoing contingency planning is considered warranted. Categorized into three broad groupings – biological, meteorological/hydrological and geological – the identified hazards range from insect infestation to extreme weather, floods, geomagnetic storms, wildfires, earthquakes, tsunamis and volcanic eruptions. (Needless to say, this is a list for the country as a whole and not all hazards are to be found in all regions or at all times of the year.) This combination of natural hazards reflects Canada's geographic location and physical characteristics, and every country can identify its own counterpart list.

Natural disasters provide a significant reference point for the study of disasters, and they were the early focus of work on disaster response by the United Nations (Touchant B8). This volume contains several case studies of individual natural events or phenomena that have constituted disasters for the affected countries and have played a significant role in shaping their national crisis management system. These include specific events, such as the Great East Japan Earthquake and associated tsunami in 2011 (Shimizu and Yasui D19, Kawai,

[2] In-text citations with an author's name combined with an alpha-numeric designation rather than a date refer to chapters in this book.

D20), which affected neighbouring countries as well as Japan (Jan, Li Wang and Chang C16), but also earthquakes in Haiti (2010 – Mamuji B9) and Italy (2009 – Kudo D17), and a severe mudslide in Brazil (2011 – Busch and Amorim D18).

Other countries discussed in this volume have been influenced by more general natural phenomena or a sequence of events; these include flooding in Ghana (Adusah-Karikari and Tandoh-Offin C12) and Poland (Matczak and Czaputowicz C15), typhoons in Taiwan, China, severe weather and associated flooding in India (Mishra and Potaraju C13) and wildland fires in France and the USA (Tiberghien, Vidal and Arnaud A7). Many countries share a common vulnerability to particular natural hazards and can collaborate or learn from each other's experience. The chapter in this book on the experience with flooding of members of the Visegrad group – four countries in Central Europe – is an example (Brazova, Matczak and Takacs B11). Countries facing seismic and related risks offer lessons as well (Comfort A4). Remote and sometimes unstable geographic features are often used as jurisdictional boundaries, compounding the complexity of dealing with disasters that occur in those areas (Kikuchi C14). On the other hand, massive urbanization, including into environmentally sensitive areas, creates its own hazards (Comfort A4). Each type of hazard has its own characteristics and requirements for response – a flood is typically more slow-moving but potentially more widespread, for example, than a wildlands fire or an earthquake, which can, however, have devastating effects in a short period of time.

Natural disasters are the result of interaction between human and natural forces, but a second broad category of crises arises directly from human action, although frequently made more acute by natural forces and often incurring significant environmental as well as human and financial costs. Two major sources of human-induced – technological, to use CRED'S terminology – crises are large-scale industrial and transportation accidents. Industrial accidents are particularly serious when they involve hazardous chemicals or radioactive materials creating extensive and long-lasting environmental risks; each industry has its own characteristics and vulnerabilities, requiring particular kinds of interventions. Transportation accidents can involve dangers to passengers and goods as well as to people in surrounding areas, including situations requiring rescue efforts; again, each transportation sector presents its own characteristics and regulatory requirements, a major concern being the currency and the enforcement of regulations (Valiquette L'Heurueux A5). Accidents in space or

involving objects from space present their own unique problems. Violent actions by criminal or terrorist actors can constitute emergencies in themselves and can also create industrial and transportation emergencies.

Transportation and industrial accidents are part of the context in most of the countries that this book looks at and often raise significant regulatory issues. Several authors studied different aspects of the Japanese triple disaster in March 2011 that included a nuclear plant meltdown, which in combination with an earthquake and tsunami created a series of events of a magnitude that severely tested the Japanese government and society.

A related area of vulnerability is critical infrastructure that is essential to the functioning of the State or of society more broadly. This includes electrical generation and transmission facilities, telecommunications and the Internet, transportation and health facilities, food and energy production and distribution, fresh water and sanitation, and the financial system. All are subject to both accidents and natural disasters, but critical infrastructure is also a significant target for violent attack, especially in politically volatile regions. Another vulnerability with the potential to have widespread effects, often crossing jurisdictional borders, is from health hazards, which in addition to various forms of environmental contamination can include pestilence and epidemic disease.

While the hazards and risks of crises arising from human action are different in many respects from natural hazards, every government can identify them with at least some level of certainty based on the nature of national industrial, transportation and other forms of economic activity and patterns of demography and public health. At times the different types of events can interact, typically involving severe weather or geological events creating transportation or industrial emergencies. The 2011 Japanese triple disaster is a highly visible example, creating effects that were still being addressed several years later. Such complex events are particularly difficult to anticipate, as the combinations are unique, compounding their impact and complicating the response. There is a growing view, however, that the fact of such complexity is an increasing part of the picture and must be taken into account in national and international planning (Comfort A4, Hur A6, Shimizu and Yasui D19 and others in this volume).

As a rule, disasters of whatever origins carry risks of injury and loss of life, which sometimes can be widespread. They can also result in major population displacement. These effects raise basic issues of timely response and rescue, especially where lives are at stake, human shelter, nourishment, and health,

including the availability of drinking water, disease prevention and removal of debris. These situations, when they occur, are an urgent priority for governments and can become a major challenge to their legitimacy and public trust and support.

All crisis-creating situations strain the capacities of the State and society, but some commentators identify "wicked problems" (Rittel and Webber 1973, Conklin 2006) that are too complex to permit a solution in light of current capacities or state of knowledge. (A related concept is "catastrophic disasters" (Hur A6)). The test of a wicked problem is to a certain degree contextual – some governments and societies are better placed to deal with complex crises than others, historical experience often being a factor – but it is a contingency that all governments face, and wicked problems are among those that are likely to extend across national boundaries. Climate change and rising sea levels can be described as slow-moving wicked problems; another (much rarer but with more immediate effects should it occur) on a potentially global scale would be a large asteroid striking the Earth. Recorded history has documented the crippling effects of volcanic eruptions such as Tambora in 1815 (Wood 2015) and Krakatoa in 1883 (Winchester 2003) which at the time had massive global effects on climate and the growing season and today would undoubtedly also affect the use of airspace and a great deal more. These examples point to the need for international collaboration to a degree that is only just beginning to be addressed in an area such as Climate change (Touchant B8).

In early 2011, the combined effects of earthquake, tsunami and nuclear disaster presented Japan with a catastrophic, verging on a wicked, problem that severely tested government, business and civil society (Funabashi and Takenaka 2011), even though that country is widely considered to be one of the most advanced in anticipating and managing crisis situations. The Haitian earthquake the previous year – of a severity that occurs regularly in Japan – was a wicked problem for that nation as a whole, creating widespread displacement of people, destruction of infrastructure and incapacitating a government and public administration that were already fragile in the poorest country in the Americas. It is instructive, and chastening, to consider these very different effects of a common hazard on two countries in very different economic and governance circumstances.

The open-ended nature of crisis response

The possible responses to crises can be as complex and diverse as the crises themselves. This is an emerging field in the study of governance and public administration and one that by its nature does not lend itself to a single public management model. There are a number of characteristics that are common to most, and sometimes all, crisis situations that should be noted, however. By definition, crises are not programmed or expected, and they are not included in the government planning cycle; however, categories and probabilities of possible crisis situations can be anticipated, even if their precise timing, location or magnitude cannot. Contingency planning, informed by risk analysis, risk management and learning from past crises, is thus a central feature of crisis management. In turn such planning can lead to mitigation of risks, with a view to reducing the likelihood of the risks being realized and the level of harm when they do. Together these are major components of crisis prevention.

The public sector in all its dimensions plays an important role. Crises do not necessarily result from State action, but States and their agents can and sometimes do trigger or compound crises, as well as being among their victims. When an organization or sector in society is unable to cope with a crisis the State is drawn into the response by virtue of the authorities uniquely available to it, the scale of its financial, information and logistical resources and the range of expertise that it can draw upon. While it is uniquely well placed in society to deal with a crisis, the public sector also has a special responsibility to guard against making the situation worse through inadequate or inappropriate action. This begins with understanding its own boundaries and limitations as well as its obligations and capacities.

Crises can seriously affect public facilities and services, but generally their greatest impact is on non-governmental social and economic institutions and on individual citizens and communities. Crises are no respecters of social or economic status or of other divisions in a society. In that sense, they are a basic test of citizenship and of a government's concern for its citizens. Non-governmental and civil society groups are frequently victims of disasters, but they also have a major role in responding to them. At least one country, Japan, has built its crisis response around the assumption that individuals and communities are the first line of response and should not expect State intervention for up to 72 hours (Kikuchi C 14). A central feature of all crisis

response, therefore, is communication, consultation, and coordination with and among groups outside government and with the public at large. In situations involving population displacement, extraordinary measures are required to house, feed and ensure the health and safety of large numbers of people and to ensure their eventual return to stable and productive lives.

The aftermath of a crisis may endure for a long time, turning into a crisis itself. Invariably crisis responses call on the resources of all levels of government – indeed, as several authors in this volume have stated, the greatest response burden is often placed on local authorities – and consultation and coordination among levels of government is a critical requirement of any response effort. This requirement is particularly acute in federal systems because of their formal divisions of powers and responsibilities, creating additional capacity to respond but compounding risks both of bureaucratic conflict and duplication and also of inadequate and uncoordinated responses.

Each crisis is unique, requiring a unique response. There are also many commonalities. Response efforts can draw on core emergency response services such as fire, police, ambulance and emergency health services, as well as civil defence and the military, but, as discussed in the next section, they also require a dedicated institutional capacity that is linked to the wider process of governance and public management. An important requirement of such a capacity is to mobilize specialized expertise and capabilities for dealing with specific types of emergencies and hazards. Such expertise is often found outside government, including in the private sector, the academic world and in professional and other non-governmental organizations. At times it is only available internationally.

Most crises play out in relatively limited geographic locations, imposing great stress on the response capacity and resources of local authorities and the front-line offices of national governments as well as on those of central authorities. Crises can also rapidly assume an international dimension. This includes when they occur along or across national borders or in international waters. Natural disasters, such as severe windstorms or earthquakes, can often have an effect on several countries at the same time, calling for cooperative responses among the affected countries, including more structured regional arrangements (Brazova, Matczak and Takacs B11).

The wider international community can become involved in a number of contexts. International intergovernmental organizations have specialized

expertise that can be made available to national governments and many have logistical capabilities that can be deployed rapidly (Touchant B8). This is also true of national governments that provide international humanitarian assistance (Mamuji B9) and of international non-governmental organizations, notably those that are focused on providing emergency responses and humanitarian assistance. Foreign governments have a consular interest in their nationals who are in a country when an emergency occurs, and individual citizens of foreign countries may become involved in emergency responses for a number of reasons and in a number of ways.

While crises and emergencies put all systems of governance and public management under stress, this is particularly true of developing countries, which as a rule are significantly less well placed to prepare for crisis contingencies or to respond when they occur. For these reasons, the international community is more likely to become involved in responding to crises in developing countries, placing enormous challenges of consultation and coordination on national governments that for both structural and circumstantial reasons are not well placed to cope either with the crisis or the international response, however well intentioned. This can occur notably on the front line where local government has been overwhelmed, posing particular challenges of coordination and sustainability. By the same token, recovery efforts can also involve measures to rebuild or strengthen national governance capacity generally as well as in the area of contingency planning and crisis response specifically.

The next section discusses some of the challenges to governance and public management that are posed by this diverse and open-ended nature of major crises and the response to them.

Crises, Public Administration and Governance

The management of crises and emergencies has received increasingly systematic attention in recent years as a public administration and public management concern. This section provides a brief account of the emergence of crisis and emergency management as a distinct field. It then considers some of the major elements of national and international crisis management capacity and response, with a particular focus on their governance and public administration

dimensions. The focus is on functional components rather than particular organizational models.

The emergence of public sector crisis and contingency management institutions

In many respects crisis management is not a new field. With the advent of Total War, engaging civilian populations as well as military combatants, European governments in particular developed civil defence mechanisms during World War I and especially World War II, much of it to protect civilians from aerial bombing. This was expanded during the Cold War, the 40-year period from the late 1940s to the late 1980s, as governments addressed the probable effects of airborne nuclear attack – which the bombings of Hiroshima and Nagasaki at the end of World War II had demonstrated would be widespread and indiscriminate – on their civilian population and infrastructure and on the operations of government itself. Most developed countries established dedicated emergency preparedness organizations during this period and prepared contingency plans that involved all levels of government and civil society. One of the enduring legacies of the Cold War period was the Internet, which at least in part grew out of planning for restoration of the United States telephone system after a nuclear attack (Rowland 2006).

From the beginning, emergency preparedness has also been concerned with non-military hazards, and many societies have historical experience of dealing with natural and public health hazards and disasters (e.g., 1755 Lisbon earthquake – Paice 2008) that dates to ancient times (e.g., Noah's flood – Dynes 2003). In practice, most of the crises requiring emergency responses, especially in developed countries, have involved major accidents or natural disasters. The emphasis shifted even more in that direction with the end of the Cold War in the late 1980s and the reduced apprehension of nuclear conflict. At the same time, the approach to crisis management became more systematic in the wake of a series of well-publicized industrial accidents and natural events (e.g., 1984 Bhopal gas plant leak – Eckerman 2005; 1986 Chernobyl nuclear plant disaster – Medvedev 1990; 1992 Hurricane Andrew – Mittler 1997). These experiences have all contributed to the development of institutions and operational capacity in individual countries.

The international community has also assumed a major role in crisis response. A number of international organizations, notably agencies in the United Nations system and international non-governmental organizations (NGOs), were established to deal with the refugee and related crises that existed in the aftermath of World War II. (Some organizations, such as the International Committee of the Red Cross (ICRC) and the associated International Federation of Red Cross and Red Crescent Societies, have much earlier origins.) These have continued to grow in number, range of functions, expertise and logistical capability, and such international organizations have assumed an important role in most major disaster situations.

Two United Nations bodies play key roles. The Office of the Coordinator of Humanitarian Affairs (UN-OCHA) plays a lead role in United Nations and international response to crisis situations as they occur (UN-OCHA 2017). The Office for Disaster Risk Reduction (UNISDR n/d) has co-ordinated a series of multilateral Frameworks for Action; currently the Sendei framework, agreed in 2015 (UNISDR 2015) in a city that was severely affected by the Japanese triple disaster of 2011, provides a common international basis for national disaster prevention and response efforts. An important related development is the introduction of global and regional platforms for disaster risk reduction and fostering of resilience in the face of disasters, most recently the Global Platform meetings in Mexico in 2017 (UNISDR 2017) and Geneva in 2019. UNISDR and other international organizations have also given priority to developing global and national data about disasters and their effects.

National crisis and contingency management capacity

The earlier part of this chapter discusses the complexity and open-ended characteristics of the environment in which a national crisis and emergency management capacity operates. This section considers some of the requirements that such a capacity is called upon to meet and some of the institutional and functional issues that experience suggests need to be addressed, situating it in the larger context of governance and public administration. There is no single formula for designing such a capacity, although many governments (e.g., Canada Public Safety 2017) organize their activities under four or five broad headings, which describe a crisis and contingency management cycle, reflecting an

approach widely adopted by other governments (e.g., India National Disaster Management Authority 2017) and in the academic literature:

- Mitigation and prevention (identifying, eliminating or reducing risks);
- Preparedness and planning;
- Identification of and response to extreme events or situations;
- Recovery and longer-term reconstruction; and
- Evaluation and learning, providing a basis for planning and preparedness for the future as well as for measures to reduce future risks.

Each stage calls for high-level government decision-making, engaging the institutions and processes of governance. However, a central focus of this paper is preparedness, as many of the most crucial decisions are taken in the advance deployment of resources and creation of processes – and a supporting culture – that are activated when a crisis occurs. These advance decisions can have a major influence on the effectiveness of decision-making and response under stress during a crisis and can make the difference between crisis and disaster. As noted by one author in the book, relationships formed in advance of a crisis can make a crucial difference during the event and in its aftermath (Kawai D20).[3]

In each country, therefore, a national crisis and emergency management capacity must be integrated with the national system of governance and public administration while being in a position, when called upon, to move effectively into action – with varying degrees of autonomy, according to the circumstances. The details will vary among countries according to their historical experience, the nature of hazards they confront and the nature of the governance and administrative environment. With this general caveat, however, it is possible to identify a number of elements that accumulated experience suggests should be considered and related issues. These are discussed in this section of the chapter.

Given the relatively new state of the field and variations among national systems of governance, no attempt is made here to identify a single governance or administrative model for dealing with crises and disasters, but the discussion that follows does reflect an implied – and very broad – underlying cycle of interlinked policy and implementation issues. These address four dimensions of crisis and contingency management in the broader context of governance and

[3] See Aldrich 2012. Kawai flags Aldrich's observation that "loose" relationships formed beforehand with outside organizations that are not affected by an emergency can become "tight" when one occurs.

public administration, each important in itself but also dependent on the others to be fully effective: the institutional environment for crisis and contingency management; management of internal and external relationships and partnerships; administrative considerations; and the need for a supporting organizational and political culture.

The institutional environment for crisis and contingency management

Institutions, whether rooted in the constitutional and legal framework or in social norms and behaviours, provide the context and the processes for governance and public administration; they also provide the linkages and common elements of these two closely related spheres. This is at least as much the case with respect to crisis and contingency management, which at different times can be both a specific sector – a sub-system – of public policy and public management and one that potentially engages the governance system as a whole, especially when it is under stress (Dror 1986, Pal 2006). Institutional issues include both the design of organizations and their functioning. A critical element is decision-making: in advance of crises, under stress during a crisis, and in the aftermath. Institutions and processes need to be situated within the constitutional and political environment of a country but – recognizing that weaknesses and vulnerabilities are often strengths carried to excess – they also need to accelerate or at times even to short-circuit features of that environment to ensure that crises are managed, even more so in the face of disaster.

A number of linked functional elements can be identified that are relevant to this discussion. These include organization, planning and decision-making, but also legality and leadership. The need to embed a crisis and contingency management capacity in the national governance environment without being its hostage is a challenge for any system of government, but it is one that is particularly challenging for developing countries.

Organizing crisis and contingency management

In public policy terms, it is useful to think of crisis management as a horizontal policy sector, with a core of institutional actors and related

communities and networks, a broad agenda, and a policy cycle involving problem definition and agenda-setting, an array of available policy instruments and decision-making with respect to their use, a variety of implementation mechanisms and an evaluation capacity. The sector is horizontal in the sense that it has a core set of institutions and processes that operate system-wide, on behalf of the government as a whole – especially in the context of contingency planning, anticipatory deployment of resources and post-crisis evaluation and learning. During a crisis situation these institutions must be able to mobilize the resources from and work in close collaboration with any part of the public sector as well as with a potentially wide range of actors from other levels of government, the private sector, civil society and the international community. A basic issue, then, is the extent to which the institutions and processes of crisis management are integrated with "normal" governance mechanisms, as opposed to representing a separate "dedicated" capacity.

Contingency planning and risk management

An important State function is to identify potential hazards and related vulnerabilities and, on that basis, identify locations where crises and emergencies might occur, to anticipate their likely nature and occurrence, and to prepare plans for dealing with such contingencies. This calls for consultation and collaboration with those potentially affected and with likely responders both inside and outside the public sector; it also involves making use of historical experience and evaluations of past crises and of risk management methodologies. A vitally important related function is to go beyond planning to put in place adequate measures to prevent hazards and risks from materializing as crises and to mitigate their effects when they do occur.

High-level capacity for decision-making and management under pressure

In any jurisdiction, a major challenge is the fit between crisis management planning and implementation and the broader governance environment. Major crises engage government as a whole, and decisions relating to crises need to be legitimate and effective, carrying the full weight of the government without being held back by routine procedure. Decision-makers also need to be assured that their decisions are informed by timely and accurate information and that they

are expeditiously conveyed to those who are affected by them, especially outside government channels. A fundamental question best settled in advance is whether crisis decision-making should be an accelerated version of standard procedures or whether it requires its own separate "fast track."

Availability of necessary legal, regulatory and administrative resources

Notwithstanding the urgency of crises, basic tests of legality and constitutionality continue to apply while responding to extraordinary events. This points to the establishment of standing emergency powers legislation and regulatory instruments that can be invoked when required as well as oversight and monitoring mechanisms to ensure that they are lawfully used. Similarly, there needs to be a contingency framework for authorizing the rapid release of financial resources and mobilization of necessary human, material and information resources. Effective accountability after the fact is a related requirement, especially with respect to the treatment of private citizens and public resources. This also enters into the area of legal liability by the State and its agents and advisors (Kudo D17).

Leadership and the allocation of crisis and contingency responsibilities, including among different levels of government

As illustrated in this volume, the creation of dedicated crisis management institutions and crisis-related government decision-making mechanisms should be complemented by identification and empowerment of political and administrative leadership with clearly articulated roles and responsibilities. It is also important to have a well-understood division of labour and effective working relationships among national, regional and local governments as well as within each level of government, especially in situations where organizations and individuals are not used to working together. This includes clearly agreed intergovernmental consultative and coordination mechanisms and identified interlocutors who are able to speak authoritatively for their jurisdictions and have ready access to their own government's leadership and decision-making bodies. Interjurisdictional coordination is a particular challenge in federal states, where "lower" levels of government have their own independent standing from the national government and there can be duplication of – or gaps among –

resources; while a vulnerability, this redundancy can be also be an asset in crisis situations.

The special circumstances of developing countries

Countries at all stages of economic development are faced with a continuing need to review and reform their national governance and administrative institutions. This is particularly the case with developing countries, where the state of their institutional governance capacity, often including a disproportionate reliance on the military, is both a reflection and a cause of their state of development. As already noted at several points, responding to disasters is a major challenge for many developing country governments, at times straining them to the breaking point. This imposes additional demands on the international system, which can act to fill voids created by a disaster, but which can also be called upon to play a role in restoring the national government itself. Fragile and failed States pose a particular problem in this regard.

Management of internal and external relationships and partnerships

Managing relationships and partnerships lies at the heart of governance and public administration. Such relationships can be within a given government and with other governments and levels of government, but also with the private sector and civil society, individual members of the public, and internationally. Often, they bring together organizations and individuals who are not used to working together and are subject to different rules and organizational cultures. Managing such relationships and partnerships is aided by identifying those who are potentially affected in a crisis and those who can be part of the response, agreeing on division of labour, leadership roles and operating procedures, coordination and consultation, and collection and sharing of information. In a crisis situation, these relationships will be *ad hoc*, for the duration of the crisis and as long as needed in its aftermath. As with governance institutions, however, they involve a combination of temporary use of permanent arrangements, brought into service to meet the needs of the occasion, and temporary arrangements established to meet an immediate purpose.

Local community capacity and responsibilities

Crises and emergencies generally are played out in a defined area, and often they are confined to a single community. Local community governments and civil society institutions, including emergency response and medical services, typically are heavily involved, to the extent that frequently they are on the front line, especially where significant numbers of local residents are displaced or otherwise affected and property is damaged. They must deal with public health impacts, supply chain difficulties and the wider impacts on the local economy. They are a major source of information for decision-making in higher levels of government and for other outside bodies, including the international community. They therefore need to have their own emergency response capacity and contingency plans, including a clearly understood division of labour with other levels of government and with non-governmental actors. While they are most knowledgeable about and sensitive to local circumstances, they may not have the technical or other resources required to address a crisis situation, especially when their own capacities are severely challenged. A compounding factor is that the skills and resources required change as the situation moves from response to recovery (Kawai D20).

Role of the private sector and civil society organizations

Private businesses and civil society organizations, as well as individual residents, are usually among those affected by crises and should be aware of contingency plans that might affect them. They can also play a central role in responding to crises, with respect both to their own situations and to the community at large. They have a particularly important role in mobilizing and organizing volunteer responders and in obtaining financial and other contributions from private individuals and organizations in communities to supplement public resources. Industrial plants that create potential hazards, such as handling toxic materials, have a particular requirement to make their own contingency plans and to be in a position to respond to crises. Many of these are linked to global corporations, which are implicated in planning and response accordingly.

Informing and supporting the public

One of the most vital functions of any emergency response is keeping the public fully informed. This requires ensuring that there are adequate communications channels as well as informed and authoritative spokespersons. A central goal of emergency response efforts is to enable members of the public to become as autonomous as possible as quickly as possible – to enable community self-organizing – and effective communications is an essential part of this effort. A critical capacity is the ability to provide accurate and timely warning of impending emergency events. By the same token, the public can be an important part of early warning systems. Communication needs to be two-way, ensuring that the circumstances and needs of individuals, families and the community in general, however defined, are known to decision-making public authorities and their perspectives and advice are drawn upon as fully as possible.

International contacts and awareness

Modern communications and social networking technologies mean that an emergency in any part of the World instantly becomes a global event. Managing media interest becomes a major challenge for crisis managers but it also represents an opportunity to mobilize international attention and support from governments, NGOs and the global public. To the extent that foreign businesspeople or tourists or other nationals are present in crisis zones, their governments have a consular interest that needs to be managed. Individuals and communities with personal and family ties with an affected country who live elsewhere are interested in determining the status of people and areas that they know and also in providing assistance. A different dimension occurs when the crisis is near or straddles an international border or when it creates transnational environmental risks, the most open-ended case being hazards to the atmospheric environment or international waters.

Coordinating foreign and domestic aid agencies

Major disasters in all countries generate responses from non-governmental, governmental and intergovernmental aid agencies. This creates coordination challenges that are significant but that can also be anticipated in national contingency planning – pointing to the desirability of involving potential

international partners in the planning process. The United Nations, through the Office of the Coordinator of Humanitarian Affairs (OCHA) and other mechanisms plays a central role in this respect, with a focus on disaster response and recovery. In the case of developing countries in receipt of official development assistance, the involvement of international partners compounds the coordination challenge that is an endemic feature of their economic and governance situation. In crises that have attracted significant international attention this can impose severe strains on national governance and public management capabilities, and there is a high risk of international agencies – and in the case of institutionally weak or failed States, the international community as a whole – circumventing national institutions, with potentially serious longer term implications.

Administrative considerations

The core of crisis preparedness and response lies in the deployment and operations of public administration organizations and resources. These provide services at the front line, backroom support, and vital linkages to decision-makers and to the wide and complex range of others involved. The full range of administrative processes and resources are engaged, requiring effective use of public management and development administration practices. At the same time, the circumstances of an emergency response, involving a massive infusion of people and resources in a short time into a situation that could not be precisely anticipated in advance, imposes enormous strains and risks on the administrative machinery.

Decisions and actions taken in advance – in the context of emergency preparedness and mitigation – can have a significant impact on the effectiveness of the response when a crisis occurs. Based on risk-based planning, this includes organizational decisions with respect to the balance between tailored emergency response mechanisms that are activated when required and making provisions for "mainstream" public sector resources to be diverted to dealing with an emergency when called upon to do so. Often the latter is a matter of bringing previously separate activities into a joint effort, for example the harnessing of fire, police, ambulance, rescue and other emergency response services. In either event a further challenge is determining when the acute requirements of a crisis

have been met and administrative machinery can return to the *status quo ante* or be replaced by more permanent recovery-oriented arrangements. This implies continuing monitoring of how public institutions are involved in a crisis situation and an ability to redeploy them as the situation unfolds.

Attention to technical considerations and expertise

Responding to crises requires mobilization of extensive technical knowledge and logistical capabilities; specialized expertise needs to be brought quickly and effectively into the generalist political and policy-making environment, calling for close collaboration between groups who often are not used to working together. At the most basic level there are issues of obtaining scarce human resources and, when they are provided, of vocabulary and intellectual paradigms that may need to be reconciled. There are also major challenges in ensuring that political and public expectations are conditioned by technical reality, but also that technical experts are sensitive to the demands of situations where there is an urgent pressure to satisfice rather than optimize. Local government and community institutions on the "front line" of emergency situations face particular issues in this regard as they generally do not have the range of required skills and knowledge immediately available to them and must rely to a considerable degree on senior levels of government and outside resources (Kawai D20).

Adequate record-keeping and information management

Good documentation of decisions and their implementation is an essential feature of good governance under any circumstances, providing the basis for effective administration, for internal and external accountability, and as a basis for evaluation after the fact. Crisis situations put considerable pressure on record-keeping and information flows, especially to the extent that these move outside of normal channels. The risks are compounded by major increases in the numbers of actors and the complexity of relationships that are brought into play in a crisis as well as by a major inflow of public and private financial and material resources, many of them originating outside the country. Adequate documentation is essential to ensure that decisions are carried out (and how),

that resources are administered efficiently and transparently, and to provide a basis for accountability and evaluation when the emergency has abated.

Governments, private companies and individuals also hold records containing personal information of citizens as well as business records. These include registrations of birth, nationality and residence, health and education records, tax records, driver's licences, business incorporation papers, property registration and ownership, criminal and other legal records, banking and credit information and many other records the loss of which could be highly disruptive to the daily lives of citizens and residents as well as to business and government. Increasingly this information is held electronically, much of it in large-scale data bases that in many ways can be regarded as critical infrastructure, which creates additional vulnerabilities although also providing opportunities for off-site back-up. Assessing information risks and establishing protection and recovery plans is therefore an essential part of crisis management.

Financial management and avoiding fraud and wastage

With the short-circuiting of regular procedures and oversight mechanisms, the potential for corruption and wasteful implementation is compounded in crisis situations by an order of magnitude, especially (but not just) in countries where these issues already pose a systemic challenge. Again, this is an area that needs to be addressed in contingency planning, with a view to having appropriate and realistic emergency monitoring and oversight mechanisms in place. It is also important to ensure that emergency financial and procurement procedures are regularized as quickly as possible and to ensure after-the-fact audit and tracking of spending and resource use during the emergency. This is another area where the international community can play a constructive role in the planning process.

People management

Disasters frequently involve major population displacement, sometimes for extended periods, requiring housing, food, sanitation and attention to physical and psychological needs generally in ways that are not ordinarily a concern of public administration. A similar requirement can also arise with respect to those involved in responding to an emergency and their families. In addition, relief workers, both public employees and those coming from other sectors and

localities, need to be provided shelter, food, protective clothing and equipment. These requirements go well beyond the ordinary human resources management functions of public administration, although these too face challenges in operating under pressure.

Training and rehearsals

The likely nature of and response to many emergencies can be anticipated, at least their broad lines, especially those involving accidents or natural hazards. Risk analysis and advance contingency planning are a critical part of an effective response, when called for, but preparedness also requires advance communication of emergency procedures to the public in general and to those most likely to be affected by a crisis or to be involved in responding to it. In the latter case in particular, attention to training in emergency procedures is highly desirable, as well as test runs and rehearsals, especially of high-level monitoring and decision-making mechanisms and other situations requiring coordination among groups who do not normally work together. Some jurisdictions also have emergency awareness and training sessions or even weeks for the population in general and for both those at risk and designated responders. Several authors in this book stress the importance of public education as the foundation for all other aspects of crisis response.

Role of the military

Although the scope of this study does not relate to emergencies in war zones and those arising directly from armed conflict, military action can often result in civilian emergencies, including major displacement of civilian populations and creation of food, health and environmental crises, both in the conflict zone and in neighbouring areas. On the other hand, the logistical capacity to deal with emergencies is often found in national military and security forces, so an important dimension of crisis management is the relationship between them and civilian authorities. A key working relationship is with civilian first responders, notably fire, police and ambulance services. In some cases separate civil defence authorities are involved. Many countries have legal or even constitutional requirements for the military to assist the civil power when called upon to do so. The terms of such assistance need to be clear, however, including financial

arrangements. There are also issues about what role the military should play in recovery from a disaster and when it should return such activities to civilian agencies and control. Overlaying these practical questions are political questions and sensitivities about the role of the military in society and governance, often informed by recent national history.

The special case of fragile states

A special set of circumstances arises in the cases of States with weak or limited public institutions and which as a result are particularly vulnerable in crises, creating a lower threshold for the tipping point when a crisis turns into a disaster. In some cases that vulnerability is a contributory factor to the severity of a crisis. This can result in the temporary assumption of State administrative functions by non-State actors, including civil society organizations but also international organizations. The challenge of restoring fragile or failed State arises even in the absence of crises (Brinkerhoff and Brinkerhoff 2002). Situations in which they are faced with natural disasters or other traumatic events are particularly challenging for neighbouring countries and the international community, both during a crisis and in restoring – in many cases building up – national institutions and capacity afterward.

Organizational and political culture

A country's ability to deal with crises and disasters over time involves a balancing act – between a culture of continuous learning from experience, change, and growth and a steady continuity. All societies have a history of dealing with disaster and many have deeply entrenched cultural values of preparedness and community response. When linked to public trust and confidence in public institutions and authorities, these are among the foundations of an effective crisis and contingency management capacity. There also needs to be a recognition that existing crisis management organizations and processes have past experiences and solutions embedded in them – whether or not they remain appropriate, it is important to understand them either to make them function as intended or to make changes.

Evaluation of past events and policy development for future contingencies

Political and policy attention to crisis management is at its greatest during a crisis and its immediate aftermath. At the same time, the ability to take stock of the response to a crisis once it has passed and in light of that experience to adjust organizational and coordination arrangements, contingency plans and legal and financial frameworks are a crucial part of preparation for future crises, which will inevitably occur, even if their nature and timing cannot easily be predicted. Again, the dilemma is how to reconcile the need for dedicated government machinery and resources with the open-ended and unpredictable nature of the requirement for contingency planning. In this respect crisis management is a microcosm of the universal challenge of keeping public sector management both stable and under continuous review.

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Chapter 3. Theoretical Perspectives on Disasters

Lauren Touchant and Aaida Mamuji

Introduction

Whether they are natural, technological, or intentional, disasters defy geographical, social, economic and cultural boundaries. They wreak havoc on communities that they hit but can also serve as windows of opportunity. While entire disciplines focus on disaster issues, such as Disaster & Emergency Management[1], there are also sociological, political, economic and international relations lenses, amongst others, that have been applied to uncovering disaster complexity. Although hard sciences can be used to explain how natural hazards such as earthquakes and volcanoes occur, in order to understand why hazards affect humans in the way that they do, an exploration of vulnerability, power dynamics, history, culture, and beliefs is necessary.

Disaster & Emergency Management literature is diverse. Included are numerous typologies of disasters, studies that focus on organizational change in disaster situations, public policy angles such as focusing events and agenda-setting, and analysis of learning processes and decision-making in disaster-settings. Case studies have explored disaster-relief coordination, post-disaster lessons-learned, and the role of resilient communities in disaster recovery and mitigation. Horizontal issues such as risk management, organizational learning,

[1] There is no universal name to describe the academic discipline that focuses on disaster issues. In addition to Disaster and Emergency Management, the discipline is also referred to as Crisis Management, Disaster Studies, Crisis Studies and Vulnerability Studies.

leadership perspectives and crisis communications are also addressed. In order to navigate through the abundance of literature, this chapter provides a modest overview of important disaster definitions; discusses different conceptions of vulnerability and risk; presents four different ways in which disasters have been interpreted over time; and concludes with the presentation of a number of disaster management models. It is hoped that this material serves as a useful theoretical foundation as readers engage in this book.

Defining Hazards, Emergencies, Disasters and Catastrophes

As is the norm in the social sciences, there are no universal definitions for terms such as hazards, emergencies, disasters, and catastrophes. Rather, these words are often used interchangeably, and have been discussed through social constructionist, political and ecological perspectives (Etkin, 2016). In general, while hazards are defined as naturally occurring events, emergencies, disasters and catastrophes can be understood as existing in a spectrum, where crises – unexpected events that disturb the regular flow of affairs and that require a decision and an action to be taken to prevent further escalation – become progressively more severe depending on the nature of the hazard and its impact (infrastructure, casualties, fatalities, environmental damage, etc.). The following section presents definitions of Hazards, Emergencies, Disasters and Catastrophes.

Hazards

The United Nations Office for Disaster Risk Reduction (UNISDR, 2016) defines a hazard pragmatically as, "A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation" (UNISDR 2017 – see also UNISDR 2009). Scholars further substantiate this understanding by introducing insights such as the probability of occurrence, temporality, and geographical perspectives. For example, a hazard has been described as "a threatening event or probability of occurrence of a potentially damaging phenomenon within a

given time period and area. It can be either natural or human-made" (Victoriano, Montero and Ruan 2013:18). Other definitions focus more precisely on the interaction between nature and mankind, defining a hazard as a process, rather than as an event:

> *"Hazard captures the notion that, to the extent that people co-exist with powerful natural and man-made processes, there is a non-zero probability that the natural variation in these processes will produce extreme events having very negative consequences. The human danger posed by these hazards varies with the level of human intrusion and the knowledge and technology associated with the hazard" (Lindell et al. 2006)*

In order to describe the different types of hazards that humans are exposed to, a number of typologies of disasters have been developed (see Table 1). While typologies are useful to simplify our understanding of reality and to structure human response to crises, it is important to note that some hazards do not easily fit into any one specific category. Table 1 distinguishing between three categories of hazards that are further broken down into seven subcategories:

Table 1 - Typology of Disasters

Natural Naturally occurring physical phenomena caused either by rapid or slow onset events which can be:	Climatological / meteorological	Floods, extreme temperatures, droughts, cyclones, storm/waves surges, tornado, climate change, precipitation, icebergs, wind, waves
	Geomorphological and geological	Earthquakes, landslides, tsunamis, volcanic activity, avalanches, soil erosion, sandstorms
	Biological and ecological	Epidemics, infestations, invasive species, wildfire, livestock plague, microbial pathogens, dangerous plants and animals

Anthropogenic Events caused by humans and which occur in human settlements. They also take into consideration intentional hazards in an attempt to harm others	Human-made	Complex emergencies/conflicts, famine, displaced populations, biological, chemical, radiological weapons
	Technological / industrial accidents	Toxic dumps or radioactive escapes, catastrophic transportation accidents
Astronomical Hazards from space	Natural	Asteroids, meteorites, comets
	Technological / human-made	Satellites, rockets, drones

Source: tables based on EM-DAT and UNISDR terminology (2017)

Depending on the nature of the disaster (natural, anthropogenic, or astronomical) and its subtype, the responsibility for responding to a hazard or a disaster is allocated to a designated agency, department, ministry or other organization, based on its mandate.

Emergency

A disaster or a catastrophe involves an emergency. Emergencies are understood generally as events with a low consequence for a community because they are manageable with local resources. These can occur regularly and necessitate the intervention of first responders such as police, paramedics, and firefighters. Examples of emergencies include car accidents, house fires, and leaks.

Disaster

An emergency becomes a disaster when the capacity of a community to cope with a hazard is limited[2]. This brings to light elements of severity, probability,

[2] CNED has established its own criteria to characterize a disaster and enter it in the database. A "disaster" must respect at least one of the following criteria:
- Ten or more people reported killed
- Hundred or more people reported affected
- Declaration of a state of emergency
- Call for international assistance

and time. According to Lindell et al (2006: 7) "a disaster reflects the actuality of an event whose consequences exceed a community's resources. Unlike imminent emergencies, the consequences have occurred; unlike routine emergencies having minor impacts, disasters involve severe consequences for the community".

This definition of disasters emphasizes the importance of community resources and temporality: the difference between an emergency and a disaster resides in the intensity of a phenomenon compared to the resources of the affected community to effectively respond to the hazard at a given time. In order to recover from a disaster, a community requires outside assistance. Disasters are distinguishable from catastrophes, however, since catastrophes involve an element of scale and impact that surpasses those of disasters.

Catastrophe

A catastrophe is "an extremely large-scale disaster" (Victoriano, Montero and Ruan 2013: 18) that not only affects the community most directly impacted by the event, but also affects surrounding communities, with the ability to reach regional, national, and international levels. In catastrophes, individuals and institutions that are normally involved in response and recovery are themselves victims. Responding to catastrophes "exceeds the resources of many local jurisdictions—in some cases crippling those jurisdictions' emergency response capacity and disrupting the continuity of other local government operations" (Lindell, 2006: 7).

The following section provides definitions and models to better understand vulnerability and its relationship to hazard impact.

Understanding vulnerability

The term vulnerability comes from the Latin word *vulnerabilis*, which means to wound. Coppola (2015: 33) defines vulnerability as "a measure of the propensity of an object, area, individual, group, community, country, or other entity to incur the consequences of a hazard". The UNISDR's 2009 terminology document and UNISDR updated definition of vulnerability (2017) offer a more detailed definition:

> *"vulnerability is defined as the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard" (UNISDR 2009).*
>
> *"These circumstances are determined by physical (infrastructure), social-economic (income, culture), political (decision-making) and environmental (existing environmental weaknesses) factors and processes, which increase the susceptibility of a community to the impact of hazards" (UNISDR 2017).*

Thus, vulnerability is:

- Multi-dimensional and differential (varies across physical space and among and within social groups);
- Scale dependent (with regard to time, space, and units of analysis such as individual, household, region, or system); and
- Dynamic (the characteristics and driving forces of vulnerability change over time). (Birkman 2006:12)

The importance of vulnerability in disaster management emerged with the behavioural and sociological schools of thought (discussed in the section on Interpretation of Disasters below), which are in contradiction with the technocratic school that predominately focuses on predictive models of disaster. One of the most well-known models used to describe vulnerability is the Pressure and Release disaster impact model.

The Pressure and Release (PAR) model establishes the causality between social vulnerability and the impact of a hazard through a chain of explanations. It highlights how vulnerabilities (root causes, dynamic pressures and unsafe conditions), rooted in social processes, increase the risk of natural hazards affecting vulnerable people. Under this model, pressure exists at

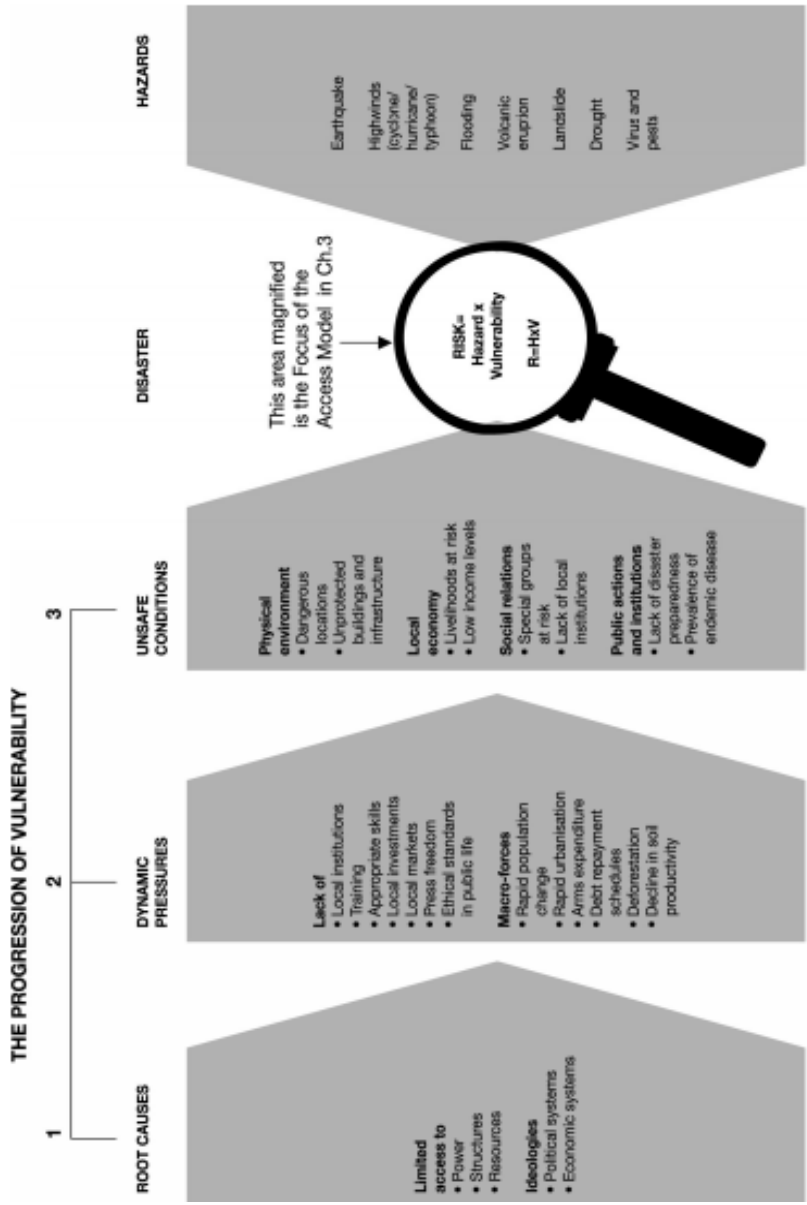
> *"the intersection of two opposing forces: those processes generating vulnerability on one side, and the natural hazard event (or sometimes a slowly unfolding natural process) on the other. The 'release' idea is incorporated to conceptualize the reduction of disaster: to relieve the pressure, vulnerability has to be reduced." (Wisner, Blaikie, Cannon and Davis 2003: 50)*

Despite its detail, one shortcoming of the PAR model is that it does not take into consideration global and transnational pressures such as climate change and overpopulation.

Theorists have expanded the PAR model to the Access Model (AM), "a more magnified analysis of how vulnerability is initially generated by economic, social and political processes, and what then happens as a disaster unfolds" (De Jesus Aragon-Durand 2009: 50). Contrary to PAR, AM is more suited to comprehend complex environments by focusing on disasters as a process (see number 7 of Figure 2).

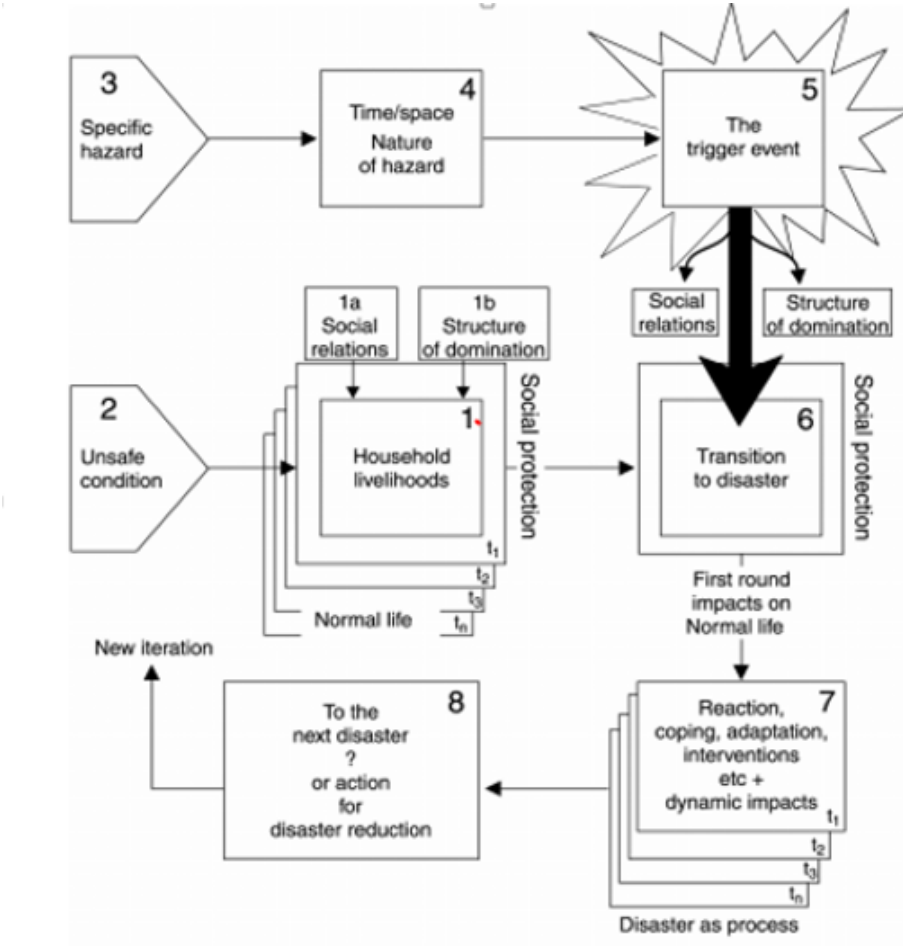
The AM illustrates the capacity of people to "deal with the impact of the hazards they face in terms of what level of access they have (or do not have) to the resources needed for their livelihoods before and after a hazard's impact," (Wisner, Blaikie, Cannon and Davis 2009: 54-55). The focus is therefore on the household level (stage 1). The unsafe conditions are influenced by social relations and the structure of domination. If the life of the household is normal, it serves as a social protection when the event triggers (stage 5) and influences the ability of the household to cope with disasters (stage 7). Moreover, it influences the capacity of individuals to mitigate the occurrence of another disaster (stage 8).

Figure 1 - Disaster-Pressure and Release Model (PAR) – progression of vulnerability



Source: Wisner, Blaikie, Cannon and Davis 2003: 51

Figure 2 - The Access Model of hazards and disasters



Source: De Jesus Aragon-Durand, 2009

The PAR and AM models can be used to measure risk. As with the definitions already discussed in this chapter, there is not one common definition of risk within academic and professional communities. According to the PAR model, risk can be measured using the following equation:

Disaster Risk = Hazard x Vulnerability

The AM model expands this equation and measures risk using the following equation:

Disaster Risk = Hazard x [Vulnerability / Capacity) - Mitigation]

In this equation, capacity is central to the measurement of both vulnerability and safety, and "refers to the resources and assets that people possess to resist, cope with and recover from disaster shocks they experience" (Widner, Gaillard, and Kelman 2012: 28). In the Access Model, capacity goes beyond the mere availability of resources, and encompasses the ability to either use or access them. While we have presented only two risk equations, there are numerous that are used in hazard mitigation planning. In many cases, these risk equations are used to develop risk matrices (Coppola 2015). These matrices increase visibility of risks and allow decision-makers and practitioners to compare risks and are useful in the overall risk management process (see for instance Vitoriano et al. 2013). It should be noted that a number of flaws have been identified with the use of risk equations and risk matrices, including that they contribute to systematic underestimation of risk (Mamuji and Etkin 2019)

Interpretations of disasters

In addition to basic definitions, it is also useful to have a general understanding of how disasters have been interpreted over time, as these understandings impact how individuals and organizations respond to them. While some understand disasters to be an Act of God or an Act of Nature, others focus on the intersection of society and nature, or look at disasters as avoidable human creation (FEMA 2004).

Disaster as an act of God – or fate?

The most traditional explanation is that disasters are an Act of God or Fate or are in some other way attributed to supernatural power. Such divine determinism builds on the idea that a deity created the world and controls all phenomena. Consequently, nothing can be done to prevent disastrous events, as these have to be accepted as uncontrollable functions of life. For example, Steinberg (2014)

explains that the earthquakes that occurred in Missouri's New Madrid fault in 1811 and 1812 were interpreted as a sign of God's power. Natural disasters have also been understood as a sign of the end of the world or the apocalypse and as punishments for sins.

When a magnitude 5.9 earthquake shook Mount Kinabalu in Malaysia in June 2015, the Deputy Chief Minister of Saba, Tan Sri Joseph Pairin Kitingan, explained that there was a causal relationship between the indecent behaviour of ten tourists on what is considered to be one of the most sacred mountains in the country, and the earthquake (Daily News, 2015). The earthquake was for many a reminder that sacred places must be respected. Similarly, Isabella Tree explains that for many devout worshippers, the 2015 Nepal earthquakes were instigated by carelessness in religious processions that were conducted just a day prior to the first earthquake, and as a result of the lack of respect towards the environment (National Geographic, 2015). Chanira Vajracharya, once worshipped as a living goddess in Nepal, explained that:

> *"the Earth starts shaking and trembling because she cannot bear the weight of people's sins and suffering any longer. People have been disregarding the Earth – most especially drilling and boring into her water. Extraction and pollution have angered the deities and made it very vulnerable. There is only one Earth. This Earthquake is not only for Nepal" (National Geographic 2015)*

Disasters are therefore wake-up calls to humanity.

Religious entities are able to draw on these interpretations in order to help victims and survivors cope with difficult times and/or to respond to significant life questions related to trauma, fear, death, and physical pain. Mourners are also able to draw life lessons from these events in order to help with overcoming the suffering and the pain of loss. In most post-disaster recovery processes, local religious organizations mobilize resources amid governmental and society organizations.

While interpretations of disasters as Acts of Gods are common today, changes are taking place. Chester (2005) states that "secular humanism has become the sine qua non which underpins explanations of disasters, and the notion of Act of God has been replaced by a perspective which views natural catastrophes as outcomes of human vulnerability and/or features of de-moralized nature" (319). The author attributes the end of divine determinism to the Enlightenment, the questioning of God's protection, and the emergence of industrial society.

Disaster as a purely physical agent – Act of nature

A second group of theories emphasizes natural disasters not as acts of God, but as purely physical agents: an act of nature such as "extreme geophysical processes" (McEntire 2004: 195). This technocratic approach considers the physical environment to be the independent variable used to explain social and economic impacts. Natural scientists, geologists, seismologists, and meteorologists claim that geophysical processes can be monitored, and that society can adapt to them through a number of means, including by controlling and containing natural hazards; building safer infrastructure; and developing better emergency management systems. While this approach to understanding disaster is adhered to by various disciplines in the natural sciences, the social sciences focus more on the relationship between nature and society.

Disaster as intersection of society and nature

Behavioural and sociological approaches to interpreting disasters, as applied by social scientists, oppose the technocratic approach and instead understand disasters as the intersection of society and nature. McEntire (2004) explains that "disasters are likely to be produced through a combination of physical, technological, social and institutional variables" (197). As a result of this, it can be argued that "no disaster is natural, because a disaster event by definition requires interaction with humans, their built environment or both" (Coppola, 2015: 50). A number of models explain the interaction between society and nature, each of which provide a different perspective on how humans deal with disasters. The following section disuses the behavioural model, the sociological model, the conservative thesis, complexity theory and chaos theory:

Behavioural model

Scholars of the behavioural model aim to analyse the behaviour of individuals while coping with vulnerability, risks, and natural disasters. There are two related assumptions to consider. The first assumption stresses that natural disasters are a threat: "an outside attack upon social systems that 'broke down' in the face of such an assault from outside" (Quarantelli 1998: 266). This '*man against*

nature' understanding emphasizes the need for individuals to adapt to their environment and to try to mitigate all occurring events that could disrupt their lives (Lindell, 2006). Individual adaptation options are not appropriate for hazards, however. Rather, disasters are instead a collective action problem.

The second assumption underscores that disasters are the manifestation of natural mechanisms amplified by human activity. They are thus anthropic. This approach illustrates that individuals can avoid disasters by settling in areas where hazards are not recurrent, or that they must adapt to their environment by building appropriate structures and implementing efficient warning and emergency management systems. In the 1960s, under the behavioural paradigm, Gilbert Write argued that people should be able to pick from a greater range of options in order to consider avoiding or leaving areas at risk.

Sociological model

A sociological approach to disaster management focuses on the social vulnerability of the population when hazards occur. Early theories appeared in the 1970s and increased the theoretical gap with the technocratic approach. In the sociological model, social factors are considered to be a cause of social vulnerability to natural disasters, such that disasters are understood as the interaction of hazards and vulnerability. Hewitt (1983) emphasized that natural disasters were not necessarily unpredictable and unexpected. He also argued that since hazards were the result of anthropogenic causes, social changes were necessary for a solution. This theory is foundational for disaster management, as it brings into perspective political and social dimensions of risk management.

In his risk management model, Lindell (2006) argues that vulnerability is a social construction that causes certain segments of the population to be more susceptible to suffer from hazards; the severity of a natural disaster is different depending on who is being affected by the event. Lindell (2006) describes four explicit causes of socially vulnerable population segments: psychological, demographic, economic, and political processes. Similarly, Birkman (2006) lists a set of characteristics of social vulnerability:

- Initial well-being (nutritional status, physical, and mental health),
- Livelihood and resilience (assets and capitals, income and qualifications),
- Self-protection (capability and willingness to build a safe home, use a safe site),

- Social protection (preparedness and mitigation measures), and
- Social and political networks and institutions (social capital, institutional environment and the like).

Although the list cited above is not exhaustive, it provides a basic risk profile that has implications for preventing potential disasters and also predicting the societal capacity to deal with a disaster when one occurs, or its resilience. Resilience is 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).*

The understanding of social vulnerability is critical to mitigate hazard consequences and to gauge a community's resilience.

Conservative thesis

In the conservative approach, culture is identified as the determinant of disaster. Essentially, "choices that are made about where and how human development will proceed will actually determine the losses that will be suffered in future disasters." (McEntire 2004: 196). For example, Mileti (1999) argues that technology has given individuals a strong belief that they are superior to nature, which has pushed them to neglect ecosystems that could have provided them with protective natural fences. In order to reduce the impacts of hazards "alterations in beliefs or behaviours and an increase of rationalization and bureaucratization," are necessary (McEntire 2004: 195).

Complexity theory

Complexity theorists question the explanation of cause and effect. According to scholars, there cannot be causality because human behaviour and nature are both unpredictable. Complexity theory aims to "emphasize the mutuality of hazard and vulnerability to disaster due to complex interactions between nature and society" (Hillhorst and Heijmans 2012: 741). Thus, "in such complex interactive systems, it is impossible to anticipate all possible events and effects;

so failure or accident is inevitable" (Stone, 1989: 288). Complexity theory, in opposition to a structural-functionalism approach, which has a more holistic (societal) approach to individual vulnerability, focuses on the interaction between nature and society to reveal the vulnerability such as social patterns and beliefs.

Complexity theorists argue that society (viewed as a system) can adapt in responding to external stimuli provoked by a disaster using information and communication means, learning processes, and resources. Comfort (1999) argues that local knowledge should be used to respond to disaster. If the top-down approach has been the dominant approach to disaster mitigation, complexity theory recognizes the need for a more comprehensive approach through a more horizontal inter-action between society and government. This approach considers the need for participation through networks as well as partnerships with the creation of Public-Private Partnerships, collaboration mechanisms, and co-governance.

Chaos theory

In his 1963 book, *The Essence of Chaos,* Lorenz defined chaos as "seemingly random and unpredictable behavior that nevertheless proceeds according to precise and often easily expressed rules" (Lorenz 1963: vii). Lorenz stresses the importance of the instability (nonlinear world) of the environment, such that individuals must adapt to future situations by tackling many variables simultaneously in order to reduce risk. He argues that "our weather is rather unpredictable instead of continually executing a monotonous cycle, or perhaps not changing at all except for the slow advance of the seasons" ((Lorenz 1963: 94). Similarly, Kiel (1995: 186) explains, "our world is filled with nonlinearity," a situation in which the relationship between variables in a system are dynamic and disproportionate. While linear systems are ideal environments in which we could predict the number of casualties and the resources (material), including the human resources, needed as well as the time required to restore the natural and socio-economic order, nonlinearity makes it such that we cannot predict hazards because we lack "linear tools for prediction and response" (Kiel 1995). Disaster response systems are therefore seen as humans' ability to survive chaotic events, to control chaos, and to reestablish order.

Disaster as avoidable human creation

The final interpretation that will be discussed understands disasters as avoidable human creations caused by unsafe conditions that increase a population's vulnerability. De Jesus Aragon-Durand (2009: 54-5) argues that

> *"Unsafe conditions are dependent upon the initial level of well-being of the people, the pattern of access to tangible (e.g., cash, shelter, food stocks, agricultural equipment) and intangible resources (networks of support, knowledge on survival, and sources of assistance, morale, and the ability to function in a crisis)."*

A population's vulnerability is thus primarily defined as a socio-economic issue, such as poverty. Disasters can be avoided if the resilience of the population is increased through mitigation and adaptation measures that improve their livelihood. This idea emphasizes the element of human exploitation to qualify the severity of a disaster. Marxist and radical theories are useful for understanding emergency management in this context.

Marxist thesis

The Marxist interpretation focuses on the economic cost of disasters. It includes direct and indirect costs such as environmental and emotional consequences. A Marxist approach to disaster management argues that economic conditions and political powerlessness increase vulnerabilities to hazards. Thus, the most vulnerable population will most likely be the most affected by a disaster. Consequently, individuals' vulnerability and their response, at the local level, will depend upon their position in the production process. Within the Marxist school of thought, there is also the economic theory that focuses on the idea that economic prosperity of a community is directly tied to its capacity to recover.

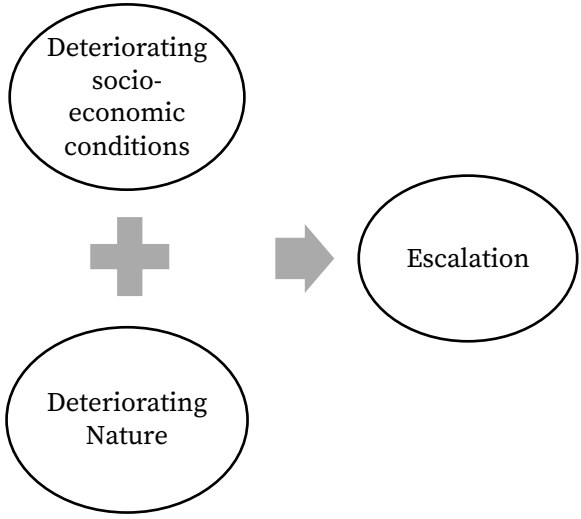
On a global scale, theories of dependence such as Wallerstein's core/(semi)periphery theory have contributed to disaster management literature. A core/periphery approach points to the responsibility of the core (developed countries) for the vulnerability of the peripheries (underdeveloped countries). The core represents all the countries who benefited economically first from the Industrial Revolution and then the Capitalist world. They possess high

standards of living and have been able to develop their economies by exploiting cheap-labour countries. The (semi-)peripheric countries often lack strong central governments and are affected by high poverty rates because they were exploited by colonial powers. The dependency of these countries (underdevelopment) sets the conditions for socio-economic vulnerabilities. This theory therefore implies that the poorest countries are more vulnerable than the richest countries because they do not possess the technology to mitigate and adapt. In this understanding, disaster relief and technology used by the richest countries to help the poorest are intentionally a demonstration of exploitation and domination, even if disaster relief aims to help the poor.

Radical theory

Radical theorists also affirm that the severity of a disaster is not only related to the stress on nature but is also connected to the socio-economic vulnerability of the population. If poverty is a fundamental element of vulnerability, radical theory, similar to Marxist theory, emphasizes the element of human exploitation to qualify the severity of a disaster.

Figure 3 – Radical Theory



Contrary to behavioural theorists, radical theorists argue that individuals cannot be responsible for being impacted by disasters because human settlement, especially in poorer countries, is not based on choice but rather socio-economic constraints. To prevent causalities and damage, according to this theory, unsafe conditions must first be addressed through prevention and preparedness, which includes addressing root causes. Root causes encompass socio-cultural factors (gender, class, and ethnicity) and economic factors (wealth and income).

The theoretical perspectives we have explored attribute different causes to disasters. While additional theoretical lenses – such as (neo-)institutionalism and post-modernism, provide alternate means of understanding how organizations and institutions contribute and/or respond to disasters, it is hoped that this survey has provided a sufficient introduction. In the following section, we explore different disaster management models.

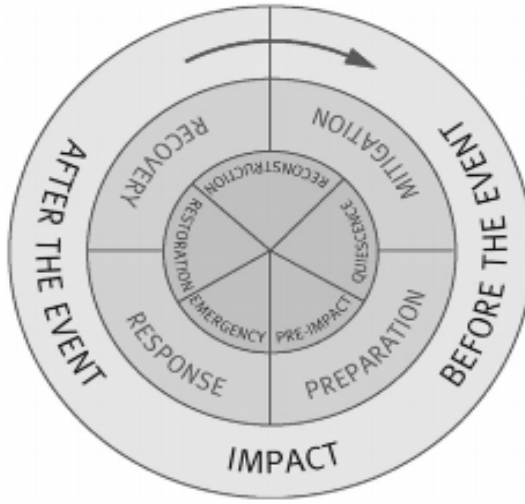
Disaster Management Models

Disasters can be understood as either *events* or *processes*. As events, they are "concentrated in time and space" (Lindell 2011: 797). In public policy literature, for example, disasters can be viewed as focusing events that have the potential to open a window of opportunity when the three independent streams that Kingdon describes – problem, political and policy – meet (Kingdon 2003). Birkland (2009) defines focusing events as rare sudden events, which could be relatively harmful. According to him, a crisis becomes a focusing event when it attracts the attention of the media and public. Focusing events can influence the public policy-making process in revealing the potential danger of a problem and the limits of current policies. The post-disaster context offers a window of opportunity for disaster risk reduction and the ability to Build Back Better. This emphasizes the importance of a robust lessons-learned approach.

When disasters are viewed as events, they are three general concentrations of time that can be considered: pre-event, during-event, and post-event. The complexity of disasters has necessitated a further break down of temporality concentrations: mitigation, preparedness (before the event), response, recovery (after the event). These four stages constitute the comprehensive emergency management model (National Governors Association 1978). These stages have

been further broken down into five micro-steps: quiescence, pre-impact, emergency, restoration, and reconstruction. Coppola's diagram (2015) summarizes these key phases of disaster events.

Figure 4 - Disasters Concentrations in Terms of Time



Source: Copolla 2015

Table 2 further explains the different stages as outlined in the diagram. We have limited our definition to one institutional definition (UNISDR) and an academic one (Vitoriano, Montero and Ruan, 2013). Vitoriano, Montero, and Ruan (2013) provide a complete and precise definition of mitigation, preparedness, response and recovery :

Table 2 - Comprehensive Emergency Management Phases

Concentrations		*Authors and Definitions*	
Temporal concentration	*Disaster Management Phase*	*UNISDR*	*Vitoriano, Montero, Ruan (2013)*
Pre-event	Mitigation	The lessening or limitation of the adverse impact of hazards and related disasters	All the middle and long-term actions and decisions aimed to prevent and mitigate the consequences of future disaster, as long as it is not (known to be) imminent. Typical tasks of this phase are the identification of risk groups and vulnerability patterns and their treatment, or the development of prediction systems and emergency plans and the allocation of resources for them
	Preparedness	The restoration, and improvement, where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors	All the short-term interventions once the available prediction systems have raised an alarm of an upcoming phenomenon until it finally strikes. This includes setting off the emergency systems and evacuation plans, the real-time tracking of the hazard, the analysis of the most probable scenarios, the reinforcement of critical infrastructures, etc. This phase also includes some long-term decisions such as inventory prepositioning and network design.

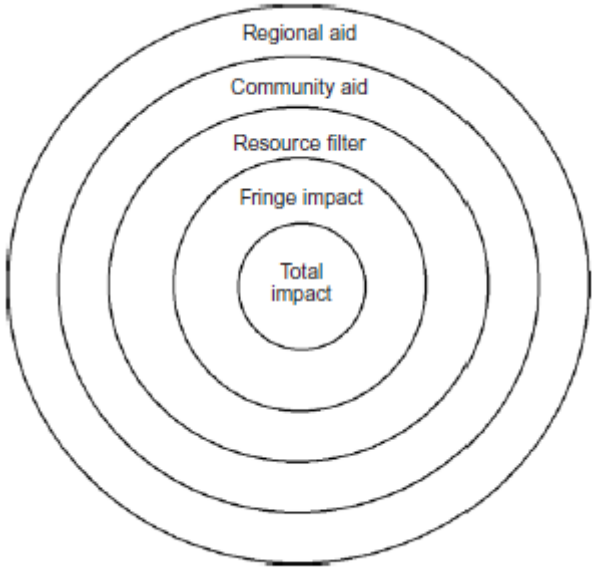
During-event	Response	The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected	Focus on saving lives; characterized by a short duration with high emergency and high uncertainty. Usually divided into a first response phase, devoted to the rescue and urgent medical assistance of injured and affected people (depending on the disaster scenario, this may last around one week from the moment of the disaster event), and a middle-term response phase, devoted to estimating and mitigating the potentially unattended first needs of the affected population as a result of possible damage to life-line infrastructures and resources (shelter, ordinary medical assistance, water and food supply, etc.). This middle-term stage usually involves the delivery of aid from outside the affected zone and can last for weeks or even months from the moment of the disaster, depending on its nature and magnitude as well as on the economic and development circumstances of the affected jurisdiction (21)

Post-event	Recovery	The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors	Focused on achieving efficiency and characterized by long duration with low emergency and low uncertainty. Refers to all the long-term actions and decision aimed to restore normal functioning of the affected community and reconstruction of its social fabric, including life-line resources, services and infrastructure, and improvements needed in order not to repeat the specific vulnerabilities shown by the affected groups and places. Sometimes, after certain disasters, a periodic flow of humanitarian aid will be needed to support particularly vulnerable people, which is outside the scope of disaster management.

In contrast to the comprehensive emergency management cycle, which defines critical stages of disaster management, other disaster management models focus more on the impacted space. Wallace (1956), for example, characterizes a series of geographical areas that are identified as concentric zones that define impact and response.

The concentric circles represent a simplification of space. The total impact space (circle 1) represents the focus point of the impact. The fringe impact (circle 2) represents the outside boundary of the disaster. The resources come from the non-affected community (circle 4 and circle 5) and are dispatched in the resource filter zone (circle 3). While this model can be used as a tool to geographically map the management of resources, both material and human, it has a number of limitations. It is difficult to entirely delineate the impact zone of an event, as the affected area can vary in size and scale and since both direct and indirect losses should be considered in disaster management. This consequently impacts the resources required for disaster relief. Moreover, for some hazards, such as earthquakes, consequences can go beyond the total impact zone affecting community aid and the resource zone.

Figure 5 - Disaster Management in Terms of Space



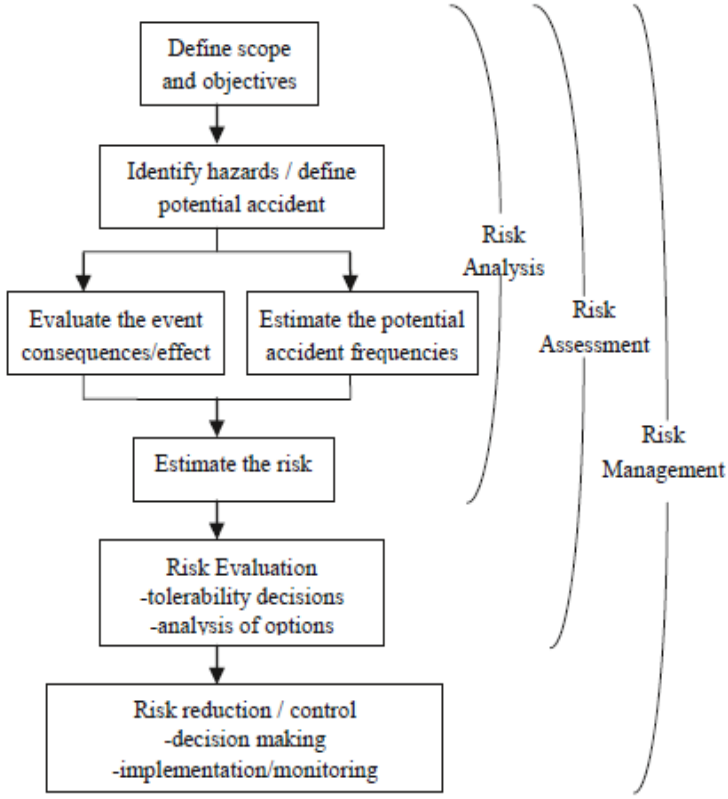
Source: Lindell 2011

Also common are risk management models. For example, Vitoriano *et al* (2013) outline the relationship between risk analysis, risk assessment and risk management (see Figure 6).

In this model, risk analysis encompasses three stages. The first stage aims to "define the scope and objectives" of the general analysis framework. The second stage, "identify hazards/define potential accident", aims to identify, describe, map, and analyze the occurring disaster, namely its physical, chemical and/or energy description. Finally, the third stage is to determine a) the consequence and the effect, and b) the likelihood/frequencies of hazards, which leads to an estimate of the risk through the use of matrices, quantitative methods, mixed methods, and qualitative methods. Once risk analysis has taken place, the risk needs to be assessed and evaluated though a series of questions:

- Are available options suitable?
- What are the instruments available?
- Who are the main actors?

Figure 6 - Simplified Relationship Between Risk Analysis, Risk Assessment and Risk Management

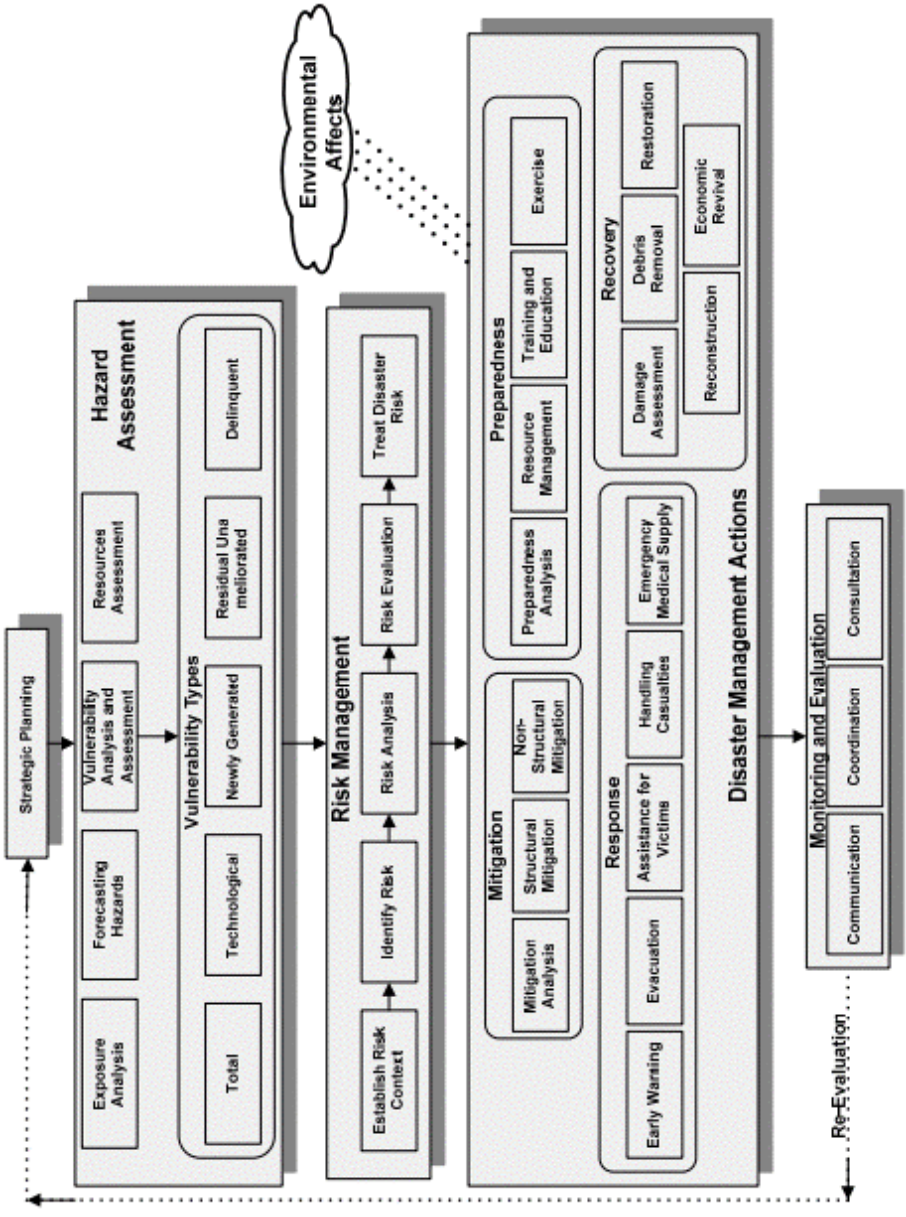


Source: Vitoriano, Montero, Ruan 2013

This stage leads to the possibility of risk reduction or mitigation though decision-making, implementation of policies, and monitoring processes.

In their disaster management model, Asghar *et al.* (2011) attempt to develop a more comprehensive and prescriptive disaster theory by bringing together both the four emergency management phases, as well as risk management (see Figure 7).

Figure 7 - A 'Comprehensive Model' for Disaster Management



Source: Asghar et al. 2011: 6

In focusing on constant data collection through monitoring and evaluation, the model ensures dynamic and informed decision-making through evidence-based policy. The model also acknowledges the importance of coordination, deliberation and participation (consultation), which optimize informed decision-making; efficiency and effectiveness in avoiding overlaps; and improving bidirectional communication and learning processes (sharing knowledge, data, information, instruments of policy action). This reinforces community resilience and social capital and provides a single window of action for crisis management.

Conclusion

In order to respond better to hazards and ensure sustainable mitigation, we need to embrace a more dynamic approach to problem solving; one that moves away from short-term thinking and that is holistic in nature. There is also a need for broader collaborative problem-solving approaches. This chapter has provided a modest overview of important definitions in Disaster & Emergency Management, discussed different ways in which disasters have been interpreted over time, and presented a number of disaster management models. The diversity of theories outlined in this chapter indicates that research in the field is multidisciplinary, with contributions from a multitude of disciplines, including public administration, international affairs, religion, natural science and geography. This is a primary strength of the discipline.

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Chapter 4. Managing Uncertainty in Regions of Risk

Louise K. Comfort

The Changing Landscape of Global Risk

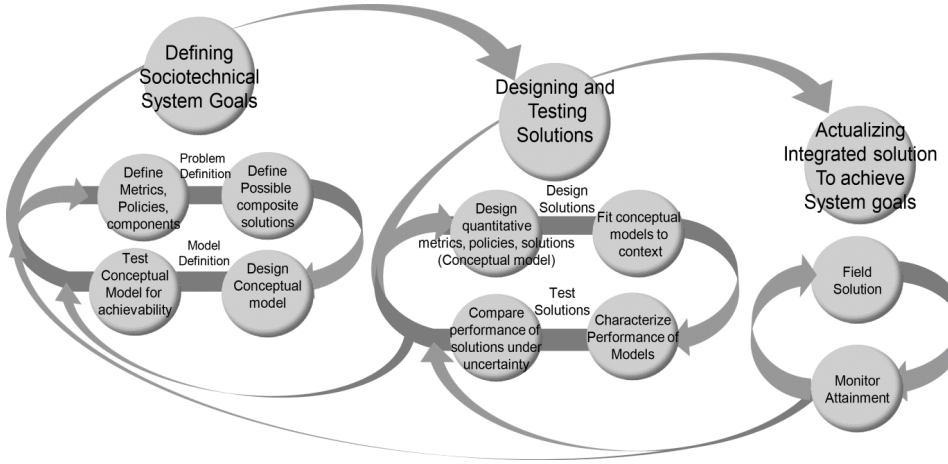
No longer can risk be managed only through national disaster management systems. Recent decades have witnessed the increase in billion-dollar losses from events generating technical, economic, and social impacts that cross national boundaries. In the United States alone, there were 14 disasters that incurred losses over $1 billion in 2011 (National Research Council, 2012). Other events, such as the 2011 Tohoku Triple Disasters in Japan illustrate the global interdependencies generated by an extreme physical event, a 9.0 Magnitude earthquake that triggered three massive tsunami waves that, in turn, flooded the generators of a nuclear plant, setting off a severe breach of radioactive pollution. The ensuing pollution contaminated the air, land, and sea within a radius of at least 50 kilometres of the nuclear plant and threatened the fishing waters of both Korea and China (Cabinet Office of Japan, 2011). In 2012, Hurricane Sandy formed as a tropical storm in the waters off the coast of West Africa, intensified to a Category One hurricane as it crossed the Caribbean nations of Haiti and Jamaica, and made landfall as a post-tropical storm on the coasts of New Jersey and New York. The losses in infrastructure and disruption of economic activity tallied over $72 billion in the U.S. alone (Aon Benfield, 2013). The cumulative losses of these regional events defy the disaster management plans of single nations.

Globally, losses have escalated to sobering heights. The Global Risk Assessment conducted by the United Nations International Strategy for Disaster Reduction (ISDR) in preparation for the World Conference on Disaster Risk Reduction held in Sendai, Japan, March 14-17, 2015 summarized the impact of extreme events on the collective global community. Average losses from earthquakes, typhoons, tornadoes, tsunamis, floods, and wildfires have risen to approximately US$250 to US$300 billion per year, while future losses to infrastructure alone are estimated at $314 billion per year (UNISDR, 2015). The rapid escalation in losses in lives and property is exacerbated by the increasing interdependence among physical, technical, ecological, social, economic, and political environments. These interdependencies generate unexpected, unmanaged risk as these complex systems interact with one another in unanticipated ways. Unrecognized, such risks cumulate to produce substantive breakdowns, not only in the system in which faulty performance originated, but in secondary and tertiary effects on interconnected systems as dysfunction ripples through complex operational systems. Such events require a different framework for management that includes adjacent actors or regions that may be affected by escalating consequences if the interdependent effects are not anticipated and mitigated.

Defining risk in interdependent operational environments means designing a framework for monitoring and measuring change in operating conditions at multiple levels. The complex adaptive systems of systems (CASoS) (Glass et al. 2011) framework offers an approach for addressing such interdependent systems. This approach represents the systematic application of an iterative process to define, design, implement, and evaluate actions that monitor risk and update the status of a target community. This theoretical framework includes three phases: 1) define the measures of the complex system under study, define the factors that influence the system, and create a conceptual model that connects the two; 2) design and test influences based on a mathematical rendering of the conceptual model (discrete to continuous agents, networks, and dynamics) in the context of uncertainty; and 3) implement the devised solution in a testbed of the real environment to assess the effectiveness of the proposed solution (Glass et al., 2011: 882-883). The process evolves continuously, as interactions among the subsystems adapt to one another and change the environment in which they are operating, precipitating fresh adaptations in the metasystem. Figure 8 below adapts the CASoS process described by Glass et al.

(2011) to the evolving problem of building community resilience to natural hazards. This theoretical framework is currently being used to guide a pilot project on early tsunami detection in Padang, West Sumatra, Indonesia (Comfort et al., 2013) that, if carried out effectively, will be applicable to other regions of the world exposed to near-field tsunami risk.

Figure 8 - CASoS Engineering Design Process



Source : Adapted from Glass et al. (2011: 383).

Implementing a CASoS framework in an actual regional context means identifying different scales of operation in a system of regional risk reduction and building a knowledge base to support not only detailed operations at a local scale, but also sufficient knowledge of the mid- and meta-scales of operation that managers are able to recognize the impact of disruptions at the local level and anticipate the consequences of those disruptions on successive levels of operation across the metasystem. A CASoS in operation, therefore, needs the capacity to transfer knowledge across different scales of operation to create an informed profile of the metasystem at the regional level. While the technical capacity to implement a regional framework to define risks, design potential solutions, and test them in actual practice is currently available (Nobre, Tobias & Walker 2009), the organizational capacity to implement, evaluate, and update such a system is more difficult.

Building the capacity for global risk assessment would entail engaging actors at local and regional levels to define, design, and implement a system of global risk reduction in an iterative process that includes both technical advancement, and organizational development and adaptation. Without such intervention, the steady churn of socioeconomic change in interaction with existing physical and engineered environments vulnerable to risk is likely to lead to increased losses in lives and property, and cumulative damage to technical infrastructure and socio-economic development. For example, Swiss Re (Annual Financial Report, 2013), a global reinsurance company, reported a 21% increase in reported losses due to natural disasters in 2013. Applying this rate of actual loss to future scenarios in an estimate of global risk assessment presents a compelling argument for designing, implementing, and evaluating more effective means of risk management at local, national, and regional scales of operation.

Changing Patterns of Uncertainty among Complex Systems

The basic resource for managing uncertainty in complex environments is the human capacity to learn and adapt to changing conditions. Yet, the degree of complexity among interacting systems requires more accurate, detailed monitoring of the processes of change, and further, integrating measures of change for single functions into a more comprehensive profile of risk for a community. Current sensor networks monitor the rates of change in physical, technical, ecological, social, economic and political systems, but to date, these sensor systems have largely been designed and implemented to monitor change in single functions, such as seismic monitoring systems that measure earth movements or Doppler radar systems that monitor wind speed and direction. Equally important is the need to measure the interaction among sets of functions, for example, the impact of windstorms on electrical grids and the potential damage from subsequent electrical failure on urban transportation services, hospital capacity to deliver medical services, or commercial capacity to continue business operations. These joint distributions of technical capacity to provide functions and organizational capacity to continue operations and service delivery represent key measures of resilience for a community. Extending these joint

distributions of technical and organizational functions to different groups within the community adds a third dimension of complexity by showing the impact of the interaction upon vulnerable populations and their capacity to cope with sudden, extreme events. Further, extending the scope of community operations to regional, national, and global scales requires adaptive management that can adjust the allocation of scarce attention, time, and resources within the metasystem appropriately as the level of risk varies at each scale of operation.

Developing the capacity for measuring the interaction among technical and organizational functions in environments exposed to risk means adopting measures that acknowledge joint distributions that may vary independently from single functions. While such distributions can be expressed mathematically (Brink and Davidson, 2014) and designed for application to specific risks, for example, seismic hazards, translating the results from such measures into management practice requires a conceptual model of change that includes the cumulative distribution of the rate of change across the metasystem under study.

Recent work in complex systems has focused on measurement of joint distribution of critical variables as they interact with one another and adapt in varying ways to changing operational conditions. The task is to measure the interaction among these component variables as they influence one another and form novel patterns of performance as the metasystem undergoes change (Glass et al, 2011). The objective is to identify points of strain at different scales of operation within the system for timely adaptation at local levels to avoid collapse of the overall system. The process of adaptive management maintains the overall goal of the system but generates a more effective balance or 'fit' among the components in response to a changing operational environment. Several authors have contributed to this literature, noting the critical role of information and communication processes among units of the system that enable it to adapt to unexpected events (Roe, 2013; Weick and Sutcliffe, 2007; Comfort, 1999; Weick, 1995; Roberts, 1993). Other authors have examined the trade-off between maintaining efficiency in organizational operations and achieving resiliency in response to unexpected threats (Brede and DeVries, 2009). The issue involves choices regarding the investment of time as well as resources in monitoring the performance of an operational system interacting with its environment. Other theorists have focused on the recognition of risk (Klein et al., 1993; Comfort, 2007), and the capacity to anticipate threats in decision processes in rapidly changing environments.

Further work has focused on the measurement of dynamical systems, and the development of models that anticipate the consequences of alternative strategies of action in the evolving process of system performance. The use of Bayesian models that identify the prior assumptions of actors as the basis for the next iteration of decisions in changing conditions offers a useful approach for anticipating consequences of those decisions for further operations, enabling more informed choice under uncertainty (Lu and Druzdzel, 2009; Voortman, Dash, and Druzdzel, 2010; Barua, Gao, and Mannan, 2012). While each theoretical approach offers useful insight, none precisely addresses the problem of scalability in large-scale, sociotechnical systems.

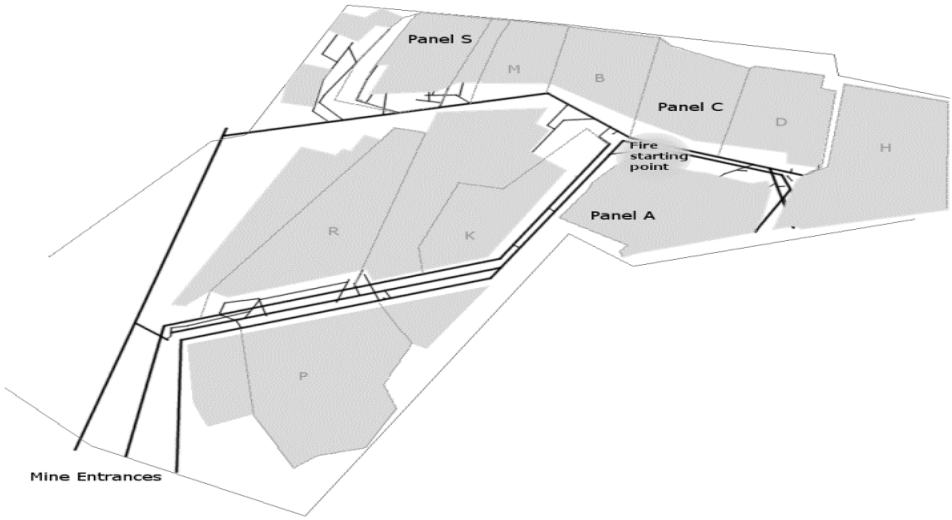
Measuring scalability represents a different challenge. The objective is to identify points of strain at different scales of operation in the overall sociotechnical system for timely reinforcement or adaptation to avoid collapse of the overall system. This objective leads to the design of a complexity index that would measure the level of strain placed on a system of large-scale, complex operations against the level of stability available in that system to mobilize the knowledge, resources, and personnel needed to counter the strain and maintain operations, likely in a redefined format. Such adaptation requires sufficient knowledge of the technical demands of the operational system matched by timely experience with organizational resources to bridge the two sets of functions in a productive response to rapidly changing conditions. The function of a complexity index can be illustrated by an actual case of sociotechnical failure in the underground mining industry.

The Soma, Manisa, Turkey Mine Disaster

On May 13, 2014, a spontaneous fire at the intersection of mine galleries shut down a coal mine operated by the Soma Mining Company outside of Soma, Manisa, Turkey at 3:10 p.m., blocking the only evacuation route out of the mine. The fire occurred at shift change, trapping an estimated 787 miners working in different galleries of the mine located at varying distances from the exit. The fire quickly spread throughout the mine, and dense smoke and carbon monoxide filled the mine galleries within minutes. With no access to fresh air, limited communications between the mine galleries, and no ready means of exit to safety, the miners were in grave danger. Rescue operations were initiated, but were hindered by the fire, which blocked the single exit from the mine. The official count of the dead was 301, with 486 miners who escaped the fire. The event ranks as the worst mining disaster in Turkey's history (BBC News 5/19/2014).

While the details are under closed investigation, this event represents a case in which the sociotechnical system for coal production had been stretched beyond its organizational capacity to manage a rapidly evolving fire, a well-known hazard in underground mining (Duzgun, 2014; Esterhuizen and Gürtunca, 2006). The mine, owned by the Government of Turkey (Constitutional Law 168), had been jointly operated since the 1980's with a private company, Soma Mining. The company gained greater control of the mine under new regulations passed in 2005 and sought to operate the mine more efficiently at lower cost. As mining operations shifted from the depleted upper levels to extract coal from deeper seams in the mine, the 'safe room' at the upper level, designed to provide a secure internal space for miners in event of fire, had been disabled. A new 'safe room' under construction at the deeper level of mining operations, was not operational at the time of the fire (BBC News, 5/17/2014).

Figure 9 - Cross-section of the Soma Mine



Source : Sketch by Ibrahim Erkan, 2015.

The organizational safety measures intended to provide recourse for technical failure were not sufficiently functional to cope with the known hazard of fire in underground mining operations.

Examining the issue of scalability in the sociotechnical system of mining operations, the technical function of extracting coal changed as access to the coal source shifted, and operations located the miners deeper in the mine, at greater risk if any component of the production system malfunctioned. This technical change necessitated a corresponding organizational adaptation in the sociotechnical system in order to secure the safety of the miners in event of malfunction. The construction of a 'safe room' for the miners at the deeper level of mining operations cost both time and resources. In an organization focused on cost reduction, the immediate trade-off between efficiency and resiliency was to continue mining operations without ensuring the timely construction of a safe room for the miners at the deeper level. Regrettably, the cost of this trade-off was the loss of 301 lives and substantial economic loss, as the disruption led to a decision to seal the mine, stopping mining operations altogether and demonstrating both lack of resilience in organizational capacity and lack of efficiency in technical operations. The Government of Turkey, and its partner, Soma Mining Company, sought to scale up mining operations to increase

economic productivity and efficiency, but were hindered by inadequate assessment of organizational and technical risk at different scales of operations. Lacking adequate judgment regarding increasing risk as the interdependent sociotechnical functions in the mine accelerated, both Soma Mining and the Ministry of Energy and Natural Resources (MIGEM) responsible for managing the mining contract were unable to cope with the uncertainty inherent in the industry.

This brief summary of the Soma mine disaster illustrates the potential application of a CASoS framework for managing uncertainty in industrial production systems. Earlier research in organizational theory indicates that inadequate information flow within a system reduces its capacity to adapt to rapidly changing contexts of action (LaPorte, 1975; Glass et al., 2011). The critical missing link between the change in the technical operations of the Soma mine and the organizational adaptation essential to ensure safety for the miners led to serious failure in both technical and organizational sub-systems involved in mining operations, with devastating consequences for the social system of support for miners' families and costly consequences for the economic productivity of Soma Mining Company and its contract partner, the Government of Turkey. As a system fails to adapt under stress, it loses stability and control, as exhibited in the Soma mine disaster.

Measuring Scalability in Complex Systems

Extending the CASoS framework to the broader concept of scalability in complex, sociotechnical systems (LaPorte, 1975), I propose the following set of assumptions to inform the design of a global commons for the study of risk:

- As the number of actors engaged in operations increases, the number of potential interactions within the system also increases;
- As the number of potential interactions within the system increases, the number of possible points of error or dysfunction also increases;
- As the number of possible points of error increases, the likelihood of loss of stability or system failure also increases;
- As appropriate actions are taken to assess the status of system increase, potential error is likely to decrease;

- As errors are detected and corrected, system performance is redefined, and stability is maintained.

As stated above, the set of assumptions articulates a general process of adaptation to changing scales of operation, but the constraints imposed by the local context in which the system operates are omitted. The local context is critical to defining performance in specific instances and identifying the critical factors that facilitate or inhibit adaptation in local contexts is central to understanding the larger process of scalability in complex, sociotechnical systems. Information flow drives the system, and its capacity to adapt depends upon the recognition of risk, the communication of that risk to relevant actors in time, and the translation of relevant information into action.

Exploring the fundamental problem of scalability in complex systems in reference to actual cases -- such as the Soma mining disaster -- will enable more informed analysis, grounded in actual constraints and opportunities that shape the process of adaptation in real time. The critical issue is the two-way strain that is introduced into complex systems by sudden, unexpected events. In complex systems that are designed for efficiency, the primary allocation of time and resources is concentrated on production. In systems exposed to high uncertainty and risk, sufficient time and resources need to be allocated to allow resilient adaptation to unexpected threats. Finding the appropriate balance between resilience and efficiency (Brede and DeVries, 2009; Landau, 1969) requires measuring not only the strain imposed on the system by extreme events, but also the depth of resources, knowledge, and external capacity that may be mobilized in time to offset the disruption to the system and maintain continuity of operations in a newly adaptive approach.

Earlier work in computer science has explored the design of dynamic indices that measure adaptation of a system to changing conditions (Chang, 1995). Yet, these early designs represented a set of one-way adaptations of possible states to an environment within a fixed range of variation, without taking into account the impact of environmental conditions on the adaptations as they were being produced. More challenging is the measurement of two-way adaptations between the physical environment and sociotechnical systems that produce novel forms of performance and alter the balance between socio and technical components within the larger sociotechnical system to ensure sustainable performance (Brink and Davidson, 2014). Such two-way adaptations suggest the development of a complexity index that would measure not only the strain imposed on a multi-

scale complex system by evolving technical, organizational, and environmental conditions, but also the capacity of the system to marshal the internal and external resources necessary to create innovative forms of response and recovery to extreme events.

One means of addressing the problem of change in sociotechnical systems is to design a complexity index to measure the degree of interaction between the technical functions required, for example, for mining operations and the corollary organizational functions required to support the miners in doing the work at different degrees of exposure to risk and at different levels of operation in the mine. The expected result is a dynamic complexity index that will enable managers to assess the strain on the overall system of mining operations and identify points of weakness and possible failure before they occur, assuring the continuing operation of a complex, sociotechnical system under different degrees of stress.

Self-organizing Processes in Managing Collective Risk

Managing collective risk represents a larger, more diffuse task than targeting a specific individual, group, or organization to reduce a particular type of risk. In limited cases, managers can set constraints and logically identify strategies of action to reduce risk within those constraints. In wider regions, such as communities, states, nations, or regional groups of nations, the plausible sources of risk, numbers of actors, numbers of interactions among actors and sources of risk, quickly exceed the range of any form of hierarchical control. No single authority or agency can manage the range of interactions or anticipate all possible strategies of action among agents, technologies, and conditions as they vary over time in a global world. For managers confronting large scale threats, the immediate responsibility for managing risk falls to each local community, with successive levels of responsibility scaling up to the global community to devise more effective means of support to local and regional communities and more innovative forms of risk reduction and measurement on a global scale. The primary means of reduction for collective risk is engaging participants at each

level of operation in informed actions that create a coherent strategy to minimize risk.

Such an approach seeks to foster collective learning and self-organizing action to reduce risk, not easy to achieve without an immediate threat. Yet, the benefit of fostering a creative approach to engender informed action on a collective scale has been shown, for example, in communities that monitor the growth of vegetation in close proximity to houses to prevent the spread of wildfire, as in Oakland, California, or that develop voluntary Neighborhood Watch groups to assist families with small children or elderly persons who may need special assistance under threat of hurricanes, as in small towns in Florida. Such an approach is based on monitoring rates of change in critical indicators of threat and timely communication of the status of risk to relevant persons who can take the necessary actions.

Communities that recognize the benefit and power of informed self-organization as a means to manage collective risk also acknowledge that the success of such measures depends upon creating a social process through which it can easily occur. Adapting the CASoS process of iterative steps to define, design, implement, and evaluate measures for risk reduction that are specific – and visible – to local communities provides a structural framework within which self-organization can be fostered and guided to meet community goals of resilience. This process is evidence-based, which lessens conflict over diverse interests and promotes an objective focus on achieving the optimum balance of risk vs. resilience for the whole community.

The key issue is how to engender and sustain this process of collective learning and action, which relies on the collective acceptance of responsibility at different stages of action for a community exposed to risk. If the process is indeed voluntary, there are, nonetheless, different mechanisms for encouraging responsible action by individuals, groups, and agencies. In designing a CASoS process for managing uncertainty, the question is who initiates the process? A maxim long respected and oft repeated in public administration is that "the responsibility goes to those who understand." This maxim has been reinforced by a second observation articulated by Herbert Simon (1962), that humans can "only create what they already understand." These observations, embedded in the informal culture of public administration, clearly imply that leadership in self organizing processes of managing risk and uncertainty derives from knowledge and experience, more than designated authority. Given this assumption,

institutions engaged in the systematic search for knowledge and public education bear a particular responsibility for active engagement and support of a process of monitoring and managing risk in regions exposed to hazards.

Mechanisms that Facilitate Collective Action in Managing Risk

Previous studies of planned change (Zaltman, Florio, and Sikorski, 1977; Mackenzie, 1986) have designed models and templates for structuring the process of enabling participants to make informed decisions regarding shared goals. If these models are developed with insight from participants and accepted in service of the larger, articulated goal, they guide the process without controlling it. The basic assumption underlying such models is that information drives the process of change, and that systematically searching for, and analyzing, relevant information in reference to the conditions and populations undergoing change is fundamental to making informed, thoughtful decisions about change. Yet, to be effective in a self-organizing process, information needs to be accessible, valid, and freely available to choose or not as a basis for action (Argyris, 1993; Argyris, Putnam, and Smith, 1985).

Adapting the CASoS framework of iterative search to define, design, implement, and evaluate actual steps to identify and reduce risk requires a systematic review of the problem as a baseline for identifying potential hazards, and the consequences of those hazards on key elements of the community, should they occur. Once a baseline profile of a community is established, the critical factors that indicate risk can be identified, as well as the key actors/agents that have the capacity either to implement or hinder risk reduction measures. These factors may be the basic operational systems for any community: electrical power, communications, transportation, water, wastewater and gas distribution systems that provide essential services to the residents of the community and enable economic and social transactions.

This basic analysis provides a rudimentary profile of the community for monitoring its exposure to stress or its degree of stability in performance. The profile, once established, serves to indicate the rate of change in baseline conditions and to define threshold points of danger for the community. This

profile must necessarily be created for each community exposed to risk, as local hazards and resources may vary among communities across the world, although basic categories of risk and resilience may be the same.

Drawing on previous research, one set of measures is a simple classification of Technical, Organizational, and Cultural characteristics that identifies both sources of risk and sources of resilience in communities exposed to hazards (Comfort, 1999). Other researchers have developed metrics that examine the functions of performance in risk environments. For example, Kathleen Carley and her colleagues (Topper and Carley, 1999) have developed a functional matrix for assessing capacity for action in risk environments that identifies the types of information that are needed for action in complex environments: actors, knowledge, resources, and tasks. Distinctive to these methods of measurement is the assessment of interactions among sub-systems of functions engaged in the processes of both generating and reducing risk in the overall metasystem of risk management for a community. In doing so, researchers are monitoring both the structure designed to maintain existing institutions and the process of change, or adaptation, in response to risk in communities.

Once a set of metrics for assessing both the structures that contribute to, and the processes that reduce, risk at the community level has been identified and used to construct a profile in practice, this same assessment needs to occur at multiple scales of action in a complex sociotechnical system. Further, the interactions among the scales of operation also need to be tracked and measured, as these interactions will reveal the rate of change that is occurring within the metasystem. At each level of interaction, the system may change at different rates, which could indicate strength in rapid adaptation or weakness in delayed adjustment to threat. In a final stage of measurement, findings from the full set of measures need to be integrated to provide a current profile of the status of stress or stability for the whole large-scale, sociotechnical system.

As the mechanism of the CASoS process of inquiry produces a systematic profile on the status of risk for a community, the implicit function of this process is to make the information public, visual, and visible in ways that translate knowledge into action. There are no guarantees; the process is fundamentally voluntary, but the long-term observation of such a process is that, over time, communities that have ready access to valid information and free choice to accept and act on that information steadily build a consensus of informed management of risk that proves more effective and efficient than establishing

mandatory or hierarchical controls. Consequently, the management profile for the community changes to one of inquiry, guidance, collective education, and development of local leadership that, together, build community capacity for resilience to hazards and risk.

The 'Whole Community' in Risk Management

A central concept underlying the current framework for risk management articulated by the U.S. Federal Emergency Management Agency is a vision of the 'whole community' as it engages in managing risk (Kaufman, 2012). The concept is simple; it means that as the risk of hazardous events is shared by all members of a community, so is the responsibility for managing that risk. Consequently, the goal is to develop a strategy of collective action that engages all members of the community in tasks for risk reduction that are appropriate for their level of resources, knowledge, and capability. This concept, articulated in earlier research in a somewhat different form (Comfort, 1999), focuses on enabling collective action and the steps needed to build capacity for managing risk at widening scales of exposure, experience, and resources. Basically, the concept shifts responsibility for managing risk from a single public agency, for example, FEMA, to a broad-based approach that involves all organizations in the community exposed to risk: public agencies, private companies and businesses, nonprofit organizations such as schools, hospitals, convalescent homes, community organizations, and households. Yet, as the responsibility for informed action shifts to multiple actors, the technical infrastructure needed to support the timely exchange of information essential to mobilize collective action among the actors also changes in form and extent.

Enabling a community to manage its own risk involves a broad approach that combines public education regarding the indicators of risk, the design and implementation of a technical infrastructure for timely, accurate transmission of risk information, and the cumulative development of a shared knowledge base regarding risk and resources extant in the community and neighbouring regions. Each of these three tasks occurs to some degree in communities exposed to risk, but in practice, they are often not consistently implemented nor coordinated by the different agencies involved. For example, public schools may have programs regarding risk in science education that teach children what causes tornadoes

and what are their characteristic indicators, but the local School Board may have decided, for reasons of cost, not to build tornado shelters for the children (Oxford and Schwirtz, May 13, 2013). Or, the local university may have developed an innovative method of detecting approaching tornadoes that allows minutes more in warning time, but it may not yet have been adopted by the local emergency managers as an official warning system for the community (Bandara et al., 2012). Such instances indicate that responsible efforts are made by separate actors to reduce risk, but their effectiveness within the overall system of risk reduction for the community is lessened by a lack of coordinated action and shared knowledge.

As the responsibility for collective action to reduce risk shifts to the 'whole community,' the need for clear communication and coordination among all participating partners increases. Risk management entails developing more effective means for participants to search, exchange, store, update, and transmit timely information regarding potential threats to relevant actors and, broadly, to the community. Adapting the premises in reference to scalability listed above (p. 6), it is possible to devise a preliminary template for mapping the tasks that are necessary to build collective capacity (Mackenzie, 1986) for risk reduction at the community level. Such a template could be fitted to specific communities exposed to known risks and provide the initial basis for mapping who would be responsible for which tasks that require what types of knowledge and what kind of resources in what time periods. This template, adapted from the framework of Topper and Carley (1999), can be replicated for known risks at successive levels of organizational responsibility to develop a comprehensive planning tool for communities exposed to recurring risk. A preliminary example of such a matrix is listed below, drawn from a general characterization of key actors engaged in operations in the Soma Mine Fire case (Erkan, Ertan, Yeo, and Comfort, 2015). Such a matrix could be designed in more detail and adapted to specify potential actions in reference to different types of risk: tornadoes, hurricanes, earthquakes, floods, industrial and transportation disasters.

Table 3 - Action Matrix for Managing Risk, Soma Mining Operations

Actors[1]	*Task*[2]	*Resources*	*Knowledge*	*Consequences*	*Updates*	*New Tasks*
Soma Mining Co.	Ensure safe working conditions, equipment	Capital gained from mining operations	Incentives for profit, cost of losses	Trade safety for profit, increase risk	Recognize degree of risk in Soma mine	Invest in safety, sustain mining operations
Miners	Extract coal	Labor	Awareness of risks, legal rights	Stop work if in danger	Save life, lose pay	Return to work under safe conditions
Min. Energy & Natural Resources	Inspect mines	Access to experienced mining engineers	Knowledge of mining operations	Limit inspections in time, detail	Acknowledge risk, close Soma mine	Review mining operations
Government of Turkey	Represent interests of Turkish people	Create incentives: economic growth and social development	Balance energy needs for economic growth vs. risk, safety	Loss of public trust	Review policy, acknowledge loss, compensate victims	Reconsider balance between energy needs and safety of minors

The process is iterative, and as new tasks are specified, new resources and new knowledge will also be added to the general operation of mining, in this case. The benefit of using such a matrix is to capture the iterative characteristics of a dynamic process of risk reduction and response, and to clarify the critical role of shared information among the participants that leads to a coherent strategy of action. Such a matrix, if applied as an analytical tool following actual events, for example, the Soma mine disaster, becomes a means of identifying the strengths and weaknesses in an operational system that can lead to the correction of errors and omissions that contributed to failure in the system in the disaster and to the design of informed interventions that will improve system performance in

[1] The main actors in this event were identified in confidential interviews conducted with experts and actors who were involved in rescue operations after the fire

[2] The tasks for each actor are defined in Turkish Law: *Mining Law 3213, 1985.* https://www.ilo.org/dyn/natlex/natlex4.detail?p_isn=108043&p_lang=en and *Occupational Health and Safety Law, 2012.* https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=92011

managing recurring risk. A matrix, well developed for a specific context, then becomes the basis for designing a complexity index for application to more general processes of decision making in reference to classes of hazards, such as earthquakes, tsunamis, severe winds, wildfires, or industrial dysfunctions.

Introducing measures of data collection, classification, and analysis for risk reduction likely shifts greater responsibility to educational and research institutions that have the capacity for engaging communities in risk education at different levels of learning. It becomes essential to conduct research to support informed, collective action, and to build skills in monitoring, analysing, interpreting, and updating risk for operational performance for leaders in operational agencies as well as community organizations. The 'whole community approach' requires engagement of educational infrastructure at all levels: elementary, secondary, tertiary, research institutions to build a common base of knowledge to support informed action. The process of public education involves not only formal educational institutions, but also an informed, responsible media which communicates information broadly to all sectors of the population. This task of communication is especially important in communities that have heterogeneous populations that may use different languages, hold different cultural norms in reference to disaster, and interpret standard warnings of threat differently. Multiple modes of communication are likely most effective in reaching all community groups regarding an impending threat.

Conclusion: Building a Knowledge Commons for Global Risk Management

The outcome of a systematic process of risk assessment, data collection, risk analysis, and investment in an information infrastructure to support is the cumulative construction of a 'knowledge commons' (Ostrom, 2005, Hess and Ostrom, 2007) for the collective management of risk. A knowledge commons is a shared public resource, open to all members of the community, that enables the search, exchange, storage, updating, and transmission of information in reference to community-wide goals. If the goal of a community is to reduce risk, reduce losses, and enable resilient response to hazards that occur repeatedly, then a primary investment by the community becomes the creation of a platform

for the interactive exchange of information about risk, resources, responsibilities, actions taken or not taken in reference to this risk. Such a platform, in current societies, will operate using an array of information technologies that include geographic mapping to show visually both hazards and resources, telecommunications in multiple forms that allow both instant and asynchronous relay of information, knowledge aggregation, classification, and archiving functions that manage historical as well as current records of rapidly evolving events, and the capacity for updating stored information that may have been incomplete or inaccurate. A knowledge commons provides a sociotechnical mechanism to facilitate informed, collective action that is central to managing risk at multiple scales of operation and over time.

Building a knowledge commons for a local community strengthens the relationships among interacting participants at the local level of operations in mitigating or responding to hazardous events. The larger and more complex task is extending a knowledge commons in reference to a specific hazard to different levels of jurisdictional operations, different disciplines of knowledge and skills required to address these problems, and increased numbers of actors and agencies involved in risk mitigation and response actions. Such an effort involves increasing the information flow within and among organizations that raises the level of shared understanding of risk for that community. It requires a sustained commitment to risk reduction and mitigation of hazards, coupled with the requisite investment of time and resources necessary to update current knowledge regarding risks and resources and to guide a continuing process of innovation and learning in regions exposed to risk. One can envision a global knowledge commons that constitutes a growing capacity to manage risk at regional and global scales. Building such a global knowledge commons has the benefit of engaging communities at risk in a learning process to manage their own safety. It is a long-term task, but failing to embark on such a task risks increasing and recurring losses over time that exceed the capacity of existing organizational or technical frameworks to manage.

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Chapter 5. Regulatory Failure and the Theory of Regression: The Lac-Mégantic Crude Petroleum Spill and Human Tragedy

Anaïs Valiquette L'Heureux

Introduction: The Case of the Lac-Mégantic Regulatory Failure

Every industrial catastrophe is unique. Yet each of them reveals something universal about the processes that generate risks within organizations. Understanding the set of factors that enable destructive oil spills or catastrophic train crashes is very important. What is of greater importance is to understand the dynamics by which apparently unconnected deficiencies and deficits correlate into creating the fertile grounds for catastrophe. The Lac-Mégantic train crash and oil spill in Quebec, Canada that caused the death of 47 persons and the largest land-based oil spill in North America in July 2013 reveals seriously troubling processes, quite common within public bureaucracies, that future analysis of risk governance networks should fully consider. This case study aims at describing the bureaucratic pathogens that incubated prior to the oil spill and that culminated in a catastrophic oversight failure. [1] This study relied on qualitative analysis of interview materials gathered from 30 respondents

[1] The findings presented here derive from the author's doctoral dissertation (Valiquette L'Heureux 2016).

representing private, non-profit and public organizations, including within the rail, the crisis-response and the transportation regulatory network (Valiquette L'Heureux, 2016). A grounded case study approach allowed for an in-depth assessment of the operational systems, organizational climates, heuristics and inter-organizational dynamics of the oil and gas transportation oversight network that conditioned the operational environment in which the train crash and oil spill took place.

A systemic analysis of this case emphasizes the historical context, the cognitive, cultural, structural, and political components, and the dynamic processes inhibiting learning in risk regimes. After presenting the main features of this case in the background section, this chapter provides an analysis of the case that seeks to explain how Canadian bureaucracies overseeing the risks inherent in the rail transportation of oil and petroleum products nurtured the conditions for a large-scale industrial crisis.

This analysis aims to present the Lac-Mégantic tragedy in its intrinsic systemic complexity and to incorporate power dynamics and economic dimensions obscured by previous technical analysis (Transportation Safety Board of Canada 2014). The conclusion offers an explanation for such a regression and suggests that public organizations must evolve towards a new paradigm of risk analysis that encompasses the decaying processes herein described.

Background: The Tragedy and the Failure to Learn

The immediate events of the Lac-Mégantic tragedy can be described as follows: a 1.5 km-long crude petroleum train, belonging to the Montreal, Maine and Atlantic Railroad, was left overnight near the city of Nantes (in Southeastern Quebec, Canada) on a descending grade of the main track. The crude oil shipment originated from the rapidly expanding Bakken region of North Dakota, in the United States Midwest, and was headed for the Irving Oil Refinery in Saint John, New Brunswick, on Canada's Atlantic coast, a distance of over 3000 km. On the way to Nantes, the locomotive engineer operating the train had trouble with one of its locomotives (Transportation Safety Board of Canada 2014). After checking with his traffic controller, he left the train unattended with the engine running to get some rest. A passerby saw that the locomotive had ignited.

Firefighters were called and used the emergency protocol provided by the railroader and shut down the engine.

According to the firefighters, another Montreal, Maine and Atlantic Railroad personnel member, who was not a locomotive engineer but a rail inspector, arrived on site and secured the train. After the rail inspector left, the pressure mechanism activating the independent brakes began to leak, which caused the air brakes to fail. The loss of pressure occurred at a slower pace than would have been required to activate an automatic braking system. Without any brakes, derail or holding device, the train began to roll down the 1% grade and crashed in Lac-Mégantic City, some 12 km further on, at 100kph (65 mph). Sixty-three of the seventy-two crude oil containers derailed, spilling approximately 6 million litres of crude oil (approximately 1.5 million US gallons).

In the first attempts at fire containment, the emergency response units were given outdated firefighting foam, which blocked the foam inductors on the fire engine. The fire being so large, there was no way of knowing that they were literally pouring water on burning oil. The crash caused almost immediately fatal injuries to 47 persons, either killed by the fire or the collapse of the building in which they were located (McCabe 2017). This tragedy caused a public uproar, as journalistic inquiry quickly revealed a pattern of negligence in the railway industry's oversight. To this day, this oil spill is the largest land-based oil spill that has ever occurred in North America. The petroleum was much more volatile than declared by the shippers or anticipated by emergency preparedness experts.

A class-action suit was filed by victims' family members and some of the first responders affected by the tragedy, and the Canadian federal government, which regulates inter-provincial rail transport, "was released from liability by contributing to a $460-million settlement" (Blatchford 2016). The private corporations whose petroleum was involved in the crash - including World Fuel Services Corp., Irving Oil, and others - also settled this suit out of court. A jury found Tom Harding, the mechanical engineer operating the train that crashed after he left it parked unattended on the main track, not guilty of charges that included criminal negligence causing death. All charges against Montreal, Maine and Atlantic Railroad's crew and personnel were dropped.

In the wake of the Lac-Mégantic crisis, the Canadian Transportation Agency (CTA), a federal regulatory authority, held consultations to validate the accreditation methods related to insurance coverage in case of hazardous goods spills, revealing several underlying issues. The first was the strong divergence of

opinions regarding what information was of public interest. The Canadian Railway Association opposed the divulgence of third-party liability insurance coverage (as well as their self-insured amounts) whereas the Chemical Industry Association of Canada, the Freight Management Association and the Mining Association of Canada considered the availability of this intelligence "essential" to the public interest (Canadian Transportation Agency 2015). Second, the transparency and coherence of the Department of Transport's conformity assessment practices were heavily criticized by some of the rail network's major stakeholders.[2] Representatives from the industry stated they were ignorant of how decisions about compliance were being made (Ibid). What is concerning from a civil and environmental safety standpoint is that the Canadian Transportation Agency publicly admitted that this tragedy led to the realization that several short line railroads were, in fact, operating without a "certificate of fitness", compulsory under federal regulation. This acknowledgment demonstrated that the accrediting body failed to provide basic oversight of who was fit to carry freight on Canadian railways; this makes this tragedy a "regulatory failure" (Hutter and Lloyd-Bostock 2017).

In response to political directives, the public agencies proposed a reform that focused on what irritated the Conservative Party majority federal government most: the risks were not properly "financed." Transportation minister Lisa Raitt explained: "With this legislation, any railway or any company that ships crude oil will share in accountability for clean-up and compensation costs in event of an accident," (Cheadle, 2015). As a result, third-party liability minimums were established. Pecuniary sanctions and minimal mandatory insurance levels were introduced. The regulatory changes granted the government powers to tax the railroaders for the cost of damages caused by a crude oil railway accident beyond the insurance coverage amounts, instituting the Fund for Railway Accidents Involving Designated Goods. However, the new legislation increased the complexity of implementing regulations for railroads' front-line staff by prescribing more operational requirements.

Within the rail industry's private corporations, budget cuts and chronic fatigue in the workplace were denounced, though both large and small rail businesses were allowed to operate with minimal staffing, limited internal oversight, and regularly reduced operational margins. Sanctions were appealed

[2] Also known as Transport Canada, the Department of Transport has policy and program responsibility for the rail and other transportation industries.

by railroads (Komadina 2016). Conflict of interest still exists, allowing railroads to determine their own safety thresholds, training contents and frequency, minimum staffing, maintenance, and self-surveillance levels.

The way in which risks are monitored and addressed by public institutions is still operating on the basis of *indirect* oversight, as it relies mostly on audits of railways' own compliance mechanisms and self-inspections. The government also announced that more auditors would be hired to oversee rail safety, although increasing budgets and human resources has had the effect of increasing transactional complexity in the Ministry and reducing prevention effectiveness over the years (Valiquette L'Heureux 2016).

The Lac-Mégantic tragedy was a focusing event (Birkland 2009) in the sense that it triggered rapid adoption of legislative amendments that had been awaiting Parliamentary sanction for seven years, but the changes did not target the rail operators' lack of prevention effectiveness. Weakened and limited oversight mechanisms inherited from decades of deregulation are still in place. In addition, in the wake of the crisis, reputational-assets protection logic and career-advancement competition have been deployed by public agencies (Hood et al. 2001; Roux-Dufort 2000; May, Workman, and Jones 2008). Changes enacted in the wake of the crisis have apparently not contributed to greater mindfulness within oversight agencies: cultural norms within government, the ritualized and minimal compliance from the industry remain.

Overall, this industrial crisis disrupted the transportation critical infrastructure in Canada but also caused other critical infrastructures to break down. It had a "domino effect" on other critical infrastructures – such as the downstream water systems and industrial alimentary production. The regulatory changes made in the wake of the Lac-Mégantic disaster did not address the crisis's roots, but its symptoms.

Instead of taking into account the systemic processes and issues which underlie the unfolding of this human and environmental catastrophe – institutional fragmentation, poor risk oversight, self-regulation governance model, among others – the organizations responsible for preventing this catastrophe protected existing power distribution and increased their institutional power and resources (on corporate opportunism, see Werder 2011). The conflict of interest that exists when railroads, determine their own safety thresholds, remained unaddressed. Given this oil spill is the largest land-based oil spill in North America and that the tragedy of July 13th, 2013 was the deadliest

train crash ever in Canada, how can such responsibility-deflecting behaviour and refusal to learn and grow in awareness from this crisis be explained?

Analysis: A Learning Problem

Crises are focusing events that push a wide range of stakeholders to get involved in the policy arena, pressuring authority to act on risk within the boundary of each's best interest (Birkland 2006). When major crises occur, the policy agenda shifts (Dekker, and Scholten 2017) and although crises incubate over long periods of time (Busby and Hughes 2004; Busby and Zhang 2008; Love et al 2018) they are set off by triggers, a chain of actions or behaviours that happened right beforehand (Simard and Laberge 2018; Broekema, Van Kleef Steen 2018). Crisis management literature warns against reducing crises' emergence process to simple "triggers" and pushes for the adoption of a process approach to the phenomenon (Roux-Dufort 2000). Public and private leadership often undertake symbolic action to communicate new institutional values and priorities (Hood et al. 2001).

Public leadership and resilience to crisis

Existing policy failure, agenda-setting, and crisis management literature defines some of the challenges government agencies experience and that render them incapable of properly monitoring (and correcting) unsafe practices – both internal and external – that endanger populations and the environment. The effective management of organizations that compose critical infrastructure networks such as rail systems, government networks, and risk oversight agencies has long been theorized (Morin 1976; Sagan 1993; Mitroff and Pauchant 1995). However, risk regimes' effectiveness is a tricky thing to analyze in practice. Recent theoretical developments in the field of risks and crisis management suggest that risk regimes can experience forms of *regression* following a crisis, often a result of regulatory capture (Valiquette L'Heureux and Therrien 2013; Valiquette L'Heureux, 2016; Litzky, Eddleston, and Kidder, 2006). Regression of public agencies can be defined as the inability to adopt systemic learning

strategies (Argyris and Schön 1978) and to learn thoroughly to avoid similar disasters in the future.

Some institutions' narrow focus on exogenous risks, structural and institutional fragmentation, as well as the lack of accountability, effective communication, and coordination about emerging risks (Klingebiel and De Meyer 2013) are some of the factors explaining the absence or recrudescence of vigilance among many of the stakeholders responsible for rail safety. Regression can be combatted by the mindfulness of public leaders and their commitment to overcoming the rationalization of risks. This case sheds light on the conditions that enable some organizations and some risk regimes to regress rather than to learn from crises.

Failure to recognize risk regimes' endogenous risks

Firstly, public leaders engage in crisis "framing" attempts by shifting blame away from their personal or institutional responsibility and creating a "comforting narrative" (Boin, Stern, and Sundelius 2016). If independent enough, government agencies that act as network administrative organizations (Provan and Kenis 2008), have the possibility to reconfigure the mechanisms ensuring safety and reliability. Busenberg (1999) described these safety-seeking organizations as "sentinels," but even with active sentinels striving to safeguard safety in a risk regime, unintended consequences of power configurations inevitably emerge. Indirect and unintended consequences of regulatory changes were inherited from two past Canadian rail disasters: the Mississauga train derailment and the Hinton train crash.

Up until the late 1980s, a single entity was in charge of economic, operational and safety regulation of the Canadian rail industry – the Canadian Transport Commission (CTC) – but two rail accidents triggered a reconsideration of this structure (CTA 2004). First, there was the Mississauga derailment of a Canadian Pacific Railroad freight train on November 10th, 1979 (Grange 1980). The train was transporting various dangerous commodities through Mississauga, near Toronto, which is Canada's 9th largest city, with a population of 284,000. A mechanical problem led to a lack of lubrication and overheating of a Journal Box of one of the cars, which led to a "hot box" fire that was not detected by the three men crew until the train's derailment. At a crossing around midnight, the train

cars began to uncouple and pile up. Three Boiling Liquid Expanding Vapor Explosions (BLEVE) occurred. The shockwaves "caused window breakage and some structural damage [...] within a 600-meter radius" (Burton, et al. 1981: 17). No one was injured, but this accident caused what was the largest peacetime evacuation in North America - displacing approximately 218,000 people, 6 nursing homes, and three hospitals - up until the 2005 Hurricane Katrina crisis in New Orleans (Centers for Disease Control and Prevention 2005). An independent inquiry, the Grange Commission, recommended "a speedier conversion of roller bearings, modification of tank cars to increase safety, the use of hot box detectors, and a reduction in speed and in the length of trains" (Canadian Transportation Agency 2004: 66)

After the 1979 Mississauga evacuation, all shippers were required to have a government-approved emergency response plan. Emergency response teams had to be included, and the shippers needed to make available to first responders the material required to manage high-risk hazardous material (Transportation Safety Board of Canada 2014).

The second major event to put the original Canadian Transport Commission role into question was the Hinton train accident on February 8th, 1986 (Foisy 1986). A Canadian National Railway freight train west of the city of Edmonton, Alberta failed to stop and collided with a Via Rail passenger train, killing 23 people and injuring 95. The report from an independent inquiry commission appointed by Parliament concluded that the tragedy was caused by a certain "lack of alertness" and regulation enforcement failure. The safety culture was neglected, and the regulator was severely blamed for it, including operating rules that became obsolete: "background and ritual". "Insufficient priority" was "given to safety technology" and all stakeholders involved failed at "its orderly and effective implementation throughout the system" (Ibid, p.5). A major policy review followed the Hinton train crash and modified fundamentally the rail oversight scheme. Two pieces of regulatory legislation were adopted (*National Transportation Act* in 1988 and the *Railway Safety Act* in 1989). The Canadian Transport Commission preserved only its economic regulation mandate and later became the Canadian Transportation Agency (CTA). It issues operating certificates, after a brief assessment of a railway's third-party liability insurance coverage.

These two crises triggered changes to respond to the deficits associated with the delegation of multiple missions to a single agency. Three separate entities

were put in place: Transport Canada, the government ministry, was to be the regulatory agency, the gatekeeper of rules, and enforcer of policies and the regulatory regime. The Transportation Safety Board was to take over the post-crisis inquiries, make safety recommendation and report back to Parliament, while the CTA was to oversee economic regulation.

This triumvirate was theoretically going to preserve the public from any crisis, but it created a new, unexpected problem: a "fragmentation effect" (Freudenburg 1992). More particularly, the division of responsibilities inherited from past crises fostered a lack of public accountability, reduced the possibility for effective communication about risks (Ulmer, Sellnow and Seegerl 2017; Comfort, Boin and Demchak 20102011), and paradoxically, created a "fragmentation" which allowed for a diffraction of responsibility (Freudenberg 1992). Therefore, since the regulator had been experiencing a conflict of interest when analyzing safety failures, a separate, independent Transportation Safety Board (TSB) was entrusted with analyzing incidents and audit safety protocols. It was thought that such "independence" from the regulatory enforcement mandate would place the TSB in a position to best preserve the public interest. Through the years, the TSB issued many recommendations, most of which Transport Canada (TC) followed through. Nevertheless, when it came to some of the problems stemming from the interworking of the rail-oversight agencies, such as those relating to auditing the rail companies' safety management systems, the independent watchdog, the TSB, remained incapable of compelling TC, the government ministry with both policy and regulatory oversight of the rail industry, to engage in corrective actions. The TSB made recommendations about phasing out the older model railcars (DOT-111) and about the quality of the audits made by TC. These action items were not carefully followed up, however, and in retrospect they would probably have prevented the Lac-Mégantic tragedy.

The division of responsibility (which can also be seen as silos) is the bread and butter of the public service. Formalization of mandates is necessary to provide order and accountability in public oversight systems, but this can also render public bureaucracies ineffective in preventing further industrial accidents. Next, we look at further regulatory changes that impacted the risk regime in the railroad system.

The consequence of the "New Public Management" era

Prior to the Lac-Mégantic catastrophe, the rail governance system in Canada underwent two other, quite fundamental shifts. The safety regulations were first made weaker by introducing the concept of a safety management system (SMS), which essentially meant that the regulatory agencies would no longer play a direct role in assessing a railroad's operational safety standards[3]. The risks induced by the lack of clarity pertaining to the "new approach" in regulation were well understood; the industry interpreted and acted as if the new systems implied "self-regulation".

Regarding these regulatory amendments, a private sector senior manager, and public advisory commission panel member stated: *"The government kept a certain control, a vision, a power of inquiry, and all that, but said: 'I will ask you [the industry[to present me with norms*"', but according to a public servant involved in the regulatory enforcement of rail safety, the Rail Safety Act Advisory Panel's 2001 recommendations went too far: *"If we had listened to those people, there would have been no more inspections."* The government tried to strike a compromise, and maintain inspections although relying mainly on audits. One of our interview respondents explained that: "[t]*he SMS regulation was too vague. A simple example: the regulation said 'You had to have a method to analyze risks.' When you do your audit, you ask: 'Do you have a method to analyze risk?' You show it to me. You meet regulation… You meet it! Even of it does not make any sense, we can't do anything."* Thus, the problem lay in the Railway Safety Management System Regulations, which stated that "Transport Canada (TC) reviews the information (…) but does not approve the SMS in terms of its effectiveness." (Government of Canada 2001).

[3] "The SMS Regulations under the Railway Safety Act require that a new railway operator submit its safety management system information at least 60 days before operations begin. 14 - Transport Canada reviews the information to ensure that it contains all of the required elements, but does not approve the SMS in terms of its effectiveness." Railway Safety Management System Regulations (SOR/2001-37), s. 4(2)(b). Cited in Stronger ties 2007.

> *"An 18-pages legal advice defining "implementation" was telling us we did not have the right to go into the implementation level, that Transport Canada did not have jurisdiction over this […] it has been quickly noticed, as early as 2006, when there was the Rail Safety Act review, that [TC's] safety management system had to be changed*[4]*. […]*
> *Many of the law revision panel's recommendations were only applicable by legislative amendments, and this must take its course. We are ready to do it, and then, elections are called, and it dies the [Parliamentary] Order Paper. Would it have prevented Mégantic? I don't know…*

"*It was definitely a perception amongst the inspectors that they couldn't enforce the SMS regulation,*" explained a public sector risk analysis. Risks stemming from this new public management-inspired regulatory framework were thus unaddressed, rationalized and dismissed. The shift towards an "audit culture" was a failure (Gilbert and Zalik 2019). The SMS regulation was but one of several regulations about which governmental watchdogs rang the alarm for literally jeopardizing operational, civilian and environmental safety in Canada.

The federal Commissioner for the Environment and Sustainable Development (the Environment Commissioner) stated that Transport Canada failed to elaborate or implement management practices to ensure effective oversight of rail transporters' compliance (Canada, Office of the Auditor General 2011). In a similar vein, the Auditor General of Canada, the Parliamentary auditor, concluded in a 2007 audit that risk management and performance standards for regulatory oversight were very poorly implemented.

Secondly, economic (de)regulation inhibited the government's ability to overturn economically motivated decisions such as single-operator activities. This meant that single-person operations could be implemented without approval from the regulatory agencies. According to experts and advocacy groups, single-person operations are among the root-causes of the Lac-Mégantic tragedy (Campbell 2018).

[4] Indeed, in 2007, a regulatory review (the Rail Safety Act's Advisory Panel's report) deemed this new approach a failure: *"Transport Canada, Rail Safety was not provided with sufficient human and financial resources and the appropriate skill sets at the outset of the SMS [Safety management system] program.(…) The integration of SMS into Transport Canada's regulatory oversight program for rail safety has been inconsistent. (…) New resources and skills are required for Transport Canada to accelerate the transition from inspection to audit"* (Lewis, Côté, Lacombe, and Moser 2007).

The locomotive engineer, Tom Harding, was operating the train by himself, with minimal support from his dispatcher, who directed him not to return to the train once it had caught on fire. Had Mr. Harding not operated the train alone, that July 2013 night, chances are that a sufficient number of mechanical brakes would have been engaged, and that the brake-test, mandated by regulation, would probably not have been rushed, botched, and so poorly executed. Thus, in the wake of the Lac-Mégantic tragedy, the entities to which the management of environmental disaster risk was bestowed failed to take stock of the recommendations of independent regulatory reviews, including those of the federal Commissioner for the Environment and Sustainable Development, the Auditor General and the Rail Safety Act Advisory Panel. This very incapacity to learn how to mobilize such "precursor signs" and channel these known, documented, risks into concrete actions is what I call "regression": since risks are rationalized, blame is shifted left and right, learning is avoided, and that is of concern.

Implementation deficits

Looking back at recommendations from previous reviews of railway safety, it is striking how many of the same themes were raised, such as insufficient data, an absence of thorough analysis, a lack of performance indicators and unenforced or poorly enforced regulations (Lewis, Côté and Lacombe 2007, with reference to Engels 1994 and Transport Canada 1998: 83). The indirect consequences and implementation deficits stemming from the New Public Management (NPM)-inspired *Railway Safety Act* create safety issues that trickled down to the factors that led to the Lac-Mégantic tragedy. There are endogenous risks that can be corrected if public agencies display high levels of safety commitment and a continuous effort to learn from near misses, from past crises and from the risks stemming from changes to internal and external environments.

Aside from the weakened safety regulatory oversight functions of the Canadian government, which stem from the New Public Management era, environmental laws also remained unenforced or partially enforced. There was another "early warning sign" that the regulatory regime was at risk of major "implementation deficits". In 1999, following a deadly and environmentally

devastating petroleum train derailment in St-Hilaire, a Montreal suburb, the Transportation Safety Board of Canada (2002) raised serious concerns about the absence of emergency planning documents and recommended that transporters of petroleum products make emergency response plans available to local authorities. Still, at the time of the Lac-Mégantic tragedy in 2013, there was no requirement for emergency response plans for transporters of crude oil (Transportation Safety Board of Canada 2014). Ongoing deficiencies in the implementation of the safety and environmental regulations were communicated to policymakers by governmental experts in the years and months leading up to the tragedy. Parliament was made aware of this as early as 2011, when the Environment Commissioner voiced concerns regarding the implementation of the *Transportation of Dangerous Goods Act* of 1992.

Barriers to systemic learning

The literature suggests that government agencies in charge of safeguarding the public's safety face a trifecta of risk: atrophy of vigilance (Freudenburg 1992), regulatory capture (Quirk 2017), and shifting political priorities (Dekker and Scholten 2017). To analyze regulatory failure and tragedy, a systemic approach is required (Sterman 1994). Such analysis can expose the complex dynamics a crisis entails, including the broader impacts of the oversight power's structure. In the crisis literature, factors such as the absence of crisis de-briefing, short windows of opportunity for profound changes and the inability of sentinels (safety-focused stakeholders) to set the agenda represent major pitfalls to learning from past crises (Busenberg 1999; Rosenthal and Kouzmin 1997; Jones and Baumgartner 2005). Furthermore, the analysis of crises experienced by NASA indicated that inadequate crisis analysis, wrongful inferences and resources scarcity are some of the factors that contribute to learning avoidance (Mahler and Casamayou 2009; Mason 2004; Gong, Zhang and Xia 2017). Prior to crises, frontline staff, upper and mid-level managers and government analysts are often strongly aware of some of the risks posed by social, environmental and economic context shifts or by the introduction of new technologies. Nevertheless, they are faced with challenges making it almost impossible for them to respond appropriately to the known, growing or emerging risks. In the Lac-Mégantic case, these signals were ignored throughout the risk management process. Inadequate resources for risk

assessments, lack of power to impose behavioural changes on other organizations, drifts and failures in policy enforcement and a lack of opportunity and political appetite for policy reforms were amongst these insurmountable challenges (Hutter and Lloyd-Bostock 2017). An analysis of the State of Florida's hurricane preparedness revealed that information availability, reliability and validity was a factor that conditioned public agencies' complacency in the face of repeated threats and warnings (Wang and Kapucu 2008). Next, I discuss the need to revisit some commonly accepted assumptions about the management of disaster risks, as possibly one of the main ways to avoid post-disaster "regression".

Debunking the myth: Safety vs economic benefits

Like Montreal, Maine and Atlantic Railroad's board members, private investors see governmental subsidies as a way to generate return on investment, but the government has yet to realize that incentivizing assets rehabilitation has unintended consequences. Government economic regulation focuses on the stability of economic growth regardless of the effects that economic regulation and governmental subsidies programs for rail maintenance have on the civilian's safety and environmental safety (Beck 2018).

In parallel to this, the government's reluctance to sue the railroads meant that there was no "gradation" in the corrective efforts; systematic deviance from federal norms did not trigger firmer regulatory response. To add to these safety-atrophying processes, self-declared incidents, as well as a failed 2001 regulatory reform, enabled railroads to claim that *they alone* could determine their own safety thresholds. This situation overall represents signs of governmental capture that remained unaddressed, despite the advent of this oil spill triggering a humanitarian catastrophe and preventable environmental devastation. Capture is hard to detect, but has high consequences on the risk level for regulatory failures. Analyzing the views of the bureaucrats was enlightening in this case study: the public agencies high-level executives' views about regulations being burdensome was much closer to the private sector's than the views expressed by the front-line staff. These prominent high-level executives' dominant views tended to shift the responsibility for economic profitability of railroads to politicians that used the citizen's taxes to ensure such profitability,

while "venting out" negative externalities to civil safety agencies, from firefighters to society as a whole.

The priority of higher-level executives in the chain of command was a focus on personal and organizational liability (Withers, Corley, Hillman, 2012), not on the careful mindfulness displayed by highly performing learning networks (Ulmer, Sellnow and Seeger 2017; Boin, Comfort and Demchak 2010).

A closed-system approach and how it contributes to risks rationalization

North American rail systems are characterized by old and geographically dispersed technology (Elms 2001) and do not face the same external demands as those evolving in a high-velocity environment (Roberts 1993; Volberda, Van der Weerdt, Verwaal, Stienstra, and Verdu 2012). The fact that rail systems *seem predictable* contributed to the "atrophy" of adaptation capacity and to the preservation of ways to interact, despite calls for (and claims of) change. In other words, dialogue, whistleblowing and questioning management's or coworkers' attitudes and practices are not instilled in the culture of the Canadian railway.

The factors that inhibit post-crisis learning, as well as the levers and barriers to systemic learning, are numerous. On the one hand, many factors contribute to the sustaining of vigilance over time (Broekema, Van Kleef, and Steen 2018; Bundy, Pfarrer Short and Coombs 2018). Those processes or characteristics include: the presence of "sentinels," i.e., prevention-focused groups or entities (Busenberg 1999); safeguards against conflict of interest (Perrow 2011a); the fostering of a "common operating picture" (Comfort et al. 2010; Weick 1993a); transparency and communication of risk data (Chatfield and Reddick 2017); as well as coordination and integration of the various stakeholders in the risk regime (Koppenjan and Klijn. 2015; Renn 2017). On the other hand, bureaucratic protection logics, responsibility fragmentation, and fragmented communication and informational structures are found to be recurring phenomena inhibiting the effectiveness of risk governance networks (Kalbassi and Kauf 2017; Williams, Gruber, Sutcliffe, Shepherd and Zhao 2018).

How to avoid incubating a crisis

Some of the pre-crisis structural conditions and dynamics at play in the Canadian railroad and oil and gas transportation-related risk governance regime will inform us of specific learning pitfalls that could be avoided by risks regimes moving forward. This tragedy is not the only case where stagnation of vigilance has been witnessed following a disaster. The analysis of the BP's Deepwater Horizon oil spill in 2010 and of precursor signs (the explosion in a refinery in Texas City prior to the oil spill) revealed that many factors inhibited organizations from learning from the crisis and revising their approach to risk management (Freudenburg and Gramling 2012; Tabibzadeh 2014; Tabibzadeh and Meshkati 2014; Lustgarten 2012).

These factors mostly had to do with the regime's macro-structure, the fiscal environment and financial and regulatory infrastructures of the oil and gas industry. Questionable ethics fueled by market pressures, as well as the sheer level of profits deriving from cost saving and corner-cutting, have allowed the oil company executives to keep disregarding employee and environmental safety; thus, they choose to pay the fines rather than correct their business practices (Ibid; Freudenburg and Gramling 2012). This leads us to a discussion about the links between politics and industrial risks in the oil and gas industry.

Politics and patronage

Politicization can also represent a pitfall to learning (Dekker and Hansén 2004). By incentivizing investments in repairs in such a way, the government did not anticipate that companies were actually pressured towards choosing a return on investment over the surveillance and risk-mitigations functions for which the railroads were now responsible. Ultimately, the government's economic intervention, while it benefited construction firms, railroads and politicians, greatly undermined operational vigilance and civil safety.

In this case, learning was inhibited for political reasons. Political agendas may conflict with the imperative to learn. In addition to these regime-induced monitoring deficits, inaccuracy in the labelling of the shipment's content led authorities to believe that the crude oil had less volatile properties it did not possess. At a higher level of the network's public management, the risk of crude

oil derailment was considered low in comparison to potential impacts of other hazardous materials (such as chlorine or propane gas), since the crude oil was considered very hard to ignite. In other words, the possibility of a crash causing fatalities was not foreseen because it was almost inconceivable to senior decision-makers in the public sector agencies. In their view, and according to the information they possessed, the crash of a crude petroleum convoy could *at worst* cause environmental damage. Faulty labelling was nonetheless just one of the many deficits that contributed to the miscalculation and misinterpretation of the potential impact of a mile-long Bakken Formation crude oil convoy's derailment.

The government agencies the public entrusted with its safety never counterchecked the level of danger that the material being shipped by rail truly represented. For the government to exclusively rely on the information given by shippers at all points in the industrial oversight process raises issues of personal perceptions of accountability (Cornelissen 2012) and of the cultural requirements for proactive risk-mitigating organizational behaviour (i.e., for a "commitment to resilience" and "safety culture" – see, for example, Weick and Sutcliffe 2011).

The risks induced by fragmentation *within* bureaucracies

Overall, the various offices, bureaus and directorates within Transport Canada that interacted with Montreal, Maine and Atlantic Railroad did not truly coordinate either to gather or to share information about safety risks. Transport Canada's Québec Bureau's Exploitation Unit was aware of numerous infringements of the Canadian railway operating rules by Montreal, Maine and Atlantic Railroad's personnel, many concerning rolling stock left unattended without proper securement, that is, not in compliance with Rule 112 mandating a proper "brake test" – (Transportation Safety Board of Canada 2014, 86). The Bureau advised Montreal, Maine and Atlantic Railroad that the measures taken to rectify some of the deficiencies identified were "insufficient" but took no further initiatives to enforce the train securement rule. This railroader's Sherbrooke Division was placed as the 13th highest-risk company out of 55 on the list of Transport Canada's Québec Region Office Engineering Functional Unit (Ibid, p. 88), meaning greater scrutiny levels from the regulator were planned.

The Equipment Functional Unit ranked Farnham and Sherbrooke Yards, belonging to this rail company, second highest with regards to the risks they

presented in 2012-2013. These risk rankings and other regulation implementation and enforcement information were not available to the Rail Security Directorate in Ottawa, which relied on Transportation Safety Board's self-reported incident compilation. This directorate was nevertheless in charge of planning inspections. Therefore, it was made aware by the Policy Directorate three months prior to the North Dakota crude oil convoy crash in Lac-Mégantic that the crude oil volumes had started to rise drastically, but the "new risks" generated by these heightened volumes of crude oil were not yet integrated into Regional Office inspection planning.

In fact, the Canadian regulator was aware that crude oil shipments had risen by 28,000% (Brewster and Shingler 2013) between 2009 and 2013, given the discovery of fracking technology and the economic boom associated with its use to extract crude oil from the Bakken geological Formation, but inspection planning – which relies on advanced methods of risk analysis – is made more than a year ahead.

Comparison with the United States rail safety regime

Historically, when it comes to regulating railroads, Canada aims at harmonizing with the United States environmental and economic regulation; in the name of economic integration, it also operates outside of the precautionary principle, which is the European model. When a new technology arises, the negative environmental repercussions must be proven before that new technology can be banned (Hammit, Rogers, Sand and Wiener 2013). Canada's economy is so heavily dependent upon the U.S. economy that the Canadian railway regime's marching order is to try to maintain Canadian firms' economic advantages and avoid regulatory restrictions that would disadvantage investments. Oil and petroleum regulatory "self-regulation", which is generally viewed as economically beneficial among politicians and industrial stakeholders, was thus favoured. Proximity to the U.S. border – the derailed train was on its way to crossing the border – is cited as a pretext for a lax regulatory regime, whereas in reality, the U.S. rail inspectors were given pecuniary sanction powers long before the Lac-Mégantic tragedy. Moreover, there was in the U.S. much more precise and regularly updated data about the compliance rates, something

fairly recent in the Canadian regime and which was only introduced in the aftermath of the Lac-Mégantic disaster.

Finally, the presence of the international border in the route taken by the train that derailed exacerbated the risks of a derailment. Indeed, the multiple regulatory requirements created double binds for the operator, given the complexity and the over-lapping regulatory systems. According to the Transportation Safety Board of Canada (2014), the Office of Safety Analysis of the U.S. Federal Railroad Administration (2015) had shared with the Canadian regulator that the company that operated the convoy that derailed and burned had an annual accident rate ranging from 5 to 10 times higher than the average railroad.

Increasing the adaptability of governmental structures

There was – and still is – no possibility for quick readjustment of the government's national inspection plan, which sets the calendar and the objective for part of the regional offices' inspection programs (Transportation Safety Board of Canada 2014, 84). Front-line staff, located in the regional offices, are not consulted when Transport Canada's Central Office establishes annual inspection targets. There are no signs indicating that the communication between directorates has improved, nor that the Central Office can rely on more accurate information.

The rail safety directorate, the unit responsible for analyzing the risks, was located in Ottawa and had no access to the data generated by the compliance officers on the field (within the regional bureaus). As stated earlier, the known lack of standards within Transport Canada pertaining to implementation of operating rules and the *Railway Safety Act* regulations made it almost impossible for Transport Canada's Central Office to have an accurate view of compliance rates, since compliance practices greatly varied across Regional Offices. This raises another factor that played a role in the crisis: the ambiguity of Transport Canada's inspectors' mandate. These frontline bureaucrats were asked to educate railroads, as well as monitor and enforce the laws, in order to promote safety and regulation objectives. Past amendments to regulations also tended to entrust the private sector with its own oversight, norms and risk management, which questioned the legitimacy of public oversight practices in the eyes of private

sector employees. This legitimacy crisis triggered behaviours of "minimal compliance" such as the ones described earlier.

Moreover, Montreal, Maine and Atlantic Railroad's rail tracks were in very poor condition, which put the regulator at ease in a way: they had "slow orders" (could not go over 25kh in most sections). These directives to travel at *very low speed* reduced the probability of a crash in the regulator's "sophisticated" and "accurate" risk analysis scheme. Not only were the perception and cognitive functions of the overseers greatly hindered by the lack of data but the readjustment potential and decision-making mechanisms were stifled by a complacent and risk-rationalizing culture and institutional fragmentation. Effective communication and coordination structures were not in place.

How can governments adapt to foster systemic learning to avoid the occurrence of predictable environmental and human catastrophes? The analysis of the Lac-Mégantic tragedy offers insights into the type of learning that has failed to occur, and into the processes required to overcome barriers to systemic post-crisis learning.

Harmonizing the conflicting imperatives between safety and profitability

In retrospect, industrial crises often result from dynamic processes and conflicting pressures for profitability and safety, and safeguards not only fail to prevent an accident from occurring but can also contribute to regulatory failure (Hutter and Lloyd-Bostock 2017).

Resilience, in the field of public administration, evokes the capacity of government agencies to effectively govern risk and increase levels of awareness and preparedness in communities (Valiquette L'Heureux 2016; Valiquette L'Heureux and Therrien 2013; Longstaff 2005). Risks-mitigation policies and economic intervention are perceived as two separate aspects of governmental regulations, whereas in reality, they are embedded in complex non-linear networks composed of rational actors that will maximize their influence and their resources to get maximum benefits. This points to the follow-on question of how can the unintended consequences of economic regulations be foreseen and avoided? Further research should consider specifically the question of political and administrative accountability, state capture and the point at which "sloppy

management" (Freudenburg 1992) becomes negligence. If a bureaucracy is deaf to emerging risks, known problems, and to proposed risk-reducing solutions (Klingebiel and De Meyer 2013), then is it only failing to honour its mandate, or is it also responsible for the consequences induced by this type of complacency and stagnation? The next section explores the roles of power asymmetries and corporate influence on a State's ability to fulfill its disaster-prevention duties.

State capture and ethical deficits

Government agencies overseeing oil and gas and the rail sectors in Canada may very well be described as being in a state of "governmental capture". In fact, program managers and executive staff at Transport Canada, the Canadian Transportation Agency, and the Transportation Safety Board (as well as the politicians that oversaw their respective operations) knew very well that the railroads simply experienced a passing, no-consequence reprimand when caught non-complying with safety standards. This type of information knowledge about risk needs to be mobilized (Busby 2006), that is, it must be fanned into decision-making, otherwise, the government demonstrates negligence. The public managers and political leaders were simply not held accountable for such vigilance drift.

Major regulatory failures, such as the Lac-Mégantic tragedy, raise questions about the extent to which government bodies can learn from past crises to implement practices that lead to more effective safety regimes (Mojtahedi and Oo 2017; Renn 2017; Hutter and Lloyd-Bostock 2017).

"Heedful interrelation" or the art of mobilizing knowledge

It is interesting to note that independent government agencies had observed and identified within themselves the implementation deficits or barriers and requested more enforcement powers to the political arena. It is also important to note that it is the endogenous factor – cultural elements – that precluded the government from utilizing some of the means that were at its disposition to rein in the industry. To understand these issues, cognitive, institutional and structural aspects must be considered.

Sensemaking (Weick 1993a; Cornelissen 2012) is a collective process, involving "heedful interrelating" - a group's ability to search for a shared real-time understanding of a constantly evolving situation (Weick 1993b). Such interrelating required the recognition of each individual's part in a wider system of interdependent interactive processes (Eisenhardt 1993: 132). Scaling up this important principle, government institutions could also play their part in a risk-governance regime's overall vigilance and positively contribute to the prevention effectiveness of the network formed by each of these organizations.

The reactiveness of government action

The Lac-Mégantic tragedy and its domino-like effects on industries and water systems triggered fast adoption of legislative amendments that had been awaiting Parliamentary sanction for years, a readily accessible (mostly symbolic) solution to problems officially documented and identified more than 7 years beforehand. The crisis nevertheless uncovered new problems and deficits deeply rooted in the risk regime. Thus, this *reactive* reform represents an attempt to protect reputational assets of the government representatives (Hood 2002).

Scapegoats, blame and government ethics

Every crisis undergoes a "framing" phase in which core stakeholders try to produce sense and protect their reputational assets (Boin, t'Hart and McConnell 2009). One of the key factors in this tragedy was the role of the executive branch of government. Canadian politicians were quick to lay the blame onto their bureaucrats (Cheadle 2013) and the private sector's malpractices (Currie- Mueller 2016). "The company did not follow the rules," said Transport Minister Raitt at a press conference in the aftermath of the crisis (The Globe and Mail 2013). The company, MMA, blamed its employees and claimed it complied with federal regulations (Paquette 2015). The MMA's employee's union blamed railroader's ownership and management. Local politicians blamed federal politicians (Agence QMI 2013). Possibly as a result of political sensitivity and bureaucratic protection logics, government agencies such as Canadian Transportation Agency and Transport Canada, as well as private sector organization such as the Canadian Railway association, the Canadian National (CN) and Canadian Pacific

(CP) Railways, started pointing fingers (Canadian Transportation Agency, 2015). Official reports overshadowed many ethical components involved in fomenting this crisis (Hood et al. 2001; Jones and Baumgartner 2005).

Further research should consider the ways by which capture and negligence concretely manifest. Further research should also consider how current managerial approaches taught in business and engineering schools emphasize control and cost efficiency over ethics and foster maladaptation to the emerging risk and complexity embedded within complex nonlinear systems such as critical infrastructure networks.

The predictors or risks factors of regression, such as conflict of interest, a corporate-focused policy agenda, an emphasis on cost and liability, public expertise decay and front-line bureaucrat's disempowerment, find echo in the literature on ethical blindness and regulatory capture. Effective knowledge-seeking initiatives, management system's ethical integrity and accountability could in turn, represent key safeguards against disasters.

Moreover, factors that impede innovation and change, such as rationalizing and deflecting signs of incorrect risk assessment, and maladaptation are the same factors that create barriers to a proactive risk management design, safety culture and resilience. Thus, the fields of ethical management and risk management are intertwined. Scholars should propose novel assessment methodologies for describing and comparing public sector agencies' learning potential. This learning potential must be assessed and steered in order to foster several positive organizational and network-level outcomes, such as disaster-prevention effectiveness.

The rationalization of risks as ethical mishap

Crises can no longer be considered alignments of the stars or acts of God. Endangering processes have long been documented. Policy makers can no longer ignore the ineluctable and indirect consequences of self-regulation and bureaucratic fragmentation. Engineers and statisticians alike can no longer ignore the pitfalls of traditional risk analysis that any safety-analysis device is predestined to experience.

Economic regulation focuses only on the positive economic results from public investments and fail to see the power dynamics and ethical dimensions

involved in maintaining current policies in place. The government subsidizes firms that become dependent upon these subsidies to function. In turn, the subsidies have an unexpected concrete effect and incentivize the re-routing of budgets towards physical infrastructure, at the expense of social-prevention based systems (training, surveillance and staffing). Thus major government subsidies were announced in the short-line railway network, without considering the negative, indirect consequences that governmental subsidies programs would have on the civilians' safety and environmental safety. Since critical infrastructures are socio-technical systems, economic policy analysts have to assess the systemic, non-linear impacts they have on other dimensions. "System's thinking" should start to be embedded into policy designs to gradually replace the silo, closed-system paradigm. As Perrow eloquently proposed, risks grow with the concentration of resources, populations and political and financial powers (2011b). Systemic complexity requires sophisticated analytical models (Morin 1976). There are emerging challenges to prevention in many critical infrastructures systems, including the oil and gas industries. For example, the rise of the oceans' acidity levels, changing weather patterns, and rising ocean temperature degrade pipelines and drilling equipment and are likely to affect coastal resilience (Valiquette L'Heureux and Maas no date). The risks and costs associated with the replacement of this ageing infrastructure represent challenges to security thresholds. Probabilistic modeling will not be able to incorporate the volatility of political contexts and other factors that may heavily affect investments in resilience and prevention.

Risk rationalization starts with delegating to a so-called objective measurement device, the assessment of our overall safety. Deflection of responsibility occurs when governments choose self-regulation of risks by regulated industries as a way to escape or minimize liability in the advent of a catastrophe. The Canadian government's positioning reduces its responsibility to the establishment of minimal insurance levels and to holding back from intervening in overseeing the preventive measures that would increase environmental and civilians' safety (Beck 2018). Safety thresholds are essentially determined by the industry, with minimal governmental intervention and with the absence of public deliberations about the ways by which risks are assessed and mitigated. Narrow definition of risk factors is common but leads to an underestimation of the need for adaptive efficiency (Volberda et al. 2012) in fostering preventive capacity.

Sophisticated risk analysis leads to the rationalizing of risks, which in turn can foster systematic overlooking of weak signs of a potential catastrophe. These paradoxes are still poorly understood within the scientific community (Amalberti 2013; Laporte, Therrien and Lagadec 2013, Freudenburg et Gramling 2011). It is thus this chapter's contribution to point out that a traditional, bureaucratic response to crisis inhibits self-criticism and diminishes the possibility for further reflexivity.

Moreover, natural disasters may be infrequent but they create compound effects that in a crisis migrate towards built infrastructure, such as the oil and gas supply chain. These "domino effects" (Kadri, Birregah and Châtelet, 2014; de Bruijne and Van Eeten 2007) can be mitigated if the coordination potential of the network managing critical infrastructures is at its best (Valiquette L'Heureux and Therrien 2013). It is therefore important to understand and make sense of previous crises in order to avoid the reoccurrence of these types of regulatory implementation failures, especially oversight fiascos that result in avoidable loss of lives (Freudenburg 1992).

When considering all of the sources and deficits involved in fomenting this crisis and making it possible for this catastrophe to occur, what is striking is that the Canadian regulatory framework's scientific-based approach narrows the risk evaluation and management and thus evacuates their ethical, environmental, and social dimensions (Létourneau 2016; Renn 2017; Klein 2017). Post-crisis learning (Argyris and Schon 1978; Deschamps et al 1997; Beck 2018) is impeded by a bureaucratically-oriented, financial liability-focused governance regime. Maintaining institutional fragmentation after a crisis leads to further public distrust. There are ways bureaucracies can nurture innovativeness from public servants as well as proactivity, problem solving, and commitment to ethics and safety. But in order to move towards these ideals of resilience-enhancing governance, some of the bureaucratic processes – especially, the formalizing (adding of formal rules and procedures) reflexes – must be curbed, if not deterred.

Crises were thought by organizational theorists to trigger paradigmatic learning (Deschamps et al 1997; Argyris and Schon 1978), but it turns out that major crises are traumatic events that can also foster regression, a counter-intuitive learning incapacity within deeply entrenched and risk-rationalizing governance regimes.

Mobilization, inertia and the moral imperative to proactive risk analysis

Industrial crises are always preceded by a long trail of weak signals (Mitroff and Anagnos 2001). Risks analyses are not merely technical; underlying them are expectations and ethical stances, aligned with the managerial paradigm of a closed system (Katz and Kahn 1969). The models traditionally used to tackle the risks were not adapted to encompass incoming changes such as the boom in petroleum exploitation, which raised the probability of rail explosions in Canada.

The risk governance regime and its programs and systems move slowly, whereas risks are highly interactive and will enter the system through unanticipated windows. Our understanding of risks must include the power structure and morality of risk regimes this power distribution reflects. It must also consider the consequences of a slow-moving bureaucracy and the various processes that lead to sclerosis and incapacity to readjust following the detection of problems. In light of our previous findings, organizational and analytical awareness and adaptability are not simply structural characteristics (Volberda et al. 2012), they are now becoming moral imperatives.

Conclusion

In summary, bureaucracies need to adopt an "open system" paradigm and develop the ability to learn from crisis. Learning to adapt is key to facing the evolutionary character of risk factors in a dynamic global environment. Governments can learn to foster institutional cultures and environments capable of adjusting prevention methods and address new risks, such as those triggered by the exponential increase in crude oil volumes transported by rail through Canada between 2009 and 2013. One other key lesson of this analysis relates to the dangers of underestimation of risks. Bureaucratic processes that preside over such risk-rationalization are the same as those that hinder systemic learning and permit regression. These "non-exogenous" risks should be proactively detected and corrected.

Since the petroleum cars travelling on the Canadian railways were wrongly labelled and the dangers of the new increase in rail transport of crude oil were underestimated, there was no sense of urgency for revising the regulatory

bureaucracy's practices or planning documents. This risk-rationalizing organizational behaviour that justifies or evacuates the impact of a given organization's outputs are labelled "vicious circles" in the crisis literature (Mitroff, Pauchant, and Shrivastava 1988; Pauchant and Mitroff 1995). Crises trigger competing legitimacy claims and the strategies by which a governance regime can proceed with the rejection of premises and values upheld by external stakeholders following a crisis (Lamin, and Zaheer 2012). Regulatory failures such as the Lac-Mégantic crisis are linked to the inability of bureaucracies to adopt proactive risk analysis, reflexive and a continuous-improvement focus and attitude.

Crises are complex, systemically-induced processes. Crises occur in specific cultural and organizational contexts, and blaming them solely on human error is spurious (Mason 2004; Perrow 2011a; Dekker 2017). Although each crisis is unique, current research outlines precisely how precursor signs (called weak signals) of crisis regularly go undetected or are systematically silenced within public bureaucracies and across industrial risk networks (Valiquette L'Heureux and Werthe no date). Pitfalls of learning from crises that the Canadian risk governance regime experienced or demonstrated both before and after this regulatory failure (Hutter and Lloyd-Bostock 2017) and tragedy are not exclusive to the Canadian context. Other regimes can also experience similar pathogens and incubation processes (Valiquette L'Heureux 2016). This original case study has detailed the unsettling but predicable failure of institutional controls in a context of systemic complexity denial. In other words, if reflexivity and self-criticism are inoperative, and the systemic complexity denied, there are few ways in which environmental safety can be improved incrementally. Moreover, in such a context, demands for radical changes will lead to positive feedback loops (negative entropy) instead of systemic learning (Deschamps et al. 1997).

A puzzling fact in the analysis of the Lac-Mégantic tragedy presented in these pages is the bureaucratic efforts deployed by leaders in the public sector to distort and frame the issue at hand, both internally and externally (Boin, Stern and Sundelius 2016) and avoid learning from past mistakes. Unlike the type of resistance theorized by Courpasson, Dany and Clegg (2012), this *regressive resistance* is a form of risk-rationalization. Closed-system thought processes that were deployed to reduce the perception of risks were again used to rationalize the crisis itself. How can a system that generates such oversight failure be so blatantly, almost willingly, ignorant of its own shortfalls, inabilities, behaviours

and consequences? Audits and investigation reports appear to act more as ways to communicate power and protect strategic positioning within the bureaucratic ecosystem than acting as triggers of change, transparency, and enhanced collaboration (Mojtahedi and Oo 2017). The theory of regression therefore complements the atrophy of vigilance theory (Freudenberg 1992; Freudenberg and Gramling 1992) in describing that bureaucratic protection logics can trigger symbolic reactions to scandals, which cause safety regimes to regress rather than to learn from crises.

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Chapter 6. Exploring Possible Catastrophic Disasters and Building Korean Disaster Response Systems[1]

Joon-Young Hur

Introduction

Super disasters such as 2005 Hurricane Katrina and the 2011 Japanese Tsunami have given us an expensive lesson. Even developed countries, in spite of their advanced disaster management systems, can be seriously affected: a huge number of casualties, a wide-ranging breakdown of industry and a severe disruption of national security. Considering how complicatedly interconnected the social and technological networks of modern countries are, one can easily imagine how serious the damage would be to such countries. Thus, how to forecast and properly prepare for such large-scale disasters has become one of the top priorities, not only in those countries where such catastrophes used to occur, but also in developed countries in general.

Given its wide array of impacts, this study seeks to answer the concerns above mentioned. It is accompanied by the following questions: What kind of catastrophic disasters can occur in Korea in the near future? What would the worst scenarios look like in terms of the development of disasters and their

[1] This chapter partially derives from the author's research (KIPA 2012-17) supported by the Korea Institute of Public Administration.

impacts on ordinary life? How can we establish disaster management systems in Korea which can successfully cope with so-called "Megadisasters" (Diacu, 2009)?

To find the answers to these questions, this study adopts the methods of future research and proceeds in the following steps. First, using the environmental scanning method, the changes in the environment can be figured out as well as social conditions and the trend of future disasters. Second, Delphi surveys with experts are deployed: The first Delphi survey undertakes to define catastrophic disasters (natural/human/social), to identify disaster cases that can occur in Korea in the near future, and to gather opinions on how to improve the response. In the second Delphi survey, priorities are set within the disaster list derived from the first Delphi survey. Finally, the chapter examines whether the current Korean system of catastrophic disaster response can be improved with respect to disaster-related laws and institutions, governance structure, practical manuals and disaster education.

Theoretical Background: Forecasting Future Catastrophic Disasters

Catastrophic disaster is not a common term in classical disaster management. However due to the changing disaster environment, in many ways the term captures the meaning of a growing area of concern. In this chapter, catastrophic disasters in various changing disaster environments are addressed, and the framework of this study is outlined after introducing methods for forecasting future disasters.

Catastrophic disasters in changing disaster environments

Definition and properties of catastrophic disaster

In the linguistic approach, the term "catastrophic disaster" could be defined as a rare event, a so-called "super disaster," that has a greater impact than an "ordinary" one on a region(s) or state(s). It is also defined as an event with huge damages which have never happened before. Although the damage will have

huge impacts on a state's economic, social, and political situations, its intensity will be different depending on the response capability of the state or states that are affected.

The United States Federal Emergency Management Agency (FEMA) uses the term "Catastrophic Incident" for severe disasters. FEMA refers to a catastrophic incident as:

> *"…any natural or manmade incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions" (USA FEMA 2008a: 42).*

In the FEMA categorization, catastrophic incident belongs to the 3rd level among the four levels of situations – 1) level of emergency, 2) level of disaster, 3) level of catastrophe, and 4) level of extinction. The Korea National Emergency Management Agency has adopted the same four levels of emergency situations.

As described by FEMA,

> *"… a catastrophic incident could result in sustained nationwide impacts over a prolonged period of time; almost immediately exceeds resources normally available to State, tribal, local, and private-sector authorities in the impacted area; and significantly interrupts governmental operations and emergency services to such an extent that national security could be threatened" (USA FEMA 2008b: CAT-1).*

Challenge of changing disaster environments

Recently, the impact of disasters is much greater than in the past. What is the reason for that? This study discusses five changing environments that cause catastrophic disasters – i) changing natural environment, ii) changing social environment, iii) changing technical environment, iv) changing politics-administration environment, and v) changing international environment (IPCC 2007).

Changing natural environment

Industrialization is considered as the factor that causes the most negative impacts on the natural environment. Of all the resulting damage to the natural environment, global warming is the most pressing issue. Many people believe that global warming, for example, causes severe weather conditions, which have not occurred before. The United Nations' Intergovernmental Panel on Climate Change (IPCC) has advised that global warming may cause rising sea levels and incidence of heavy rain, hurricanes, typhoons, drought, and so on (IPCC 2007). Korea also cannot avoid damage from such severe weather situations. In Korea, natural disasters such as localized heavy rain, huge typhoons, and heavy winter storms are occurring more frequently, and the damage is increasing.

Changing social environment

Consideration of population growth and centralization provides a critical basis for studying the changing social environment from a catastrophic disaster perspective. Population centralization pushes cities to construct more skyscrapers and mass transportation systems, resulting in more population overcrowding. Hence, when catastrophic disaster hits the metropolitan areas, the damages will be much greater than in rural areas in terms of casualties and property. For example, when SARS (Severe Acute Respiratory Syndrome) or Aviation Flu occurred, the spreading rate of disease was much higher and casualties were significantly heavier in cities than in rural areas.

In addition, population growth increases food consumption that causes mass food production. In that case, the methods of producing mass food can cause more damage. For example, high stocking density for breeding cattle can increase vulnerability to infection for livestock. When foot-and-mouth disease hit an area of cattle breeding, the damages were much greater than before.

Changing technological environment

Although advanced technology increases the quality of human life, it can also turn out to be a cause of severe disaster. Human beings tend to have a more technologically dependent life. For example, nuclear power plants are relying more on computerized automation systems for their operation. In other words, fewer human being are involved in operating nuclear power plants. If a nuclear

power plant's automation systems malfunction, catastrophic disasters such as Japan's Fukushima nuclear power plant accident (2011) can happen. Therefore, advanced technology can also be a potential factor in causing catastrophic disaster.

Politics-administration environment

When the Hebei Spirit Oil spill occurred near coastal wetlands in Korea in 2007, many volunteers took part in recovery activities. Although many people voluntarily participated, the unskilled government coordination reaction delayed recovery activities. In cases like this, the government-centred disaster management system can generate more problems in catastrophic disaster situations. Korea is no exception, especially where the government provides the only "emergency management" service. Therefore, emphasizing government's effectiveness becomes a major concern for public management. The government should consider having emergency management services where the private sector can also be involved.

Changing global environment

Catastrophic disaster is not just a domestic matter but more than that. For example, in 2011, when a tsunami broke down a Japanese nuclear power plant, the resulting disaster showed up as a global problem. Catastrophic disaster influences the state itself and the surrounding states, hence cooperation with them is inevitable in order to overcome disaster and solve problems.

Methods for Forecasting Future Disasters

Characteristics of Future Catastrophic Disasters

Due to the rapid social change in modern society, the possibility of forecasting disasters is restricted, and uncertainty is increased (Sherma et al., 2012). This uncertainty is critical to constructing the meaning of disasters, in that they are influenced by risk, including uncertain damage size and frequency. Thus, in order to cope effectively with unexpected disasters, a new disaster research

method for forecasting future disasters is required. Traditional disaster forecasting mainly focuses on routine, seasonal, and regular patterns of disasters: for example, in Korea, mountain fires in the spring, and hurricanes and heat waves in summer. These disasters are not highlighted here because they are expected, and governments prepare for them every year. The main concern of this paper is with irregular, non-routine and random disasters, which are increasing according to the changing disaster environment (Gad-el-Hak, 2008) and could wreak havoc on the whole country.

Considerations for selecting a forecasting method

The Future Disaster Forecasting Method forecasts types of future disasters as well as damages and losses resulted from particular disasters. Therefore, it focuses on negative aspects such as "black swans[2]" in how disasters are perceived. Thus, it differs from normal "neutral" forecasting methods including both negative and positive aspects. However, the future disaster forecasting method could make good use of general futures forecasting in that both approaches target uncertain future events. Classical methods for future forecasting are as follows: Delphi, Environmental Scanning, Expert Interview, Expert Panel, Foresight, Future Search Conference, Mind mapping, Network Analysis, Scenarios, Simulations, Strategic Foresight, Structural Analysis, System-Dynamics Model, and Text-mining.

Among them, Environmental Scanning stresses discerning emerging issues and trends in the environment. The purpose of this method is to provide basic knowledge for establishing future strategies. This has the characteristic of an initial step for preparing main future research activity because it highlights understanding opportunities and risks in the changing environment that a company confronts. Nowadays not only private companies but also government, universities, and NGOs use this method for collecting information about the

[2] I.e., major unexpected events that catch those affected by surprise, with the result that they may not respond appropriately (Taleb 2007).

external environment[3]. Information collecting for environmental scanning includes text mining[4], discussions, meetings, expert interviews, surveys etc.

An expert panel is the method which forms an expert pool from various fields and builds strategies dealing with the future of targeted themes through discussions. Although it has an advantage that bias can be excluded from the mutual discussion among various experts, but its disadvantage is that powerful members of the panel can decide panel results. Therefore, in establishing the structure of an expert panel balancing the power and harmony of members is crucial and the role of moderator is very important.

Delphi Analysis is one of the best-known future forecasting methods and has been used by private companies as well as think tanks, governments, educational institutions and researchers (Keeney et al. 2011). Nowadays it is applied in searching for policy alternatives and in strategic decision making across a wide range of disciplines (Edwards 2002; Sowell 2000; Palmer and Batchelor 2006). This method aims at collecting and structuring future knowledge from groups of experts, drawing on their professional experience and knowledge. On the basis of this information, it explores future issues. Its strength is in the interaction between experts through a multi-round process in which each opinion is gathered and shared. In doing so, collective opinions are identified and the result can be expected to be more objective. In addition, Delphi is not a simple questionnaire but a mutual interaction in that participants can re-assess their own positions, which makes the overall results more valid by contrasting them with the results of the first round (Wehnert et al. 2007).

Framework of the study

First, with the goal of confirming the changing disaster environment, this study uses the Environmental Scanning method, taking into consideration the STEEP factors (Thomas 2008). STEEP is an analysis technique focusing on finding

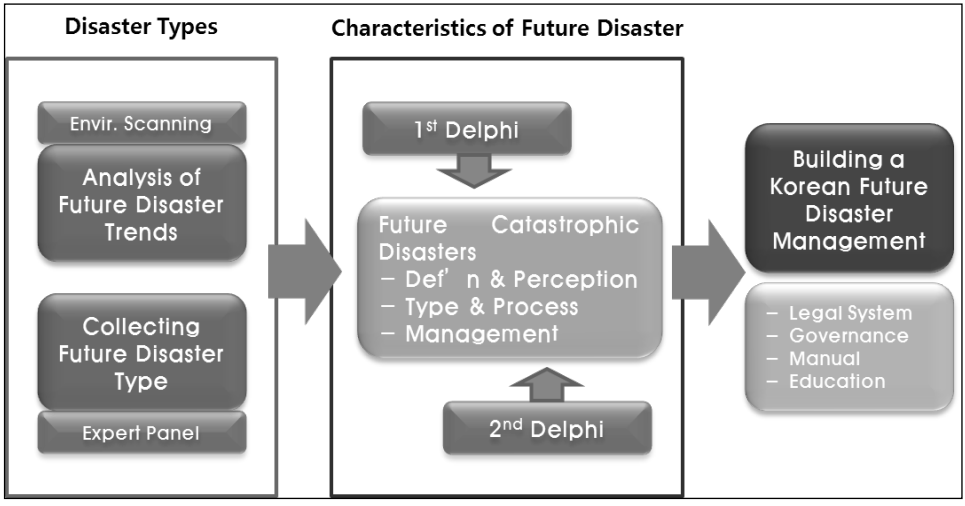
[3] SigmaScan is one of the most outstanding examples. DIUS (Department of Innovation, Universities and Skills) in the British Government provides a Horizon Scanning Centre and collects trend information for all ministries. Through SigmaScan the government explores emerging critical issues in society and analyzes future effects (Thomas 2008).

[4] Text mining is the method which focuses on finding regular patterns in target texts such as newspapers, books, articles, papers, and so on. It classifies the relationships and patterns among the unstructured mass of texts and also creates useful knowledge for decision making.

external factors which affect the macro environment: Society, Technology, Economy, Ecology, and Politics. Second, Expert Panel Interviews and Expert Interviews are used for collecting individual viewpionts. Experts include researchers and practitioners in the fields of disaster management, from both governments and NGOs.

Finally, Delphi is an appropriate method for involving a large number of disaster experts and practitioners in the various disaster fields, including natural and human as well as social and hybrid disasters. Their heterogeneous backgrounds provide the basis for a large-scale discussion process for assessing forecasting of future disasters. The anonymity of the process guarantees that the participants can change their minds without losing face or without having to push their established position (Wehnert et al. 2007). Moreover, the Delphi method provides predictions as well as discussion among the participants, and thus it helps to establish a common knowledge base.

Figure 10 - Tasks and Workflow of the Study



As Figure 10 shows, this study has three steps. First, analysis of disaster trends, using the method of environment scanning as well as collecting future disaster types, is conducted in order to collect material for a future disaster poll. Second, two Delphi Surveys are performed to reveal the characteristics of future

disasters under the categories of definition and perception, type and process, and management. Last, in light of the Delphi survey results, some suggestions will be made about Korean future disaster management from the perspective of the legal system, governance, manual (i.e., rules and procedures) and education.

Findings and Analysis

In this chapter changing disaster environments as well as future disasters are addressed, based on the results of an environmental scanning exercise and analysis of the results of two Delphi Surveys.

Changing disaster environment and future disasters

As a basis for using environmental scanning, this study reviewed recent reports and books about futures research and also drew on two forecasting studies: "15 Megatrends of Korean Society" (Korea National Information Society Agency 2010) and "Emerging Risk in the 21st Century" (OECD 2003). Through environmental scanning using the perspective of STEEP, the following issues are derived:

- Social dimension: extension of absolute poverty; increasing business monopoly; vulnerability to disaster due to ageing; increasing monitoring, control and possibility of privacy infringement; reality distortion by media; demolition of social structures by ICTs (Information and Communication Technologies); increasing social unrest factors arising from urbanization; and leakage of personal information.
- Technological dimension: uncontrolled robots; spreading negative effects of the network society; possibility of biological terror.
- Economic dimension: yearly tremendous financial loss due to increasing carbon dioxide concentration.
- Environmental dimension: deepening of water shortages; environmental pollution and depletion of resources by economic activity and increase in consumption; possibility of higher damage from overcrowding; ecocide, for example loss of biodiversity; widespread emerging infectious diseases resulting from globalization; increasing riskiness of new chemicals;

environmental and health problems resulting from nuclear power plant operation; and reckless development of North Korea after Korea unification.
- Political dimension: state disputes using cyber terror; attacks on nations by outside forces resulting from globalization; establishment of terror networks; state disputes to ensure energy supplies; rising risks in the Korean peninsula over Korean unification.

Through meetings with expert panels and individual experts in the disaster as well as the security fields, a possible set of future disasters is suggested. Two group discussions and five individual interviews were conducted with researchers and practitioners in universities and governments. The experts pointed out that when more than two categories of disasters (not only natural, human and social disasters but also hybrid disasters) combine, the chances of wreaking havoc on nations would increase. Concerning future possible disasters, the Korean government has prepared crisis management manuals which provide a comprehensive listing of possible disasters and the agencies responsible for dealing with them (see Table 4).

Table 4 - Type of Crisis Management Manual (2008.10.31)

Field	*Type*	*Primary Agency*
Disaster	- Storm and Flood - Earthquake - Wildfire - Large-scale High-speed railway Incident - Large-scale incident in Densely crowded Facility - Large scale Environmental Pollution - Harmful Chemical Leakage - Dam Collapse - Large-scale Subway incident - Common Utility Tunnels Disaster - Epidemic - Livestock Disease	- National Emergency Management Agency - National Emergency Management Agency - Forest Service - Ministry of Land, Transportation and Maritime Affairs - National Emergency Management Agency - Ministry of Environment/Ministry of Land, Transport and Maritime Affairs - Ministry of Environment, Ministry of Labor, Ministry of Knowledge Economy - Ministry of Land, Transport and Maritime Affairs - Ministry of Land, Transport and Maritime Affairs - Ministry of Land, Transport and Maritime Affairs - Ministry for Health, Welfare and Family Affairs - Ministry for Food, Agriculture, Foresty and Fisheries

National Critical Infrastructure	- Electric Power - Oil Supply - Nuclear Power Plant Security - Finance and Computing - Overland Freight - Water - Public Health and Medical Service - Information and Communications	- Ministry of Knowledge Economy - Ministry of Knowledge Economy - Ministry of Education, Science and Technology/Ministry of Environment - Financial Service Commission - Ministry of Land, Transport and Maritime Affairs - Ministry of Land, Transport and Maritime Affairs/Ministry of Environment - Ministry for Health, Welfare and Family Affairs - Broadcasting and Communication Commission
Security	- Riots and Disturbance	- National Police Agency

Delphi design

Employing an expert panel and Delphi process

The choice of panel members is essential for the Delphi technique as it relies on their opinions through interaction. For the findings to be accepted, panel members as experts of disaster management should be representative of their profession or professional organization in the various disaster fields (Delbecq et al. 1975; Fink 35 al. 1984; Duffield 1993). In this study, expert panels are formed in three groups, in the research, practitioners and academic areas (Table 5).

Table 5 - List of Delphi Experts[5]

Area	*Institutions*	*N of participant*	*Career (Average)*
Research	Researchers working for National Assembly, Governmental Research Institutes, NGO think tank	9 (2nd 10)	7 years
Practice	Public officers in Governments and public enterprises	7	6 years
Academy	Professors of national and foreign universities	8 (2nd 7)	10 years
Total	Researchers, Public Officers and Professors in disaster management fields	24	8 years

The Delphi survey was conducted electronically and off-line. The first-round survey was conducted in the period from 11th to 15th June 2012, and the second from 30th July to 13th August 2012. A total of 24 experts participated in the first and second round surveys, with a response rate of 100%. The second-round survey included the results from the first-round survey, with some adjustments and improvements.

Delphi questionnaire

In this study, two parts are crucial: The first is about the definition and perception of catastrophic disasters, as well as experience regarding catastrophic disasters. When it comes to perception of catastrophic disasters, respondents were asked which Korean disaster cases come into their mind at first when they think of "catastrophic disaster". They were asked to choose catastrophic disaster experiences that had happened in Korea within 30 years. After the questionnaire they were asked to address management issues. The second crucial part is about the types of future catastrophic disasters, priority among them, and related management issues. Experts selected possible emerging disasters in each changing disaster environment and gave their reasons. After that they were asked to set priorities, giving consideration to the expected frequency and effects of the predicted disasters.

[5] One professor could not participate in the 2nd survey due to his sabbatical. Therefore, one researcher specialized in U.S.A disaster management was chosen, instead.

First round Delphi

In this round, the Delphi process was conducted by inductive as well as deductive means in order to confirm the concept of catastrophic disaster. First, the experts inductively defined catastrophic disasters as "1) surpassing the government's existing management capacity, 2) nation-wide or international damage, with wide-spread effects beyond metropolitan areas, 3) incurring countless casualties or tremendous loss of fortune, 4) amplification of the population's fear and its spreading to other sectors." When asked to name catastrophic disasters of worldwide importance. Through this Delphi, six experts chose the Japan earthquake and East Asian Tsunami (2011), five preferred the 9.11 terrorist attacks (2001) and Hurricane Katrina, four picked the Korean nationwide blackout in 2011, three decided the Chernobyl nuclear disaster and the Sichuan earthquake, two chose Haitian Earthquake, and the foot-and-mouth disease outbreak (FMD) in 2010, and so on.

When it comes to experience of Korean disasters, 66.7% of the experts deductively chose Typhoon Rusa in 2002, giving as their reasons the tremendous damage caused, the overwhelming of governmental management capacity, the great psychological shock to society, the threat to national infrastructure, and so on. The second case was FMD, which happened in 2010 (62.5%) and included a wide range of damage, significant financial costs, widespread psychological shock, significant recovery cost, an event that was beyond governmental capacity with a response system based on the law and procedures at the time, and expected major environmental pollution in the near future as a side effect. The third Korean disaster cited was nation-wide torrential rain in 1998 (45.8%), involving a wide range of damage and emasculation of the disaster management system. Next are the Hebei Spirit Oil Spill in 2007 (41.7%) and collapse of the Sampoong Department Store in 1995 (41.7%). The experts concluded that the issues of tremendous scale of damage, psychological shock, lack of capacity, emergency and difficulty of response against disaster were all important elements of catastrophic disasters. In sum, the experts reached a rough consensus inductively as well as deductively that catastrophic disaster is different from normal disaster in four respects: 1) response capacity, 2) range of damage, 3) size of damage, and 4) psychological shock.

Second round Delphi

On the basis of the results from the first-round Delphi, experts deliberated the definition of catastrophic disasters as a form of law in the following terms:

> *" 'Catastrophic Disaster' is a disaster that is included in the disaster category by Article 3 clause 1 of Korean Framework Act on the Management of Disaster and Safety (hereinafter referred to as the "Act")[6] and includes emerging as well as hybrid disasters, in situations that are beyond the capacity of the national disaster management system and result in or possibly result in extreme damage. Extreme damage implies that, 1) damage and its ripple effects spread nation-wide or internationally, beyond metropolitan areas; 2) damage could have a significant impact on the national economy due to high casualties or major property or financial losses, or to spreading fear of disaster into to society as a whole."*

When it comes to assigning priorities to future catastrophic disasters, each expert chose two cases in each category, such as natural, human and social disasters. First, regarding natural disasters, storms and flood damage were in first place, with 20 responses (83.3%). The second largest response was earthquakes and tsunamis (seven responses, 29.2%). In the category of human disasters, 11 experts answered nuclear plant accident (45.8%) and nine experts chose large-scale incident in a densely-crowded facility (37.5%). Finally, regarding social disasters, a new epidemic is the most popular choice among the experts (21 responses, 87.5%), followed by nuclear accidents (seven responds, 29.2%). Table 6 lists the future catastrophic disasters in each category and the related selection criteria.

[6] Article 3 clause 1 of this Act contains a definition of disaster which refers to natural, human and social disasters. This classification has faced much criticism from scholars and practitioners because it refers to cases rather than categories of disasters. Therefore it does not include emerging and hybrid disasters such as climate change, unidentified epidemics and so on.

Table 6 - Type of Possible Catastrophic Disaster of Korea in the Near Future

Category	*Type*	*Criteria of Selection*
Natural	Storm Flood	- Enlarging trend of natural disasters due to Climate change - Many historical experiences (high frequency and extreme damage) - Impossible prevention - Paralysis of basic city functions in a short time - Beyond Gov. capacity and extreme damage scope - Ex) 1000mm per 1-day super Hurricane
Human	Nuclear Plant Incident	- Beyond Gov. capacity and extreme damage in quality and quantity - Low possibility but critical damage - high fear by citizens and inefficient Gov. response system - Nation-wide damage effects - Lack of Safety control regarding nuclear plant facilities - Devastating ripple effects with social problems including energy - Difficulty from useless previous response experience
Social	(New) Epidemic	- Countless casualties - Break down of economic and social system due to quarantine and control of moving about - Tremendous ripple effect to whole society - Rising possibility owing to Globalization - Widespread damage and beyond government response capacity, extraordinary fear by population - Social unrest from extended reproduction of rumors through SNS

Building the Korean Disaster Management System against Catastrophic Disasters

Recently, the Korean disaster management system has started to move from a prevention-oriented system to one entrusting the local governments to cope with disasters (Hur 2012). Thus, the Korean central government has given priority to building up an integrated management system and to reinforcing

cooperation with agency authorities as well as disaster management capacity focusing on single disaster events for each disaster type in every step of the disaster management cycle (prevention, mitigation, response, and recovery). However, this approach has its limitations when dealing with catastrophic disasters that seriously affect the whole country, such as large-scale hybrid disasters. It means that the existing system needs to be supplemented with a new approach to protect the country from catastrophic disasters that exceed national capacities. On the basis of the expert Delphi opinions, this section discusses possible alternative measures from legal and institutional perspectives, governance perspectives, and in terms of approved procedures (the manual) and Disaster Education and Training.

Legal and institutional perspective

As mentioned above, a catastrophic disaster is a unique and extreme event which we have not yet experienced. Thus, current laws and institutions established to manage normal disaster would not properly be able to cope with it. Therefore, we can assume two strategies for solving this problem from the perspective of the law and of institutions: the first is to establish an individual law specifically for responding catastrophic disasters. With a special law specifying the definition and management structure, such a type of disaster could be highlighted, which would be the most effective way to deal with it. However, considering that citizens could easily feel vulnerable, simply introducing such law would make the population more fearful. This could lead to fruitless discussions in the parliament, which could instead add the relevant article about catastrophic disasters to the Korean Framework Act on the Management of Disaster and Safety. By doing so, the response to catastrophic disasters could be built on the foundation of the current legal system. Such an approach could also stop the unrest of the relevant disaster management institutions. Additionally, scattered disaster management plans based on individual laws should be rearranged in an integrated plan. Furthermore, it is necessary that the importance of international cooperation should be stressed in the integration plan.

Governance perspective

There are two possible solutions from the structural perspective, as follows: the first one would be to set up organizations with comprehensive responsibilities, such as a bureau or committee, to deal with exclusively catastrophic disasters; the other is to establish a task force when a catastrophic disaster is expected or happens. In the former case, a regular central organization which runs independently, along the lines of FEMA in the USA, would be effective in that it could order and control quickly through a unified decision- making process. However, if a dedicated task force is launched, this organization should receive full powers from the nation to respond to and recover from catastrophic disasters. To enhance inter-organizational cooperative governance requires trust to be built among participating ministries and agencies by previously establishing a well-connected network.

It is inevitable that a wide range of ministries and agencies will need to cooperate intensively in dealing with catastrophic disasters. Thus, tightly coupled networks among the control tower and the many fields agencies that will or might potentially be involved should be prepared in order to prevent the dispersion of national capacities and their resulting operational inefficiency. In order to establish a systematic catastrophic disaster management capacity, not only central but also local government, as well as private and international disaster management networks should be built and utilized.

Manual approach

The practical manuals setting out operating procedures in time of disaster should be designed to ensure that relevant citizen groups, governments, military, private companies etc. work better together. The most important thing is that the manuals should be written in a way that is function oriented.

Moreover, manuals should be prepared for the worst-case situation in which the operation of the existing disaster agencies could be stopped. Thus, it is essential to guarantee Continuity of Operations (COO). In the case of USA, National Security Presidential Directive-51, Homeland Security Presidential Directive-20 (NSPD-51/HSPD-20), as well as the National Continuity Policy Implementation Plan (NCPIP) all mention Continuity of Operations (COO), with

the goal of continuing relating organizations' prime functions even in large scale emergencies.

In addition, there must be systematic personnel management including developing capable staff who can cope with even hybrid catastrophic disasters. It is necessary for related agencies to carry out simulations, following the procedures laid out in the manuals. In that case the training should be creative, based on a catastrophic disaster scenario. The training results should then be considered in the next update of the manual.

Disaster education and training

Disaster education including planning, implementation, and evaluation should be provided with a long-term orientation and purpose. In particular, reimbursement of education and training costs for individuals with disaster management responsibilities is needed. This education and training should be identified as a separate category at both the decision-making and the implementation levels in order to guarantee customized programs for each group. Experienced personnel could participate in case studies during the education and training. For those who complete education and training programs, various incentives can be provided to guarantee the effective use of the education and training.

Moreover, active education and training for ordinary citizens should be required. In doing so, all the leaders in our society should make sure they support the importance of education and training in advance about catastrophic disasters and their management. Eventually, perception change is a priority ahead of any other preconditions for building catastrophic disaster management. In addition, the importance of disaster management lies in a change in perceptions, including a focus on catastrophic disaster prevention instead of response.

Conclusions

The conclusions drawn from the analyses can be summarized as follows: Catastrophic disasters include not only traditional categories of disasters (natural, human and social causes), but they should also include new types of disasters (hybrid disasters), which with the extent of their socio-psychological impact often go far beyond the capacity of an average national disaster management system and thus seriously affect the economy, politics, culture and society. To cope with such disasters, the understanding of a catastrophic disaster should be enhanced, the focus of response should be shifted from treatment on the spot to continuous measures based on the basic national functions, an integrated national disaster management system mobilizing all national capacities should be prepared, and lastly the networks of national and international cooperative systems based on the participation of all members of a society should be created.

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Chapter 7. Successful Management of the Tension between Control and Mindfulness: The Case of Wildland Firefighting in France and the USA

Bruno Tiberghien, Renaud Vidal and Charlène Arnaud

Introduction

Studies of large disaster response organizations are likely to draw the attention of a growing number of organization sciences scholars, for at least two reasons.

First, the frequency and impact of catastrophes have been increasing for the past 20 years. Regarding large wildland fires that are the object of this study, the vulnerability of a growing number of territories has reached a critical threshold, due to the conjunction of three long term trends: global warming, growing wildland-urban interface and increase in biomass. The more frequent occurrence of wildland fires seems inexorable. As a result, improving the reliability of response organizations becomes crucial.

Second, studies of emergency operations are interesting because they shed a special light on organizing. Ultimately, crises and catastrophes can be defined as the collapse of meaning, i.e. the irrelevance of our expectations about the world and about the outcome of our interactions with this one. However, this is precisely the set of agreed-upon premises and common expectations that allow organizations to act collectively. Emergency responders, who often face the unexpected, have to deal with an organizational paradox: to act collectively in a

decisive way when the sense of a situation is collapsing. Thus, the study of how response organizations face the unknown may bring us closer to the nature of organizing.

The central argument of our work is that the successful management of these conflicting requirements is the main source of high reliability in emergency operations. To explore this idea, we observed some of the best Incident Management Teams (IMTs) from France and from the U.S. for the past three years. This paper presents our findings and contribution to firefighters' organizational reliability. The first section sets the theoretical framework within which the management of the tension between opposing demands are conceptualized. The second section offers a brief description of the France-U.S. High Reliability Organizing (HRO) project, and the third one presents the contrasted results of French and U.S. IMTs as well as their interpretation. The final section discusses how organizations can learn from firefighters' organizational forms of management, combining stability and change, flexibility and robustness, adaptability and adaptation (Weick 1979).

Emergency Operations as the Management of the Tension between Control and Mindfulness

Our research is based on the following idea: individuals, groups or organizations as a whole are crossed by a fundamental tension between control and mindfulness, i.e. two types of processes that are antagonist but whose expressions are necessary. The next section provides a theoretical background.

Control and mindfulness: Two processes necessary to systems persistence

Control and Mindfulness processes can be described within the paradigm of complex and adaptable systems, as proposed by Buckley (1968). Buckley describes the environment of a system as a set of elements, states or distinct events in space or time. The variety of this set - the number of different elements - is limited by stable causal, spatial or temporal relationships. The lack of stability

and regularity would result in a chaotic environment, which is excluded by hypothesis.

A system maps the variety and constraints of the environment when the latter acquires features that permit it to discriminate, to act upon and to respond. The persistence of a system, defined as the maintenance of the system's essential variables within acceptable limits, mainly depends on successful mapping. When facing stable environments, organizations tend primarily to preserve their current mapping and evolve towards an archetype that Hedberg, Nystrom and Starbuck call an "organizational palace" (Hedberg et al. 1976: 44).

Control refers to organizational processes that preserve the existing mapping. Such processes limit the increase in internal entropy and tend to optimize the allocation of resources on the basis of the prevailing mapping premises.

According to Buckley (1968), complex environments are characterized by a high level of constrained variety and by short-term and local regularities. This limited stability results in the definition of a set of variables and causal relationships between these variables, permitting the system to explain and predict its interactions with the environment. Complexity manifests itself by the redefinition of this set of relevant variables and/or relationships at varying degrees. As a result, a complex adaptive system should be able to detect these changes and update its mapping. We call this capability mindfulness. In general the higher the internal variety of an organization, the greater its capability. This phenomenon is known by the principle of requisite variety. According to Ashby (1957): only (organizational) variety can destroy (environmental) variety. In other words, a necessary condition for an organization to detect and adapt to world's changes consists in creating and maintaining a variety of ideas and of response repertoires. This internal variety is sometimes described as a "deviation" from the prevailing norms of mapping (Buckley 1968), as equivocal organizational processes (Weick 1979), or as conceptual slack (Schulman 1993).

Mindfulness refers to the processes of re-mapping. They make swift detection of changes in the environment and contribute to creating novel ad-hoc responses. Mindfulness grows with internal variety.

To sum up, the persistence of the systems facing complex environments depends on their ability to structure, de-structure and re-structure. In other words, a persisting system succeeds in exhibiting control and mindfulness.

Control and mindfulness: Two organizational processes in tension

These two processes are antagonistic and/or in competition. First, they are antagonistic with regards to their underlying logics. Control aims to optimize the adaptation of a system to its current environment, to suppress ambiguity and variability around standard operating procedures, overlap in responsibilities and organizational roles, and employees' autonomy and discretion. In doing so, control processes reduce organizational variety to its minimal value. Mindfulness brings about experimentation, uncertainty, equivocality, dispersion of outcomes, risk, discussion, and improvisation. It increases the pool of alternative ideas and behaviours, some of which will be useful to adapt to changes in the environment. Mindfulness, in fine, increases adaptability. Then, these two processes can be in competition for organizational resources. Time is an example of such precious resources: mindfulness consumes time that control wants to reduce or use in pre-planned programs (March and Simon 1958).

A central issue of emergency operations

Control and mindfulness processes have been thoroughly examined, but separately. Modes of managing the tension between control and mindfulness processes have been rarely explored (March 1991; Levinthal and Rerup 2006). More specifically in the domain of safety, we can mention the High Reliability Organization (HRO) Project at the University of California, Berkeley. HROs theory progressively emerged in the past 20 years from the analysis of complex organizations facing high-risk environments (NASA, nuclear power plants, nuclear aircraft carriers, submarines, and firefighters...). It highlighted the cognitive processes making early detection of signals of crises possible as well as resilience capability (Weick et al. 1999). HROs succeed in creating and in maintaining a dynamic state of "collective mindfulness," by heedful relationships among their members. In the 1990's a theoretical debate opposed the proponents of HROs to the proponents of the "normal accident" theory (Marais et al. 2004; Perrow 1994). The latter, developed by Charles Perrow (1984), states that any organization with tightly coupled components and interactive complexity is prone to unavoidable major accidents. Hence, it is never possible to obtain

absolute reliability. The reason is simple: an error in one of the tightly coupled components can potentially propagate quickly to the rest of the system, and because of the system's complexity, it will fail long time before anyone can understand what is going on and what should be done. In other words, Perrow's proponents think that such a tension cannot be managed, because:

- Interactive complexity can only be addressed by a highly decentralized organization;
- Centralization is the only way to detect and stop the propagation of errors within a tightly coupled system.

Since an organization cannot be at the same time centralized and decentralized, it is vulnerable. This line of reasoning can be reframed by stating that mindfulness and control cannot be found within the same system. In this debate, Perrow's opponents think that HROs have developed ways to successfully manage this tension[1]. Our work is in line with this approach. Although it can be stated that the findings of the Berkeley HRO project demonstrate that some organizations are able to manage the tension between control and mindfulness processes, researchers have mainly focused on mindfulness processes (Weick et al. 1999). We intend to pay attention to the organization as a whole by observing control as well as mindfulness processes. By observing the best IMTs in France and the U.S., our research aims at:

- Exploring the tension between control and mindfulness processes, i.e. understanding how these processes interact with each other;
- Identifying successful tension management strategies.

[1] It is indeed significant that their work uses terms that reflect this tension; either directly: "ambivalence as the best compromise" (Weick 1979); or indirectly by putting together two words characterizing the two types of processes: "heedful interrelating" (Weick and Roberts 1993), "Collective Mindfulness" (Weick et al. 1999), "Flexible bureaucracy" (Bigley and Roberts 2001), "Managing the Unexpected" (Weick and Sutcliffe 2007).

Incident Management in France and the USA: The HRO Project

This section exposes the methodological part of our research, detailing context, goals and data collection in the HRO project.

Context and goals

The HRO project aims to prepare IMTs to deal with large wildland-urban interface fires, in the context of increased frequency of occurrence and severity. The main idea consists in mobilizing High Reliability Organizing theories and in comparing two territories: Southern France and the Western US. Participants include: the universities of Aix-Marseille and California Berkeley; firefighting training institutions such as France's Civil Protection Training School (ECASC) and the National Advanced Fire Resource Institute (NAFRI) for the US; and IMTs from the US Forest Service and Bouches-du-Rhône Fire Department.

Data collection

The research design combines the following three phases of data collection.

First, an impregnation phase, aimed at getting familiar with the professional norms and culture and at acquiring a minimal technical level pertaining to firefighting operations and incident management. This phase included the training of researchers to the firefighter entry level, numerous days spent in fire houses, on the fire line, on IMT training sessions, the study of standard operating procedures, training manuals, engagement doctrines, after-action reports, national databases, surveys and previous studies, and informal interviews with team members. This phase spanned the entire project duration but was more intense during the first year.

The second phase focused on the direct observation of large incidents and of specific training sessions. The goal was to identify operational tensions and to understand how they are managed. A cumulated number of 90 days was spent on the fire line and over 10 training sessions were attended. The observations were performed by a mixed team comprising experienced firefighters as well as

researchers from Berkeley and Aix-Marseille universities. On some fires, IMT members were audio taped from 7:00 to 22:00 each day and critical moments (briefings, strategy meetings, and planning meetings) were videotaped.

The third phase consisted in experiments conducted on a virtual reality-based training platform. The previous phases led to formulate hypotheses on how IMTs can manage operational tensions. This phase aimed at refining these hypotheses. The experiments were conducted on France's Civil Protection virtual reality-based training platform. The 5-day simulations involved an American 'elite' IMT (the Atlanta-based NIMO team[2]) and a French IMT from SDIS13 (one of Southern France's leading fire departments in wildland firefighting). Both teams were put separately in the exact same operational conditions and performed successively on three different scenarios.

Table 7 - Three Scenarios for Simulation Exercises

	Rate of spread	*Equivocal inputs (complexity)*	*Requested process*
Scenario 1	High	Low	Control
Scenario 2	Low	High	Mindfulness
Scenario 3	High	High	Control & Mindfulness

Each IMT member was videotaped. Data collected included the after-simulation debriefings by each team and their discussions with the national firefighting experts who attended the simulations.

Data treatment

All communications were recorded during the experimental phase. We suggested creating and computing the "coupling" between individuals, defined by the number of interactions between two pairs divided by the mean duration of their interactions. The interest with this variable lies in its connection with the type of processes (low values correlate with mindfulness processes, high values with control processes). The real time network of interacting individuals (the link

[2] National Incident Management Organization (http://www.nifc.gov/nimo/nimo_summary.htm).

between two individuals being weighed by their coupling) and its evolution over time indicate the location of control/mindfulness processes in space and time.

The processes' interactions were inferred by axial coding (Strauss and Corbin 1990). Subcategories were informed by responses of operational actors to the questions posed by the researchers or addressed in after-action reviews. Such questions included: strengths and weaknesses of a control/mindfulness process that was just observed, rationales for organizational transformations decided or corrective measures to be implemented by the actors, specifics in the current context...

Fighting Wildland Fires in France and the USA: Two Approaches

We have chosen to segment the results along four lines: action principles, command organization, planning, and interactions among team members.

Principles for action

The first question that is systematically raised by trainers to the future US IMTs is: "Why are you here? What do you bring to the table?" And, invariably, the answer expected is: "We bring order to chaos" (i.e. internal order should overcome external chaos). This motto is immediately associated to the following injunction: "Process, Process, Process!" In other words, members of IMTs define themselves as high-level professionals, mastering incident management processes. As a result, these teams guide their actions and measure their success with respect to the rigorous application of rules and standard operating procedures, most of them included in the Incident Command System (ICS).

Symmetrically, a French officer describes his job as "organizing chaos." The principle for action of French IMTs consists in stopping the chaos created by the fire as soon as possible, even if the organization is itself somewhat chaotic. French operational processes are codified in several documents (national reference guides for training and professions, national guide for Air resources use, national guide for Wildland firefighting operations), but much less detailed than in the American ICS. Moreover, simulation exercises showed that the

French IMT (among the best in SDIS13) worked sometimes slightly differently from the official doctrine.

To sum up, U.S. IMTs consider themselves as high-level professionals, capable of managing complex situations and make the process obligation a priority. French teams are result-oriented, to limit the size and complexity of the situation to handle.

Organizing command

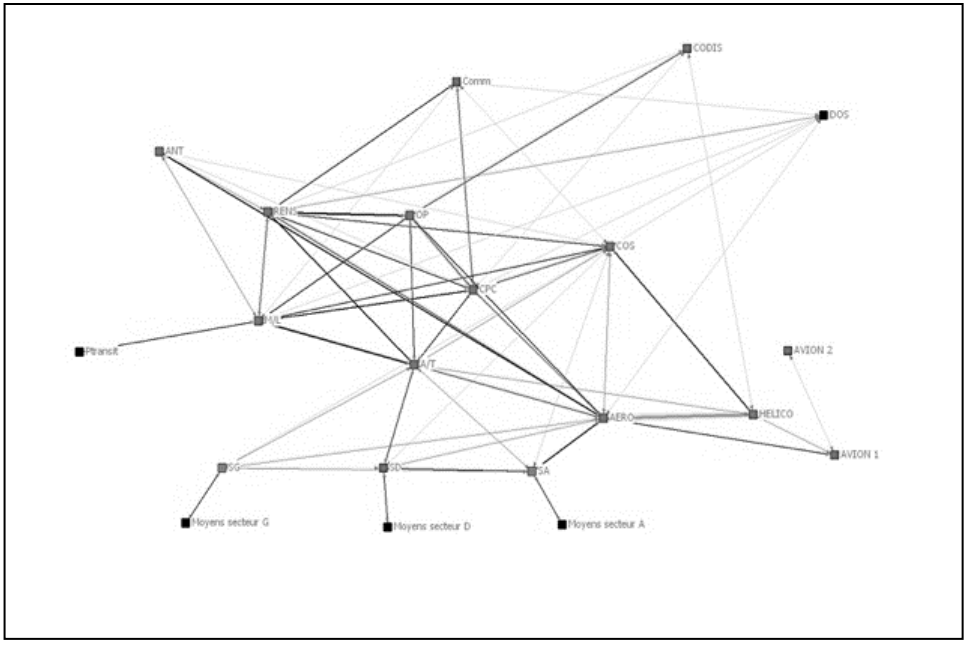
We can point out a crucial difference pertaining to the degree of decentralization of command.

In the U.S. case, the Agency Administrator sets general objectives to the Incident Commander (IC). These objectives revolve around three themes: safety of firefighters and residents, containing the fire within geographic limits, setting a maximum cap for suppression cost. The IC then validates the translation of these objectives into operational goals and tactics proposed by the operation section chief. The fire is divided in sectors (called divisions and branches) corresponding to three types of missions: direct attack, indirect attack, point protection (structures, businesses, infrastructures...). As a result, within this framework, each division supervisor or branch director assesses his needs and required resources to carry out the mission, and then organizes as desired. The analogy given by an experienced firefighter is “your division is your own state, and you are the governor.”

The French approach is quite different. Once in charge, the IC defines the ‘SAOIEC’. This French acronym contains the following elements: Situation, Anticipation of upcoming changes, Objectives, Idea of manoeuvre (tactics) to meet the operational objectives, Execution and Command (who is in charge of what). SAOIEC is the framework for the entire organization. It is validated by the equivalent of the Agency Administrator (the Mayor or the Prefect). Members of the Incident Command Post (ICP) are responsible for carrying out the plan. Division supervisors have a certain degree of autonomy in the local implementation of the plan, but they are - first and foremost – in charge of executing the global and integrated plan made by the IC. As a result, most decisions are made by the IC: the French organization is strongly centralized, while the U.S. organization is decentralized.

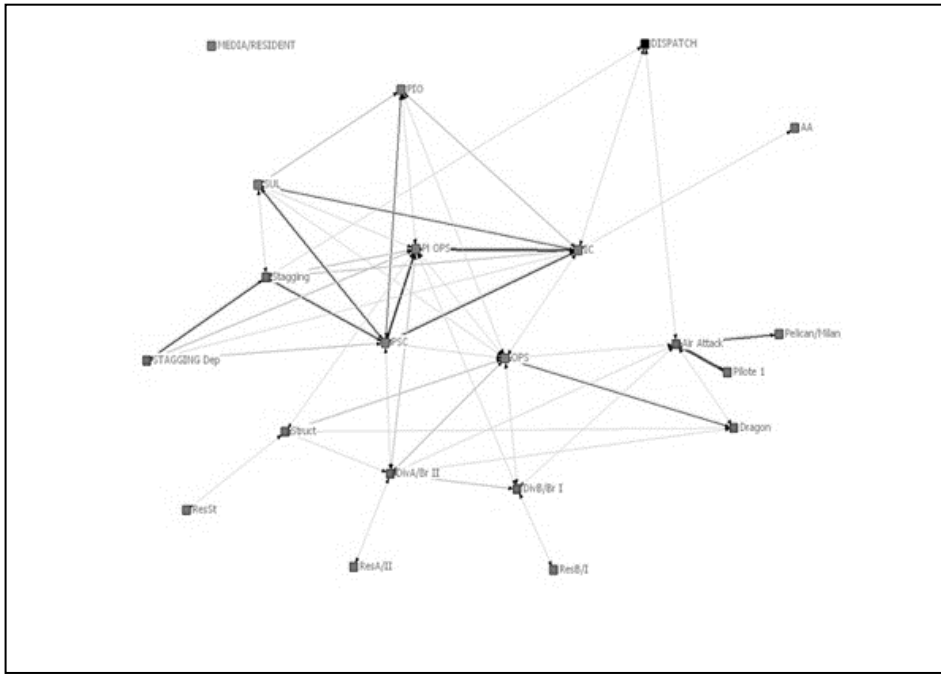
The simulation exercises provided multiple quantitative measures, including the centrality of interactions networks. The coding of the six exercises (over 200 hours of data) made the construction of the following interactions networks possible. For better clarity, we only show simulation 3 networks here below:

Figure 11 - Interactions Network for Simulation: French IMT



N.B.: Links' size is proportional to couplings. The definition and measure of couplings between pairs of individual is given later. Measures of centrality take into account the existence of links between individuals regardless of the weight.

Figure 12 - Interactions Network for Simulation: American IMT



The centrality of interactions networks can be assessed by considering the variation in the degree of centrality among the members of the network (Monge and Contractor 2003). For instance, if the degree of centrality is about the same for all members, the network is not centralized. If it is much higher for a few individuals or one individual, the network is centralized. The degree of centrality is measured from different possible angles:

- The number of members with which one is communicating (degree);
- The proximity of a member to the members with which he/she is not directly connected (proximity);
- The mediation, which measures the tendency of a member to be in communication with any two individuals of the network (mediation).

The measures obtained with the simulation exercises are given below.

Table 8 - Normalized centrality measures

	FRANCE	*U.S.A.*	*delta U.S.A./FRANCE*
Number of actors	20	20	1.0
Interacting pairs	98	80	0.8
Network centrality			
Degree	13%	11%	85%
Proximity	50%	41%	82%
Mediation	24%	19%	79%

The French IC is always the most central actor of the network in terms of degree, proximity and mediation (to a lesser extent).

The structuring of command is also significant when the organization is expanding. As already noted, the French IC designs the plan ('SAOIEC') and defines generally three or four branches and their resources. When the operation expands, each branch is then split up in divisions.

In the U.S. dynamics, the fire is initially organized in divisions/groups; as the incident grows, they are aggregated in branches for improved coordination. The French start with branches that they later separate into divisions and the Americans start with divisions that they 'branch' when too numerous. The French dynamics are based on a top-down logic, while the US dynamics are bottom-up.

Planning

The planning process includes the assessment of the situation, the development of objectives, the selection of the appropriate tactics and resources. On the French side, the process boils down to the 'SAOIEC' made by the IC. It is centralized and not very formalized, while the U.S. planning process is distributed and extremely codified.

The French planning is integrated, global (forming a coherent whole) and based on decisive actions (designed to stop the fire). Indeed, the IC bases its tactics on the combined effects of the actions conducted simultaneously by each division. These actions are defined and related resources are scaled so as to stop definitively the progress of the fire.

Concerning the U.S. IMTs, the plan documented in the Incident Action Plan (IAP), is loosely integrated, under-specified and consists in a guide for situated action.

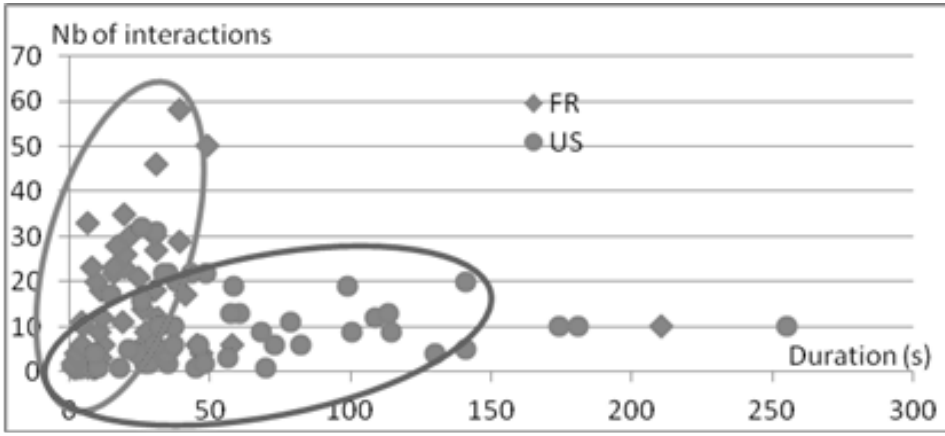
Each division has its own objectives and allocated resources, operating almost independently from the others. In that sense, the plan is less integrated because not based on decisive actions but on a set of actions; each of them improves the global situation partially, and not necessarily simultaneously. This plan provides the big picture of a complex operation, and the information to build one's own reasoning: general objectives, potentially dangerous phenomena, meteorological forecast, fire behaviour forecast, assignment of other divisions, and availability of air resources...

Interactions within the teams

Interactions among the U.S. and French teams are different in format as well as in content. The format of French interactions is short, frequent and codified, while the format of U.S. interactions is long, rare and free. For the French firefighters, communications must be brief and concise in order not to clog the radio traffic. To the contrary, U.S. communication style is rare but longer. It goes as far as having an implicit norm: "no news is good news." This is to be put in the context of the strong autonomy of the divisions, which are not required to report their status continuously. As a result, when communication occurs, exchanges happen among individuals who need to catch up with one another (what is the situation in their division, how they feel about their chance of success, how they will coordinate...). Since communication is rare, it takes the form of a discussion that lasts longer and in which more data (denser in context) are exchanged.

These qualitative observations have been measured during the simulation exercises. First, we displayed all interacting pairs along two dimensions: mean duration of interactions versus the number of interactions (cf. Figure 13). It appears that the interactions of the U.S. team are mainly in the area long duration/low frequency, while the interaction pairs of the French team are mostly in the area short duration/high frequency.

Figure 13 - Number of interactions versus average duration of interactions



We then refined the analysis by computing the coupling of each pair. The coupling is defined by the formula: number of interactions/mean duration. An overall coupling at the group level was also computed. The value of couplings for each simulation shows that the French average coupling is twice as high as the U.S. one (cf Figure 14).

Figure 14 - Interaction couplings per simulation exercise

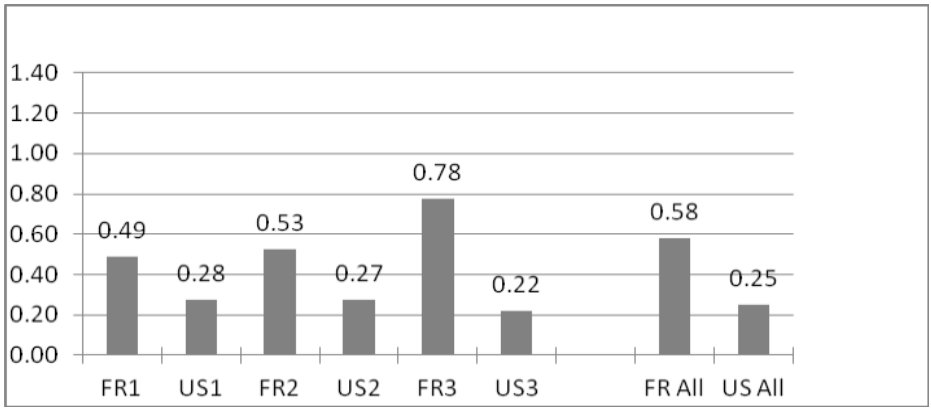


Table 9 - France-USA Comparison

	France	*USA*
Action principles		
Role	Organizing chaos	Bringing order to chaos
Time horizon	Massive attack - action/reaction -short term horizon - improvisation	Anticipation - planning- mid/long term
Type of obligation	Results	'Process, Process, Process'
Attitude with respect to external stakeholders	Constraint undergone	Constraint managed - Transparency
Command organization		
Dispatch	Operational staff In anticipation	Administrative staff In reaction
Command	Unique and centralized Merged functions: strategy/tactics	Unified and distributed Separated functions: strategy/tactics
Structuring	Top-down: from the Incident Commander to division supervisors	Bottom-up: from division supervisors to the Incident Commander
Planning		
Process	Under formalized - centralized	Formalized – distributed
Type of tactics	Integrated – precise – based on the concept of 'decisive action'	Weakly integrated - underspecified - guide for coordination – based on opportunism with regard to conditions (topography/weather)
Resource engagement	Immediate – in anticipation - in excess	Post-analysis: anticipating resting ratio, safety briefing, cost
Interactions		
Radio traffic *Norms*	Frequent – short – structured Concise and precise	Spaced – long – free discussion 'No news is good news'
Type of interactions	Generic	Inter-subjective

The interactions of the French team are tightly coupled while they are loosely coupled for the U.S. team. French interactions are generic while the US interactions are inter-subjective. Exchanges between French officers are rather uni-directional and closed, and show the salience of hierarchy. The U.S. exchanges are more bi-directional and open (even when a chief and his subordinate are interacting).

Data interpretation: Two management modes of tension between control and mindfulness

The data interpretation, applying the concept of organizational coupling to the French and American IMTs, reveals two different management modes of the tension between control and mindfulness.

Tight and loose couplings in organizations

In order to interpret results, we found it useful to rely on the concept of organizational coupling. The coupling of two entities A and B refers to the predictability of B's behaviour, given A's behaviour. Miller (1978 cited by Weick 1982) suggests that A and B are loosely coupled when A impacts B:

1. suddenly (versus continuously), for example when reaching a threshold effect;
2. marginally (versus significantly), for example when there is a buffering effect;
3. indirectly (versus directly), when there is a mediator between A and B;
4. after a lag (versus immediately).

When two entities remain loosely coupled long enough, this decoupling becomes cognitive and behavioural, i.e. the mapping of each other's environment tends to decouple. An organization with different types of couplings between its components will display different systemic characteristics. Weick (1982) argues that the intensity of couplings induces:

> *"differences in the degree to which means are tied to ends, actions are controlled by intentions, solutions are guided by imitation of one's neighbor, feedback controls search, prior actions determine subsequent acts, past experience constrains present activity, logic dominates exploration, and wisdom and intelligence affect coping behavior." (382)*

From a research design perspective, we identified the nature of couplings by analysing the duration and frequency of interactions: short and frequent communication points to a tight coupling, long and rare exchanges refer to loose coupling. First, we will locate ongoing couplings in the American and French teams. Then we will establish the link between the distribution of couplings and the modes of tension management.

Application to the French and U.S. IMTs

The French IMT is characterized by a tight coupling between entities that display varying production processes, while the US IMT is characterized by a loose coupling of entities with highly normalized production processes.

Concerning the French case, the coupling intensity can be seen through frequent and short interactions. The standardization and codification of oral exchanges, the need for velocity, lead to a system in which each member receives and transmits the values of predefined parameters, necessary for the unfolding of routines. The strongest values can be found in the Incident Command Post and between the Incident Command Post and the branches (including the air branch). Loose couplings exist in the form of:

- Variation around production processes (standard operating procedures);
- A preference for action/reaction modes and resilience, rather than for anticipation. This is a source of loose coupling between pre-established plans and the actual situation, but also between actions. This preference translates frequently into "improvising" in the sense that firefighters recombine portions of their action repertoires in novel ways, in order to meet situational demands.
- Sporadic calls for support/advice from the IC to some officers.

Concerning the American case, the low coupling intensity translates into rare and long interactions. This comes from the strong autonomy of division supervisors. Tight coupling is due to:

- A strong codification of working processes;
- Examples include the planning process ('planning P') codified in the ICS, or the 50 rules of engagement that apply to firefighters on the fire line;
- Rigorous, specialized, long training sessions;
- Socialization process;
- Socialization reinforces common beliefs, norms of behaviour or professional values. They are specific to the organizational role of each team member, but they also emerge for each IMT, reflecting the IC's personality.

Strong coupling exists because these common expectations allow each member to quickly make sense of others' behaviour and adjust his own behaviour accordingly.

Interpretation:
Two management modes of tension between control and mindfulness

Tight coupling is the main source of control and loose coupling is the main source of mindfulness (Weick 1982: 388). As a result, we brought to light two ways of expressing control and mindfulness processes, within IMTs.

The French doctrine (massive attack of starting fires) leads to a specific mapping of the environment by the organization. This mapping creates common expectations enabling control processes to unfold. Among these processes, a strong centralization induces rapid, integrated, coordinated collective action. As it is often the case with strong centralization, local adjustments are necessary. Tolerated variations around working processes reinforce a capacity for adjustments or improvisation, characterizing mindfulness processes.

In the U.S. IMTs, mindfulness processes are based on the autonomy of entities (divisions, functional sections) for which local adjustments are continuous and independent because mainly a result of their specific local situation, unconstrained by strong central and integrated orders. Control processes rely on a high codification of working processes, socialization and training processes prior to the actual operations. This control enables a minimum coordination of autonomous entities.

Each management mode exhibits limitations

Each tension-management mode possesses its own strengths and weaknesses, generating the need for corrective measures to maintain the system's reliability.

Strengths and weaknesses of each tension management mode

Centralization brings along significant advantages: better knowledge of the big picture and of interdependencies among entities. Moreover, reactivity for remapping and restructuring is enhanced once the IC decides so. However, the group relies mainly on one individual who cannot manage large and complex situations, even if smart and experienced. Also, local adjustments sometimes happen through improvisation with varying success and consequences (for instance, in the first simulation exercise, an improvised backfire escaped and worsened the situation). Another weakness was observed during the exercises: a difficulty to step back and to see an emerging trend. By design, a 180° wind shift occurred within one hour. The Incident Command Post, continuously communicating with the team members "on the ground," kept acknowledging small changes in wind direction, but never realized the significance of the phenomenon. Finally, overconfidence in the IC's experience (regardless of any kind of deference to hierarchy) prevented relevant questions to be raised.

The strength of the U.S. configuration relies on continuous local adjustments and its capability to integrate numerous and complex constraints (logistics, finance, environment, politics ...).

Nevertheless, some inertia can be observed coming from a less acute awareness of interdependencies among the components. Also, the high degree of specialization of each function, associated trainings and socialization processes, leads the organization to focus on itself: inflation in norms, high focus on internal processes to the detriment of results...

Corrective measures taken to mitigate the weaknesses

We observed a number of actions designed to correct the negative outcomes of some processes. Naturally, these actions are not consciously taken to fix the imbalance between control and mindfulness processes.

For the French IMTs, corrective measures contribute to:

- Influence the environment to simplify the issue at stake (FR1). During the simulation exercises, the IC regularly tried to influence the environment (i.e. the agency administrator, grey zones of the scenario, the media…) in order to simplify the constraints of the situation faced. Such attempts echo the limitations of one's brain to manage interactive complexity.
- Increase the normalization of working processes (FR2). SDIS13 invests heavily in training and in a quality management approach in order to reduce the variability of its production processes and to improve the organization's steering tools.
- Engage in HRO training (FR3). Among other things, SDIS13/ECASC have progressively realized with the HRO project the limitations of the current operational approach. By engaging the IMTs to enhance the quality of their interactions and to open more sensemaking spaces, the project addresses the weaknesses of their tightly coupled system.

For the U.S. IMTs, corrective measures contribute to:

- Make significant efforts to construct and share a global picture of the situation (US1). These efforts translate into multiple briefings, to counteract the trend for divergence among loosely coupled entities and related coordination problems.
- Set boundary conditions (US2). Setting trigger points or STICC briefings[3] reflect this idea. The goal is to set the main limits within which the current situation and organizational response are valid. If those limits are crossed, a change (in sensemaking, in decision making) is necessary. This technique is particularly useful to counter the organization's inertia.
- Focus stakeholders on specific issues (US3). Stakeholders include the media, elected officials, residents and authorities … The IC devotes an extensive part of his time and energy to stakeholders, dedicating two segments of the organization ('Public Information' and 'Liaison') that included over 50 members on several operations (e.g. Slide Fire, California November 2007). By being transparent with respect to stakeholders, by explaining their working processes, IMTs focus the attention of stakeholders on their professionalism and away from problems of global reactivity.

[3] STICC briefings follow a 5 step format: Situation, Task, Intent, Concern, and Calibrate. The forth step "concern" is intended to review the conditions that make the plan valid.

- Engage in HRO (US4). For several years, the U.S. Forest Service engaged an extensive training program to HRO principles, expecting to enhance IMTs responsiveness.
- Constitute and develop a 'Lessons Learned Center' (US5). Since innovations are local and communication among autonomous entities is scarce, the center enables all firefighters to share their experience (through after-action reports, case studies, libraries ...).
- Create NIMO teams and carry out central inspections (US6). Some internal studies from U.S. Forest Service pointed to a general trend of IMTs to align their actions with the agency administrator's expectations, sometimes to the detriment of the headquarters' instructions (often related to cost control). The creation of NIMO teams (small size elite teams) and central inspections during the fires aim at reinforcing the coupling between IMTs and the headquarters and in fine the Congress.
- Finally, the U.S. Forest Service (Fire and Aviation Management) started a broader reflection on moving from rule-based behaviour to principle-based behaviour (US7).

Discussion

In this last section, we explore the different strategies used for managing the tension between control and mindfulness and draw the contours of their limits.

Managing the tension between control and mindfulness

We pointed out the source of loose and tight couplings in American and French IMTs. Then we identified the modes of expression of control and mindfulness processes, which allow us to bring to light four tension management strategies: manipulating, alternating, specializing and diffracting.

Manipulating

This strategy consists in influencing the environment so that the organization can express one of the two processes only, without suffering the negative consequences of not expressing the other process. There are control-oriented or mindfulness-oriented manipulations. In the former case, the organization leads external stakeholders to focus on the portions of the environment that will be well handled by its control processes only; in the latter case the strategy consists in influencing external stakeholders on the portions of the environment that will be well handled by its mindfulness processes only.

Alternating

This strategy consists in alternating the expression of each leg of the tension. There is a gradation in the spontaneity of the alternation.

Alternating by design: This is the prevailing functioning mode of the U.S. teams. Codification of working processes, extensive training, socialization by job and by team precede the actual operations. This construction of common frames of reference (control processes) is followed by a strong decoupling of divisions during operations (source of mindfulness). The two dimensions of this tension management strategy are:

- The loose coupling of organizational units. Their interactions lead to making more explicit rationales for action, viewpoints and premises. They enable to reconstruct collectively the sense of situations and what to do about them (mindfulness).
- A strong organizational culture as a source of coordination and control of loosely coupled systems (Bierly and Spender 1995; Weick 1982; 1987).

Alternating by plan: The ICS requires mindfulness moments at pre-set times (e.g. “strategy meeting”), during which the situation is re-assessed and the next incident action plan is drafted, followed by the execution of the incident action plan.

Alternating dynamically: The setting of ‘trigger points’ creates more flexible alternation between control and mindfulness.

Alternating by discretion: The French IC periodically asks for advice (in general to a branch director he trusts, the Incident Command Post chief…). After such a discussion, a decision is made and the rest of the organization executes.

This happens randomly, i.e. whenever he feels it to be useful, at his own discretion.

Specializing

The idea is to express simultaneously control and mindfulness processes, but at different organizational levels. This is the prevailing mode of tension management for the French Teams. Control is expressed through the Incident Command Post and branches. Mindfulness is located around the IC and within divisions and manifests itself by their resilience and improvising ability. Variations around this principle can be observed:

- Designed organizational roles can be the dividing line between control and mindfulness-oriented jobs. For instance, in the U.S. team, each member follows a routine (control) while the IC pays attention to how it unfolds (mindfulness). Similarly, American and French rules of engagement require that one member of the crews on the fire line acts as a lookout and watches for the fire's behaviour.
- Gauthereau and Hollnagel (2005) analysed a programmed outage in a Swedish power plant and suggest a distinction between four levels of processes: targeting, monitoring, regulating, and tracking. There is a gradation in the degree of anticipation (the highest being the targeting level) and in the degree of adjustment (the highest being the tracking level). Anticipation is (in this case) linked to control processes and adjusting ability to mindfulness. With our vocabulary, the authors have brought to light a strategy of progressive specialization.
- Management by objectives, which is a characteristic of the ICS (Bigley and Roberts 2001), provides another example of this principle. Each organizational level is free to work within the framework of the general objectives determined by/with the higher organizational level. The authors describe this scheme as "constrained improvisation."

Diffracting

This strategy consists in diffusing the tension between control and mindfulness to the entire organization. The following three observations

illustrate this idea: creating rules about not applying rules; ambivalent norms; creating training and socializing to norms on mindfulness (HRO approach).

This is a way of increasing the "requisite variety" of the organization. People who do not blindly follow prevailing norms and rules will pay attention to more cues and will try more interpretative schemes to make sense of the situation they face. Such a lead has been developed by Weick through the concept of "wisdom," an individual and collective attitude which consists in simultaneously trusting and doubting knowledge (Weick 1998). This attitude aims at avoiding two pitfalls: overconfidence leading to erroneous interpretations, and over cautiousness that paralyzes action. Wisdom internalizes the tension between control and mindfulness.

We chose to label this strategy diffracting by reference to the physics phenomenon according to which an electromagnetic wave diffuses in space when meeting an obstacle. The interest of this comparison is reinforced by the fact that diffraction is related to the wave-particle duality. Indeed, this strategy tends to diffuse the duality control-mindfulness to the entire organizational space.

To sum up, four families of strategies have been presented: manipulating, alternating, specializing and diffracting. Each team uses these strategies at varying degrees. The following section attempts to sketch the limits of each strategy.

Limits of prevailing strategies

Strategies are not successful in all situations. Weaknesses, failures and corrective actions taken by the U.S. or French IMTs inform about their limits. Three characteristics emerged:

- Manipulability: the extent to which the organization can influence portions of the environment;
- Variety: the variety of the environment is defined by the number of elements, states of distinct events in space and time, with different attributes;
- Constraints: the extent to which this variety is constrained, i.e. the extent to which the elements are linked by stable causal, space or time relationships.

When we focus on the last two dimensions, the management strategies can be applied in the following contexts:

- Alternating is relevant in situations where the surroundings of loosely coupled entities are relatively independent. This decoupling increases internal variety and enables the organization to manage a high level of variety in the environment. Multiple simultaneous and independent local adjustments - also referred to as disjoint incrementalism (Lustick 1980) - provide adaptation and adaptability;
- Specializing is more appropriate in an environment with a high level of constraints in its variety. Causal relationships among the environment's variables require a global grasp and a strongly coordinated response. If this environment's variety is not too high, the organization's control centre can manage it;
- Diffracting should be the direction towards which an organization with a specializing strategy but with increasing interdependencies among the main variables heads. It could also be the direction for an organization with a specializing strategy but facing such an increase in the variety of the environment that the control centre cannot manage it anymore.

HRO researchers placed the principle of requisite variety at the heart of their theories (Weick et al. 1999) stating that an organization should be as complex as the environment it is trying to control. We found that decomposing variety along 3 dimensions (manipulability, strict variety, constraints) enables going further in the prescription of the regulation modes that should prevail.

Conclusion

Disaster response organizations face simultaneously the question of meaning and demand for effectiveness, a double requirement for planning and improvising. In other words, emergency operations must reconcile control and mindfulness.

We identified four types of strategies adopted by some of the best IMTs in France and the U.S.: manipulating, alternating, specializing and diffracting. The U.S. teams who have built an incident management system, historically to contain large forest fires in the wildland, now need to be more pro-active to be able to protect people and structures in wildland-urban interfaces. The French teams, whose organizing mode is oriented towards the principle of massive initial

attack, need to upgrade their processes to manage potentially larger and more complex wildland fires.

Control and mindfulness have been extensively studied by scholars, but separately. The tension that ties both processes together has rarely been taken into account (March 1991; Levinthal and Rerup 2006). Our research is a small step in that direction; how well this tension is managed may spell the difference between failure and success. Our goal is less to prescribe and predict, than to give conceptual tools to the actors on the ground to foster reflexivity about their own activities and routines, and to set their imagination in motion.

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Part B.

International and Regional Collaboration and Institutional Capacity

Chapter 8. The United Nations Management System and Disaster Management

Lauren Touchant

Introduction

Global attention to Disaster Risk Reduction (DRR[1]) first emerged with the creation of a disaster relief department in the United Nations, in the 1960s in New York. This followed a series of natural disasters in developing countries, including two in 1963: an earthquake in Yugoslavia that left a death toll of about 1,000 individuals, and Hurricane Flora, one of the five deadliest hurricanes in the history of the Atlantic Ocean, that struck the Caribbean Sea, leaving a death toll of 7000-8000 individuals and $528 million dollar in total damage. Following these events, the United Nations Disaster Relief Office (UNDRO), located in New York

[1] Disaster Risk Reduction (DRR) is one of two main components of Disaster Risk Management (DRM). The other is Disaster Management (DM).

- Disaster Risk Reduction: concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters. Describes the development and application of policies, strategies and practices that minimise vulnerabilities and disaster risks through the society to avoid or to limit the adverse impact of hazards within the broad context of sustainable development. DRR uses a wide range of legal, institutional and policy frameworks, administrative mechanisms and procedures related to risk reduction of current and future disasters. (Begum, 2014:3)
- Disaster Risk Management: Goes beyond DRR by adding a management perspective that combines prevention, mitigation and preparedness with response. Hyogo outlines the roadmap for DRR, encompassing governance, risk assessment and early warning, knowledge and education, and reduction of underlying risk factors. (Begum, 2014:3)

City, was created in 1971. It was mandated to put together an Expert Group to work on natural disaster and vulnerability analysis, led by the Disaster Relief coordinator (UNGA Resolution 2816) reporting to the Secretary General, whose tasks were to:

- Promote the study, prevention, control, and prediction of natural disasters,
- Assist in providing advice to governments on pre-disaster planning,
- Improve national disaster warning systems, and
- Mobilize, direct, and coordinate disaster relief activities with UN agencies, governmental and non-governmental organizations, in particular the International Red Cross and Red Crescent Societies. (UNISDR, 2017)

After six years of research, UNDRO published in 1979 a report recommending a greater emphasis on: developing better techniques to improve vulnerability analysis and risk management in the pre-disaster planning and prevention processes; ensuring scientists, planners, and administrators better cooperate; and on clarifying key concepts in risk management, proposing a series of terms that paved the way to the terms used today (natural hazard vs. disaster, vulnerability, etc.), as well as categories of types of natural hazards in general groups (meteorological and hydrological disasters, volcanoes, earthquakes) and subgroups (storms, avalanches, floods).

The UNDRO report established a risk identification methodology and suggested the use of evaluation methods as vulnerability analysis tools. However, it was only at the end of the 1980's that Disaster Risk Reduction was proposed as a global policy priority, with the recognition that an integrated approach to disaster management was required to increase social and economic resilience. This led to the proclamation by the United Nations General Assembly, on January 1st, 1990, of the International Decade for Nature Disaster Reduction, with UNDRO as its secretariat. However, it was only four years later that the first global strategy was drafted and approved by the General Assembly. The Yokohama Strategy and Plan of Action for a Safer World was endorsed by UNGA Resolution 49/22 in December 1994, following the World Conference on Disaster Reduction that took place in May 1994 in Yokohama, Japan.

Slowly, the United Nations redefined its role in disaster reduction. In 1999, in the context of a new United Nations International Strategy for Disaster Reduction, UNDRO became the United Nations Office for Disaster Risk Reduction (UNISDR), and in 2001 its mandate was expanded to link to other areas such as humanitarian aid and international development. Hence, UNISDR "serves as the

focal point in the United Nations system to ensure coordination and synergies among disaster risk reduction activities of the United Nations system and regional organizations and activities in socio-economic and humanitarian fields" (UNGA resolution 56/195).

Progressively, UNISDR's scope of action has broadened to link to DRR-related issues such as climate change and infrastructure that could impact socio-economically states and communities. According to Sall Diallo (2015), the decade of natural disaster prevention has brought awareness of the ideas that natural disasters threaten social and economic stability and that one of the primary solutions is prevention. However, as disasters increase in frequency and intensity, the future challenge is to create resilient communities "moving from a single hazard and response-focused approach to embracing an all-hazard prevention, preparedness, and recovery and rehabilitation approach, and embracing multisectoral and multidisciplinary action that links with sustainable economic development and climate change" (Aitsi-Seli and Murray, 2016).

In this chapter, we focus on the most recently adopted agreement, the Sendai Framework, voted by the General Assembly in 2015. We argue that this agreement symbolizes another paradigm shift in DRR. In fact, for the first time, the United Nations sent a signal towards clearly integrating disaster reduction, sustainable development and climate change, taking a more holistic approach. This change is supported by the negotiation of three high-profile international policies the same year:

- The Sendai Framework for Disaster Risk Reduction 2015-2030, adopted in March 2015,
- Sustainable Development Goals (SDGs) adopted in September 2015 as the next generation of the earlier Millennium Development Goals, and
- A new climate agreement under the United Nations Framework Convention Climate Change Conference of Parties 21, agreed in Paris in December 2015.

Even though these agreements are still not part of a single comprehensive agreement, they reflect a global movement towards a holistic approach to achieving sustainable development. The foundation is a common understanding that DRR, climate change, and eradication of poverty are intertwined and cannot be addressed separately.

In order to defend our argument, we will review the evolution in thinking that has driven a significant re-orientation in the United Nations approach to DRR in the past two decades. We will begin with an overview of the United Nations'

operational role, in order to provide context, and then review in turn the Yokohama Strategy (1994), and the Hyogo Framework (2005) and the Sendai Framework (2015). However, we will argue that even if the Sendai Framework Agreement (SFA) is a step towards a more holistic approach, it is not bold enough to tackle upcoming challenges related to climate change. A more integrative DRR framework is required to respond to future uncertainty and risks.

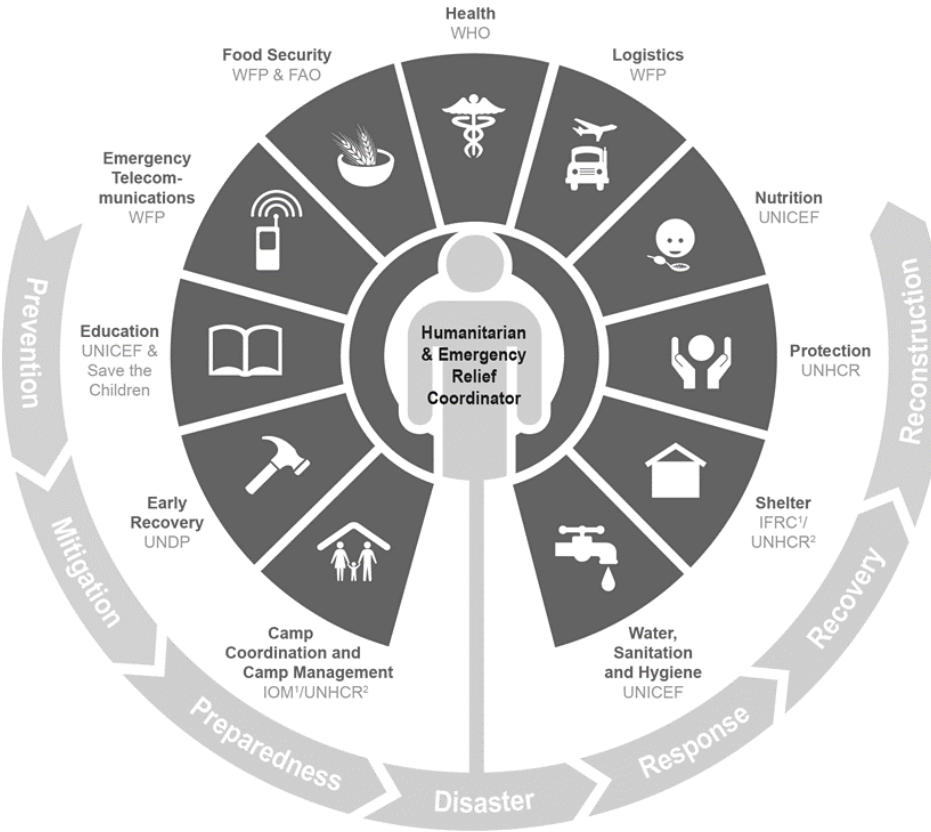
United Nations' Role in Disaster management: Operational Level

While the United Nations Strategy for Disaster Reduction's focal point is to lead the international strategy of risk reduction and act in high level politics, the management of disasters at the operational level is led by OCHA, the Office for the Coordination of Humanitarian Affairs. In this section, we briefly explain the role of OCHA and compare it to the role of UNISDR.

In 1991, the United Nations implemented its own mechanism through UNGA resolution 46/182 to provide international support to countries affected by a disaster and requiring humanitarian assistance when the disaster overwhelms the capacity of the national state. The resolution also created a high-level position of Emergency Relief Coordinator (ERC), whose role is to oversee all emergency management efforts. Nevertheless, following the resolution, more changes were implemented as the Department of Humanitarian Affairs (DHA) and the Under-Secretary-General for Humanitarian Affairs were created to ensure more coherence when responding to catastrophes and emergencies. In 1998, DHA was replaced by the Office for the Coordination of Humanitarian Affairs (OCHA), a United Nations body responsible for coordinating humanitarian action and the UN focal point for responding to natural disasters. When a country requests the action of OCHA, the department may dispatch a United Nations Disaster Assessment and Coordination team (UNDAC) to the country within 24-48 hours following the disaster. The purpose of UNDAC is to facilitate the coordination of disaster relief between all levels of government and NGOs. If the situation requires, the UN may decide to set up an On-site Operations Coordination Centre (OSOCC) to help authorities and better coordinate international relief. Depending on the assessment, OCHA may decide to trigger the cluster system to ensure UN

agencies and non-UN agencies work efficiently together to respond effectively to an emergency.

Figure 15 – The United Nations' Cluster System



Source: United Nations OCHA, 2017

The cluster system has as its primary objective to bridge gaps and limit overlapping when organizations respond to emergencies. A cluster can be defined as a group of humanitarian organizations (UN and non-UN organizations) who come together under a single sector to work together to achieving one common goal. There are 11 clusters (Figure 15):

1. Camp Coordination and Camp Management, led by the International Organization for Migration (IMO) and the United Nations High Commissioner for Refugees (UNHCR),
2. Early Recovery, led by the United Nations Development Program (UNDP),
3. Education, led by the United Nations Children's Fund (UNICEF) and Save the Children (an international Non-Governmental Organization),
4. Emergency Telecommunications, led by the World Food Program (WFP),
5. Food Security led by the World Food Program (WFP) and the Food and Agriculture Organization (FAO),
6. Health, led by the World Health Organization (WHO),
7. Logistics, led by the World Food Program (WFP),
8. Nutrition, led by the United Nations Children's Fund (UNICEF),
9. Protection, led by the United Nations High Commissioner for Refugees (UNHCR),
10. Shelter, led by the International Federation of Red Cross and Red Crescent Societies (IFRC) and the United Nations High Commissioner for Refugees (UNHCR), and
11. Water, Sanitation and Hygiene, led by the United Nations Children's Fund (UNICEF).

The figure shows that each of the 11 clusters has one or sometimes two Cluster Lead Agencies, in all but one case a UN agency. Each designated agency coordinates and manages the cluster and is supported by a cluster coordinator. The cluster coordinator is an administrator whose role is to report to the Humanitarian Country Team (HCT) that is established in the country where the disaster event has occurred, and to ensure that the overall strategic plan is implemented on the ground and that emerging issues that cannot be solved are signalled to the HCT, the strategic and operational decision-making body led by the Humanitarian Coordinator (HC). The HC, accountable to the Emergency Relief Coordinator, must ensure that the disaster relief efforts on the ground are well-organized and suited for the assessed issues. With the Humanitarian Country Team, the HC assesses which cluster should be activated and which organization should lead the cluster on the ground and facilitates inter-cluster collaboration over identified inter-related issues. Through the Humanitarian Coordinator, OCHA ensures its response is appropriate in supporting the HC and the HCT and the cluster system works smoothly.

In 2008, OCHA and UNISDR collaborated to publish a *Guidance and indicator package for implementing Priority Five of the Hyogo Framework*. The fifth priority of the HFA was to strengthen preparedness for response. In the same line, OCHA also participated in the Global Platform in May 2017 and shared expertise to discuss the fourth pillar of the Sendai Framework, which focuses on disaster preparedness.

As explained in this section, OCHA and UNISDR have two different missions and mandates. The table below summarizes their roles and responsibilities.

Table 10 - Summary of UNISDR and UN-OCHA Roles and Responsibilities

Roles and responsibilities	
UNISDR	*OCHA*
Proactive: Intervenes to reduce risk to mitigate disasters	Reactive: Intervenes when a country calls for international help after a disaster
Prevention: Focus on Disaster Risk Reduction to prevent disasters (DRR)	Response: Focus on responding to a disaster or an emergency management (DM)
High level politics: Work with States to implement global agreement (YS, HFA, SFA)	Local grounded strategies and policy: Work with UN agencies, Non-UN agencies, government to respond to disaster (ground work)
Agency within the United Nations Secretariat	Agency within the United Nations Secretariat

Source: Author, 2017

Now that we have established the context in which Disaster Risk Management unfolds, we will focus our chapter on the three primary international agreements that have been concluded in the area of Disaster Risk Reduction, in chronological order: the Yokohama Strategy (1994), the Hyogo Framework Agreement (2005), and the Sendai Framework Agreement (2015).

Yokohama Strategy (1994)

The Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and the related Action Plan were adopted at the World Conference on Natural Disaster Reduction in Yokohama,

Japan in May 1994. This strategy "provides landmark guidance on reducing disaster risk and the impacts of disasters" (UNISDR, 2005:4). It was adopted on the premises that:

- The human and economic impacts of natural disaster have increased;
- To ensure the sustainable development of societies, States have to include four elements of disaster management: disaster prevention, mitigation, preparedness and relief and ensure adequate measures are taken at every level of the State;
- Community participation is needed to develop efficient policies; and
- Each country has sovereign responsibility to protect its citizens from natural disasters.

The Yokohama Strategy focuses on "a more pro-active approach to informing, motivating and involving people in all aspects of disaster risk reduction in their own local communities." (Ranke, 2015: 190) The singularity of the Yokohama Strategy at the time was its attempt to create a global culture of prevention. For the purposes of this paper, its greatest relevance is the World Conference on Disaster Reduction, convened in 2005 by the UN General Assembly both to review the Yokohama Strategy and its Plan of Action and to set the thematic agendas for the next decade (Oluwu, 2015: 305). This review was an opportunity to merge DRR activities and objectives with the implementation of relevant provisions of the Johannesburg Plan at the World Summit on Sustainable Development (2002), with respect to vulnerability, risk assessment and disaster management. For the first time, DRR goals were directly connected to sustainable development. Thus, we could argue that the Yokohama review was a first step toward more integration toward sustainability. This trend was enhanced with the opportunity to share good practices and lessons learned to promote the achievement of sustainable development to increase resilience and reduce risks. Another aspect during the review was the UNISDR's effort to raise countries' awareness of disaster reduction policies. At the review meeting, UNISDR promoted the implementation of DRR policies through reliable and available information shared with civil society and all agencies at every level of government.

Drawing on the conclusions of the Yokohama Strategy Review, five gaps were identified from which five priorities were outlined to ensure sustainable development of societies:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation, which includes the

strengthening of national institutional and legislative frameworks, resources, and community participation.
2. Identify, assess and monitor national and subnational disaster risks and enhance early warning. This includes increasing the institutional and research capacity to improve the forecast of natural hazards and to facilitate information and data dissemination.
3. Increase knowledge of risk management and education to build a safety and resilience culture at all levels.
4. Reduce underlying risk factors to disaster management, including sustainable management of ecosystems and natural resources, food security initiatives, protection of critical infrastructure, sustainable land-use planning, and other social, financial, and economic safety nets.
5. Improvement of preparedness mechanisms for effective response and recovery at all levels (UNISDR, 2005: 4).

In the review process of the Yokohama Framework at the World Conference on Disaster Reduction, nine considerations were also outlined:
1. Taking into account the importance of international cooperation and partnerships, each state has the primary responsibility for its own sustainable development;
2. An integrated, multi-hazard approach to disaster risk reduction should be factored into policies;
3. Gender perspectives should be integrated into all disaster risk management;
4. Cultural diversity, age, and vulnerable groups should be taken into account;
5. Both communities and local authorities should be empowered to manage and reduce disaster risk by having access to the necessary information, resources and authority to implement actions for disaster risk reduction;
6. Need to enhance international and regional cooperation and assistance in the field of disaster risk reduction: transfer of knowledge, technology and expertise, sharing research findings, enhance governance for disaster risk reduction, full, speedy and effective implementation of the Enhanced Heavily Indebted Poor Countries Initiative, etc.;
7. Promote a culture of prevention;
8. Take proactive measures; and
9. Recognize Disaster Risk reduction as a cross-cutting issue in the context of sustainable development (UNISDR, 2005:7).

These considerations demonstrated countries' acknowledgement of the underlying ideas that disasters have social-economic externalities, such as worsening poverty, and increase social-economic discrepancies. Thus, it appears that in 2005 there was a consensus among countries that emergency preparedness is important for sustainable development and is inherent in humanitarian relief and the achievement of the Millennium Development Goals. On these new premises, countries signed the Hyogo Framework in 2005.

Hyogo Framework (2005)

The Hyogo Framework for Action (HFA) 2005-2015 was adopted by the World Conference on Disaster Reduction held from January 18th to 22nd, 2005 in Kobe, Hyogo, Japan. This new framework, which built on a review of the Yokohama framework, was endorsed by 168 countries and was the first global DRR strategy to provide a detailed work plan for different sectors and actors. The discussion paper "Disaster Risk Management in a changing climate," which was presented at the conference, stated that climate change is going to change the "profiles of natural hazards, alter underlying environmental risks and introduce new threats" (Sperling and Szekely, 2005: 9). The report recommended an integrated approach to disaster management that includes capturing and understanding climate change underlying factors and trends, better knowledge and experience sharing mechanisms, as well as limiting institutional barriers. In response, UN Member States committed under the Hyogo Framework to "publish national baseline assessments of the status of disaster risk reduction", to "publish and periodically update a summary of national programmes for disaster risk reduction"; and to "promote the integration of risk reduction associated with existing climate variability and future climate change." (Oluwu, 2015:306)

Contrary to the Yokohama Strategy, the Hyogo framework placed greater emphasis on resilience and communities. In a "more multidisciplinary, forward-looking approach" (Begum, 2014:364), the HFA focused on the Disaster Risk Reduction (DRR) concept, which intends "to systematically avoid (prevent) and limit (prepare for/mitigate) disaster risks with regard to losses in lives and the social, economic and environmental assets of communities and countries." (Oluwu, 2015:306). HFA demonstrated a shift from focusing on responding to natural disasters to a more proactive stance of prevention and preparedness. This

involved developing plans to ensure timely reaction and effective logistics of post-disaster humanitarian emergency response (Oluwu, 2015).

HFA can be summarized in five broad themes of actions contributing to achieving resilience of communities.

Figure 16 – Hyogo Framework for Action Themes

Source: Author based on Zhou et al., 2014

The HFA clearly articulates that the governance of DRR needs to occur at all jurisdictional levels, thus State governments, regional organizations and institutions, and international organizations (including the United Nations System and International Financial Institutions) were identified as major actors by the HFA.

The HFA sets three fundamental goals that governments and communities must achieve in order to increase their resilience:

1. Integrate DRR into sustainable development policies and planning;
2. Develop and strengthen institutions, mechanisms and capacities to build resilience to hazards;

3. Incorporate risk reduction approaches into emergency preparedness, response, and recovery programs (Sall Diallo, 2015:32).

It also identifies five priority actions:

1. Make disaster risk reduction a priority at a national and a local level, with a strong institutional basis for implementation;
2. Know the risks and take actions, i.e. identifying, assessing and monitoring disaster risks, and enhanced early warning;
3. Build the culture of resilience using all possible knowledge and innovation, and as well increase understanding and awareness;
4. Reduce underlying risk factors through adequate risk management techniques; and
5. Always be prepared and respond appropriately when necessary for effective response at all levels (Zhou et al., 2014; Begum, 2014; Oluwu, 2015: 306)

These five priority actions respond to the five gaps that were identified in the review of the Yokohama Strategy in 2005.

The five priority actions belong to a much broader UN strategy to build community resilience and mitigate vulnerabilities – the International Strategy for Disaster Reduction (ISDR) - which is named several times in the Hyogo Framework Agreement. ISDR is presented as a priority for the United Nations in paragraphs IV. D, respecting International Organizations, and IV. E, dedicated to the International Strategy for Disaster Reduction. When we deconstruct the paragraphs, we read in paragraph IV. D that the UNGA recognizes the critical role that international organizations and the United Nations system must play in supporting and implementing the International Strategy for Disaster Reduction in following the actions outlined in the Hyogo agreement. Then, in section E of the Hyogo Framework, this mandate is restated but this time a greater role is attributed to the Inter-Agency Task Force on disaster reduction. The Inter-Agency Secretariat and Task Force were created by the UN General Assembly through resolutions 54/219 in 2000 and 56/195 in 2001.

These measures highlight the shift to a more holistic and integrated approach to DRR by ensuring inter-agency collaboration and cooperation among United Nations agencies and others key stakeholders across the world. The Inter-Agency Task Force aims to “serve as the main forum within the United Nations for continued and concerted emphasis on natural disaster reduction, in particular for defining strategies for international cooperation at all levels in this field,

while ensuring complementarity of action with other agencies." (UNISDR, 2005) The main functions of the task force were to:

1. Serve as the main forum within the United Nations system for devising strategies and policies for the reduction of natural hazards;
2. Identify gaps in disaster reduction policies and programmes and recommend remedial action;
3. Provide policy guidance to the ISDR secretariat; and
4. Convene ad hoc meetings of experts on issues related to disaster reduction (UNISDR, 2005).

Members included fourteen representatives of agencies, organizations and programmes of the United Nations system, up to eight representatives from regional entities, and up to eight representatives of civil society and relevant professional sectors. The chair of the Task Force was the Under-Secretary-General for Humanitarian Affairs, and the Director of the ISDR secretariat acted ex officio as the Secretary of the group. External and internal technical expertise was involved in the Working Groups of the Task Force. Initially, four Working Groups were created to ensure discussion over a wide range of issues related to disaster prevention and preparedness:

1. Working Group 1 focused on climate and related disasters and was chaired by the World Meteorological Organization;
2. Working group 2 dealt with early warning. It was chaired by United Nations Environmental Agency;
3. Working group 3 discussed vulnerability and impact assessment. It was chaired by the United National Development Program; and
4. Working group 4 concentrated on wildland fires and was chaired by the Global Fire Monitoring Centre.

In bringing together key stakeholders, the Inter-Agency Task Force became a wide network of organizations and institutions working together to achieve the HFA goals. Two years later, the Global Platform for Disaster Reduction replaced the Inter-Agency Task Force. Still active, this platform is described as a forum for Member States and other stakeholders to assess progress made in implementing the HFA, "enhance awareness of disaster risk reduction, share experience and learn from good practices, identify remaining gaps, and identify actions to accelerate national and local implementation" (Sall Diallo, 2015: 33). This forum is convened every two years. Its core function is to "enable governments, NGOs,

scientists, practitioners, and UN organizations to share experience and formulate strategic guidance for the implementation of global disaster risk reduction agreements: the 2005 Hyogo Framework for Action and its post-2015 successor the Sendai Framework." (UNISDIR, 2017)

The HFA provided guidance from 2005-2015 for reducing the loss of life and assets in the event of disaster, in particular those arising from natural hazards, based on what was regarded as a proactive and holistic approach to DRR. The HFA was, however, strongly criticized on several grounds. To begin with, HFA did not succeed "in steering a substantial reduction of disaster losses in terms of human lives and social, economic and environmental damage, and spending on DRR is still largely trumped by spending on disaster relief and reconstruction." (Mysiak 2015:102) This was primarily due to the fact that HFA failed to provide the necessary framework to engage actors at the subnational level (regional, territorial and local) as well as the private sector, neither of which can be left behind in any attempt to rebuild a sustainable state:

> *"HFA did not create an inclusive assessment process of the HFA on all levels of disaster management. Instead, a self-assessment process was used which neglected the direct input of local and regional communities. This led to severe gaps in the needs and priorities of disaster-prone and vulnerable communities." (Sall Diallo, 2015: 59)*

Instead, HFA worked within a top-down framework, making DRR policies too high-level by primarily engaging states and international actors. Consequently, DRR strategies were implemented through rigid and formal institutional mechanisms and arrangements.

> *"National platforms are being set up and thematic platforms are being formed at the instance of those who work at the global level, in the UN or donor agencies. Although large numbers of individuals and organisations are involved, and are being consulted and engaged with good effect, the process is still decided at the top, not according to local agendas." (Bhatt, 2007).*

This is in contrast to the widespread understanding at the local and community level that subnational entities are best equipped to address disasters and in particular to implement mitigation and adaptation strategies (Benson et al., 2001; Dekens, 2007; Gaillard & Cadag, 2009; Pelling & Wisner, 2008; Oluwu,

2015:307). This lack of collaboration with the subnational level raised questions about the coherence and coordination of policies and strategies among levels of government and between governmental and non-governmental actors. The rigidity of the top-down system, and the nature and scope of the UNISDR prevented it from dealing directly with subnational actors on a one-on-one basis. It also prevented subnational entities from playing an important role at the global level, thus neglecting the expertise and capacity-building accumulated over the years by local actors and leading de facto to duplication and redundancy.

This challenge is aggravated when local actors are not even recognized nationally as legitimate policy entities. In order to remedy the institutional paralysis, Sall Diall (2015) suggests taking steps to "decentralize UNIDSR and alleviate it from an autonomous institution in DRR initiatives to a guiding resource designed to assist the needs of each level of DRR" (62). Through decentralization, UNIDSR will be better placed to listen and respond to community-level needs. It is evident that to have a significant impact, UNIDSR needs to work closely with local governance institutions and include them in DRR strategic planning and implementation. It also needs to ensure that all levels of government are collaborating with each other and with organizations outside government in sharing information, knowledge, and resources. Even though the Sendai Framework refers twice as often to the local level than does the Hyogo Framework, thus acknowledging the importance of involving and collaborating with the community and subnational, it does not suggest any decentralization of UNIDSR or DRR activities from the United Nations.

Overall, even with numerous flaws, the Hyogo Framework was sociologically significant because it was able to bring national actors to a common understanding of natural disasters and a greater commitment to addressing them. Even if it failed to involve subnational actors, it fostered national capacity building and helped countries develop national disaster management plans and build their preparedness capacity. The Hyogo Framework was also significant for harnessing national knowledge to advance emergency preparedness practices and better equip countries with adequate preparedness mechanisms.

Hyogo's support to national capacity-building was reinforced by the development and implementation of early warning mechanisms across the world as well as the collection and production of more organized international data to better inform countries. The best-known initiative is EM-DAT, the International Disaster Database, created by the Centre for Research on the Epidemiology of

Disasters (CNED). CNED was created in 1973 in the School of Public Health of the Université Catholique de Louvain in Belgium and benefits from a large network working in collaboration with the International Committee of the Red Cross and Red Crescent Societies and UNISDR. In 1990, CNED was an active advocate of the International Decade for Natural Disaster Reduction (IDNDR), which ran through the 1990s. The EM-DAT database is divided into two main categories, natural disasters and technological disasters. The natural disaster category is divided into six subgroups (Geophysical, meteorological, hydrological, climatological, biological, extra-terrestrial) and the technological disaster category is divided into three subgroups (Industrial accident, transportation accident, miscellaneous accident). CNED has established its own criteria to characterize a disaster and enter it in the database. For its purposes, a "disaster" must respect at least one of the following criteria:

- Ten or more people reported killed,
- Hundred or more people reported affected,
- Declaration of a state of emergency, and
- Call for international assistance.

These criteria unfortunately do not take into consideration administrative loss or disruption as well as socio-economic damage.

As the ten-year Hyogo Framework came to an end, the United Nation General Assembly passed on March 18th, 2015 Resolution 66/199 to launch the development of a post-2015 framework for DRR, the Sendai Framework for Action.

Sendai Framework for Action (2015)

The imminent end of the Hyogo Framework created a need for a new agreement that would also address the gaps in the HFA. In March 2015, 187 nation states, meeting in Sendai, Japan, adopted the Sendai Framework for Disaster Risk Reduction (SFDRR – or Sendai Framework for Action), a 15-year voluntary agreement laying the ground for DRR from 2015 to 2030. This third UN World Conference on Disaster Risk Reduction took place in a context that was symbolically important, meeting in the administrative centre of the region of Japan that was devastated by the Tohuku earthquake, tsunami and nuclear triple

disaster in 2011. In fact, it was the first of three landmark agreements negotiated in 2015 and was part of a broader picture that linked international action on climate change, sustainable development and poverty eradication. The Sendai Framework meeting was followed by the International Conference on Financing for Development (FfD) in July 2015, the United Nations summit for the adoption of the post-2015 development agenda in September, and the 21st session of the Conference of the Parties (COP21), which led to agreement on the United Nations Framework Convention on Climate Change (UNFCCC) in December. For the first time in the history of the UNISDR, the United Nations and its member states conceptualized and integrated Disaster Risk Reduction in the broader climate discussion.

The overarching goal of the Sendai Agreement is 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" (Aitsi-Selmi, 2016: 102). In order to do this, the Sendai Framework for Disaster Risk Reduction 2015-2030 called for substantial improvements in seven global outcomes/target areas:

1. Substantially reduce disaster mortality by 2030, aiming to lower the average per 100,000 global mortality in the decade 2020-2030 compared to the period 2005-2015;
2. 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;
3. Reduce direct disaster economic loss in relation to global GDP by 2030;
4. 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;
5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
6. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the framework by 2030; and
7. Substantially increase the availability of and access to early warning systems and disaster risk information and assessment to the public by 2030 (UNISDR, 2017).

These targets will be achieved by focusing on four priorities. The then-Special Representative of the UN Secretary General for DRR, Margareta Wahlström, defined them as follows:

- Priority 1: Understanding disaster risk. Disaster risk management needs to 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. Local government officials need to be given adequate training.
- Priority 2: Strengthening disaster risk governance to manage disaster risk. Work is required to guide, encourage, and incentivize the public and private sectors to take action and address disaster risk.
- Priority 3: Investing in disaster risk reduction for resilience. Public and private investment in disaster risk reduction needs to focus on structural and non-structural measures that can also result in co-benefits such as economic growth and job creation. Target areas include early warning systems, protection of productive assets, and improved safety and functionality of critical infrastructure.
- Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction. Strengthen disaster preparedness for more effective response. Disasters have demonstrated that the recovery, rehabilitation, and reconstruction phases are opportunities to build back better in a disaster-proof way. (Wahlström, 2015: para. 8)

A notable feature of the Sendei Framework Agreement (SFA) is that the stated outcomes are significantly more evidence-based and target-oriented compared to the HFA. In comparison with the HFA, science is placed at the forefront of informed decision making and evaluation. In fact, when we compared the incidence of the words scientific, science and scientific knowledge in the HFA and the FSA, we see a clear difference. FSA refers to science more often than the HFA.

The agreement's greater focus on sustainability and international development situates DRR outcomes in a broader, integrative and holistic approach to sustainable development. SFA becomes intertwined with the Millennium/Sustainable Development Goal agenda, and its targets are in that context. Limiting the duplication of work and objectives, SFA draws the path for deeper cross-departmental and multisectoral work.

The Sendai Framework also reflects a shift in the definition and approach to natural hazards. HFA was single-hazard and response-oriented, however the Sendai Framework shifted to a more preventative and proactive approach. In its promotion of an integrated and holistic approach to DRR, the SFA also suggests a multidisciplinary, multisectoral and all-hazard approach that links once again sustainable development and climate change (Aitsi-Selmi and al. , 2016). In HFA, the multi-hazard approach was mentioned but only at the post-disaster level. The SFA enlarges it to all of society and integrates it into a much broader perspective through sustainable development and climate adaptation and mitigation. In this sense, SFA focuses more on a preventive approach than a reactive approach.

It is also clearer in the Sendai Framework that natural disasters are not seen as an act of nature but are instead at the intersection of society and nature. Political and social dimensions are at the heart of the Sendai Framework, therefore embracing a sociological conceptual model of DRR that considers social factors as a cause of vulnerability (level of socio-economic exposure, livelihood and resilience, social capital, infrastructure and institutions). Aitsi-Selmi et al. (2015) and Wahlström (2015) characterize this new approach as an historical and philosophical shift in DRR by moving UNISDR beyond disaster management to embrace a proactive disaster risk management approach to "prevent new risk, reduce existing risk, and strengthen societal and environmental resilience" (Wahlström, 2015). Sall Diallo (2015) sees this focus on resilience as an opportunity for change. She deplores the use of the term "vulnerability", arguing that it carries a "negative connotation" (60). The recent emphasis on resilience, "adds a more positive spin without the negative connotation of labeling and categorizing a community's strength (59-60).

One of the fiercest critiques of the HFA framework was its lack of consideration for subnational actors. The Sendai Framework's guiding principles include not only the state as the primary entity but also the community and all levels of government. FSA has twice as many references to "local" and "community" as does the HFA. Building on the gap in the HFA that left behind the local level, FSA mentions it twice as often as the HFA. The importance of collaborating and increasing the resilience of the local level in working with subnational entities and communities is acknowledged several times throughout the text. To this extent, Sendai takes a new step in involving local levels. However, Sendai falls short when it comes to suggesting concrete actions or to establishing

how states and the United Nations system should work with subnational entities and communities to build their resilience.

The HFA did recognize the local level as "vital stakeholders in supporting the implementation of disaster risk reduction at all levels" (UNISDIR, 2005:13), and they were even integrated into the priority for action to "ensure that disaster risk reduction (DRR) is a national and local priority with a strong institutional basis for implementation" (UNISDR, 2007:25); however this did not lead to expected outcomes, especially in developing countries, where the local level does not often have the resources or powers to act. Indeed, in countries where the network of international organizations is stronger than the local one, International NGO's tend to play a bigger role than local government.

In 2014, the European Forum for Disaster Risk Reduction working group (2015), based on a survey of 43 countries to evaluate local level implementation of HFA, drafted the following recommendations:

1. Local-level disaster risk management capacities should be reinforced and harmonized with national development plans.
2. Disaster loss data collection, disaggregated according to the new indicator system of the post-2015 framework for disaster risk reduction, should be promoted at the local level.
3. Establish stronger linkages with the sustainable development agenda and climate change framework at the local level via the UNISDR Making Cities Resilient campaign.
4. Local public-private partnerships should be promoted, as the private sector is a major stakeholder in sustainable urbanization.
5. The science-policy interface at the local level should be reinforced, capitalizing on knowledge, including innovation and technology (11).

The Sendai Framework assigns greater importance to society as a whole, but in particular it calls for the "collaboration and inclusion of marginalized and diverse groups such as women, children/youth, the elder community, persons with disabilities, indigenous peoples, poor people, migrants, volunteers, and grass-root communities such as community of practitioners (Sall Diallo, 2015; UNISDR, 2015). Women were already mentioned in the Hyogo agreement, based on a recognition in the review of the Yokohama agreement of the necessity to add a gender perspective to disaster risk management as well as considering "cultural diversity, age and vulnerable groups" (UNISDR, 2005), which were also mentioned in the HFA. The SFA goes a big step further, however, for example

clearly recognizing the importance of indigenous "traditional knowledge" and "local knowledge as a complement to scientific knowledge" (UNISDR, 2015) in the DRR approach. Accordingly, the SFA promotes tailored strategies that take into consideration the specificities of localities, something that HFA failed to achieve.

Even though SFA presents important improvements, there are some grey areas for debate.

The most striking lies in the fact that the SFA is a voluntary but universal agreement. Even though it brings together 187 countries, signatories are not obliged to abide by it. Nonetheless, the involvement of so many nation states paves the way for more collaboration and demonstrates an interest in addressing the deep roots of disasters. Moreover, although the SFA relies more on science and the target setting constitutes the foundation for evaluating it in 2030, the framework does not describe the evaluation methods. In lacking a strong monitoring system, SFA fails to hold signatories accountable. Also, it raises other challenges such as access to reliable data and data availability; many developing countries do not have either the capacity or the transparency and accountability mechanisms to collect, analyse, and share reliable, evidence-based data. The SFA does not come with a new evaluation process and relies on the processes outlined in HFA, with the difference that SFA promotes evidence-based monitoring.

Another debatable aspect of evaluation is the broad quantification of the seven global targets. The use of "substantially" opens the door to various interpretations and does not provide tangible targets either to evaluate or to reach. In other words, it does not define what would be considered as an acceptable substantial reduction. Thus, even if efforts were made to integrate science and collect reliable data, SFA provides a weak foundation for proper evaluation. Nevertheless, it will be interesting to pay more attention to the review of global progress. Most recently, the Sendai Framework was reviewed at the Global Platform for Risk Reduction held in May 2017 in Mexico. Leaders who attended the conference recognized the impact of disasters on economic prosperity: "participants in the Leaders' Forum, recognize that globally, direct economic losses attributed to disasters are increasing significantly, having over the last decade reached close to US$1.4 trillion." (Global Platform for Disaster Risk Reduction, 2017). Also, leaders at the conference pressed the urgency of addressing climate change while acknowledging the causality between climate and extreme weather events.

Leaders talked specifically about the “water-climate close nexus” (GPDRR, 2017) especially water-related events that account for 90% of most events since 1990. Leaders “understand that climate change affects the frequency and intensity of weather-related hazards and presents greater challenges in disaster risk reduction and building resilience.” (GPDRR, 2017). The ideas that climate change increases vulnerability and exacerbates socio-economic disparities were central in the discussion during the Global Platform. Partners specifically identified low-income households, recognizing that the poorest individuals are most probably living in hazard-exposed areas. In order to alleviate risk, global leaders recommended the execution of systematic disaster risk assessment for existing critical infrastructure by 2019 and for any upcoming land use planning, construction, building codes and infrastructure. Furthermore, the Global Platform recommends a people-centred and gender-sensitive approach to risk reduction and building resilience of communities. Finally, the discussion reaffirmed the need to increase international cooperation at every level of governments. The lastGlobal Platform for Disaster Reduction will be held in Switzerland in 2019. Conversations at the 2019 GPDRR included talks on national and local disaster risk reduction, multi-hazard early warning system and the role of cities. At the Global Platform, leaders discussed the integration of Climate change adaptation, resilience and disaster risk reduction.

The Great Convergence: DRR vs. Sustainable Development (Health, Poverty Eradication, and Climate Change)

The section on the Sendai Framework Agreement noted that it was the result of one of three major international negotiations in 2015 and argued that the SFA discussions were integrated into a broader discussion of climate change and sustainability. In its effort to achieve sustainability, SFA has reached out to organizations working in the fields of health in particular but also poverty eradication and to some degree climate change. Thus, contrary to previous agreements, SFA pays closer attention to the broader picture in which a convergence of DRR and sustainable development policies is unavoidable to

achieve the Millennium Goals and increase the resilience of communities and states.

Greater emphasis on health

One of the most important aspects of the SFA is its greater focus on health. According to Aitsi-Selmi (2015), health became an outcome of the FSA through the influence of health actors who participated in great number in the SFA policy process and found support in UNISDR to ensure that health became a tangible outcome of the new agreement. Their mission is therefore accomplished, as the agreement clearly references the word "Health" 76 times, and it is a key component of the priority 3 that aims to invest in disaster risk reduction for resilience. First, it calls for the:

1. Enhancement of the resilience of national health systems by integrating disaster risk management into primary, secondary and tertiary health care;
2. Development of the capacity of health workers in understanding disaster risk and applying and implementing disaster risk reduction approaches in health work; and
3. Promotion and enhancement of training capacities in the field of disaster medicine; and supporting and training community health groups in disaster risk reduction approaches in health programmes, in collaboration with other sectors, as well as in the implementation of the International Health Regulations (2005) of the World Health Organization (UNISDR, 2015:19) at the national level.

Also, SFA focuses on health by promoting cooperation between the various health entities at all levels, protecting local critical infrastructure such as hospitals, and creating a resilient health care system. The health dimension is also highlighted in the agreement as a variable in DRR which includes developing sustainable plans to manage risk related to people with life-threatening and chronic disease prior, during and after a disaster as well as mental health, especially after a traumatic event. For Aitsi-Selmi, SFA constituted an important step that follows a past commitment to better integrate DRR and Health by 2026/27. Member States of the WHO voted for Resolution WHA64.10 entitled *Strengthening national health emergency and disaster management capacities and resilience of health systems*, on May 2011 at the 64th World Health Assembly in

Geneva. This resolution, beyond reaffirming the responsibility of states to "protect the health, safety and welfare of their people" (WHO, 2011) and building on existing frameworks including climate change, the Hyogo Framework (Resolution 60/195), and Disaster management (Resolutions 61/198, 62/192, 63/216, 64/200 and 64/251), urge signatories to:

1. Strengthen all-hazards health emergency and disaster risk-management programs at all levels of government;
2. Ensure hospitals are prepared, located in safe areas and ready to respond to emergencies;
3. Ensure collaboration and cooperation between entities, including the WHO; and
4. Strengthen the role of local health entities in health emergency management.

Put back into perspective, only 27 member states of the WHO signed the agreement in 2011, out of 194 member states, however the importance of this agreement is less in the number of countries adopting the resolution than in the symbolic message it carries for the convergence of DRR and Health, and how it opened the path for the Sendai Framework Agreement.

Poverty eradication and sustainable development cannot be ignored

The second convergence within SFA is the focus on poverty eradication, sustainable development and DRR. SFA recognizes that to prevent or mitigate disasters, nation states need to increase their resilience in addressing poverty to reduce theirvulnerabilities. Thus, for achieving a greater good, the rationale is to directly tackle "underlying disaster risk drivers" (UNISDR, 2015:10), in other words, socio-economic and sustainable development challenges such as poverty and its consequences, poor levels of land use and management, demographics, housing, food security, etc. to reduce vulnerability and increase resilience. Sustainable development and poverty eradication was integrated in the priority 3 of SFA, which aims to invest in disaster risk reduction for resilience by proposing to "strengthen the design and implementation of inclusive policies and social safety-net mechanisms" (UNISDR, 2015:19) that include housing, education, health, food security and nutrition, all underlying drivers for disaster risk management. The intentions are clear in the SFA:

> *"States also reiterated their commitment to address disaster risk reduction and the building of resilience to disasters with a renewed sense of urgency within the context of sustainable development and poverty eradication, and to integrate, as appropriate, both disaster risk reduction and the building of resilience into policies, plans, programmes and budgets at all levels and to consider both within relevant frameworks." (UNISDR, 2015: 9)*

Overall, the outcomes of SFA and the Sustainable Development Goals (SDGs)are interdependent. Only one disaster is required suddenly to sweep away the achievements of the Millennium Development Goals, and now the SDGs, if a society is not resilient enough to overcome such a disaster, but it can also prevent the implementation of long-term strategies due to major setbacks (disease outbreak, displacement of population) that would require rebuilding communities. This is a fact that the United Nations has clearly understood. In fact, in its 2030 Agenda for Sustainable Development, six of the 17 goals "directly relate to disaster risk reduction, recognizing that reducing exposure and vulnerability of the poor to disasters is essential for sustainable poverty eradication, and underlining the importance of resilient infrastructure, improved urban planning, and climate adaption and ecosystem protection". (United Nations, 2015).

Climate change: The elephant in the room is a DRR game changer

Adding to the risk equation, climate change is also a game changer that can no longer be ignored in efforts to achieve sustainable development and community resilience. Therefore, the final convergence of SFA is with the important topic of climate change.

The Sendei Framework Agreement strongly acknowledges the importance to "address climate change as one of the drivers of disaster risk" (UNISDR, 2015: 11). Article 4 of the SFA highlights that climate change drives vulnerability of communities faster, in every country on the planet. It is the only time that the impact of climate change on vulnerability is mentioned in the framework.

"Disasters, many of which are exacerbated by climate change and which are increasing in frequency and intensity, significantly impede progress towards sustainable development. Evidence indicates that exposure of persons and assets

in all countries has increased faster than vulnerability has decreased, thus generating new risks and a steady rise in disasterrelated losses, with a significant economic, social, health, cultural and environmental impact in the short, medium and long term, especially at the local and community levels." (UNDRR, 2015 : 10)

Although, the SFA references "Climate/Climate change" 13 times, it does not provide any substantial strategies to address it, but simply reiterates that climate is an underlying driver to not forget. While it does refer to multi-hazards, it does not refer to multi-vulnerability driven by climate change. Adaptation to climate change is referred to once, in Article 47, but SFA fails to twin climate change adaptation and DRR. This is primarily due to the fact that SFA recognizes that addressing climate change is primarily the mandate of the United Nations Framework Convention on Climate Change (UNFCC). The fact that SFA defers to it as the entity in charge, the United Nation Framwork Convention on Climate Change, and does not take a similar approach as for health raises questions about whether climate actors such as the UNFCCC participated in the FSA policy-making process to ensure that climate mitigation and adaptation policies would be included among the various priorities of DRR.

While this may constitute a significant limitation to SFA, Wahlström (2015) affirms that the Sendai Framework Agreement "is integral to upcoming major processes to mitigate and adapt to climate change and to agree to a new set of sustainable development goals" (Wahlström, 2015: para. 9). On the other hand, Surminski (2015) is more hesitant; even though he hopes that the agreement will "send the right signals to the next round of international political negotiations", he does not believe that SFA is going to be a "pivotal point for global climate risk management" (para.10). Overall, even if we recognize SFA for including and considering climate change as a substantial driver to DRR, we regret the lack of commitment and strategies to better integrate climate change adaptation and mitigation, and DRR through tangible efforts, strategies and solutions in the Sendai Framework Agreement. The Global Plateform in May 2017 reassertedthat the Sendai Framework needs to be implemented in coherence with the Sustainable Development Goals, the Paris Agreement on Climate Change, the new Urban Agenda, and other relevant agreements as acknowledge by the 2017 Global Plateform for Disaster Risk Reduction. Once again, even if we recognize the effort to have a comprehensive approach to addressing risk reduction, neither the Sendai Framework nor the Global Platform provides a framework

outlining how to have a coherent approach and how outcomes and outputs will be evaluated while considering other agreements.

Conclusion

From Yokohama to Sendai, there demonstrably has been a paradigm shift that has changed the approach to DRR over the past 20 years. UNISDR is now far away from a single-disaster approach and is closer to a more holistic approach to DRR in integrating sustainable development in a more integrative and comprehensive framework. The Sendai Framework Agreement represents significant progress in converging health, poverty eradication and sustainable development with DRR practices, however this latest international agreement is not bold enough in addressing climate change as an underlying risk driver. Although it recognizes the urgency to act, FSA only barely scratches the surface and disengages its responsibility in this area by leaving the UNFCCC as the sole entity responsible for climate change. While this is regrettable, the Sendai Framework Agreement at least sends an important message to the world in showing the importance of addressing climate change if we want to increase the resilience of nation states and communities. At the same time, after 20 years DRR is an inevitable concept that has taken its place as a central component of the overarching paradigm of sustainable development. It may be, however, that the real progress is not to be found in the Sendai Framework, but in the 2030 *Agenda for Sustainable Development*.

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Chapter 9. Coordination of Humanitarian Assistance within Donor Countries: A Canadian Perspective

Aaida Mamuji

Introduction

On January 12 2010, an earthquake of 7.0 magnitude on the Richter scale hit Port au Prince, Haiti. The earthquake caused an estimated death toll of 220,000 people, displaced around 1.5 million, and resulted in extensive infrastructure damage (DEC 2010). The Haitian government was incapacitated. United Nations (UN) offices were severely damaged or destroyed. This included the Port au Prince office of the UN's Office for the Coordination of Humanitarian Affairs (UN-OCHA), whose functioning was directly affected by the death of the Head of Office's entire family (Bhattacharjee and Lossio 2011). Although UN clusters were activated within three days of the earthquake, it took about 2-3 weeks for all clusters to become functional. This state of affairs, however, did not inhibit a multitude of international actors from providing more immediate support to Haiti. Canada is a case in point.

Canada and Haiti share a rich history of diplomatic relations, with Canada spearheading a number of development, security and political operations in the country. Canada's engagement in Haiti falls within its priorities for the Americas and focuses primarily on prosperity, security, and democratic governance. Haiti is one of the highest recipients of Canada's Official Development Assistance

(ODA) – flows of official financing contributed by member countries of the OECD with the main objective of promoting the economic development and welfare of developing countries (Canada CIDA 2011). There is also a large Haitian diaspora in Canada. In 2001, there were approximately 82,000 Canadians of Haitian origin, and the 2011 census indicated that this number had risen to 137,995, with a strong concentration in Quebec (Canada Statistics Canada 2011). Canada's former Governor General, Michaëlle Jean, is also of Haitian origin and held this position at the time of the disaster in Haiti. These strong ties, as well as Haiti's geographical proximity, resulted in an atmosphere that favoured a robust disaster-relief effort after the drastic 2010 earthquake in Haiti.

Hours after the earthquake hit, Canada's whole-of-government system for response to natural disasters abroad was set in motion. The whole-of-government approach requires close collaboration between Canada's foreign ministry (Canada DFAIT), development agency (CIDA), and defence force (DND)[1]. In response to the 2010 earthquake in Haiti, these efforts resulted in interdepartmental collaboration between fourteen federal-level departments and agencies, and the deployment of over 2000 Canadian Forces (CF) personnel to Haiti, to aid in relief efforts. Canada conducted its own needs assessment to decide how best to match its resources and capabilities to those needs. Canada also implemented unprecedented measures to deal with the evolving situation, including launching a fund to match donations made by Canadians and establishing special immigration measures (Canada DFAIT 2012). Less than 24 hours after disaster-onset, Canadian personnel were already engaged in medical relief efforts in Port-au-Prince (Golberg 2011).

[1] The Canadian federal government operates within the Westminster parliamentary model of governance. It uses the term "department" when referring to its ministries under the direct control of a minister and "agency" to refer to semi-autonomous organizations that are subject to ministerial policy direction. All ministers are elected members of Parliament and also members of the Cabinet (council of ministers), which is led by the Prime Minister. In March 2013, the Government of Canada announced that CIDA would be folded into DFAIT, with the combined organization renamed the Department of Foreign Affairs, Trade and Development (DFATD). This department was subsequently renamed to Global Affairs Canada in 2015. There are five ministers working out of this department, led by the Minister of Foreign Affairs and including the Minister of International Cooperation. Both these ministers directly participate in decision-making related to Canada's humanitarian relief efforts. This merger minimally affects the whole-of-government approach described in this chapter. As such – and as the events described in this paper pre-date the reorganization – the earlier titles for the agencies are used.

Variants of the whole-of-government approach have been developed internationally through a number of models. The UN, NATO and the EU refer to the "comprehensive approach," and several governments, such as Australia and the United Kingdom, refer to their system as "joined-up government." Each model recognizes that for peace and stability operations there is great interconnectedness between political, security, governance, and development dimensions. According to the OECD Development Assistance Committee (DAC) peer review, Canada's whole-of-government approach for responding to natural disasters abroad serves as an important good practice in this regard. Canada's approach is characterized as an effective framework for action, particularly because of its ability to ensure "a coordinated, principled and appropriate cross-government response to major humanitarian emergencies." (DAC 2007; DAC 2012) While its merits are known, the details on how Canada's whole-of-government approach has evolved over time and how it works are not readily available. This chapter seeks to fill this gap.

International relief efforts in response to humanitarian crises are enhanced when individual donors have processes in place for coherent internal coordination, especially when a plethora of humanitarian actors rush into the affected country to offer aid. After providing justification for this argument, this chapter describes in detail the Canadian model for response to natural disasters aboard. The chapter concludes with a cautionary note on the implications of politics and media in affecting the degree to which humanitarian responses are needs based.

Coordination of International Aid Efforts

Catastrophic natural disasters often leave affected governments with no choice but to declare a state of emergency, requesting international assistance for disaster-relief and reconstruction. In these cases, a multitude of actors, including local and regional players; bilateral donors; international agencies; non-governmental organizations; and concerned global citizens, seek to provide extensive relief-assistance to the affected region. The UN Office for the Coordination of Humanitarian Affairs (UN-OCHA) is tasked with coordinating this outpouring of support and for ensuring that the cooperative efforts amongst responding parties work towards meeting common goals in the aftermath of the

disaster (UN-OCHA 2013). These are usually organized through a cluster system. Designated by the UN's Inter-Agency Standing Committee (UN-IASC), clusters are composed of UN and non-UN humanitarian organizations in main sectors of humanitarian action, including Water, Sanitation and Hygiene; Shelter; Health; and Logistics. Clusters are used for planning, coordination and execution of humanitarian assistance (for more details see UN-OCHA n.d.). Furthermore, OCHA triggers flash appeals to the international community within one week of an emergency, providing an overview of urgent lifesaving needs and recovery projects that can be implemented within the first 3-6 months of the disaster.

The number of humanitarian agencies that were engaged in relief efforts in Haiti is unprecedented. OCHA initially estimated that there were 400 humanitarian agencies in operation, but later revised the estimate to 2,000 operational agencies based on real-time evaluation (UN-IASC 2010). Media reports indicated that at one time there were up to 8,000 national and international humanitarian and aid agencies in Port-au-Prince (Doyle BBC News 2010). Given these staggering numbers, lack of coordination after the Haiti earthquake led to duplication of efforts and inefficient utilization of resources (Weisenfeld 2011). These problems are compounded when there is poor internal coordination amongst participating actors, such as donor countries.

Individual donor countries are able to provide support in a number of ways. While some opt to make financial contributions, others may engage in conducting needs-assessments, providing relief supplies, deploying experts, and/or providing military aid. DAC member countries typically have aid agencies responsible for handling international development efforts, such as the United States Agency for International Development (USAID), the United Kingdom Department for International Development (DFAID), and the former Canadian International Development Agency (CIDA) (OECD 2013). When a donor country decides to provide major relief assistance however, these individual agencies are often required to collaborate with other domestic ministers and agencies in their country. This is especially true where the donor country is also going to provide military support, thereby activating the defence ministry in disaster-relief discussions. In order to be successful, these cross-government collaborative efforts require proper coordination mechanisms. If this is not the case, effective discussions during OCHA-led donor cluster meetings are inevitably hampered.

Evolution of Canada's Framework for Response to Natural Disasters Abroad

Canadian foreign aid began in 1950 when it joined the Colombo Plan for Co-operative Economic Development in South and Southeast Asia as a post-cold war anti-communism security strategy (Morrison 1998; Spicer 1966). Canada believed it should contribute fifty million dollars yearly, which, it was argued, would have the effect of halting communism in Asia. The discourse changed about five years later when Canada's official justification for its international development role moved away from supporting an American-led Western Alliance to one reflecting its proclaimed values of humanitarianism and social justice. Canada created an External Aid Office in 1960, which in 1968 became the Canadian International Development Agency (Canada CIDA). CIDA has been the primary federal body responsible for administering the majority of Canada's Official Development Assistance budget, until its merger with the Department of Foreign Affairs and International Trade, and subsequent renaming in 2015 to Global Affairs Canada (Canada DFAIT) in 2013.

At its inception, CIDA was a relatively independent organization. The deputy minister,[2] who was responsible directly to the Secretary of State (Minister) for External Affairs, was given the title President (Pratt 1998). This gave the organization a sense of importance, but also independence (Rawkins 1994). The initial set-up mandated that neither administrative decisions nor policy advice to the Minister could be overruled by officials of the Department of External Affairs (the Canadian foreign ministry), no matter how senior they were. Thus, "once the president of CIDA had convinced 'its' minister of the necessity of any policy, that policy would be unlikely to be successfully challenged at Cabinet." (Pratt 1998: 2) In 1996, however, it was announced that CIDA would be overseen by a junior minister within the External Affairs portfolio, titled the Minister for International Cooperation. This decision has been argued to have contributed to a stronger alignment of Canada's development objectives with those of domestic foreign policy (Morrison 1998; Pratt 2007). Although afforded a ministerial title, the Minister of International Cooperation is junior to the Minister of Foreign Affairs, and the Department of Foreign Affairs has the lead on advising Cabinet on all

[2] In the Canadian public service, a deputy minister is the senior permanent official in a department, the counterpart of a British permanent secretary.

aspects of Canadian foreign policy, including aid. Both organizations have therefore worked closely on development and humanitarian interventions, including disaster-relief, with DFAIT having ultimate administrative authority.

Initially, international disaster-relief decisions were handled through ad hoc interdepartmental collaboration between CIDA's International Humanitarian Assistance (IHA) program, the Government of Canada's main channel for the provision of non-food emergency humanitarian assistance, and DFAIT's Human Rights, Humanitarian Affairs, and International Women's Equality (AGH) Division (Canada DFAIT 2005). In 2005, DFAIT established the Stabilization and Reconstruction Task Force (START)[3]. Following the Canadian response to the 2004 Indian Ocean basin earthquake/tsunami, a recommendation was made to "strengthen and integrate with the stabilization and reconstruction Taskforce the departmental crisis response unit (AGH) to ensure sufficient capacity during major, prolonged international crises." (Canada DFAIT 2005) Crisis response and management capacities were strengthened and consolidated in a standalone group taken from the AGH, now known as the Humanitarian and Disaster Response Group (IRH), housed within START. This is in line with the OECD suggestion that given their position, role and mandate, foreign ministries are best placed at headquarters to take on the lead coordinating role of whole-of-government efforts (OECD 2006). START-IRH is responsible for coordinating Canada's responses to international disasters abroad, as well as for the

[3] Established in 2005, START was the DFAIT branch that was designed to help answer the growing international demand for Canadian support and involvement in complex crises. It also administered the Global Peace and Security Fund (GPSF) which was established in 2005 to "provide financial and programming resources to facilitate timely, effective and accountable conflict prevention, crisis response, peace operations, civilian protection, and stabilization interventions in fragile states" (Canada DFAIT 2011, Online). START was made up of four divisions. The Humanitarian Affairs and Disaster Response Group (IRH) is the division of focus in the current chapter. The Stabilization and Reconstruction Programs Division (IRG) provided guidance, direction and horizontal coordination along geographic and thematic lines. The Peace Operations and Fragile States Policy Division (IRP) developed and coordinated policy in Cabinet-mandated countries of focus, primarily in fragile states and in the areas of conflict management, and international peacekeeping/peacebuilding initiatives. The Coordination and Deployment Division (IRC) coordinated all business processes and reporting for START, as well as was responsible for whole–of–government expert civilian deployments (for a history and further details, see Canada DFAIT 2011). START is the predecessor of the Peace and Stabilization Operations Program (PSOPs), which was established in 2016 (Canada GOC 2016).

development of Canadian policy on international humanitarian affairs. It is also involved in coordinating with the military in joint disaster-relief efforts.

The appointment of Lloyd Axworthy as Minister of Foreign Affairs in 1996 is argued as having begun the era of securitization of aid in Canada (Pratt 2007). That year the Department of National Defence and the Canadian Forces (DND/CF)[4] developed the Disaster Assistance Response Team (DART), adding military facilities to Canada's toolbox for disaster-relief in cases where civilian capabilities are considered to be insufficient on their own. DART was originally designed as a rapidly deployable stabilization tool, able to provide specific medical, water purification, engineering, logistical, and security services for 40-60 days after the onset of a disaster (Canada DND 2012). Before the Haiti earthquake, DART had been deployed four times: Operation Central (1998) in Honduras in response to Hurricane Mitch; Operation Torrent (1998) in response to the earthquake in Turkey; Operation Structure (2004) in Sri Lanka in response to the Indian Ocean basin earthquake/tsunami; and Operation Plateau (2005) in Pakistan in response to the earthquake there (Canada DND 2012; Canada NDCAF 2013b)[5]. The response to the Haiti earthquake in 2010 was named Operation Hestia.

Canada's 2005 International Policy Statement (IPS), entitled *A role of pride and influence in the world,* placed interdepartmental collaboration at the heart of Canada's development and humanitarian interventions abroad (Canada DFAIT 20005b). Known then as the "3-D" approach, it emphasized that defence, diplomatic, and development mandates are to be jointly addressed in Canada's involvement in failed and fragile states, citing the approach as the ideal strategy for "supporting states that suffer from a broad range of interconnected problems." (Canada DFAIT 2005b: 20) This approach was acted on most systematically in Canada's participation in the United States-led coalition in Afghanistan. In an attempt to bridge a gap between the security aspect of Operation Enduring Freedom and wider reconstruction and stabilization needs in that country, Canadian Forces (CF) in Kandahar province saw the introduction

[4] The National Defence Headquarters is the headquarters for Canada's Department of National Defence (DND) and the Canadian Armed Forces (CF). While the CF is completely separate and distinct from DND, DND acts as the civilian support system for the CF (NDCAF 2013a).

[5] DART capability was also deployed in Operation Renaissance (2013) as part of the Government of Canada's response in the Philippines following Typhoon Haiyan and Operation Renaissance 15-1, in response to the devastating earthquakes that hit Nepal on 25 April 2015 and 12 May 2015.

of quick impact projects (QIPs), where military personnel would engage in short-term and small-scale "hearts and minds" efforts (Baker 2007). With the shift from a Liberal to a Conservative government in Canada in early 2006, the interdepartmental approach was given new branding and became known as a "whole-of-government" approach to Canada's international development initiatives (Travers and Owen 2008; Hrychuk 2009).

The government has argued that the three departments working together is the "best use of all available expertise, exploits local knowledge and ensures that complementary functions are coordinated on an interdepartmental basis" (Canada DND 2006: 5). Together with the Privy Council Office (PCO, the Prime Minister's non-partisan public service department), DFAIT, CIDA and DND form the permanent members of the Taskforce for Natural Disasters Abroad (referred herein as Taskforce). Other federal government departments may be required to assist in international relief efforts based on the nature of the natural disaster. This is a joint decision made by humanitarian experts in DFAIT and CIDA immediately following a natural disaster, and evolves as more information about the event is obtained. The following section discusses the specifics of the whole-of-government approach which facilitated Canada's 2010 response to the earthquake in Haiti.

Canada's Whole-of-Government Approach

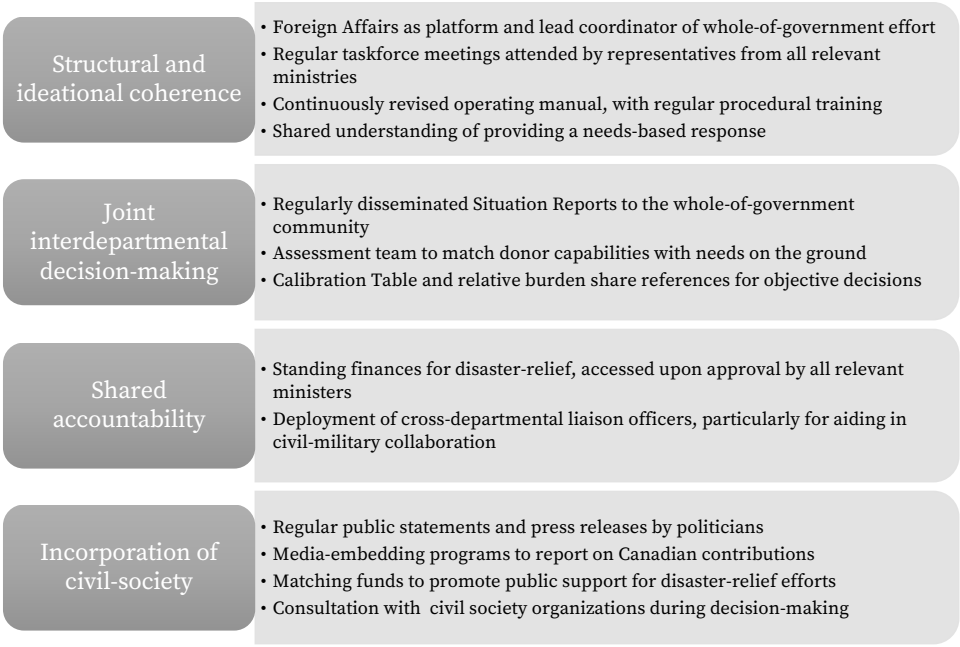
In Canada's response to the earthquake in Haiti, close interdepartmental collaboration was required between 14 federal entities, in addition to CIDA, Foreign Affairs and DND. These included: Citizenship and Immigration Canada; Canadian Border Services Agency; Public Health Agency of Canada; Public Safety Canada; the Royal Canadian Mounted Police; the Department of Finance; and Natural Resources Canada, amongst others (Canada DFAIT 2012). Exceeding ten times the traditional 205 personnel DART unit, Operation Hestia resulted in 2050 CF personnel deployed to Haiti. Furthermore, within two weeks of the earthquake the Canadian government also organized an international Ministerial Preparatory Conference in Montreal attended by representatives from 11 countries, as well as international financial institutions, including the Inter-American Development Bank (Canada DFAIT 2012). The conference provided an opportunity to assess the evolving situation on the ground, and through

developing a common vision for the international community, efforts were made to ensure that the UN was fully supported in achieving its early recovery and long-term stabilization and reconstruction goals in Haiti. While such a conference is not a common occurrence during Canada's engagement in disaster-relief efforts, the Montreal meeting demonstrated the inbuilt capability of the government to liaise with the international community for a concerted development effort.

Many aspects of the whole-of-government approach facilitated this interdepartmental effort. Its strengths can be categorized as consisting of: i) structural and ideational coherence; ii) joint interdepartmental decision-making; iii) shared accountability; and, iv) incorporation of civil-society[6] (see Figure 17). Donor countries seeking to strengthen their disaster-relief mechanisms may find useful insights from these approaches for their own system.

[6] Descriptions of the whole-of-government approach were obtained through semi-structured interviews that were conducted between June 2011–March 2012 with civil-servants who participated in Canada's Haiti earthquake relief efforts from: DFAIT; CIDA, DND/CF; Privy Council Office (PCO); Department of Finance; Natural Resources Canada; and the Canadian Public Health Agency. Access to Information requests were used to obtain lessons learned documentation, internal memos, and assessment reports pertaining to disaster-relief operations which involved DND/CF, dating from 1998–2010. Publically available information Online, particularly DFAIT's website "How the Government of Canada Responds to Natural Disasters Abroad" (see Canada. FATDC 2013) was also used.

Figure 17 – Summary of Canada's Whole-of-government Approach for Response to Natural Disasters Abroad



Structural and ideational coherence

The Standard Operating Procedures (SOPs), of which DFAIT is the custodian, is a working document that forms the foundational reference for responding to international natural disasters. After Canada's experience in response to Hurricane Mitch in 1998, PCO gave a directive to the now IRH unit to create a strategy that would manage consular issues and the dynamics of providing humanitarian assistance abroad. The SOPs are continually revised and strengthened as lessons are learned through successive interventions. They "are designed to streamline standard actions in response to a major crisis and to anticipate turnover in staff amongst the various stakeholder units and organizations" (Canada DFAIT 2005). Amongst others, the SOPs include prior designation of officials to carry out specific tasks, reporting templates, authority structures, and step-by-step processes to be undertaken. IRH runs training

programs every summer in order to ensure that staff within DFAIT's divisions and in departments across government are aware of their roles in the event that an international natural disaster response is required.

Following each large-scale Canadian disaster-relief response, such as those that included the deployment of DART and Canada's 2003 response to the Bam earthquake in Iran and Hurricane Katrina in 2005, DFAIT engages in a robust After Action Review process where independent consultants are contracted to critique the Canadian disaster-relief effort. With each After Action Review, lessons are to be learned, and established processes in the SOPs are to be redefined and streamlined accordingly. While only a thin manual, the SOPs have proven to be effective for enabling structural coherence.

According to the SOPs, individuals in CIDA's IHA and DFAIT's IRH monitor natural disasters abroad on a 24/7 basis, receiving automatic alerts through geological monitoring systems on their smart phones when a country faces a quick onset natural disaster. Canadian diplomatic mission staff in the affected country is contacted and DFAIT is required to activate a meeting of the Interdepartmental Task Force on Natural Disasters Abroad (Taskforce) if deemed necessary.

Initial Taskforce meetings following the earthquake in Haiti saw over seventy people in attendance, including the Canadian Head of Mission (HOM), Ambassador Gilles Rivard, who joined via teleconference from Port au Prince. It was apparent very early on that the Government of Canada aimed to provide a robust response in Haiti. Whereas the earthquake hit at around 1700 on January 12, the DART received a warning that it might be deployed by 1800 the same day. The DART reconnaissance team began its journey to Haiti the following day, January 13, at 0600, only 11 hours following disaster onset (DND 2010). While the employee grades of individuals participating in Taskforce meetings vary depending on the severity of the disaster and the degree to which Canada is likely to be involved, middle level managers participated in Taskforce meetings for the Haiti disaster-relief effort. The Director-General of START moderated Taskforce meetings, and she also served as the single focal point for the Canadian post in Haiti, such that the Ambassador could channel all requests to one source.

In accordance with standard procedures, during Taskforce meetings, department personnel shared information that they had on the situation on the ground, and presented resources that they were able to bring to bear. Through discussions on what the Canadian response could possibly look like, the skeleton

of the Canadian response began taking shape by the end of the first Taskforce meeting. This facilitated group ownership for the recommendations sent up to relevant Cabinet ministers for consideration. The Taskforce also served as a forum to address any coordinating issues in executing decisions, especially with respect to flight scheduling, visas, and diplomatic matters that were likely to arise. Augmenting Taskforce meetings, senior management from DFAIT, CIDA and DND also held their own meetings to iron out any issues of contention before appearing at the interdepartmental table. In the four days following disaster onset, seven Taskforce meetings were held; a total of 39 Taskforce meetings were convened during the two months following the earthquake. Having all relevant actors meeting together from the beginning of discussions is also important from an ideational point of view.

Through Taskforce meetings, all relevant departments and agencies were able to develop a common mental frame for what Canada's response in Haiti should look like. In addition to the shared understanding that START-IRH serves as the lead coordinator of the whole-of-government approach, there is an overwhelming consensus amongst Taskforce members - regardless of which department they are from - that the objective of the whole-of-government approach is to uphold the humanitarian ideals of responding based on the needs on the ground, and in ways that are fair, impartial and independent, as mandated by the Good Humanitarian Donorship (GHD) principles (see Hilhorst 2005; Walkers 2005; Good Humanitarian Donorship Website 2015). Members from the participating departments have a clear and common understanding that their objective is to collaborate so as to ensure that Canadian aid is delivered to those affected in the most efficient way. The more common the mental frame, the more likely that mutually reinforcing policy objectives are reached, and the more unified the collaborative effort is (Fischer 2003; Peters 2005); certainly a factor credited by Taskforce participants as a strength of the Canadian disaster-relief model.

Joint interdepartmental decision-making

Despite the numerous and often conflicting self-interests of individuals and stakeholders, collaborative efforts are recognized for their ability to address inter-organizational conflict by requiring stakeholders to develop a unified

strategy on how to decide on the issues that brought them together (Vigoda and Gilboa 2002; Ansell and Gash 2007). One way to enable this is to ensure that all stakeholders share the same base set of information. The regular development and distribution of Situation Reports (SitReps) is one means by which to ensure that stakeholders have the same information on developments. Within one month of the earthquake, DFAIT distributed 34 SitReps to the whole-of-government community, the first of which was sent roughly nine hours into the earthquake. The SitReps outlined all important information regarding the evolving situation in Haiti, an updated assessment of the needs, as well as steps taken by the Government of Haiti and international actors in response to the earthquake. The reports also provided an update on Canada's consular efforts; other Canadian interventions; announcements made by the Prime Minister and Cabinet members; and, statements from the Government of Canada that could be used when addressing media representatives.

An additional mechanism that promotes interdepartmental collaboration is standardization of decision-making processes (Peters 2005). One means that Canada has available to assist in developing recommendations for consideration by Cabinet is the Interdepartmental Strategic Support Team (ISST). A small team of a minimum four members, it is Canada's interdepartmental reconnaissance and assessment capability. Representatives sitting on the ISST for each disaster are selected based on their expertise and availability. The ISST must include one representative each from DFAIT and CIDA, and two DND/CF personnel. If deemed beneficial, representatives of other departments may be called in to participate. Through collaboration with the host government, the local embassy, and international humanitarian actors present on the ground, the ISST is the first unit to provide relief recommendations for the Taskforce to deliberate.

There are a number of intervention options that the ISST can consider when establishing their recommendations, including cash contributions, deployment of pre-identified Canadian technical experts, and distribution of relief stocks (Canada FATDC 2013). The SOPs require that the ISST recommend the use of military assets before they can be officially deployed by the Government of Canada, and the team is required to make recommendations within 36-48 hours of a quick onset natural disaster. Reflecting the magnitude of military assets used in Canada's response to the earthquake in Haiti, changes have now been made to the DART Contingency Plan. In addition to the deployment of DART, potential additional military assets can include Army Brigades, Navy Ships and Air

Command for strategic airlift, reflecting the scalable nature of military engagement. In response to the earthquake in Haiti, the ISST was deployed within 18 hours from disaster onset. Given the severity of the disaster, DND also deployed a small medical team at this time in order to expedite medical operations.

ISST personnel use a Calibration Table when making their recommendations. Aimed at limiting subjectivity, the table suggests possible responses depending on the nature of the disaster and the extent of damage caused. While not an exact science, the Calibration Table attempts to standardize Canada's relief efforts based on the facts on the ground. Similarly, when developing initial recommendations, ISST and Taskforce members assess Canada's global burden share based on the UN and consolidated flash appeals. This is an attempt to ensure that Canada's contribution remains within a pre-identified and agreed range in relation to wider international support. These decision-making mechanisms ensure that stakeholders from the three main departments come to an agreement on recommendations, thereby facilitating ownership of decisions taken, minimizing conflict, and providing the most optimal disaster-relief package possible. According to the standard procedures, ISST recommendations are discussed at the Taskforce before being provided to Cabinet ministers and their deputy ministers for consideration through Action Memos. This is followed by a series of letters of understanding exchanged between ministers, with a final written request sent to the Prime Minister for approval.

Shared accountability and responsibility

One of the identified risks of collaborative efforts such as whole-of-government approaches is the fact that they often result in complex accountability arrangements, particularly in light of the myriad of stakeholders involved (Pollitt 2003). Since managing international disaster-relief requires leadership to steer resources in the right direction at the right time, and quickly, some argue that for truly integrated planning and implementation to occur, "a joined-up pool of resources, is absolutely necessary." (Fitz-Gerald 2004: 22; Brattberg and Sundelius 2011) Canada's framework for disaster-relief interventions in response to catastrophic natural disasters addresses this through its Crisis Pool mechanism.

Canada's Global Peace and Security Fund (GPSF) is administered by START to support Canada's response to international crises (OECD 2006). Announced in the 2005/06 Budget, part of the GPSF is the Crisis Pool, a sum of money, capped at CAD 400 million, for international aid and stabilization efforts that exceed approved departmental budgets. The Crisis Pool is jointly managed by DFAIT and CIDA, in consultation with the Privy Council Office (PCO), the Department of Finance and the Treasury Board Secretariat (TBS). Upon the agreement of these departments and agencies that an event constitutes a major crisis requiring extraordinary contribution from the Government of Canada; that the crisis has required a multilateral response; and that there are insufficient resources to provide an adequate Canadian response in IHA or START, the Ministers of International Cooperation and Foreign Affairs, with a letter of concurrence from the Minister of Finance and consensus of the central agencies, write to the Prime Minister (or write a Memorandum to Cabinet) requesting approval to access Crisis pool funds. Where DND assets are to be used in the initiative, such as through the deployment of DART, the funds required by the military are used as part of a wider Crisis Pool allocation. This also requires approval of the Minister of Defence. Final release of Crisis Pool funds must be authorized by the Treasury Board, upon receipt of approval from the Prime Minister or Cabinet.

After making contributions to aid efforts from their own reference budgets, DFAIT and CIDA ministers can request to access the Crisis Pool for funds over CAD 10 million. This resource pool is locked, in order to ensure that the rest of the development system is not affected when Canada mobilizes a large-scale relief effort. While access to Crisis Pool funds is generally limited to specific supply cycles, in exceptional circumstances there is an amount set aside which can be released very quickly upon receiving the appropriate approvals, regardless of where the request falls within the fiscal calendar. The responsibility of the Department of Finance at this time is to play an oversight and challenge role to ensure due diligence, requiring that proper monitoring and accountability frameworks be put in place so that allocated funds are eventually spent as intended, with accurate account-keeping. This joint structure for accessing Crisis Pool funds ensures that financial accountability is shared amongst all primary stakeholders in the whole-of-government effort.

In response to the earthquake in Haiti, on January 14 at 8.30am, the Minister of International Cooperation announced that a Matching Fund would be open, for up to CAD 50 million (see section on Incorporation of Civil Society for more

details on the Matching Fund). This required access to the Crisis Pool, and saw a joint letter being written by ministers of the three departments (DFAIT, CIDA and Finance), with final approval given by the Prime Minister.

Furthermore, Stabilization and Humanitarian experts, also referred to as Liaison Officers, from both DFAIT and CIDA are deployed alongside military personnel in each of the bases where Canadian military assets are used as part of Canada's whole-of-government effort. Liaison Officers are tasked with ensuring a smooth transition once Canadian military officers end their humanitarian mission within the mandated 40-60 days. Within this timeframe, it is expected that "national and/or international organizations…assume responsibility for the capabilities provided by the CF" (Canada CEFCOM 2010: 10); it is the responsibility of Liaison Officers to aid in succession planning by interfacing with NGOs that will remain in the disaster-affected area in the long term, and to coordinate with local authorities and UN organizations. During the earthquake response, a total of six Liaison Officers accompanied the Canadian bases that were established in Haiti, with two individuals in Port-au-Prince, Léogâne and Jacmel each. Given the often-contentious reaction towards military aid in humanitarian crises, the use of Liaison Officers in Haiti proved critical in easing tension amongst local authorities and non-governmental organizations (NGOs). They also assisted in mitigating the cultural differences experienced when civilian and military personnel jointly work together on humanitarian missions. Physically co-locating diplomatic and development officers is said to provide a "comprehensive and integrated approach right from the beginning of [the] operation" (Golberg 2011).[7]

Having members from different departments exchange personnel to this degree provided the sense that the three primary departments were working as a unified entity, with shared accountability and responsibility. It also assisted in the transition from relief to recovery once military assets returned to their home theatre.

[7] In Ottawa, DFAIT and DND also exchanged Liaison Officers, with the DFAIT Liaison based at the Canadian Expeditionary Force Command (CEFCOM), the operating body of the armed forces. This connection was useful in dealing with important operational issues, including the issuance of security clearances, flight scheduling and planning, and ensuring that required resources were available and accessible.

Incorporation of civil society

Whole-of-government approaches are arguably significant opportunities to engage the community in social and political processes (Wilkins 2002). Hackman (2009) shows that political leaders have an important communication role in decisive intervention outcomes through public engagement. In a framework to assess public sector performance developed by Schacter (2008), responsiveness to the public is indicated as a key performance indicator for collaborative networks. Within three days of the earthquake, almost 20 press conferences and public statements were made by Canada's Prime Minister, Governor General[8] and Cabinet Ministers. Furthermore, on 14 January 2010, the Minister of Foreign Affairs met with the Haitian community in Montreal, one of several meetings that involved representatives of the Government of Canada engaging with the Haitian diaspora.

The Canadian Forces Media Embedding Program (CFMEP) is also an important mechanism for involving civil society during humanitarian interventions. As described by DND/CF, "the objective of the CFMEP is to inform Canadians about the role, mandate and activities of Canadian Forces task forces deployed on operations around the world" (Canada CEFCOM 2009). The Embedding Program formally began in Afghanistan in 2003, where it allowed journalists to live, eat, sleep and work right next to soldiers while reporting on them and the mission. On DART's second plane out of Ottawa to Haiti, the Government of Canada ensured that 18 journalists were present on the flight.

Furthermore, the public is able to directly shape the magnitude of the Canadian response through the Cabinet decision to set up a Matching Fund. First introduced in Canada's response to the 2004 Indian Ocean basin earthquake/tsunami, Canada has established a mechanism whereby it commits to match dollar-for-dollar donations that the Canadian public makes to eligible charities. On January 14, two days after the earthquake in Haiti, Minister of International Corporation Bev Oda announced the creation of the Haiti Earthquake Relief Fund, through which charitable contributions to Canadian and international non-governmental organizations for relief-efforts in Haiti between January 12 to February 12, would be doubled by the government. While an initial cap of CAD 50 million was set, this was soon removed based on the government's

[8] The Governor General is Canada's *de facto* head of state.

discretionary authority. CAD 220 (USD 228.25) million dollars were raised by the public during this time (Canada DFAIT 2012). Inclusion of civil society organizations during disaster-relief operations is also entrenched in the Canadian model.

The Government of Canada has a noteworthy relationship with its NGO community through the Humanitarian Response Network of Canada (see humanitarianresponse.ca), formally known as the Policy Action Group on Emergency Response (PAGER). PAGER is an informal forum of the Canadian Red Cross and NGOs that are most operational in responding to humanitarian emergencies internationally. CIDA-IHA and DFAIT-IRH members participate in PAGER meetings as non-voting members. Soon after a catastrophic natural disaster hits, PAGER teleconference calls are convened. PAGER participants engage in information sharing with the CIDA and DFAIT representatives, specifically discussing the evolving situation on the ground, providing updates on what respective members are planning to do to address the disaster, as well as to promote co-ordination between the agencies involved in the humanitarian action. Active since 1999, this is a relatively rare example of sustained cooperation between CIDA, DFAIT and the NGO sector (Buchanan-Smith and Folser 2002). During the Haiti response, the first PAGER call was made the day following the earthquake and continued every couple of days thereafter during the rescue, relief and recovery stages.

While important strengths and good practices of the whole-of-government approach have been demonstrated, there is room for improvement. The following section raises a concern that the increasing use of the military in humanitarian interventions bolsters the role of political leadership in shaping the magnitude, timeliness and decision to intervene in disaster-relief efforts, inevitably raising questions about how Canada can ensure that its aid is provided on the basis of need, and in a fair and impartial way. Even the most coordinated administrative system must still contend with politics.

Responding Based on Need: Whose Need?

The Oslo Guidelines regulate the use of military assets in humanitarian situations (UN - OCHA 2007). The guidelines were developed in 1992 when over 180 delegates from 45 states and 25 organizations met to work on them, but these

were amended in 2007. The contents are similar to the 2003 "Guidelines on the Use of Military and Civil Defence Assets (MCDA) to Support United Nations Humanitarian Activities in Complex Emergencies" (also known as the MCDA Guidelines), which Canada participated in forming and evaluating (UN – OCHA MCDA 2003). The guidelines provide a normative and practical international framework for the use of military and civilian defence assets in natural disaster response. Both the Oslo and MCDA Guidelines specify that the use of military for providing humanitarian assistance should be a last resort, and only when deemed appropriate by experts. Furthermore, foreign military assets should be requested only when there is no comparable civilian alternative.

While the Canadian SOPs and mechanisms such as the ISST and Calibration Table are theoretically designed to comply with Good Humanitarian Donorship (GHD) principles (Good Humanitarian Donorship Website 2013) and the Oslo Guidelines, political actors must approve whole-of-government recommendations for disaster-relief before they are executed. While Taskforce members offer recommendations based on technical expertise, it is not always clear whether the final disaster-relief decision is actually provided in the best interest of the affected region. Like most government decisions, disaster relief is also political.

Scholars on Canada's foreign aid policies have recognized that over time, Canada's aid objectives have been moving away from humane internationalism – more altruistic provision of aid where priority is the interests of those for whom the aid is intended – towards international realism, where domestic political and economic gains, be they diplomatic, trade or security related, or simply for achieving prestige, form the priority of the aid intervention (see for instance Pratt 2007; Brown 2011). Undoubtedly, the 2005 relocation of the ad hoc coordination mechanism that existed between CIDA and DFAIT for responses to international disasters, to operate under the START umbrella, has given disaster-relief high political profile and domestic recognition - something it did not have before the move. It could be argued that regardless of the political calculations that were behind Canada's intervention, any relief provided to disaster-affected victims in Haiti was beneficial. While this is true in many ways, the fact that Canadian domestic political imperatives shaped the nature of disaster-relief raises questions about the degree to which Canada's response was commensurate with the actual needs on the ground. This is particularly true when the interplay between media and military involvement is explored.

The Government of Canada leveraged its media capability during the disaster-relief efforts. On January 25, only 13 days after the earthquake, 45 Canadian journalists were already on the ground in Haiti, housed in the compound of the Canadian embassy. Inevitably, Canada's rapid response to the catastrophic earthquake shifted news media coverage away from domestic affairs to covering the disaster-relief efforts, and was an ideal opportunity to showcase Canada's leadership globally. Through a system of message control as necessitated by the requirement of a Message Event Proposal (MEP; see Gecelovsky 2013)[9], Canada's communications policy in international efforts prohibits civilian field staff from speaking directly to media without approval, although CF personnel do not have this prohibition. Utilization of military assets clearly gives exposure to the donor country's 'brand,' as every military aircraft and soldiers' uniform bears the national flag. These are inherently strong incentives for the deployment of military assets, and in turn constitute a particularly attractive political implementation option.

During Operation Hestia, 2050 CF personnel were deployed in three locations in Haiti: the Joint Taskforce Headquarters in Port au Prince; the DART in Jacmel; and an infantry brigade (Brigade Van Doo's) in Léogâne. In addition, there were two Canadian Navy ships, one on the shore of each of Jacmel and Léogâne, the latter of which included a field hospital. CF Air Command included the deployment of C-17s and six CH-146 Griffon helicopters for strategic airlift (Canada DND 2011). The entire cost of military assets for Operation Hestia amounted to CAD 183,850,000, approximately 46 percent of the Government of Canada's response to the earthquake (Canada DND 2011b).

While initial demand for earthquake-related medical services immediately following onset were high, this quickly tapered off. On January 29 2010, the first day of the Role 2 medical facility opening, while 103 patients were treated, only 21 had conditions immediately resulting from the earthquake (Tabah 2010). On its third day of operation, only 5 percent of all 234 patients seen had disaster-related injuries. While this medical care was welcomed and necessary, these numbers beg the question whether alternate means of disaster-relief

[9] While the Message Event Proposal was initiated and in practice throughout the period in which former Prime Minister, Stephen Harper of the Conservative Party, was in power (2006-2015), the policy has undergone changes under the current Prime Minister Justin Trudeau's Liberal administration. The MEP practice has been formally dissolved, although some departments still maintain certain elements of the practice (see Marland 2017 for more details).

intervention might have been more appropriate. Having opened only on day 17 after disaster onset, it can be argued that the Role 2 hospital in Léogâne may not have fulfilled the goal of addressing the immediate needs created by the earthquake, but rather addressed longer term development objectives. Furthermore, only a few days after the earthquake, ISST reports indicate the Haitian Prime Minister requested that no further rescue teams be deployed on the ground in Haiti, primarily due to congestion at the airport and the overwhelming number of international personnel that landed in Haiti. This, however, did not deter Canada from authorizing a far greater number of military personnel on the ground (Mamuji 2012).

The question to ask then is whether the investment of finances and resources that Canada put into its military response to the earthquake could have been more effectively used to address the immediate needs in Haiti through other means. It was clear very early on that there was a political will and push for a large-scale response in Haiti that involved the military. One DND presentation indicates that the Chief of Defence Staff (CDS) of the CF gave the order to "Go fast, Go Big" (Canada DND 2010b).[10] When the military response dominates media, the public may believe that military action is the only way - and perhaps the best way - in which to address humanitarian emergencies, adding pressure for subsequent disaster-relief interventions to increase the use of military assets. A form of securitization of aid (see Brown 2012; Pratt 2007; Woods 2005) thus manifests itself, in that the government may feel more inclined to favour a military response even when alternative means may be more appropriate, such as through making financial contributions to multilateral organizations. In fact, after touring the devastation in Haiti in mid-February 2010, Prime Minister Stephen Harper used the opportunity to "tout Canada's new preparedness and ability to act quickly," focusing his statement specifically on the purchase of expensive C-17 aircraft, for which he was previously criticized (Canadian Press 2010).

The Canadian experience points to a need to develop and enforce standards for determining the nature of humanitarian interventions in crisis situations in order to control the unpredictability and arbitrariness in humanitarian

[10] Despite these serious drawbacks, however, the clear cut-off time of 60 days for military forces to leave the disaster-affected area when it works with DFAIT and CIDA on a disaster-relief operation is welcome. Without this cut-off time, disaster-relief interventions could very much begin to resemble military occupations.

assistance that can result from politically motivated disaster-relief decisions. Despite the facilitation of interdepartmental collaboration afforded by Canada's whole-of-government model, political imperatives still affected the final disaster-relief package in its response to the 2010 earthquake in Haiti. It may also be useful to better appreciate the political space which humanitarian interventions open, and to leverage this space as an opportunity to better meet humanitarian and development objectives. The January 2010 Montreal conference, described earlier, is a case in point.

In Canada's response to the 2010 earthquake in Haiti, one interview respondent explained that even a year after the earthquake, political actors in Canada remembered and recalled favourably the January 25 Ministerial Preparatory Conference rather than the details of Canada's disaster-relief efforts. The Montreal conference served as an avenue to showcase Canada's competence as a donor country and enabled it to gain leadership recognition internationally. It also was designed to move the international community away from simply looking at the response as short-term, but to make Haiti's overall development a priority, and led to the International Donors' Conference Towards a New Future for Haiti on March 31, 2010 in New York. This event, therefore, served to meet both political and humanitarian/development impacts in an effective way. Political actors also appreciated recognition through the media at this time. In DFAIT's review of almost 40 media dailies, its internal media analysis on the coverage of Canadian involvement in Haiti highlighted the fact that "Minister Cannon [Minister of Foreign Affairs] garnered significant coverage when he announced a Ministerial Preparatory Conference would be held in Montreal," a notable peak for positive media attention (Canada DFAIT n.d.: 3).

Conclusion

Notwithstanding the catastrophic state of affairs that followed the 2010 earthquake in Haiti, Canada was able to launch a relief effort almost immediately. Due to the timeliness of intervention, the efficiency of response, and the evident impact of Canadian financial contributions, resources and personnel deployed to Haiti, Canada's response received praise both domestically and internationally. The interdepartmental team received the Public Service Award of Excellence for "Exemplary Contribution under

Extraordinary Circumstances" on June 14, 2010 (Canada TBS 2010). Addressing the World Economic Forum in Davos, former U.S. President Bill Clinton publicly hailed Canada's efforts in Haiti as "unbelievable" (Akin 2010). Commenting on Canada's military assets having to leave Haiti at the end of its mission, Nigel Fisher, the United Nations (UN) Head of Humanitarian Aid in Haiti, told The Canadian Press that "many felt that they wished they had stayed because they were extremely effective." (quoted in Annis 2010)

The Canadian response to the earthquake in Haiti was quick, important and definitely met needs that the Haitian population faced. Through its whole-of-government approach, DFAIT, CIDA and DND were able to work together in what, for the most part, resulted in seamless interdepartmental collaboration. A recognized lead, DFAIT maintains and continually revises Standard Operating Procedures that take the guess work out of who is to do what, when, and how. Joint Taskforce meetings and the distribution of Situation Reports ensured that all parties had up-to-date information, and formal recommendations were made only after a collaborative needs' assessment was conducted through the Interdepartmental Strategic Support Team. Consistency in disaster response has seen Canada develop mechanisms to standardize its intervention as much as possible, using a Calibration Table to more objectively develop a disaster-relief intervention, and by maintaining relative burden share with other donors in response to international appeals. Joint requests by the main organizations involved in accessing additional funds through the Crisis Pool, as well as the exchange of Liaison Officers amongst agencies, enabled the Canadian government to ensure shared accountability and responsibility. And, through its PAGER network and Matching Fund mechanisms, Canada's whole-of-government approach included civil society in the development of its disaster-relief strategies.

This case study emphasizes the importance of understanding the dynamics of decision-making and implementation both within donor country national governments, and the field, in the event of a disaster. Other donors can judge for themselves the extent to which the Canadian model offers insights for them, but there is no question that a strong donor framework will subsequently result in more efficient international disaster-relief coordination through the UN-OCHA system. Donors, however, are cautioned against the use of excessive military assets in relief efforts, especially since decision-makers often opt for this type of effort in light of political incentives. As one way to mitigate this perceived conflict

of objectives, it may be useful to explore how the political space that is created by international crises can be used as an avenue to enhance development goals.

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Chapter 10. Space Tools in the Management of Terrestrial Disasters[1]

Chris de Cooker

Introduction

Space tools play an increasingly important role in our daily lives. We on Earth rely on them to communicate and locate, to forecast the weather, to monitor the Earth and its environmental changes, to do scientific research, etc. Satellites operate in a hostile environment with changing temperatures, radiation levels and solar activity and where space debris and near-Earth objects, such as asteroids, pose constant threats. These factors need to be, and are, in fact, monitored on a permanent basis in order to mitigate these risks and to protect men and women working in space, the infrastructures in space and the Earth itself from negative impacts. The loss of a communication satellite (or temporary loss of use because of solar flares) can have far-reaching economic consequences. Intentional and accidental collisions of satellites have already happened and have created more debris. Space debris and asteroids enter the Earth's atmosphere regularly and occasionally hit the surface; and they will continue to do so. A lot can be written about the risks of disasters in these areas and their mitigation, but the present contribution will concentrate on the use of space tools in support of the management of disasters on our own planet.

[1] The views expressed in this chapter are the author's ones and do not necessarily reflect those of the institutions he was or is associated with.

The space community is, in fact, increasingly involved in disaster management. Space tools are relied upon throughout the disaster management cycle, which is dealt with elsewhere in this publication. Space-based technologies play a role in the phases before the disaster (i.e. mitigation and prevention, preparedness, prediction and early warning), during the disaster, and in the recovery phases (i.e. impact assessment, recovery and reconstruction). Or, as the 2010 US Space Policy puts it : "(t)he utilization of space has … helped save lives by warning us of natural disasters, expediting search and rescue operations, and making recovery efforts faster and more effective." (USA National Space Policy of the United States of America 2010: 1) As will be explained below, the role of the space agencies themselves has now become essential during and immediately after major disasters when they provide up-to-date information concerning the zones struck by a disaster.

It must be admitted, however, that the importance of space technologies in disaster management is relatively new and still unknown to many. The exploration and "use" of outer space is, in fact, still young. The first artificial Earth satellite (Sputnik) was launched in 1957; the first human being orbiting the Earth (Yuri Gagarin) did so in 1961; the first telecommunication satellite (Telstar 1) was launched in 1962; the first geostationary telecommunication satellite (Syncom 3) was launched in 1964; and, following a number of precursor satellites, the USA launched its first fully operational geostationary meteorological satellite (GOES-1) in 1975, and Europe followed in 1977 with Meteosat-1. The first decades were essential for the development of the first satellite and launcher technologies. Since then space exploration (by satellites and humans) has continued at an impressive pace, and this will not stop. At the same time, technologies have been further developed. In addition, space technologies are now increasingly being used to know more about our own planet Earth and to better understand the processes that influence our lives. They provide the necessary input to decision-makers, which have to adopt longer-term policies and strategies concerning sustainable development and the environment. They also provide, in the disaster management field, crucial information to both decision-makers and relief workers.

Space-based Earth Observation

Three types of satellites are of importance for disaster management: i) geostationary satellites (both communication and meteorological satellites) at an altitude of 36.000 kilometres, ii) navigation or spatial positioning system satellites at an altitude of around 20.000 kilometres, and iii) Earth observation satellites in polar and sun-synchronous orbits (between 500 and 800 kilometres).[2] The International Space Station orbits between 330 and 410 kilometres. We are generally referring here to civil satellites or to the civil use of part of military systems such as GPS, although it does occur that some countries use other satellites during a disaster. During a disaster all of the above-mentioned types of satellites are being used: Earth observation satellites provide satellite imagery; telecommunications satellites are used when the usual local systems can no longer be used; and navigation satellites assist in particular in search and rescue operations.

None of these satellites is designed for disaster management alone. They are designed to provide and transmit data to communication, meteorological and navigation operators and users as well as scientific data to researchers. All remote sensing data are numerical data that have to be processed in order to have an "image". Besides, only a small number of the satellites have optical instruments. The data are being collected on a continuous basis. This allows for an analysis of their evolution. Seen from space, there are no borders – in a similar way also disasters do not know borders – and there is fortunately a very strong cooperation between the respective space agencies as well as amongst scientists to make sure that essential data are shared, that there are no, or not too many, overlaps in activities, but, more importantly, that there are no gaps and that continuity in data collection is guaranteed. Reference is made here to the Committee on Earth Observation Satellites (CEOS), established in 1984 and bringing together over 33 space agencies (some of them representing many countries), and to the Group on Earth Observations (GEO), established in 2005, which is open to all member states of the UN, with its Global Earth Observation System of Systems (GEOSS). The latter seeks to coordinate the Earth observation efforts of its members and to arrive at common standards. Its "GEOPortal" offers

[2] The Iridium satellite phone system also uses Low Earth Orbit.

a single Internet access point for users seeking data, imagery and analytical software packages relevant to all parts of the globe.

Remote sensing data come at a great cost. The development, launch and operations of satellites are expensive, and are, with the exception of most – commercial – communication satellites, paid for by public money. The classic view has been that these data are then freely available to public policy and decision makers and to scientists providing input to them, but not to others. The data were to be sold to all other users, i.e. commercial users, in order to generate income. Amendments have recently been made to this, and some approaches go beyond the public interest criteria, such as disaster response. For example, the European Space Agency (ESA) has most of its Earth observation datasets on the Internet, which are free of charge. Access is granted after user registration. Some "restrained" datasets are generated also free of charge, but only after specific user requests. The latter users must first provide a project proposal, allowing ESA to define a product/programming quota. In a recent study commissioned by ESA it is proposed that for the future Sentinel Earth observations satellites, which are being developed by the European Commission and ESA under the Copernicus[3] program, the public sector data should be made freely available for reuse by the private sector. This may generate new businesses, jobs, and tax income.

More than a hundred Earth observation satellites collect data in a number of different and increasingly specialized fields. Much progress has been made particularly over the last decade in developing more advanced technology, allowing for very high precision.[4] Very sensitive instruments can, for example, measure sea levels with a precision of centimetres.

The International Space Station (ISS), with its specific low orbit at an inclination of 51.6 degrees, also contributes to Earth observation, both with automated and crew-operated assets, particularly in response to disasters.

Earth observation technology is now contributing to a better understanding of the processes that influence our planet Earth and the evolutions therein. Satellites provide essential data for the establishment of wind profiles. They provide data on, for example, the oceans' salinity and circulations; on sea and

[3] The new name for the Global Monitoring for Environment and Security (GMES) programme.

[4] As an example : a satellite mapping differences in the pull of gravity across the surface of the Earth, which are caused by the uneven distribution of mass within the planet, registered with its accelerometers the low-frequency acoustic waves caused by the 2011 Tohoku earthquake in Japan, which perturbed the density of air molecules and changed their speed.

land surface temperatures; on moisture levels; on gravitation and magnetic fields; on air composition and quality; on wind speeds; etc. Together with data coming from in situ observation systems they form the basis for improved knowledge on the processes that impact on our lives now and in the future. They permit more detailed forecasting, such as meteorological forecasting. They contribute to improved modelling of phenomena, such as El Niño and la Niña. They contribute to consolidated mapping. And so on.

Pilot studies and pilot projects have shown the important contribution that space tools can bring in the areas of disaster prediction and monitoring. Radar instruments, for example, provide data that advance the knowledge of volcanic activities and surface movements. Similar data help mapping deformation of the ground following the rupture of faults that cause earthquakes.

Burning fires can be detected with instruments on board of satellites. Worldwide fire maps are on-line now. Most fires can be found in developing countries. Water pollution, in particular in coastal waters and including oil spills, can be monitored as well.

In another example, space-based information, together with in situ data, can assist in improving models for drought and crop monitoring. As a consequence, early warnings can go out and food assistance can be better planned.

Satellites can provide data that can help forecast the outbreak of some epidemic diseases. The malaria season, for example, is determined by variations in the temperature and in the amount of water, where the larvae develop. Monitoring these carefully can contribute to better forecasting and to preventive action at the right moment. A beginning has been made with telemedicine[5], including in disaster-struck areas. Humanitarian aid workers start using space-based information to produce digital or paper maps for areas for which maps are outdated or do not even exist. And so on.

These are just examples, and encouraging examples, of the potential that space-based information has in so many areas. The pilot projects were undertaken by space agencies testing the capacities of their satellites, sometimes in close cooperation with specialized UN agencies or NGOs.[6] A more structured approach is, however, to be developed by the user communities themselves.

[5] See for a recent comprehensive study and pertinent references: European Space Policy Institute, Humanitarian Telemedicine. Potential Telemedicine Applications to Assist Developing Countries in Primary and Secondary Care, Report 48, February 2014.

[6] For example, FAO, UNHCR, UNICEF, UN/OCHA, UN/OPS, WHO, Doctors Without Borders, etc.

Special mention must be made here of one of the major challenges planet Earth is facing: climate change. The consequences of climate change may be impressive: rising sea levels will entail more flooding and may affect freshwater resources. Global temperature increases may entail droughts and reduced food production, etc.

As the report of the "Rio+20" conference observed:

> *"We acknowledge that climate change is a cross-cutting and persistent crisis and express our concern that the scale and gravity of the negative impacts of climate change affect all countries and undermine the ability of all countries, in particular, developing countries, to achieve sustainable development and the Millennium Development Goals and threaten the viability and survival of nations. Therefore we underscore that combating climate change requires urgent and ambitious action, in accordance with the principles and provisions of the United Nations Framework Convention on Climate Change." (United Nations 2012)*

The same report recognized the importance of space-technology-based data, *in situ* monitoring and reliable geospatial information for sustainable development policymaking, programming and project operations.

Satellite data provide essential input concerning our planet's climate. Data concerning many "Essential Climate Variables" are provided by satellites and, for example, the Intergovernmental Panel on Climate Change uses them extensively. The Global Climate Observing System has put together a set of standards for satellite data to meet the needs of the climate change community.

Many more examples could be given of the potential contribution that space tools can bring to development and to disaster prevention, preparedness, prediction and early warning.

Space-based Earth Observation and Disaster Management

As mentioned, many of the remote-sensing data can be used to better identify risks and potential disasters and many databases on risk information and knowledge now co-exist, all in support of decision- and policymaking in disaster

management. The United Nations Development Programme (UNDP) has created GRIPWEB, an online platform with data and information on disasters and risks at all levels – global, regional, national and sub-national. The information is grouped into five sets: countries and risk information, the world's disaster databases catalogue, the early warning systems catalogue, the global dataset catalogue, and the training courses catalogue. Decision-makers need information, not data.

Databases show that disasters, both natural and human-induced, occur everywhere in the world. Flooding is probably the most important and most costly natural disaster, entailing major human and economic losses. Looking at the number of people affected it is obvious that disasters affect developing countries most and many of the poorest countries are hit by the same disasters every year. Although progress has been made in a number of countries, particularly concerning the main weather and climate risks, many still lack the necessary monitoring and infrastructure for early warning.

Disaster management proper starts with a better understanding of the processes that may lead to disasters. This is followed by modelling and risk mapping. Following this, evolution in data have to be monitored which will allow for better forecasting and, when necessary, early warning, which can contribute to risk reduction and mitigation. The space infrastructure contributes essential data for this, which generally need to be corroborated with in situ data.

Data have to be collected and analysed and turned into information. This requires extensive knowledge of the tools. And even when the data are available, very often the capacity doesn't exist, particularly in developing countries, to adequately use them and integrate them in overall disaster management models.

The United Nations General Assembly adopted an International Strategy for Disaster Reduction in 1999 and established the United Nations Office for Disaster Risk Reduction (UNISDR) as its Secretariat. It is the focal point in the UN system for the coordination of disaster risk reduction and the implementation of the international blueprint for disaster risk reduction. It organizes a biannual Global Platform for Disaster Risk Reduction, which is a forum for information exchange, discussion of latest development and knowledge and partnership building across sectors, with the goal to improve implementation of disaster risk reduction through better communication and coordination amongst stakeholders. It brings together government representatives, NGOs, scientists, practitioners, and UN

organizations. Recent Platforms have been held in Geneva in May 2013, in Sendai, Japan in March 2015 and in Cancun, Mexico in May 2017.

In 2006 the United Nations General Assembly established the United Nations Platform for Space-based Information for Disaster Management and Emergency Response - UN-SPIDER [7]. Its mission is to ensure that all countries and international and regional organizations have access to and develop the capacity to use all types of space-based information to support the full disaster management cycle. It in particular facilitates capacity-building and institutional strengthening, with an emphasis on developing countries.

In parallel, emergency and relief services need to be prepared. Also, they may need to use the space infrastructure, for example, for communications through satellite mobile systems and positioning when the usual infrastructures can no longer be used.

Space Agencies and Disaster Response

International cooperation is in particular required during the disaster itself and the space-faring nations all make their contributions. The third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), which was held in 1999, declared that:

> *"action should be taken to implement an integrated, global system, especially through international cooperation, to manage natural disaster mitigation, relief and prevention efforts, especially of an international nature, through Earth observation, communication and other space-based services, making maximum use of existing capabilities and filling gaps in worldwide satellite coverage." (United Nations 1999: 6)*

The most important action in this respect was being implemented the following year when the European Space Agency, together with the French Space Agency CNES, initiated the International Charter "Space and Major Disasters." The Canadian Space Agency joined in October 2000 and the Charter became operational on 1 November 2000. The Charter is open to space agencies and

[7] Resolution 61/110 of 14 December 2006.

national or international space system operators wishing to cooperate in it. All major space agencies have signed the Charter since then.[8]

The Charter consists, in fact, of a virtual constellation of satellites. It ensures organisations dealing with major disasters immediate access, at no cost, to remote sensing data to support their disaster-response. The data provided are both archive data and data that are acquired on a priority basis. For the latter, relevant satellites are often re-tasked. The service normally includes processing and interpretation. Each member agency has committed resources to support the provisions of the Charter and uses their best efforts to plan the availability of space facilities. Article II of the Charter defines the purpose as follows:

> *In promoting cooperation between space agencies and space system operators in the use of space facilities as a contribution to the management of crises arising from natural or technological disasters, the Charter seeks to pursue the following objectives:*
> - *supply during periods of crisis, to States or communities whose population, activities or property are exposed to an imminent risk, or are already victims, of natural or technological disasters, data providing a basis for critical information for the anticipation and management of potential crises;*
> - *participation, by means of this data and of the information and services resulting from the exploitation of space facilities, in the organization of emergency assistance or reconstruction and subsequent operations." (United Nations International Charter Space and Major Disasters 2000)*

The cooperation is on a voluntary basis and no funds are exchanged. The structure of the Charter is simple: the administrative, operational and technical coordination needed to achieve this cooperation is provided by a Board which has a rotating chairmanship every six months and on which each party is represented, and an Executive Secretariat consisting of employees of all

[8] In chronological order of adhesion : the Indian Space Research Organisation (ISRO), the United States National Oceanic and Atmospheric Administration (NOAA), the Argentine Space Agency (CONAE), the Japan Aerospace Exploration Agency (JAXA), the British National Space Centre (now UK Space Agency), DMCii - including Algeria, Nigeria, Turkey Space Centres -, the U.S. Geological Survey (USGS), the China National Space Administration (CNSA), the German Aerospace Agency (DLR), the Korea Aerospace Research Institute (KARI), the Brazilian National Institute for Space Research (INPE), the European Organisation for the Exploitation of Meteorological Satellites (Eumetsat), the Russian Federal Space Agency (Roscosmos) and the Venezuelan Agency Bolivariana para Actividades Espaciales (ABAE).

participating agencies implements it. The Charter is thus independent from the United Nations, for example.

The Charter is activated as follows. Normally, the disaster management authorities of the country concerned determine whether the events require the intervention of the Charter. Charter member countries have direct access to the system. The Charter has, however, a list of cooperating bodies, including the European Union, UN Agencies who may submit requests on behalf of users from the United Nations,[9] and Sentinel Asia[10], who can call on the Charter on behalf of any country in the world or relief agency active there. In 2012 the Charter adopted the principle of universal access: any properly mandated national disaster management authority may submit requests to the Charter for emergency response upon completion of a registration form. The authority must, however, have the capacity to download and utilize the data and maps. If not, it should go via the UN or other agencies that have the capacity. The registration is to be approved by the Board. In other words, a country does not have to be a member of the Charter in order to activate it.

The procedure starts with a simple phone call to an operator, who is 24/7 on duty at the European Space Agency facility in Frascati, Italy. He checks the identity of the requester and verifies that the request form is correctly filled out and contains such essential information as date and time of disaster occurrence, affected areas (with coordinates) and the type of hazard. The operator passes the information to an emergency on-call officer – this function rotates weekly among ten agencies - who analyses the request and the scope of the disaster with the requester, and prepares an archive and acquisition plan using available space resources. Upon this, a Project Manager will be appointed who assists the user throughout the process and interfaces with the agencies that will provide data.

The Charter is activated about 40 times a year, with a peak of 51 activations in 2010.[11] More than sixty per cent of the activations are weather related (floods,

[9] In particular UN/OOSA and UNITAR/UNOSAT.

[10] The Sentinel Asia initiative is a regional collaboration between space agencies and disaster management agencies in 32 countries in the Asia-Pacific region.

[11] The Brussels based Centre for Research on the Epidemiology of Disasters (CRED), established in 1973, maintains EM-DAT, a worldwide database on natural disasters. It reports over the last decade between 350 and 400 such disasters per year.

tropical storms, landslides, etc.) and twenty-five per cent are solid Earth related (volcanos, earthquakes, etc.). Some three per cent concern oil spills.[12]

Once the emergency relief operations are over, the role of the space agencies under the Charter ceases. Space-based data continue to be used, however, in the next phases of the disaster management cycle. Sometimes the countries concerned have the means to do this themselves. Most of the countries and relief agencies, however, require specialized support. This is in particular provided by UNITAR's Operational Satellite Applications Programme (UNOSAT), which, it is recalled, also plays a role during the emergency response. It is operational since 2003. It provides UN agencies and NGOs with maps, satellite image analysis and data that can be integrated into their own mapping systems.

Conclusion

In conclusion, space tools have become very important for a better understanding of the processes that influence our planet. They contribute to disaster preparedness, mitigation and early warning. They have become crucial during disaster emergency relief operations. They are much of use during the follow-up recovery and reconstruction phases. More capacity-building is required, however, in particular at the users' end in order to make full use of the remote-sensing products.

[12] Two quite different disasters were covered by the Charter in 2014: the disappearance of an airplane from Malaysia Airlines in March and the Ebola Epidemic in West Africa in the second half of 2014. In the first case, data of optical and radar satellites of Charter member agencies were acquired and analysed in order to find floating debris or oil spills in the ocean in the area where the plane possibly crashed. In the case of the Ebola epidemic, Charter data was used to provide information about infrastructure to aid teams.

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Chapter 11. Civil Security Systems of the Visegrad Group Countries: The Challenge of Adjustment[1]

Vera-Karin Brazova, Piotr Matczak and Viktoria Takacs

Introduction

Over the last quarter of the 20th century, Europe witnessed an important shift in perception of security. The attention paid to civil security in peacetime in general and to natural as well as anthropogenic disasters in particular has increased significantly. This shift was broadly reflected at the ministerial meeting of the European Communities in 1986 and later during the NATO Rome summit in 1991. Over time, cooperation in this respect developed into various coordination mechanisms which are now in place. Within the European Union (EU), it is especially the Community Mechanism for Civil Protection (the role of which is facilitating cooperation and assistance during major disasters) and its Emergency Response Coordination Centre (ERCC)[2]. Within NATO, one can mention the Euro-Atlantic Disaster Response Coordination Centre (EADRCC) as an operational tool

[1] This chapter exploits data gathered within the ANVIL project, conducted within the EU FP7. The chapter was supported by the grant SVV 260 596.

[2] The ERCC was opened in May 2013 and thus replaced the former Monitoring and Information Centre (MIC) established in 2001. Although it is based at the European Commission in Brussels, apart from the EU 28 some non-EU countries are also included, such as the Former Yugoslav Republic of Macedonia, Iceland, Liechtenstein and Norway (ERCC online).

for coordinating relief efforts during and after disasters in the NATO and partner countries.

In Central and Eastern European countries which underwent a democratic transition in the early 1990s and joined the EU later, during waves of accession starting from 2004 onwards, such a shift towards more civil security has also occurred. Since 1989, these countries have undergone a major transition of their socioeconomic, legal and administrative systems. The changes had an important impact on the civil security systems of these countries: civil defence started to move towards crisis management and citizen protection, with the emphasis on peacetime operations. Moreover, democratic accountability has been introduced in civil security policymaking and practice. Yet not much has been written on these changes nor on the institutional setup of the civil security systems in the younger EU member states. The aim of this chapter is thus to provide such overview, looking into how these countries deal with the challenge of adjustment.

This chapter deals with the civil security systems of the Visegrad Group (V4)[3] countries (Czech Republic, Poland, Slovakia and Hungary) and their capacity to deal with risks. It builds on both geopolitical similarities, as well as on the similar nature of threats these countries are facing. Historically, in the communist past of these countries, civil security was closely related to military threats and the prevailing concept was the one of civil defence. After 1990, with the collapse of communism, the systems were gradually transformed so as to correspond to the changed circumstances and new types of risks that emerged. Building on these similarities, the differences in the civil security systems[4] are contrasted. In particular, after outlining the most typical threats in all four countries and mapping the reaction of their systems to "signature crises" (Section I), the case of large floods of 2010 (2002 in the Czech case) is taken to illustrate the functioning of crisis management and lessons learned in these countries as well as the issues of regional cooperation (Section II).

[3] The cooperation of the Visegrad Group countries was established in February 1991, the members being three Central European States – Czechoslovakia, Poland and Hungary. After the split of Czechoslovakia in 1993, Slovakia was accepted as a new party to the cooperation agreement.

[4] In this chapter we understand the civil security system as the state's non-military mechanisms for protecting civilians against high impact - low probability risks. These usually stem from the natural environment (such as floods or epidemics) or they may be human-induced (such as industrial disasters) or a combination of both (such as a failure of the critical infrastructure due to a natural disaster).

Typical Threats in the V4 Countries and their Civil Security Systems

The V4 countries have faced different types of crises over the last 25 years. To ensure better comparability among our cases, we relied on the Emergency Events Database (EM-DAT)[5] in identifying the most important disasters. The EM-DAT Database shows that although there were natural, technical and transportation accidents in all of the V4 countries, the most frequent disasters were floods. In many instances, floods were also the most important events where special (crisis) measures had to be taken. This section looks at the experience of each of the four V4 countries in turn, briefly summarizing their experience with disasters and their respective legal and institutional responses.

Czech Republic

In the Czech Republic, measured by the total number of affected people, the biggest disasters over the past twenty years appear to be floods. All disasters (including the number of casualties, affected population and damage) are summarized in

Table 11. The largest floods occurred in the years 1997, 2002, 2010 and 2013.

[5] The EM-DAT Database (created with the help of the WHO and of the Belgian Government) has been run since 1988 by the WHO Collaborating Centre for Research on the Epidemiology of Disasters. The data on disasters in most of the world's countries are compiled from sources such as UN agencies, NGOs, insurance companies or research institutes (Guha-Sapir et al., online).

Table 11 - Czech Republic (10.6 million inhabitants in 2017): disasters 1993-2016

Disaster Type	*Year*	*People Killed*	*People Injured*	*People Affected*	*Total Damage (1,000 USD)*[6]
Transport accident	1995	18	4	0	0
Flood	1996	1	0	60	36,000
Flood	1997	29	2,409	87,725	1,850,000
Flood	1998	6	0	0	52,000
Flood	2000	0	0	0	80,000
Flood	2002	18	0	200,000	2,400,000
Storm	2002	2	0	0	20,000
Transport accident	2003	19	35	0	0
Flood	2005	1	0	0	0 (NA)
Storm	2005	0	3	0	0 (NA)
Flood	2006	6	0	4,315	0 (NA)
Storm	2007	4	0	0	150,000
Storm	2008	2	0	0	50,000
Transport accident	2008	10	100	0	0
Flood	2009	13	0	14,450	150,000
Storm	2009	2	12	0	0 (NA)
Flood	2010	11	0	1400	347,560
Flood	2013	7	0	1,300,000	1,083,887

Source: EM-DAT (Guha-Sapir et al., online)

The flood of 1997 served as a "wake-up call", as attention to civil security issues was relatively limited during the early and mid-1990s, and the issue as such lacked both public and political interest. Major reforms followed, including the enactment of the Constitutional Act on Security in 1998, which for the first time paid attention to non-military threats, and additional crisis legislation in 2000.

[6] Methodological note: The EM-DAT database relies on reports from various sources, especially from the UN agencies, NGOs, research institutes, press agencies, etc. (Guha-Sapir et al., online). Hence, the information on damage is not always included as it is hard to estimate. As a rule, transport accidents did not cause significant material damage but their death toll was high compared to other disasters. In the case of storms and floods, the zeros in the right column of the table should be read as "not reported" or "missing data". Typically, these incurred multi-million damage, especially to private and municipal property. E.g. in the Czech case, the total damage after the 2006 flood was estimated to be 5 billion CZK (approx. 200 million USD) by the government, including also damage to construction and infrastructure.

Prior to this, civil security was not comprehensively covered by legislation, and responsibility rested with the Ministry of Defence – a relic from the Cold War era. By the reforms of 2000, the responsibility was transferred to the Ministry of Interior and its Directorate General of Fire Rescue Brigades, and the current system was formed[7].

The first "test" to the newly established civil security system was the flood of 2002, which was also the most devastating one in terms of total damage as well as casualties and is commonly referred to as a "thousand years' water". All subsequent floods, especially the one of 2013 where the number of affected populations was even higher, resulted in significantly less damage and also the number of casualties was lower. As there is an overall consensus that these floods were managed successfully, the flood of 2002 seems to be the most interesting one in terms of lessons learned within the new civil security system set up after the year 2000.

Since 1990, the Czech Republic also experienced five large so-called technological disasters. These included two explosions – a methane explosion in a coal mine in 1990 and an ammunition explosion in Soviet army barracks in early 1991. There were also two major railway accidents, in 1995 (killing 18 people) and 2008 (killing 10 people and affecting some 100), and a bus crash in 2003. None of these events was understood to be a failure of the system of civil security and protection. The explosions in the early 1990s were treated as risks integral to the specific fields, not threatening the general public.

In four cases so far, a state of emergency was declared by the government (during floods in 2002, 2006, 2013 and after the storm in 2007). Yet, the state of emergency, as such, was codified only in 1998, in the Constitutional Act on Security, and thus could not have been used prior to this date. In fact, the adoption of this act was speeded up by the floods of 1997, which pointed to the malfunctioning and unpreparedness of the system.

[7] Although Czech crisis-related legislation has been subject to numerous changes since its enactment in 2000, none of the changes have touched the whole *modus operandi* and set-up of the system.

Hungary

Table 12 - Hungary (9.8 million inhabitants in 2017): disasters 1990-2016

Disaster Type	*Year*	*People Killed*	*People Injured*	*People Affected*	*Total Damage (1,000 USD)*[8]
Transport Accident	1992	16	0	0	0
Transport Accident	1994	31	59	0	0
Industrial Accident	1995	0	0	0	60,000
Flood	1996	0	0	0	0 (NA)
Transport accident	1996	11	20	0	0
Flood	1997	0	0	0	10,000
Flood	1999	8	0	131,441	293,400
Storm	1999	40	0	0	0 (NA)
Flood	2000	1	0	2,000	55,000
Industrial accident	2000	0	0	0	0
Flood	2001	0	0	10,000	5,000
Flood	2002	0	0	1,430	30,000
Transport accident	2002	19	32	0	0
Storm	2003	7	0	0	0 (NA)
Transport accident	2003	33	5	0	0
Flood	2004	0	0	384	0
Flood	2005	0	0	0	48,000
Storm	2005	4	0	0	0 (NA)
Flood	2006	0	0	32,000	0 (NA)
Storm	2006	5	300	0	10.000
Transport accident	2006	42	0	0	0
Flood	2010	1	0	2,000	440,000
Industrial accident	2010	9	150	0	103,000
Transport accident	2011	14	2	0	0
Earthquake	2013	0	0	1,800	0 (NA)
Flood	2013	0	0	48,565	0 (NA)
Storm	2013	0	0	14,000	0
Flood	2014	0	0	6,500	0
Flood	2016	0	0	2,282	0

Source: EM-DAT (Guha-Sapir et al., online)

[8] Methodological note from Table 11 also applies here.

Floods represent the most typical crisis and the most frequent natural disaster in Hungary as well. Information on all disasters is summarized in Table 12.

Especially severe floods occurred in 1970, when 300 people died. More recent cases (in 1999, 2000, 2006, and 2010), on the other hand, were characterized by high numbers of inhabitants affected and substantial damage. Especially in 2010, after long and heavy rains, several rivers flooded Hungary simultaneously. A state of emergency was announced for 14 counties (out of 19).

Among technical disasters, a noteworthy case was the cyanide spill poisoning the Tisza River in 2000. A leak of cyanide from the gold mine near Baia Mare (Romania) caused massive, trans-boundary environmental disaster on the rivers Tisza and Danube. The most dreadful industrial disaster was then a red sludge accident in October 2010 in Ajka (Western Hungary). Nine people died and 122 were injured. Both the Ajka disaster and the floods of 2010 represented a major challenge to the civil security system, states of emergency were declared, and help was also requested from abroad.

In 1996, acts on Civil Protection, Fire Protection and Disaster Management were adopted. The act on Civil Protection stated the main tasks of civil protection – basically using the definition in the Geneva Conventions (1949). Later, in 1999, the Disaster Management Act was adopted by the Hungarian Parliament, establishing the Civil Protection Directorate. The State Fire Fighters Directorates were merged, and the Disaster Management Authority was established. A National Directorate General on Disaster Management (NDGDM) was established in 2000, with departments of fire protection, civil protection, critical infrastructure and hazardous industry (Hoffmann and Nemeth 2010). The aforementioned disasters (floods in 2010 and red sludge spill in the same year), then resulted in further important changes to the security system in 2011.

Poland

In Poland, as it is shown in Table 13, the main risks are natural ones: floods, landslides, strong winds and wildfires. Among industrial disasters, in January 2006, snow on the roof of a fair exhibition building caused collapse of the building, killing 65 people and injuring 170 (Chmielewski 2007). In November 2006, a methane explosion in a coal mine in South Poland killed 23 miners. In January 2008, a relatively small yet shocking airplane accident happened in

which 20 highest-ranked air force officers died. The most tragic transportation accident definitely was the presidential plane catastrophe in Smolensk on April 10th 2010, killing 96 top-ranked politicians (including the President) and public figures. It has had dramatic social and political consequences.

Table 13 - Poland (population of 38.4 million in 2017): disasters 1990-2016

Disaster Type	*Year*	*People Killed*	*People Injured*	*People Affected*	*Total Damage (1,000 USD)*[9]
Storm	1990	0	0	0	50,000
Transport accident	1990	16	39	0	0
Transport accident	1991	10	0	0	0
Wildfire	1992	35	0	0	0
Misc. accident	1994	3	210	0	0
Storm	1994	1	0	0	1,000
Transport accident	1994	31	45	0	0
Misc. accident	1995	21	0	0	0
Flood	1997	55	0	162,500	3,500,000
Transport accident	1997	10	12	0	0
Flood	1998	9	0	1,200	0 (NA)
Storm	1999	3	0	0	10 000
Flood	2001	27	0	15,000	700,000
Industrial accident	2002	10	1	0	0
Storm	2002	9	0	0	150
Flood	2004	0	0	600	0 (NA)
Flood	2005	2	0	3,600	0 (NA)
Storm	2005	0	0	0	0 (NA)
Transport accident	2005	12	40	0	0
Flood	2006	0	0	500	0 (NA)
Industrial accident	2006	23	0	0	0
Misc. accident	2006	65	170	0	0
Storm	2007	19	0	0	100,000
Storm	2008	2	10	1,050	50,000
Transport accident	2008	20	0	0	0
Flood	2009	1	0	150	100,000
Industrial Accident	2009	20	22	0	0
Misc. accident	2009	22	20	0	0

[9] The methodological note from Table 11 also applies here.

Storm	2009	8	82	0	0 (NA)
Flood	2010	19	0	100,700	3,080,000
Transport accident	2010	17	1	0	0
Storm	2012	1	10	300	5,900
Transport accident	2012	16	60	0	0
Storm	2013	4	53	0	0
Transport accident	2014	11	1	0	0
Storm	2015	1	17	1,200	0
Flood	2016	1	3	0	0

Source: EM-DAT (Guha-Sapir et al., online)

The largest disaster in Poland in recent decades was the devastating flood of 1997, on the Odra River (Kundzewicz et al. 1999; Chmielewski 2008). The 1997 flood was followed by a smaller (yet still causing huge losses) flood in 1998 on Nysa Łużycka, Southern Poland. Several other floods occurred later. Another devastating flood occurred in May-June 2010 (similarly to other Central European countries), with losses reaching several billion USD.

Similarly to the Czech Republic, the flood of 1997 had the biggest impact on the shape of the civil security system in Poland (Golc 2008). The flood brought about tremendous losses but it also revealed the weaknesses in the civil security system. In 1997, the civil protection responsibility was moved away from the Ministry of Defence to the Ministry of Interior. In 1998, the Civil Protection Office was replaced by the Office for Crisis Management and Civil Protection. While the previous office focused on civil protection, the new office had a wider area of responsibility, including crisis management. In 2001, the Act on Civil Readiness and Crisis Management and the Act on Citizens' Security, Crisis Management and National Rescue System were drafted. In 2001, the Water Act came into being, assigning the responsibility for flood protection to administrative bodies.

Slovakia

Also in Slovakia, floods are the most common disaster, counting for almost 50% of all disasters and accidents between 1989 and 2013, according to the EM-DAT database (Guha-Sapir et al., online). The overview of all disasters is provided in Table 14.

Table 14 - Slovakia (population of 5.4 million in 2017): disasters 1993-2016

Disaster Type	*Year*	*People Killed*	*People Injured*	*People Affected*	*Total Damage (1,000 USD)* [10]
Industrial accident	1995	11	200	0	0
Flood	1997	0	0	0	60,000
Flood	1998	54	61	10,850	45,000
Flood	1999	2	0	35,207	113,300
Wildfire	2000	6	0	0	0
Flood	2001	1	0	0	6,000
Flood	2002	0	0	0	3,000
Transport accident	2003	11	24	0	0
Flood	2004	1	0	230	0 (NA)
Storm	2004	2	24	10,300	383,300
Flood	2005	1	0	0	0 (NA)
Flood	2006	1	0	100	0 (NA)
Misc. accidents	2007	11	0	0	0
Industrial accident	2009	20	0	0	0
Transport accident	2009	12	20	0	0
Flood	2010	4	0	850	25,000
Flood	2013	1	0	0	0 (NA)

Source: EM-DAT (Guha-Sapir et al., online)

Of the natural disasters, the floods of 1998 cost the most lives. Other natural disasters that took human lives were a wildfire in 2000; floods in 1999, in 2010, and in 2004; a flash flood in 2001; and a storm in November 2004 which devastated large forest areas. Although technological disasters have occurred in Slovakia (such as a coal mine explosion in 2009 or an explosion at military repair facilities in 2007), they have been comparatively less important than natural disasters in terms of the number of people affected. Among the natural disasters which have occurred over the past decade, the floods of 2010 can be considered the most important, due to their scale as well as damage.

In Slovakia, the legislation on civil protection was enacted very soon after the country's independence in 1993. The previous legislation on civil protection was deemed insufficient and a new Act on Civil Protection was thus adopted in 1994, much like the Austrian example (Slovakia Reasoning Report 1994). The other V4

[10] The methodological note from Table 11 also applies here.

countries (Czech Republic, Hungary and Poland) followed a different reform path, at first only modifying the civil security systems extant before 1989.

The remaining important acts were, however, adopted later in Slovakia - namely in 2002, when the Acts on Security and on Integrated Rescue System and the so-called Crisis Act were approved. When drafting the latter, the need was stressed to react to a new global security environment after the terrorist attacks in the USA in 2001 (Slovakia Reasoning Report 2002). It was through this legislation that the current version of the civil security system was established.

Institutional Background

Generally, the 1990s were marked by a decreasing role of civil defence in the V4 countries. This occurred especially for two reasons: firstly, the probability of an armed conflict was significantly diminished by the end of the Cold War and by the dissolution of the Warsaw Pact in 1989/1990. Secondly, the overall shift to post-materialist values (Inglehart 1990) changed the popular mood, with less attention to armed conflicts and civil defence at both the political and the societal level. The emphasis has gradually shifted towards peace-time civil security, taking largely into account non-military threats.

In all V4 countries, crisis management is currently based on civilian operations (as opposed to military ones), with the responsibility for civil security resting currently with the Ministries of Interior. This institution is responsible for policy formulation in the area of civil security. The statutory basis relies in all four cases on formal legislation (as opposed to executive orders). In the Czech Republic, Poland and Slovakia, the current legal framework for governing civil security was already established before the 2010 floods (it dates from the year 2000 in the Czech Republic, 2002 in Slovakia and 2007 in Poland). In Hungary, on the other hand, after the disasters of 2010 (both floods and red mud sludge), the system and its legal framework were changed significantly in 2011.

In Hungary and Slovakia, crisis management in case of disasters (including floods) is hierarchically organized, with state administrative bodies playing the most important role. In Hungary, the National Directorate General for Disaster Management, County directorates and their local branches play the vital role. In Slovakia, in case of a crisis, the Government establishes a Central Crisis Staff (the Head thereof is the Minister of Interior) which coordinates activities of state

administration bodies and self-governing bodies. At the regional level, the District Offices in the seat of a Region[11] (which are part of state administration) also establish Crisis Staffs and coordinate activities of Regional Offices and municipalities with respect to preparedness and response to crisis situations (Slovakia Act Nr. 387/2002 Coll.). In both countries, crisis management activities are supervised by the Ministries of Interior. Financing of civil security and protection activities is also centralized. In Slovakia, the Ministry of Interior approves the composition and size of expenses of the District Offices for civil protection (which are financed through its budget). In Hungary, disaster management costs are elements of the central budget (accepted by the Parliament). Both the National Directorate General for Disaster Management and Regional directorates are independent economic entities with their own budgets (obtained from the central budget). The size of the necessary budget for running the institutions is approved by the Ministry of Interior.

In Poland and the Czech Republic, the regional level is comparatively more important. In the Czech case, executive responsibility rests primarily at the regional level. Unless a *state of emergency* is called, the central responsibility for operational crisis management rests with the Regional Presidents. These are also entitled to call a *state of danger* for a maximum of 30 days. If a crisis affects more regions, the Prime Minister can call a (qualitatively higher) *state of emergency*. Crisis management is then in the hands of the Ministry of Interior. At all levels of administration (central, regional, local), a Security Council is formed as a permanent body (Czech Republic Act Nr. 240/2000 Coll.). The General Directorate of the Fire Rescue Brigades (a body under the Ministry of Interior) ensures through its regional offices an efficient coordination of the preparation for crisis situations and their management at the regional, municipal and local levels. The regional Fire Rescue Brigades are then responsible for crisis preparedness and management in cooperation with municipal bodies. In the framework of multi-source financing, they get finances from both the Ministry of Interior's budget and regular contributions from the regions.

In Poland, the role of provincial governors is crucial. They coordinate the prevention of all types of hazards, support the efforts of local governments, and

[11] *Obvodné úrady v sídle kraja*, created by public administration reform in 2007. These are state administration bodies responsible for the entire territory of a region (8 regions in total). At the regional level, self-administration in the form of Regional Offices also exists. The latter are, however, not significantly involved in the management of a crisis.

assist lower levels if their resources are inadequate. A Governor heads a crisis management team and has wide powers in coordinating and linking the local system with the central government. Declaration of a *disaster* is undertaken at the level where the crisis occurs (while immediately informing upper and lower levels of the crisis management system). The response is adjusted to the territorial scale of an event. In the case of a *disaster*, the response basically starts at the local, municipal level. However, it depends on the scale and type of a crisis. Up-scaling is a typical procedure presumed by the law. If a crisis exceeds the given territorial scale and capacities, the responsible bodies of the higher administrative level are activated.

In all V4 countries, the primary response duties rest at the lowest (local) level. The mayors of municipalities are expected to execute measures to deal with crisis situations. In Slovakia, municipalities establish their own Crisis Staff and – in case of crisis – they demand assistance from the District Office (Slovakia Act Nr. 387/2002 Coll.). Both municipalities and District Offices in the seat of a Region then can and do declare an *emergency situation* when a crisis arises. This was also the case during floods in 2010, when the *emergency situation* was declared in several regions[12]. In Hungary, disaster preparation, planning and response at the local level are the duties of the Mayor (since 2012 there has been an obligation to employ a "disaster management referee" in bigger municipalities to help mayors in fulfilling disaster-related tasks). Also in 2012, due to a special legal order, emergency coordination of disaster response was taken over from the mayors by the regional disaster management authorities (Hungary Act Nr CCXXVIII/2011 §16**).**

In the Czech Republic, at the local level, mayors of municipalities are responsible for crisis planning and crisis preparedness in their municipalities (Czech Republic Act Nr. 239/2000 Coll.) In Poland, at the municipal level, the head of a municipality is responsible for planning and defines civil protection tasks for all institutions that are appropriate within the municipality. The response also starts at the lowest municipal level, with further activation of higher levels of administration (county, provincial and national) if necessary.

[12] Theoretically, the national Government can also declare an emergency situation when the crisis extends beyond the territory of the region (Slovakia Act Nr. 42/1994 on Civil Protection), yet this right has not been used so far. Instead, the Government declared a higher *state of emergency* in 2011, when there was a significant shortage of medical doctors due to their leaving their jobs in a joint protest organized by the Medical Unions.

In the Czech Republic and Slovakia, the so-called Integrated Rescue System (IRS) exists as a platform for dealing with disasters. It is a coordinated proceeding of several bodies, especially of the firefighters, police and medical rescue services. Other bodies (such as e.g. voluntary firefighters, the army and others) also participate in the IRS but never assume a leading role. In the Czech Republic, the IRS is made up of three main agencies: the Fire Brigades, the Health Emergency Services and the Police. Typically, these agencies operate at the regional level. Cross-regional or national cooperation, however, also takes place, depending on the scale of the crisis. There are also secondary agencies included in the system which can be used during emergencies on special request, such as designated military capabilities or civic organizations (Czech Republic Act Nr. 239/2000 Coll.). The actions of the system are coordinated by the Operation and Information Centres – professional dispatching centres which are operated under the regional Fire Rescue Brigades (Skalská et al. 2010).

In 2002, inspired by the Czech Republic, Austria and Germany, a similar system was introduced in Slovakia (Slovakia Explanatory Memorandum to the Act Nr. 129/2002 Coll., 2002). Here, the Integrated Rescue System is a platform for cooperation among the Ministry of Interior (which has the leading and coordinating role), Health Ministry, District Offices in the seat of a Region, and Rescue Bodies. The Rescue Bodies are then divided into three parts: Basic Rescue Services (the Fire-fighting and Rescue Brigade, Health Emergency services, Inspecting Chemical Laboratories, Mountain Rescue Service, and Mining Rescue Service); Other Rescue Services (e.g. Army, Municipal Fire Brigades, Municipal Police, Civil Protection Units or the Slovak Red Cross); and the Police Corps (Slovakia Act Nr. 129/2002). The main level of operation is at the regional level. At this level, Coordinating Centres were established in 2003, located at the District Offices in the seat of their Region (Koncepcia 2011). While the Czech system proved to function well during the 2002 floods and onwards, the Slovak one largely failed during the floods of 2010 and is currently subject to substantial revisions (ibid.) which should be implemented by the end of 2017 (Government Office 2016: 22).

In Poland, on the operational level, similarly to the Czech Republic, the most important element of crisis management action is the State Fire Service, which is a major part of the National Firefighting and Rescue System (it also includes Voluntary Fire Service brigades; the Mountain Rescue Service and the Water Rescue Service, hospitals, ambulance service etc.). Although the National

Firefighting and Rescue System deals mostly with everyday actions, it is also activated in case of a crisis. The State Fire Service is the main part of the National Firefighting and Rescue System, and the Chief Commandant of the State Fire Service is the central authority responsible for the organization of fire protection and the National Firefighting and Rescue System.

Floods of 2002 and 2010

Although the most damaging floods took place in 1990s, this chapter focuses on more recent ones which occurred over the past 15 years, as they represent more accurately the current functioning of the civil security systems in the affected countries. For this reason, the following case illustrations focus on the most damaging floods, i.e. the floods of 2002 in the Czech Republic, and of 2010 in Slovakia, Hungary and Poland. Together with the brief description of the event, the main challenges and lessons learned in each case are presented.

Czech Republic

In the Czech Republic, the 2002 flood serves as an example of a well-managed crisis situation, after which no important changes to the security system were necessary (Špidla 2012; Czech Republic General Directorate of the Fire Rescue Brigade 2012). These floods constituted a major "test" of the system and are generally perceived by both politicians and practitioners as well managed (Špidla 2002). The public, too, viewed the crisis management positively. The rescue forces were highly esteemed after the floods. The army was positively evaluated, as it was participating in rescue and recovery works (Factum Invenio 2005). Also the police – despite its general low popularity – played its role during the floods well, which was positively noted by both the mass media and the general public (Fiala 2003: 5).

The first wave of floods started in mid-July 2002 when an unfavourable meteorological situation was accompanied by intense torrential rains – especially in the Blansko district and the South Bohemian region. In both cases, the Integrated Rescue System was used. A large number of persons had to be evacuated from the aforementioned areas (1500 people were evacuated, ca. 100

people were rescued). More important and damaging, however, was the second wave, which started on August 11th, 2002, when the water level on the upper stream of the Vltava River rose due to torrential rains. Consequently, the regions of South Bohemia, Karlovy Vary and Pilsen were affected. Further down-stream regions followed: namely Prague, Central Bohemia, South Moravia and Vysočina. In total ten regions (out of fourteen) were affected (Prudil 2002).

At first, a state of danger was declared by the affected regions. Due to the extent of the floods, however, it was impossible to coordinate rescue work only at the regional levels, and coordination at the national level was necessary. In accordance with §7 of the Crisis Act (Czech Republic No.239/2000Coll), the Ministry of Interior – General Directorate of the Fire Rescue Brigades started to coordinate the rescue and recovery works from 10 a.m., August 12. Crisis Staffs were activated at all levels of administration. Based on the assessment of the situation, the Prime Minister declared on August 12 from 6 p.m. a state of emergency for five regions. On August 13, the Ústecký region was added. The end of this state was then at midnight August 31, and in many places it was replaced by a "lower" regionally-declared state of danger (Kopp and Doležel 2002).

During the crisis, specific measures were carried out, such as informing and warning the threatened population together with a subsequent evacuation of people from the affected areas and debris disposal operations. Military assistance was used to help carry out evacuation works and later debris disposal operations and humanitarian assistance, under civilian command. Thanks to the public media and the well-functioning regional warning systems, spontaneous evacuation of tens of thousands of people also took place without any significant problems. The operation of the central Crisis Staff made it possible to conduct a managed evacuation of several more tens of thousands of people. It was by the Crisis Staff, too, that the technical and material humanitarian aid (both domestic and from abroad) was coordinated (Prudil 2002).

The floods created a great wave of solidarity, with people helping in the affected areas voluntarily, without being active members of any NGO. Immediately after the floods 45 thousand donors were registered. Other thousands of people donated through phone-lines or SMS messages. The largest public collection, "SOS Floods" (*SOS Povodně*) organized by the NGO People in Need, received 269 million Czech Crowns[13]. Also, other NGOs, such as the Czech

[13] approx. 13,5 million USD

Red Cross and Adventist Development and Relief Agency (ADRA) organized collections and voluntary help for the affected areas. Thousands of people and dozens of affected municipalities were delivered this aid (Marek 2003). From the civic sector, the crucial role was played by the Voluntary Firefighters, which have a major tradition in the country and are an official part of the IRS; 19,100 Firefighters helped during the floods (Prudil 2002).

Lessons learned

A weak spot turned out to be the preparedness of the private sector, where crisis plans were sometimes neglected. Probably the best example is the flooding of a chemical plant, Spolana Neratovice, which led to leakage of chloride. In its vicinity, the highest degree of chemical danger had to be declared. People were asked not to leave their homes and to not open the windows. Police closed roads, and firefighters sprinkled the area with water mist to "pull" the gas to the ground. Although the responsible company was legally sued for the leakage, the legal case has been put to a halt (Baroch 2004).[14] The experience with evacuation during the floods pointed to the need for public education on civil security, which was completely abandoned in the early 1990s. Since 2003, this education has again been on the primary and secondary schools' curricula, although not to a very large extent (Krobath and Stejskal 2004).

Responsibility in general was rather hard to pinpoint. Overall, three police investigations were initiated after the 2002 floods: with respect to the Prague Metro flooding; investigations into possible criminal liability for improper management of the runoff from a range of retention reservoirs of the Vltava cascade; and with respect to chloride leakage from the Spolana chemical company. No charges have been laid (Fiala 2003). Also a commission of the municipality established to investigate the Prague Metro flooding reached ambiguous conclusions, and in the end only the water was blamed. Police investigation, too, went to no effect, and despite finding that there were some shortcomings (e.g. the construction plan was not fully observed in some cases) nobody could be accused of causing a public threat. Two officials from the Prague Public Transport Company were dismissed, but in the view of some these were instead scapegoats to the necessity to blame someone (Otto and Hrbáček 2004).

[14] Note a different situation in the case of the Ajka spill in Hungary, where the company was nationalized in order not to allow it to avoid responsibility.

Slovakia

In Slovakia, the flood of 2010 demonstrated the weaknesses of the civil security system: from mal-staffing of the District Offices, through communication problems, to imperfect legislation. It showed that the Integrated Rescue System was not sufficiently ready to deal with consequences of a large-scale event at the central level for a long period of time. The crisis management was also somewhat complicated by the impact of a relatively recent reform of public administration in 2004[15]. After this experience, the government approved a new conception of the Integrated Rescue System and its operation in January 2011 (MoI SK 2011; Filip undated). Among the population, however, the floods did not arouse serious controversies, as can be judged from a very low number of related petitions and complaints addressed to the state administration at all levels (Slovak Governmental Office 2011).

Extreme rains in May 2010 resulted in floods hitting almost the entire territory of Slovakia. The most affected was the Košice region in the east of the country (here alone damages were estimated at 156,8 million EUR, i.e. approx. 169 million USD) (Tej and Živčák 2010: 233). Nitra and Prešov regions were also badly affected. Due to worsening of the situation, the regional Flood Committee asked the Head of the District Office in the seat of the Košice region to declare an *emergency situation*. This was done on 18 May at 6 a.m. for the whole region, lasting until 21 May (Slovakia Ministry of Environment Report 2010).

When there was a second wave of flooding, the situation in the Košice region started to be critical. District Offices began declaring emergency situations on their territories. The state administration did not have sufficient means nor staff for providing rescue and protection. Therefore, the Head of the District Office in the seat of Košice region declared an *emergency situation* for the territory of the whole region on 1st June at 11 p.m. (lasting until 25 June). After the emergency situation was un-declared at the regional level, it was declared by some municipalities (e.g. by the Mayor of Košice city), based on their assessment of the situation. Civil protection measures were taken, such as evacuation, raising

[15] Since 1996, Slovakia has gone through several waves of reform of public administration. Especially the reform of 2004 resulted in some confusion in crisis management: after the reform, the legal principles of functioning of the Crisis Staffs at the municipal, district and regional levels remain unclear. Also, the competencies and crisis management tasks of state administration and self-governing bodies are overlapping in large cities (Šimák, Míka 2009).

levees with sandbags and pumping water from flooded electric centrals. The evacuation was carried out by municipal Evacuation Committees in collaboration with the District Evacuation Committee (Slovakia, Ministry of Environment Report 2010).

Also, for the whole Prešov region an emergency situation was declared by the Head of the District Office in the seat of the Prešov region on the suggestion of the Head of the Regional Office for the Environment on 4 June at 12 a.m. The situation was controlled and coordinated by the Crisis Staffs of the District Offices. 4,782 people were evacuated, mostly for a short time: either to public buildings designated for these purposes in crisis accommodation plans of the municipalities; or self-evacuated to their relatives (ibid.). In the Nitransky region (Central-Western Slovakia), all districts were affected too. Rescue work was conducted by the bodies in the Integrated Rescue System as well as by members of the population capable of work. Help was also provided from other regions (ibid.).

During the floods, volunteers as well as NGOs were widely involved. Representatives of the Slovak Red Cross (SRC) became members of the Crisis Staffs in some districts (e.g. Levice) when the emergency situation was declared (SRC online). Apart from the SRC, other organizations from the non-governmental sector were also involved, such as the Samaritan Association which supplied medicines to people in hard-to-access territories (Hužiková undated); Modrý anjel (*Blue Angel*), specializing in crisis intervention and helping especially in the Handlová municipality (Modrý anjel online); or ADRA organizing money collection and providing alimentation for part of the evacuated population (ADRA online). Perhaps most importantly, the help of the Voluntary Fire Brigades proved important, especially in dealing with the consequences of the floods and rescuing peoples' property (Rusňáková 2011).

Lessons learned

Already during the floods, the Government asked for an analysis of flood protection in the country. This showed that complex arrangements with a number of systemic measures in all areas of flood protection existed (such as, e.g., a warning and forecast system), yet the lack of finances for their full implementation was the problem. Reckless construction on the riverbanks then contributed to the damage (Slovakia Ministry of Environment Report 2010b). Also

analyses conducted at the regional level stressed either the lack of financial resources or imprecise legislation (Forrai undated).

On the operational level, municipalities remained "alone" for some time. This was because the District Offices and the IRS bodies were not able to be everywhere and priorities had to be set. The forces and facilities of professional rescue bodies were not sufficient; armed forces were not able to supply the demanded help. The situation was complicated by secondary effects of the floods such as landslides, damage to communications, bridges and houses, stretching the evacuation facilities (Hoško undated: 4-5). In addition, operations at the municipal level did not always go completely smoothly. For example, in the town of Poprad (Prešov region), the mobile phone of the leader of the rescue works collapsed due to the heavy rain, thus leaving the Crisis Staff without the latest information. After this experience, the town purchased waterproof mobile phones for the members of the Crisis Staff and equipped the leader of the rescue works with three high quality mobile phones, each with a different mobile provider (Kisel undated).

During the floods, the staffing of civil protection and crisis management of the District Offices became rather insufficient. Also the cooperation among and operation of some bodies was problematic, as the role and competencies of leading agencies and bodies were not entirely clear – an acknowledged result of the inadequacy of legislation in the field of crisis management and civil protection (Forrai undated). The Fire Rescue Brigade performed its professional duties; however – from the point of view of complex security provision – it could have provided more assistance to the Civil Protection bodies (Hoško undated: 1). Cooperation on the side of municipalities, too, was problematic, as these did not observe the obligation to inform and update the higher levels of administration about the current situation (Forrai undated).

Hungary

In 2010, as a result of extremely long and heavy rains, several rivers flooded Hungary simultaneously. The Hungarian Parliament announced the *state of emergency*. Altogether 518 municipalities in 14 counties were flooded, more than 5,200 people were evacuated, 3,118 houses were damaged (Szarka 2011). Apart from this, the inland water also caused damage in 380 settlements.

During the flood protection activities, at the maximum 21,156 persons were involved simultaneously from several institutions, including police, army and rescue organizations (Szarka 2011). Additionally, NGOs were involved.

At that time, under normal conditions, water management authorities were in charge of coordinating flood protection at the regional level and at the local level, local protection boards played the same role. Under special conditions (state of danger or emergency) the Governmental Coordination Committee took over these duties. The water management directorate maintained a National Technical Coordination Body (OMIT), which ran the coordination of institutions responsible for logistics in disaster management, public health, water quality monitoring etc. At that time, water management issues belonged under the Ministry of Environment and Water Protection, while other actors in crisis management were under the Ministry of Internal Affairs.

Lessons learned

The 2010 floods were important in evaluation of the disaster management structure. There were problems with logistics, coordination and cooperation among actors during the response phase. There were no clear supervising and reporting rules. Thus, the coordination among actors (disaster management, army, water management authorities) was not smooth enough. There was also a need for clear supervision and task division. Also, the NGOs' activities could have been more efficiently coordinated (Hungary National Accountancy Office Report 2012). Moreover, plans for flood protection were not obligatory for smaller communities. Thus, disaster preparedness was not proper there. Additionally, implementation of spatial planning principles and practices had to be reconsidered as there was not proper impact assessment when granting building permits (e.g. the settlement Felsozsolca was flooded because the shopping centre was built in the flood zone). This flood demonstrated the necessity of working out an integrated management system (Szarka 2012), with clear lines of responsibility and supervisory roles and better organized cooperation with NGOs. The flood of 2010 (together with the Ajka spill) was a crucial event resulting in substantial changes to the Hungarian crisis management structures.

Poland

As the catastrophic flood of 1997 triggered the establishment of the crisis management system in Poland, the next catastrophic flood, in 2010, subjected the system to a test. In May-June 2010, the flood wave level in the Vistula River was the highest in the past 160 years. Several cities were flooded, dykes were broken, and 30,000 people had to be evacuated. Also 1,300 landslides occurred as the result of the flood and heavy precipitation. Losses were estimated at approx. 4.1 billion US Dollars.

The national crisis management system, as well as the regional and local ones, was activated. Also the army was activated in accordance with the "Plan to use the Polish Armed Forces in crisis" implemented several months before the flood.

The operation of the crisis management system was criticized, and a formal question was submitted to the government by a Member of Parliament on "the actions and omissions of the government crisis management during the flood". The Supreme Audit Office published a report stating that the actions taken by the administration were generally accurate and effective (Poland NIK 2011). The inspection of the provincial authorities identified a number of good practices that raised the effectiveness of anti-crisis measures. Also, the Supreme Audit Office positively evaluated the fulfilment of the Minister of Interior and Administration's obligation to issue regional planning guidelines for emergency rescue, and for organizing and conducting training and exercises in the field of crisis management. Expenditures for the tasks within crisis management were assessed as well-targeted and cost-effective in the inspected units.

In addition, in the Government's answer to the formal question of the MP, the functioning of the crisis management system and the rescue services was assessed as effective. Actions undertaken by the public administration were deemed adequate and sufficient to cope with the crisis situation. The system was also assessed as properly functioning because it was not necessary to establish the *state of disaster* (Interpelacja 16330 - 2010).

Lessons learned

Although the performance of the crisis management system during the 2010 flood was assessed positively, several weaknesses of the flood management were indicated in the Supreme Audit Office report (Poland NIK 2011). Urgent solutions

were required to the problem of under-funding of flood protection. The poor condition of – and growing need for – modernization of levees, natural watercourses, canals, pumping stations and dams was indicated. Due to the insufficient funding, public authorities could not fully carry out the tasks of flood protection, while the state budget then spent a multimillion-dollar amount on flood damage (ibid.).

Although the criticism was related mainly to the infrastructural part, more general criticism concerned the scale of losses, leading to the conclusion that the flood of 1997 did not teach the public administration very much. Indeed, a judgment about why the scale of losses was so large (as high as in 1997), despite the introduction of the entire crisis management system in the country, is not easy. It poses a question of efficiency of crisis management investments. However, efficiency considerations are only in their infancy in Poland.

International and Regional Cooperation

The floods of 2002 (referred to as a "thousand years' water") were the only case when the Czech Republic requested foreign assistance. Not yet an EU member, NATO played a very important role. On 14 August, the Government requested assistance through the Euro-Atlantic Disaster Response Coordination Centre (EADRCC). In particular, portable dryers and pumps were requested. Among other material, vaccines against Hepatitis A, chlorine-based disinfectants and repellents were also requested (EADRCC online). The country also turned to the EU and the UN, as well as to other countries through their representative offices. Foreign help was delivered swiftly from almost fifty countries, including Poland, Hungary and Slovakia (Krul et al. 2003). According to the official statements, this assistance (counting for 214 rescue workers) was important but not crucial for managing the crisis. It was used to enhance the extant capacities (especially dryers and vaccines) which were needed in large quantities at the same time in many regions due to the extraordinary scale of the floods (Špidla 2002).

In 2010, when floods hit all of Central Europe, the Ministers of the Czech Republic, Poland and Slovakia agreed to cooperate "in the rescue operations and debris disposal operations during the (...) floods." (ČTK 2010) In this way, the Czech rescue workers (members of the Fire Fighting Brigade of the Moravskoslezský region and of the Rescue Corps of the Fire Fighting Brigade)

were sent to Slovakia upon the request of the Slovak Republic for a rescue operation in Eastern Slovakia (USAR 2010). Slovakia, in turn, sent in-kind help (sandbags) to Hungary. Also, operational bonds between Slovakia and Poland functioned well when there was mutual assistance provided during the 2010 floods in the border regions (Slovak Ministry of Foreign Affairs Annual Report 2010).

International organizations were also used in 2010. Hungary requested aid from abroad through both the EADRCC system and through the EU-MIC (Monitoring and Information Centre). Poland, too, activated MIC procedures to get assistance and obtained international help from several countries. The EADRCC was also used (EADRCC online).

As follows from the above argument, the cooperation and mutual assistance among the V4 countries materializes itself either on a bilateral basis (most typically in the form of cross-border cooperation, which is well developed); or through EU mechanisms, such as the EU Monitoring and Information Centre for disaster response or the EU ECHO[16]. In the field of disaster management, the Visegrad Group[17] as a platform has a low profile in terms of both budget and impact. The practical use of the V4 is rather indirect: in facilitating meetings to establish contacts which could later be used in times of emergency (Brazova and Matczak 2013). Common exercises in the field of disaster management also exist, yet they are not organized under the Visegrad Group heading (Brazova, Matczak and Takacs 2013).

As the countries face similar challenges as well as similar difficulties with the implementation of some of the EU flood-related legislation, a stronger functional role of the Visegrad Group could be envisaged. Similar levels of institutional capacity and available resources (which are comparatively lower than in the Western European countries) might be considered a facilitating factor for an increased cooperation. Yet, no such strengthening of cooperation within the Visegrad Group platform is currently envisaged. If this is to materialize in the future, it would rather need to take on a bottom-up approach, with regional and/or cross-border cooperation creating precedents for a broader official collaboration.

[16] European Community Humanitarian Office

[17] The Visegrad Group is a consultative framework designated for high level officials' meetings among the four participating countries. It does not have any organizational structure. Although civil security became of interest to the group in 2001, it has never been on the top of the agenda.

Conclusion

It can be concluded that the civil security systems of the V4 countries are now in place and relatively well capable of dealing with emergencies. Three countries (Czech Republic, Poland and Slovakia) have developed an integrated response system to deal with both every-day and extraordinary emergencies. Yet, as follows from our flood case studies above, all of the four countries did draw somewhat different lessons learned from the disasters. While the performance of the crisis management system was assessed positively after the large floods in the Czech Republic and to some extent also in Poland, this was not the case in Slovakia and Hungary where more lessons were learned, followed by substantial changes to the countries' civil security systems.

Generally speaking, rather than the issues of crisis management as such, the question of responsibility and accountability can be regarded the most problematic part in the Czech case. This can be understood in both a legal sense (i.e. legal liability) and also in the sense of preparedness, be it of the private sector (neglecting the crisis plans) or of the public sector (lack of public education on civil security). Just as in the Czech case, there were no problems with the actual managing of the crisis in Poland. What turned out to be controversial, though, was the efficiency of crisis management investments. Overall, the lack of finances and the resulting under-funding of flood protection was the largest problem in Poland.

In Slovakia, several lessons appeared: especially the lack of finances (similarly as in Poland) and imprecise legislation, resulting in problems in cooperation (similarly as in Hungary). On top of that, reckless construction alongside the rivers and insufficient staffing of civil protection can be viewed as factors fuelling the crisis. Also in Hungary, cooperation and coordination among different actors was problematic and resulted in a change in the legislation. Similarly as in Slovakia, spatial planning and building permits were mentioned in the Hungarian case as a lesson learned. Furthermore, disaster preparedness in smaller communities was not sufficient, as the plans for flood protection were not obligatory.

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Part C.

National Institutional Capacity Case Studies

Chapter 12. Managing Disasters in Developing Countries: Perspectives from Ghana

Augustina Adusah-Karikari and Patrick Tandoh-Offin

Introduction

Natural and man-made disasters are said to be capricious emergencies because of the potential to create crisis situations for all societies. Whenever they occur, disaster events like oil spills, building collapses, ethnic conflicts and earthquakes have a tendency to temporarily disorganize livelihood activities for humans and the ecosystem. The urgency for swift, as well as deliberate, decision-making at both the operational and the political levels rather generates specific responsibilities especially for public administration and management. The potential threats and conditions of uncertainty associated with disaster events allow issues of emergency and relief management to receive necessary consideration in the public management agenda of governments around the world in recent times (Boin and 't Hart 2010; Drabek 1987; Farazmand 2007; Waugh 2006).

Ghana as a developing country has had its fair share of the common disasters and crises such as flooding, ethnic clashes, and in recent times, an airline crash, industrial accidents and fire outbreaks. Disasters in Ghana have worsened the plight of the rural and urban poor. They have claimed many lives, caused material losses and diverted scarce resources to rehabilitate victims and repair or replace damaged social and economic infrastructure (UNDP 2010). Like many developing nations, public sector institutions have had numerous constraints in

dealing with the events as they occurred, even with the more recurrent ones such as fire outbreaks and flooding for various reasons (Lebel, Manuta, and Garden 2011). Regardless of where they have been experienced, disaster events like flooding, ethnic clashes, and fire outbreaks, usually exhibit common characteristics and impacts. Conversely, the absence of planned mitigation strategies, via contingency planning, have worked to escalate the vulnerability of governments and the ability of public sector managers to effectively respond to such events.

The challenges that confront public managers in dealing with contingencies are numerous. These include the absence of well-documented experiences and inadequate supply of personnel with the requisite skills and of the financial support to deal decisively with disasters. Invariably, there are limited capacities within government authorities and among communities to cope effectively with disaster. According to Callahan, Olshfski and Schwella (2005), experience, real or vicarious, is a useful resource for managers, especially in the public sector for program planning, implementation and evaluation. And since not all experiences have to be personal or first-hand, relying on the experiences and decisions of others equally constitutes a useful way to learn how to manage similar situations and events, even in different contexts. The ability to learn from crisis experiences is a key asset for building crisis management capacities (LaPorte 2007; Stern 1997). Most of the issues and events that public administrators in developing countries are expected to manage especially in disasters and crises, seldom present unique opportunities for impulsive decision-making. Such situations therefore call for resources, both human (skills and knowledge) and material, to be made readily available for the remediation or control of disaster events.

In this chapter we provide documentation of three disaster events in recent times (flooding, an airplane crash, and the Melcom disasters), as well as the approaches that were adopted to manage these events by the government and public sector institutions in Ghana. The following questions guide the paper: What disaster management frameworks and strategies exist in Ghana for eliminating or reducing risks? Are the existing strategies and frameworks sufficient in dealing with major disasters? How can future disasters be addressed?

In this regard, for each of the three disaster events, the following approach was followed to develop the event and their mitigation processes into case studies: narrative summary of the disaster event or case; a review of the national

disaster management institutional frameworks (capacities and administrative issues) for dealing with disasters and crises, including a description of policy documents, initiatives and performance of the role and interaction of key actors; and a documentation of the lessons-learned for future actions. In order to provide context for these accounts, the section that follows is a brief overview of the National Disaster Management Organisation (NADMO), the government agency with responsibilities for the management of disasters as well as other emergencies in Ghana.

National Disaster Management Organisation (NADMO)

The Government of Ghana established the NADMO by an act of Parliament (Act 517 of 1996) to manage disasters and emergencies. This was mainly in response to the United Nations Declaration GAD 44/236 of 1989, declaring 1990 to 1999 as the International Decade for Natural Disaster Reduction (IDNDR). The UN (IDNDR) in the 1990s disseminated preparedness techniques and institutional arrangements throughout the Global South (Quarantelli 1998).

Prior to NADMOs establishment, Ghana had experienced severe drought, bushfires, and famine in many parts of the country in the period between 1982 and1983. The National Mobilisation Programme was set up as the implementing agency of the National Disaster Relief Committee. NADMO currently is the national body in Ghana designated for multi-sectoral co-ordination and collaboration in disaster risk reduction. Act 517 (1996) mandated that NADMO's primary function is to be "responsible for the management of areas affected by disasters and similar emergencies, for the rehabilitation of persons affected by disasters and to provide for related matters" (Ghana 1996).

The main functions under the Act include:

- Prepare National, Regional and District Disaster Management Plans for preventing and mitigating the effects of disaster;
- Ensure the establishment of adequate facilities for technical training and institution of educational programs to provide public awareness, warning systems and general preparedness for its staff and the general public;

- Coordinate local and international support for disaster or emergency relief services and reconstruction.

The National Disaster Management Committee (NDMC), chaired by the Minister of Interior, has administrative oversight responsibilities for NADMO and reports to the National Security Council, which is NADMO's Governing Council. Seven hazard-specific technical committees of governmental and non-governmental experts advise the NDMC. The mandate of NADMO stipulates that it offers relief support in times of emergencies in any location of the country. As such, the organization has structured its offices along the decentralized system of national, district, and zonal levels. At the decentralised level, NADMO has ten regional offices, 243 Metropolitan, Municipal and District Secretariats, and 900 Zonal Offices headed by Regional, District and Zonal Coordinators respectively.

Selected Major Disasters in Ghana

In this section, we rely on three major disaster events that have occurred in the last decade as a basis to characterize disaster management processes in Ghana. For each of the three events, we discuss possible causes and the institutional, as well as NADMO's, responses to the disaster events. The purpose in all the chosen cases is to evaluate Ghana's capacity and preparedness to respond to disasters.

Flooding disasters in Ghana

Ghana ranks high amongst African countries with the most exposure to risks from multiple weather-related hazards (Amoako and Ampofo 2009). Ghana's exposure to floods and droughts is mostly felt in the Northern Savannah belt. Epidemics, pests, infestations and wildfires occur across these regions of the country. Current development dynamics and demographic changes put more people at risk of disasters in Ghana, which manifests in increasing rural poverty, rapid urbanization, growth of informal urban and coastal neighbourhoods, poor urban governance, and declining ecosystems (UNISDR/World Bank 2009).

Floods are a common feature in the country with areas being cut off from time-to-time during the Rainy season. Between 1991 and 2011, Ghana experienced several major floods, with a record two million people being affected by the 1991 floods alone. The table below outlines the incidence of floods, the number of casualties and individuals affected through displacement and homelessness.

Table 15 - Floods and their Impacts in Ghana

Year	*No. of People Affected*	*No. of Casualties*
1991	2,000,000	-
1995	700,000	145
1999	324,600	52
2001	144,025	-
2007	325,000	56
2008	58,000	-
2009	19,755	-
2010	377,652	63
2011	43,385	16

Source: Adapted from OFDA/CRED International Disaster Database

The flooding disasters experienced in 2007 resulted in 18 deaths and over 260,000 individuals being displaced in the three northern regions alone (UNDP/World Bank report 2009). Damage caused by the floods included the destruction of thousands of homes, water supply systems and loss of cropped farms and livestock. Additionally, public infrastructure, such as schools and road networks suffered damages due to the floods including nine bridges that were washed away. Treatment plants and pumps for water supply were also destroyed.

In view of the magnitude of the floods and the severity of the damage suffered on the people and their communities, the government of Ghana declared the three northern regions as a disaster zone on September 12, 2007 (IMDRC/UN 2007). A culmination of events in 2007 that is believed to have caused the humanitarian situation includes a prolonged dry spell followed by abnormal torrential rains in the Savannah and Sahel regions of northern Ghana. There was also the spillage, without warning, of the Bagre and Kopeanga Dams in Burkina Faso, Ghana's northern-most neighbour, a situation that aggravated the flooding in communities in the three northern regions (Gold 2010).

Unlike the northern savannah and forested regions, flooding in mostly urban areas in the south is usually caused by construction of buildings along waterways and choked drains, especially in heavily built areas of Accra. This situation therefore generates critical concerns about the efficiency of public sector institutions that are responsible for ensuring the implementation and enforcement of building regulations and codes, and environmental considerations in the siting of buildings and infrastructure (Lebel et al. 2011). A critical observation from flooding disaster events and the destruction it causes in Ghana relates to the incidence variation between predominantly rural forest and savannah regions in the northern half of the country, and the mostly urban, built areas in the coastal regions. The damage from flooding disasters is mostly felt in these two extreme regions.

The Melcolm disaster

On Wednesday November 7th 2012, a six storey building serving as a shopping mall for Melcom Ghana Limited collapsed around 0940 hours GMT in Achimota, a suburb of Ghana's capital, Accra. The eventual death toll was 14, with about 70 people being injured. Eyewitness accounts that were documented in print media noted that the building had developed varying degrees of cracks, which were evident in the building walls and columns. Just before the building collapsed, a large bang was heard in the lower floors of the building.

A preliminary report submitted by an eleven-member committee set-up by the Ghana Institute of Engineers (GhIE) revealed that the use of substandard materials in the construction of the building, no reinforcement in the columns that held the building, and low base concrete strength were the main causes of the collapse. These factors can be summarized further into the three broad threats and hazards, namely: the use of faulty and inferior quality construction materials; negligence which manifests in either a lack of standard building codes enforcement (Burby 1998), or a lack of periodic maintenance and proper usage of the facility (Kasperson and Pijawka 1985); there is also the issue of random threats of natural disasters due to seismic activities.

The foregoing re-emphasizes the failure of public institutions and public management systems to effectively implement building codes and enforce regulation of environmental standards in Ghana. The charge of negligence,

especially on the part of government agencies with responsibility for ensuring building quality standards, manifests in the lack of a systematic approach for risk assessment, and quality control (Johnson 2011; Kasperson and Pijawka 1985). There is also the issue of limited exercise of oversight responsibility by the appropriate national and decentralized bodies charged to ensure conformity with building codes and regulations, especially where pressure from organized civil society is non-existent.

The 2012 airplane disaster

The Ghana aviation industry on the night of Saturday June 2nd, 2012 suffered a major disaster with the crash of an Allied Air Boeing 727-200 Cargo aircraft with registration number 5NBJN en route from Lagos via Accra to Abidjan. Preliminary investigations revealed two major factors that may have accounted for the accident. The first is that the Nigerian cargo jet developed a technical problem in its brakes which caused the airplane to overshoot the runway. Additionally, a heavy downpour of rain had left a pool of water on the runway and may have contributed to the crash-landing of the airplane close to the El-Wak Stadium in Accra. The cargo aircraft first smashed through the fence wall perimeter that runs around the airport before hitting a Benz bus, a Daewoo taxi cab, and two pedestrians. Even though, all the four crew members on the plane survived, the aircraft crash resulted in 12 casualties, made up of the 10 passengers on the Benz bus and 2 other pedestrians.

The case has been made that most national airlines in Africa tend to operate with out-dated planes, amidst the usual non-compliance with strict aviation regulations and international air safety standards. Much as the cargo aircraft crash is not an isolated air disaster event in Ghana, in comparative terms, the country has not experienced any major air disasters such as occurs in other countries in the sub-region. Changing economic fortunes in the country, especially among the middle class, has necessitated the increased usage of air travel in Ghana in recent times.

Having provided descriptions of the three major disaster events selected for this chapter, we now proceed to evaluate the national capacity and responses to those events. The intention is to assess the disaster management frameworks or strategies that guide Ghana's emergency responses. We also assess the

effectiveness and sufficiency of existing structures and strategies in the face of the three major disaster events being considered in this chapter. The importance of such an assessment is found in the space it offers for characterizing existing national capacities for disaster risk management (Asia-Pacific Network for Global Change Research 2005).

National Capacity and Response

As a multidisciplinary activity, disaster management involves a number of public sector organizations and agencies, as well as NGOs and civil society groups. The new paradigm of Disaster Risk Reduction has been formalised in the internationally widely recognised Hyogo Framework for Action 2005-2015 (HFA) (Johnson 2011). The HFA acknowledges the important role of Government agencies in disaster management, but also explicitly identifies the need to include civil society and other organizations (e.g. trade unions or religious institutions) in the design and implementation of such institutional frameworks (Becken and Hughey 2013; Lebel et al. 2011).

The relevant agencies in Ghana that form that core team for emergency coordination (National Disaster Management Committee - NDMC) consist of representatives from the following state institutions: NADMO, Ministry of Interior, Ghana National Fire Service (GNFS), the Ghana Police Service, Ghana Armed Forces, and Ghana Ambulance Service. This core coordinating body works with other stakeholders such as the UN agencies, NGOs, and other civil society groups. Meanwhile, depending on the type and extent of an emergency or disaster event, agencies with technical expertise such as the Environmental Protection Agency (EPA), the Ministry of Local Government and Rural Development and utility providers like the Electricity Company and the Ghana Water Company, may be brought on board.

Research reveals that the management of disasters has shifted from a reactive, top -down approach to a more inclusive approach that seeks to proactively reduce the risk of disasters occurring and to minimize the negative consequences for human lives and economic activities (Innocenti and Albrito 2011; Johnson 2011; Thomalla et. al 2006). The NDMC has adopted this renewed approach to disaster risk management through a revision of NADMO's mission to incorporate a co-ordination of the resources of government institutions and non-governmental

agencies (Lebel et al. 2011). They are also expected to engage in developing the capacity of communities to respond effectively to disasters and improve their livelihoods through social mobilization, employment generation and poverty reduction projects. The manifestation of these new strategies for disaster risk management by NADMO also includes the establishment of Disaster Volunteer Groups (DVGs) at the local level, to serve as frontline operators within communities to help manage disasters whenever they occur. According to Larsen, Calgaro and Thomalla (2010), the opportunity to capitalise on local or indigenous knowledge and to tap into existing social relationships has been identified as an effective approach to strengthening the resilience of communities in the face of disaster.

In respect of national frameworks that guide emergency and disaster management, Ghana can boast of the NADMO Act (Act 517) of 1996. Also available are the National Disaster Risk Reduction Policy (DRR) which is Ghana's response to the Hyogo Framework for Action (HFA). There is also the National Environmental Policy (NEP), and the National Climate Change Policy (NCCP). Relevant sections of the NADMO Act for emergency and disaster relief and management include: article 2(2)(a) which states that one of the objective of NADMO is to prepare national disaster plans for preventing the consequences of disasters; article 10(f) states that one responsibility of the National Committee is to analyse the nature of hazards, vulnerability, and risk situations in particular areas; articles 10(g) and 10(j) also deal with information management; and other relevant articles include 2(2)(c) (education for public awareness, warning and preparedness), 14(a) (regional planning for mitigation and preparedness), and 16(a) (mitigation and preparedness planning at the district level).

The government of Ghana has in recent times been advocating for a re-orientation of the approach to disaster response from management to disaster risk reduction, which is in line with the requirements of the Hyogo Framework for Action (HFA). The new focus in public sector disaster and emergency management starts with planning and acting in ways that reduces vulnerabilities, while working to prevent the spread of hazards from becoming disasters (Oteng-Ababio 2013). The government has worked with relevant disaster management stakeholders and also relied on internationally accepted best practice approaches to develop a common framework, the National Disaster Risk Reduction (DRR) policy. The national policy creates a common platform for DRR framework that is usable by all public and non-governmental institutions in Ghana for planning,

budgeting, and operations (Ghana 2011). The common framework also requires local governments to take ownership of DRR and incorporate its principles into the development initiatives for their jurisdictions by creating bylaws to warrant budgetary allocation.

Two other frameworks - the National Environmental Policy (NEP) and the National Climate Change Policy (NCCP) - have been developed that link NADMO to the EPA to further enhance the new direction in disaster management where the focus is on risk reduction and climate change adaptation. The emphasis placed on climate change adaptation flows from the greater severity of predicted impacts of prolonged droughts and extreme storms and floods, especially for countries in Sub-Saharan Africa (Mileti 1999). Thus the public sector manager in a developing country like Ghana with increasing population growth rates and their attendant socio-economic and environmental implications is ever more confronted with disaster or emergency management challenges as part of the whole art of governance (Lindell, Prater and Perry 2007; OECD 2003).

In principle, the government of Ghana, through the adoption and incorporation of international and national frameworks for disaster risk management into national DRR frameworks may be considered to be on the right path. However, in terms of implementation and enforcements of the principles and policies, much is left to be desired. The delicate operational and technical aspects of coping with emergencies and crises, such as saving lives, protecting property and allocating resources, are important tasks in traditional emergency and public sector management (Deverell 2010; IFRC 2012). The expectations of citizens in all parts of society is that public sector managers are able to fulfil these tasks in a correct and efficient manner (Boin and ‘t Hart 2010), and knowingly or unknowingly oblivious of the many constraints under which such officers operate.

In the section that follows, we present an analysis of the national capacities for responding to the three disaster events in Ghana. We also subject the overall approach and institutional resources employed in the relief efforts to critical evaluation for public management effectiveness in dealing with disasters and emergencies in the developing world.

Assessing national responses to disaster events: Floods

The strategy adopted to respond to flood disaster events in Ghana over the years has often been a *Program Based Approach*[1] (PBA) for *Relief*[2], and then *Recovery*[3], in addition to the existing national institutional set-up, NADMO, for disaster management. The PBA allows for support coordination and leadership by the host country in the delivery of short-term assistance or interventions after an emergency or disaster event. Additionally, the political space that is guaranteed by the program-based approach ensures that decisions and actions taken after a disaster event intended for rehabilitation and reconstruction to reduce disaster risks can take place (Lebel et al. 2011).

In the case of the 2007 flooding of the three northern regions of Ghana, the government established an Inter-Ministerial Disaster Relief Committee as well as District Task Force Teams to oversee the relief efforts in the affected areas. According to the 2007 Joint Assessment Report, NADMO through the Regional authorities made passionate appeals for *relief*, and the responses from charitable organizations, NGOs, and religious bodies manifested in the timely delivery of several tons of relief items to the affected areas. On the part of the UN, the response was in the form of mobilizing in-country capacities to offer technical services for site coordination, information management and assessment. The Red Cross and the Red Crescent Movements mobilized in-country as well as international resources to respond to the emergency and relief coordination.

Thus, whereas the actions of government through public sector actors focused on the management of both the *recovery* efforts, those of non-governmental actors focused on *relief* resource mobilization. The existing disaster and emergency management frameworks allowed for the public sector actors to have the institutional set-up to effectively manage the post-event relief efforts. However, the extent of infrastructure damage and property losses pointed to a

[1] According to the Caribbean Disaster Emergency Management Agency (CDEMA), PBA involves leadership by host country or organization, for donor coordination and harmonization of procedures, among other things.

[2] Relief refers usually to the short-term (but can also be protracted) assistance or intervention provided immediately after a disaster event intended to preserve life and meet basic needs of affected populations.

[3] Recovery describes the decisions and actions taken after a disaster event that are meant to bring back victims into conditions they were before the disaster. It also encourages, where necessary, adjustments for risk reduction.

lack of an effective and an all-encompassing public sector management in Ghana. The 2007 floods revealed weaknesses in the disaster preparedness and the emergency response systems, and exposed peoples' vulnerabilities, and land use and infrastructure systems deficiencies in the affected areas, especially in the three northern regions (UNDP/World Bank Report 2009).

Assessing national responses to disaster events: Melcom disaster

The response to the Melcom disaster was a combination of several disaster management frameworks or strategies, with the visible ones being the Program Based Approach (PBA), *Results Based Management*[4] (RBM), and the *Disaster Recovery Approach* (DRA). Whereas the RBM rather focused on the results, getting as many victims out of the rubble and alive as possible, the PBA ensured there was coordinated support for the *relief* and *recovery* effort through local and international collaborations. There was the assemblage of national institutional networks for dealing with emergencies such as the NADMO, Fire Service, National Ambulance Service, Ghana Armed Forces, and again, a major role for the Executive branch of government. The DRA related to the international bilateral support provided by the government of Israel to assist with the search-and-rescue efforts. Having made initial assessment of the site using special equipment and sniffer dogs to identify the locations of possible survivors or corpses, the Israeli team worked in close collaboration with their local emergency response counterparts in the search-and-rescue mission.

The collaboration from the 18-member Israeli team and their sniffer dogs, detachment from the Field Engineers Regiment of the Ghana Army, NADMO, Fire Service, Ghana Police and the National Ambulance Service resulted in the rescue of at least fifty persons from the rubble at the Melcom collapse site. By the time the collaborating rescue team ended their mission at the Melcom collapse site on 13th November 2012, the official count of casualties retrieved were 14 dead bodies. However, the team managed to rescue or save 67 out of the said 81 victims that got trapped in the collapsed Melcom building. The team also received

[4] RBM moves attention to results as opposed to input monitoring and calls for effective management decision-making

massive support from other private volunteers and non-governmental organizations.

The support of the international collaborators proved to be the most useful effort. With its focus on results, and the application of relevant technological, strategic emergency management practices through effective management decisions the effort was able to reduce the number of casualties. The PBA also allowed Ghana to play a leadership role as a host country to coordinate and harmonize donor support and all other actions in the relief effort. The government in a 2011 statement at the third session of the global platform for DRR in Geneva identified inadequate funding and technical support as limitations in any effort to create a conducive environment to support the development and implementation of a functional DDR (Ghana 2011). But what is most needed beyond the support and collaborations for the *relief* effort would be long-term collaborations for the training of public sector managers to have the capacity and institutional backing for effective and efficient enforcements of existing building code regulations and standards in Ghana.

Assessing national responses to disaster events: Airplane disaster

Public sector managers adopted a different approach, the *disaster recovery approach* to deal with the 2012 airplane disaster. The approach is a post-event effort, usually short-term recovery, and employs several modern technologies such as cellular phones, GPS devices to assess damage and hazardous facilities to aid rapid and definitive disaster response. The objective is restoring or improving the pre-disaster living conditions of affected communities and environments.

In the airplane disaster the strategy involved the creation of an Emergency Operating Centre (EOC) by the rescue and relief team to coordinate efforts for effectively managing the situation. Additionally, the team that comprised of the military, Ghana Civil Aviation Authority (GCAA), the Ghana Airports Company Limited (GACL), NADMO, Ghana Police and other emergency agencies, took the decision to secure the scene of the accident and kept the major road closed to the general public to allow unhindered investigation into the accident. The application of modern technological devices enhanced the disaster risk reduction

processes involved in or associated with the disaster recovery approach in the rehabilitation and reconstruction of affected environment and communities.

Evaluation and Lessons Learned

The foregoing brings to the fore some vital issues about the capacity of national institutions and their ability to effectively respond to disaster events, such as the three that constitute the focus of this section. Much as Ghana has institutional frameworks like the NADMO Act (Act 517), and such other arrangements, these have not been matched with the willpower to implement and enforce statutes that prevent or minimize the impact of disaster events. The capacity of national and district institutions charged with managing disasters can be considered to be low and weak. Most stakeholders are not proactive to disasters. They react only when a disaster has occurred. There is thus a growing concern to change the mind-set of stakeholders, both public sector managers and civil society groups, to embrace disaster risk reduction into their planning processes. The mind-sets are currently focused on response and relief.

The Asia-Pacific Network for Global Change Research in a 2005 report (APN 2005) differentiated four capacities that are relevant for disaster management from the perspective of public sector management. The first is the capacity for deliberation and negotiation meant for capturing the concerns of socially vulnerable groups. The second is the capacity for mobilizing and coordinating resources for disaster prevention and mitigation. The third is capacity for implementation and describes strategies for deploying resources for disaster response. The fourth is capacity for evaluation, which is deemed necessary for ongoing improvement and adaptive learning among relevant stakeholders. The four capacities discussed here therefore constitute the yardstick for evaluating the performance of Ghana's public sector responses to disaster events, as has been presented earlier. A key observation was that the public sector responses to disasters in Ghana has mostly been relief and limited on prevention planning.

The rampant development of infrastructure and other landed properties along drainage and water courses have been identified as some of the major cause of flooding in urban areas. There is thus a suggestion that implementation and evaluation capacities are not functional in Ghana as integral parts of the public sector's preparedness and response in disaster risk management. In spite

of the institutional coordination failures for implementation and enforcement of compliance, the agencies designated to deal with emergencies in Ghana demonstrated some strengths and potential to be effective.

In all three cases, NADMO and the other partners were able to provide timely relief to victims of the various disaster events. Response time is a critical attribute in effective disaster management (Lindell et al. 2006). There was no delay in the disaster response by the Ghana Armed Forces. In both the Melcom Disaster and the Cargo Plane Crash, the timely and professional response of members of the Ghana Armed Forces in conjunction with other security agencies has been widely acknowledged as being responsible for the overall success of the rescue effort. Both incidents occurred in the capital of Ghana, Accra. Particularly in the case of the Cargo plane crash, it happened very close to the Army base. The rescue and relief operations started within an hour of the disaster. This was particularly made possible as the Army had disaster and emergency preparedness plans and protocols in place.

An effective communication system is of paramount importance in the coordination of rescue and relief operations (Gupta, Khanna and Majumdar 2012). The public needs to be properly educated on how to communicate disasters to the appropriate authorities. A Greater Accra Regional Police Commander stated that the police heard of this disaster from a radio station and responded instantly by moving into the area. According to him, that was not the best practice. Every form of disaster should first be reported to the police on telephone line 18555. Most people were not aware of this. To this end, the capacities for prevention and response action lacked essential components, targeting of the relevant stakeholders with the right message to make response programs easily usable.

Similarly, the role of hospitals in disaster preparedness is very crucial. Hospitals have always been an important link in the chain of disaster response and are assuming greater importance as advanced pre-hospital care capabilities lead to improved survival-to-hospital rates (Gupta et al. 2012). Most of the rescued survivors of the Melcom Disaster were treated at the 37 Military Hospital and Allied Medical Facilities. The four surviving crew members involved in the Airplane crash were treated at the Airport Clinic while the 12 bodies were deposited at the 37 Military Hospitals. Thus, the capacity for mobilizing and coordinating relief efforts may be considered to have been useful and responsive to the task. That capacity was best seen in all three disaster events where the

government through public sector agencies led the relief and rescue efforts, including those that involved international collaborators from the Israeli Army and various other international donors and partners.

On a broader governmental/governance level, contingency planning processes and programs may help secure confidence in government (Erickson and McConnell 2012). The reason is that the contingency planning process involves prior assessments of the capacities and the resource (human and financial) requirements and their coordination, communication procedures, as well as the technical and logistical needs for dealing with disasters (IFRC 2012). It has the potential also to quell significant public fears and the need to deal with them, while paving the way for governments to continue their desired policy trajectories (Erickson and McConnell 2012).

Further, the shortcomings of NADMO and the other allied institutions for dealing with disasters can be overcome by the establishment of functional trans-boundary and intra-regional institutional arrangements for the management of flood-related disasters and risks. More specifically, there is the need for stronger cooperation between Ghana and Burkina Faso for better management of flood disasters, as it emerged that most of the flooding events in the northern Ghana are partly caused by water management issues in Burkina Faso. Since this is in the realm of capacity development for deliberations and negotiations, the focus should be on building an integrated and an interdisciplinary approach to flood disaster management which will also incorporate issues of sustainability into the creation of public awareness on flood disasters in the overall national development planning processes.

NADMO's three-year strategic plan (2004-2006) highlighted the need to work with other stakeholders to help mitigate resource and other logistical constraints. These stakeholders include the Fire Service, the Police, the Army, the Ghana Health Service and NGOs, as well as community groups. In response to the UN's recommendation for nations to establish Platforms for Disaster Risk Reduction and Climate Change Adaptation, the Republic of Ghana launched its National Platform in May 2006.

The increasing technological and scientific understanding of disasters, hazards, and the responses that have been developed and documented over time, allows for countries to easily have access to internationally accepted best practice approaches for responding to disaster events. It is these principles that have informed the new emphasis in social and environmental impact assessment, not

as an afterthought but as an integral part at the conception stage of business development, and also as a requirement for social licence to operate businesses, especially in the extractive sector (Amoako and Ampofo 2009).

Additionally, the multiplicity of technologies that can be relied on for short-term and well as long-term emergency response and disaster recovery needs some emphasis. Public awareness and education programs need to target the easy acquisition and use of simple and advanced technologies for communications, disaster prevention and mitigation where necessary. In this regard, the general public needs to be educated on how they can employ their cellular telephones and other telecommunication devices with inbuilt GPS systems for disaster event evaluation and mitigation.

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Chapter 13. Disaster Management in India: Governance Issues and Challenges

R. K. Mishra and Geeta Potaraju

Introduction

The South Asian region is quite vulnerable to all types of natural disasters such as floods, landslides, tsunamis, earthquakes and volcanoes. Many countries, including China, Pakistan, Bangladesh, Afghanistan, Sri Lanka, Nepal, India and others, have faced these natural disasters from time to time. One of the worst natural disasters in the region in recent times was the earthquake in Nepal during April 2015 when a 7.8 magnitude quake hit the country, killing 8,857 and injuring an estimated 21,952. Some of the natural hazards faced by countries in South Asian region during recent times have been listed below.

Table 16 - Natural hazards faced by countries in the South Asian region

Year	*Type of disaster*	*Country*
2000	Flood	India
2001	Earthquake	India
2002	Extreme Temperature Earthquake	India Afghanistan
2003	Extreme Temperature	India
2004	Earthquake Earthquake Flood	Sri Lanka India India

Year	*Type of disaster*	*Country*
	Flood	Bangladesh
2005	Earthquake Earthquake Flood	Pakistan India India
2006	Flood	India
2007	Storm Flood Flood	Bangladesh India India
2008	Storm Earthquake Cyclone	Afghanistan China Myanmar
2009	Flood	India
2011	Flood	India
2012	Flood	India China Pakistan

Source: World Bank 2012.

Natural Disasters in the Indian Context

A natural disaster is defined as:

"a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment and is of such a nature and magnitude as to be beyond the coping capacity of the community or the affected area" (Ministry of Law and Justice, Government of India, 2005).

India's geo-climatic conditions make it highly vulnerable to natural disasters such as floods, droughts, cyclones, earthquakes and landslides. About 60% of the landmass in India is prone to earthquakes of various intensities; 40 million hectares is prone to floods; about 8% of the total area is prone to cyclones and 68% of the area is susceptible to drought. India has been susceptible to some of the deadliest natural disasters, such as earthquakes, super cyclones and floods which have unleashed losses to both human life and property (India National Institute of Disaster Management 2012).

Each time a disaster hits the country, it results in huge losses both in terms of human losses and economic. According to a World Bank study on National Disasters conducted (2010), India faces losses up to 2 per cent of its GDP due to natural disasters. These disasters immensely impact the poor and vulnerable sections of the society. Some of the deadliest disasters which have shaken India in recent times have been presented below:

Table 17 - India's Deadliest Disasters

Sl. No.	*Name of Event*	*Year*	*State and Area*
1	Latur Earthquake	1993	Latur, Marthawada, region of Maharashtra
2	Orissa Super Cyclone	1999	Orissa
3	Gujarat Earthquake	2001	Bhuj, Bachau, Anjar, Ahmedabad, and Surat in Gujarat
4	Tsunami	2004	Coastline of Tamil Nadu, Kerala, Andhra Pradesh and Pondicherry, Andaman and Nicobar Islands
5	Maharashtra floods July	2005	Maharashtra
6	Kashmir Earthquake	2005	Kashmir
7	Kosi Floods	2008	North Bihar
8	Cyclone Nisha	2008	Tamil Nadu
9	Cyclone	2012	Tamil Nadu

Source: India Ministry of Home Affairs 2011

Disasters are generally categorized based on the nature of the occurrence. Two types of disasters are commonly known: (1) Natural disasters, and (2) Human-made disasters. Natural disasters are the ones caused due to floods, droughts, tidal waves, earth tremors, while man-made disasters are due to environmental pollution, industrial pollution, vehicular pollution, riots, political instability, terrorism, external aggression and such other factors.

The latest National Disaster Management Plan (2016) indicates the various types of natural disasters and which are geophysical, hydrological, meteorological, climatological, and biological. The table below shows the types of natural disaster and their manifestation.

Table 18 - Categories of Natural Hazards

N°	*Type of Natural Disaster*	*Manifestation*
1	Geophysical	Earthquake/Mass movement of earth materials
		Volcano
		Tsunami
2	Hydrological	Flood Landslides Wave Action
3	Meteorological	Hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that may last for minutes to days
4	Climatological	Unusual, extreme weather conditions related to long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal (long-term) climate variability
5	Biological	Exposure to germs and toxic substances

Source: India, National Disaster Management Plan. 2016

Disaster Management Policies in India

Disaster management systems, processes and policies in India can be traced back to 1871-74, during British rule, when the Indian administrative system was undergoing a change and it was the Collector at the District level who was made responsible for carrying out relief work during emergencies/disasters (United Kingdom Independent Statutory Commission 1930).

In the post-Independence period, at the federal level, the Revenue Department was established as a specialized department and made responsible for relief and rehabilitation activities, including disaster management. A system was established that when a disaster occurs, a senior Indian Administrative Service Officer is designated as a relief Commissioner and coordinates work with the Central Relief Commissioner at the federal level. Over the past sixty years, the approach to disaster management in India has undergone substantive changes. India witnessed major disasters such as the Latur Earthquake (1993),

Malpa Landslide (1994), Orissa Super Cyclone (1999) and Bhuj Earthquake (2001), which led to drawing up a systematic, comprehensive and holistic approach towards disasters (India National Institute of Disaster Management 2013).

Various strategies for managing natural disasters and facilitating effective planning for safe national development have been brought up for consideration by the Tenth Plan document during 2002-2007 by the India Planning Commission.

The policies have further evolved over the years, and the National Disaster Management Plan (2016) released by the Government indicates the vision to make India disaster-resilient, achieve substantial disaster risk reduction, and significantly decrease the losses of life, livelihoods, and assets – economic, physical, social, cultural, and environmental – by maximizing the ability to cope with disasters at all levels of administration as well as among communities.

Policy Framework for Disaster Management in India

In the year 2005, Government of India established a legal framework and passed the Disaster Management (DM) Act with an objective to promote a culture of prevention and preparedness in the context of disaster management (DM) in India. The nature of disasters was spelt out in the Act to include Floods, Cyclones, Earthquakes, Epidemics, Chemical Disasters, Industrial Disasters, Rail Accidents, Air Accidents, Fire, Nuclear Incidents and Mine Disasters. The Act encourages mitigation of disasters with the help of the latest technology.

Key highlights of the DM Act are as follows:

- To mainstream disaster management concerns into the development planning process and strengthen regulatory structures through a robust techno-legal framework.
- To involve the people of this country in planning and implementation of disaster management systems.
- To provide for an institutional mechanism for drawing up and monitoring the implementation of plans for responding to disasters.
- To involve various wings of the Government for prevention and mitigation of disasters.

Institutional Mechanisms for Managing Disasters in India

Institutional mechanisms have been created under the Disaster Management Act for strategizing, coordinating, implementing and coordinating disaster management activities. The table below indicates the institutional mechanisms and framework for dealing with disasters in India.

Table 19 - Institutional Mechanisms for Dealing with Disasters

N°	*Name*	*Composition*
1	Cabinet Committee on Security (CCS)	Prime Minister, Minister of Defence, Minister of Finance, Minister of Home Affairs, and Minister of External Affairs
2	National Crisis Management Committee (NCMC)	Cabinet Secretary (Chairperson), Secretaries of Ministries /Departments and agencies with specific DM responsibilities
3	National Disaster Management Authority (NDMA)	Prime Minister (Chairperson), Members (not exceeding nine, nominated by the Chairperson)
4	National Executive Committee (NEC)	Union Home Secretary (Chairperson), Secretaries to the GOI in the Ministries/Departments of Agriculture, Atomic Energy, Defence, Drinking Water and Sanitation, Environment, Forests and Climate Change Finance (Expenditure), Health and Family Welfare, Power, Rural Development, Science and Technology, Space, Telecommunications, Urban Development, Water Resources, River Development and Ganga Rejuvenation, The Chief of the Integrated Defence Staff of the Chiefs of Staff Committee, ex officio as members. Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, Mines, Shipping, Road Transport and Highways and Secretary, NDMA are special invitees to the meetings of the NEC.
5	National Disaster Response Force (NDRF)	Specially trained force headed by a Director General. Structured like para-military forces for rapid deployment
6	National Institute of Disaster Management (NIDM)	Union Home Minister; Vice Chairman, NDMA; Members including Secretaries of various nodal Ministries and Departments of Government of India and State Governments and heads of national levels

N°	Name	Composition
		scientific, research and technical organizations, besides eminent scholars, scientists and practitioners.

Source: National Disaster Management Plan, 2016

The State Disaster Management Authorities (SDMAs) under the Chairmanship of the state Chief Ministers, as well as the District Disaster Management Authorities (DDMAs) under the Chairmanship of Collectors/District Magistrates/Deputy Commissioners have also been put in place to manage situations at the federal and local levels.

National Disaster Management Authority (NDMA)

The NDMA was created under an administrative order notified in 2005 under the Disaster Management Act. The main responsibilities of the NDMA are:

- Lay down policies on disaster management;
- Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan;
- Lay down guidelines to be followed by the State Authorities in drawing up State Plans;
- Lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the purpose of integrating measures for prevention of disasters or mitigation of their effects in their development plans and projects;
- Coordinate the enforcement and implementation of policies and plans for disaster management;
- Recommend provision of funds for the purpose of mitigation;
- Provide such support to other countries affected by major disasters as may be determined by the Central Government;
- Take such other measures for the prevention of disasters, or the mitigation, or preparedness and capacity building for dealing with threatening disaster situations or disasters as it may consider necessary and;
- Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

The National Executive Committee (NEC) assists the NDMA in the performance of its functions.

State disaster management authorities

State Disaster Management Authorities have been set up for laying down policies and plans for disaster management in their respective states. The Act envisages establishment of a State Executive Committee, to be headed by the Chief Secretary of the state Government, with four other Secretaries of such departments as the state Government may think fit. It has the responsibility for coordinating and monitoring the implementation of the National Policy, the National Plan and the State Plan.

District disaster management authorities

District Disaster Management Authorities have been set up in each district of a state for planning, coordinating and implementing bodies for disaster management and to take all measures in the district in accordance with the guidelines laid down by the National and State Authorities. The District Magistrate/District Collector/Deputy Commissioner heads the Authority as Chairperson, with an elected representative of the local authority as Co-Chairperson, except in the tribal areas where the Chief Executive Member of the District Council of Autonomous Districts is the Local Authority.

National Institute of Disaster Management (NIDM)

The National Centre for Disaster Management, established in 1995, was upgraded to the National Institute of Disaster Management (NIDM) after the transfer of responsibility for disaster management to the Ministry of Home Affairs. The main responsibility of the institute is human resource development through development and implementation of human resource plans, capacity building and training, research, documentation and policy advocacy in the field of disaster management. NIDM works in tandem with the NDMA and Central, State and local governments as well as various other stakeholders to build their capacities towards promoting a culture of prevention and preparedness at all levels.

In addition to the above, the following institutions have been established by the Government to train and equip personnel on aspects of disaster management:

1. **National Fire Service College:** The National Fire Service College (NFSC) at Nagpur is a national-level institution mandated to train the personnel of state fire services/brigades in all spheres of fire engineering.
2. **National Civil Defence College:** The National Civil Defence College (NCDC) at Nagpur is one of the main centres for disaster relief and management training and a nodal centre for radiological, nuclear, biological and chemical emergency response.

The National Disaster Response Force (NDRF)

The National Disaster Response Force is a disaster response agency under the National Disaster Management Authority (NDMA) created by the Ministry of Home Affairs, Government of India. It was established in 2009 in Delhi, for disaster management and specialised response to natural and man-made disasters. Functioning at state and central-level under the National Disaster Management Authority (NDMA) based in Delhi, it consists of ten battalions of the Central Armed Police Forces, including two that have been set up in each of the Border Security Force, Central Reserve Police Force, Central Industrial Security Force and Indo-Tibetan Border Police trained in various types of natural, man-made and non-natural disasters. All the battalions are being trained to respond to natural disasters while four of them are being specially trained for handling radiological, nuclear, biological and chemical disasters.

Financial Assistance from Government

The Disaster Management Act 2005 facilitates the creation of funds for disaster response, in the form of National Disaster Mitigation Fund and similar funds at the state and district level. While the budgetary provision for these relief funds is dealt with by the Ministry of Finance, the processing of requests from the state governments for these funds and monitoring the utilization of funds is done by the Disaster Management Division of the Ministry of Home Affairs (Ministry of Finance 2009).

A State Disaster Response Fund (SDRF) has been set up by the Government of India (GoI), under which assistance will be provided to the States in accordance to their needs. Following the recommendations of the 13th Finance Commission (India Planning Commission 2013), the Government of India has approved an allocation of Rupees (Rs) 33,580.93 crore[1] in the State Disaster Relief Fund to all the states, comprising of Rs 25,847.93 crore as the central share and Rs 7733.00 crore as the state share.

The scheme of SDRF provides for release of the Central Government share of SDRF in two equal installments in the months of June and December in each fiscal year. Out of the total contribution indicated above, Government of India contributes 75% of the total yearly allocation for general category States and 90% for special category States in the form of a Non-Plan grant. Table 20 shows state-wise and year-wise allocation to the SDRF for the period 2010-15.

It is observed that there has been a gradual increase in the funding pattern for the State Disaster Response Fund as the occurrences of disaster have been increasing in this region due to climatic changes and drastic weather fluctuations; almost every year some kind of major incident has occurred. Therefore the government has increased its vigilance and also the allocation to states for disaster relief.

[1] A crore is a unit of account equal to 10 million Rs (Rupees). 1 crore = approx. US$ 150,000 at June 2016 exchange rates.

Table 20 - State-wise Allocation of State Disaster Response Fund[2]

States	2010-11	2011-12	2012-13	2013-14	2014-15	Total
Andhra Pradesh	508.84	534.28	560.99	589.04	618.49	2811.64
Arunachal Pradesh	36.74	38.58	40.51	42.54	44.67	203.04
Assam	263.77	276.96	290.81	305.35	320.62	1457.51
Bihar	334.49	351.21	368.77	387.21	406.57	1848.25
Chhattisgarh	151.32	158.89	166.83	175.17	183.93	836.14
Goa	2.96	3.11	3.27	3.43	3.6	16.37
Gujarat	502.12	527.23	553.59	581.27	610.33	2774.54
Haryana	192.9	202.55	212.68	223.31	234.48	1065.92
Himachal Pradesh	130.76	137.3	144.17	151.38	158.95	722.56
Jammu & Kashmir	172.46	181.08	190.13	199.64	209.62	952.93
Jharkhand	259.45	272.42	286.04	300.34	315.36	1433.61
Karnataka	160.96	169.01	177.46	186.33	195.65	889.41
Kerala	131.08	137.63	144.51	151.74	159.33	724.29
Madhya Pradesh	392.75	412.39	433.01	454.66	477.39	2170.2
Maharashtra	442.69	464.82	488.06	512.46	538.08	2446.11
Manipur	7.22	7.58	7.96	8.36	8.78	39.9
Meghalaya	14.65	15.38	16.15	16.96	17.81	80.95
Mizoram	8.55	8.98	9.43	9.9	10.4	47.26
Nagaland	4.97	5.22	5.48	5.75	6.04	27.46
Orissa	391.58	411.16	431.72	453.31	475.98	2163.75
Punjab	222.92	234.07	245.77	258.06	270.96	1231.78
Rajasthan	600.66	630.69	662.22	695.33	730.1	3319
Sikkim	22.75	23.89	25.08	26.33	27.65	125.7
Tamil Nadu	293.52	308.2	323.61	339.79	356.78	1621.9
Tripura	19.31	20.28	21.29	22.35	23.47	106.7
Uttar Pradesh	385.39	404.66	424.89	446.13	468.44	2129.51
Uttarakhand	117.66	123.54	129.72	136.21	143.02	650.15
West Bengal	304.83	320.07	336.07	352.87	370.51	1684.35
Total	6077.3	6381.18	6700.22	7035.22	7387.01	33580.93

Source: India Ministry of Finance 2009: Vol. II, Annex 11.3.

[2] Note: All the figures have been indicated in crore Indian Rupees (Rs crore)

Capacity building for disaster response

In order to strengthen disaster management institutions and activities, major thrust has been laid on taking up capacity-building initiatives, and funding has been provided to take up the capacity-building activities. The Thirteenth Finance Commission (India Ministry of Finance 2009) recommended a grant of Rs 525 crore for capacity-building to handle disasters in a better manner and for preparation of District and State-level disaster management plans in accordance with the guidelines of the Disaster Management Act, 2005. This grant helps the States to provide essential training and support capacity building of stakeholders and functionaries, preparation of Disaster Management Plans based on hazard, risk and vulnerability analysis, and setting up/ strengthening of Emergency Operation Centres (EOCs). Battalions of the National Disaster Response Force (NDRF) are trained and deployed in strategic locations, armed with technology, equipment and tools in strategic locations.

Following the recommendations of the Thirteenth Finance Commission Report, a grant of Rs 87,519 crore is allocated to Urban Local Bodies, a portion of which is available for revamping of fire services within their respective jurisdictions. These bodies can provide financial support to the State Fire Services Department towards this objective. The States are eligible to draw their share from the grant only if all the municipal corporations with a population of more than 1 million (2001 census) are required to put in place fire hazard response and mitigation plans for their respective areas.

Box 1 - Disaster Management: Post-induction and in-service training of civil and police officers

Capacity building modules on disaster management are included in course curriculum for engineering, architecture, and medical degrees on the themes indicated:

- Model building by-laws for town and country planning legislation, land use zoning, and development control legislation, to be followed by municipalities and city development authorities
- Bureau of Indian Standards revised National Building Code in different seismic zones in the country.
- National Programme for Capacity Building of Engineers launched in Earthquake Risk Management to train engineers and architects on safe construction techniques and architectural practices.
- A Web-enabled centralized inventory of resources has been developed to minimize response time in emergencies. Over 110,000 records from 600 districts have been uploaded.
- Safe construction practices and dos and don'ts for various hazards are being disseminated for creating public awareness.

Source: India National Institute of Disaster Management

Timely relief

Though a National Disaster Response Fund has been set up by the Government of India to deal with the expenditures on rescue, relief and immediate rehabilitation in the wake of disasters, there are issues in terms of the flow of funds from central government to the states and there remains a great deal of dissatisfaction on this aspect after each disaster. A very good example of providing relief and aid during a disaster was set by the Government of India during the April 2015 Nepal Earthquake. Within hours of the first 7.8 magnitude quake, India began planning a massive cross-border aid mission, faced with 8,857 dead in Nepal, and 9,018 in total, and 21,952 injured. In one day alone, India delivered 187 tons of supplies, including 50 tons of water, 22 tons of food and 2 tons of medicine. India's Prime Minister, Narendra Modi, as quoted in the media

(Man Ki Baat, radio program on 27th April 2015), made a special effort over Nepal and addressed the nation, asking Indians to "*wipe the tears of every Nepali, hold their hands, and stand with them.*"

Prevention and Mitigation

Prevention and mitigation are two essential components of the disaster management strategy. The Tenth Five Year Plan document of the Government of India for the first time brought out a detailed plan on Disaster Management (Planning Commission 2002). There was a separate chapter on Disaster Management in the Plan document with major thrust on building in mitigation plans as a part of the development process. State Governments were encouraged to prepare a plan of action or a scheme for disaster management in accordance with the state's specific needs. These measures included both institutional mechanisms as well as people-centric mechanisms as a part of the plan. The ultimate objective was to institutionalize the process of designing a disaster mitigation and prevention plan in the development process.

Innovative approaches

The Government of India over the past few decades has taken initiatives to build systems and processes using available technology and scientific capabilities to provide inputs on preparing impending disasters to local authorities, communities and other support teams. Some of the important initiatives are discussed below.

Tsunami early warning systems

In 2007, the Department of Ocean Development installed ocean-bottom pressure recorders close to two zones in the Indian Ocean, one between Java Sumatra and Andaman Nicobar and the other on the Makaran coast on the Arabian Sea. These are the most likely areas which can generate earthquakes.

The ocean-based Tsunami Early Warning Centre and the Indian National Centre for Ocean Information Services (INCOIS) are both located at Hyderabad

(India ESSO INCOIS n/d). It is INCOIS which interprets the data from the recorders and disseminates it on its website on a regular basis, benefiting all countries in the area. During the earthquake which struck twice near Indonesia in 2012, with an intensity of 8.5 on the Richter scale, there was concern that it might generate a tsunami that could have struck the eastern coast of India. Between the earthquake and the tsunami alert, there was an interval of just 20 minutes. Within half an hour, the alert was called off. The rapid warnings issued by the government through the NDMA revealed the speed at which tsunami warnings can be given. The NDMA gave all credit to the ocean bottom pressure recorders placed in vulnerable areas of the Indian Ocean by the Indian government in 2007 through which all those connected to the INCOIS got the alert that there was no danger of a tsunami and it would not affect India.

Remote sensing satellite programme

The Indian Remote Sensing (IRS) satellite programme is the largest remote sensing constellation for civilian use anywhere in the world. Following the Mumbai terror attacks of November 2008, India launched the Risat-2, a spy satellite with synthetic aperture radar (SAR) that allowed for very fine spatial resolution in images, in April 2009. Risat-2 can see through thick cloud cover, rain, snow, fog or even camouflage-like foliage. This allows all-weather monitoring of movement across India's borders with Pakistan, Bangladesh and China. Prior to this, India depended on US satellites such as Ikonos for the same information.

Remote sensing is supplemented by multiple other instruments that can detect changes in weather phenomena. Tsunami buoys, for example, can detect changes in water pressure, which could indicate an incoming tsunami. MCGM's disaster management cell has commissioned the Indian Institute of Technology, Mumbai to study peak-ground acceleration (PGA)—a measure of how hard the ground shakes in an earthquake.

Hotline communications

Government enhanced its communication systems and set up hotline connectivity in the coastal area of Mumbai wherein the Mumbai Metropolitan Region Development Authority (MMRDA), police, Navy, Army and central

western railway are connected through a hotline. This is similar to the initiative taken by Government of Tamilnadu, when Chennai faced the devastating tsunami in 2004. An external siren-based warning system along the coastline was built with World Bank funds to develop a hotline linkage with concerned authorities to ensure minimum damage during the tsunami.

National centre for seismology

The 12th Plan provides for a thrust in seismological research related to earthquake studies and generates inputs for earthquake disaster mitigation. The primary activities include deep crustal studies across the Indian subcontinent. A National Centre for Seismology has been set up. Council of Scientific and Industrial Research laboratories have developed a significant knowledge base on water- and water-related technologies which is proposed to be made use of in disaster-affected areas, along with Reverse Osmosis (RO) desalination technologies. (India Planning Commission 2013)

Spatial planning

Maintaining critical infrastructure such as power supply, communication, water supply and transport is one of the major concerns during disaster events, as dealing with disasters in this area requires major coordination between various agencies and is a herculean task when it comes to the Government. In order to strengthen and develop a robust mechanism for dealing with disasters and redress public grievances, government has built into the flagship national urban renewal programme, the Jawaharlal Nehru National Urban Renewal Mission, initiatives for 70 cities with experience of "unprecedented" extreme weather conditions, and also 100,000 Rural Knowledge Centres and IT Kiosks with an emphasis to develop Spatial e-Governance for informed decision-making in disaster-prone areas: before, during and after disasters.

Disaster Management Support (DMS)

The DMS Programme of the Indian Space Research Organization (ISRO) is intended to provide near-real-time support and services from imaging and communication satellites for efficient management of disasters in the country.

One of the main targets of this DMS programme is to operationalise a National Database for Emergency Management (NDEM). There is continued impact on mapping and monitoring of natural disasters with improved turnaround time and with newer capabilities and strengthening R&D.

Fire Alert Messaging System (FAMS) in Madhya Pradesh

Forest hazards are a major threat to natural ecosystems. Ninety percent of the tribal population in Madhya Pradesh in central India relies on forest produce for survival. Fire disasters hurt tribal sources of income, burn fuel and fodder, threaten biodiversity and pollute the air. In order to ensure effective fire management, the IT section of the Madhya Pradesh Forest Department (MPFD) developed a system to protect fire sensitive forest locations and dependent communities. A Fire Alert Messaging System (FAMS) combines Geographical Information System (GIS) and Management Information System (MIS) technologies. It uses processed remote sensing data from active fire locations and sends alerts to concerned field staff via SMS on registered mobile phones and through email. This information allows the patrol camps to execute fire-combating operations in a timely manner, saving forested areas from being destroyed. The system also maintains a database of fire locations which can be used to identify fire sensitive zones and plan fire control operations. The system monitors Beat officers (frontline staff forest guards) and field officers, hence ensuring their accountability. In just one year, FAMS has been able to decrease the average land destroyed per fire from 5.6 to 3.35 hectares. Under the Additional Chief Conservator of Forest, Government of Madhya Pradesh, the state forest department has succeeded in conceiving, developing and implementing a cutting-edge and unique forest information and management system that has become an exemplary model for others to follow in management of forest resources.

Emergency Management Response Initiative (EMRI)

EMRI is a non-profit professional organization operating in the Public Private Partnership mode. EMRI handles medical, police and disaster emergencies, although the emphasis is on medical help, through the "1-0-8 Emergency service." This is a free service delivered through state-of-art emergency call

response centres. In recent times the Emergency Management and Research Institute (EMRI) has brought out significant improvements in dealing with emergency medical services. Having launched the 108 emergency response service on August 15, 2005, the agency provides an integrated emergency service across the state of Andhra Pradesh, with 9,488 ambulances serving over 24,074 emergencies per day. It is currently operational in 15 States, i.e. Andhra Pradesh, Telangana, Gujarat, Uttarakhand, Goa, Tamil Nadu, Karnataka, Assam, Meghalaya, Madhya Pradesh, Himachal Pradesh, Chhattisgarh, Uttar Pradesh, Rajasthan, Kerala, and 2 Union Territories, Dadra & Nagar Haveli and Daman & Diu.

Strengthening governance processes

The disaster planning process in India is a top-down approach. The planning process is initiated at the national level with the national plan, leading to state plans, and then district plans etc. There is a limited role envisaged for local governance institutions and local communities in the process of planning and effective management of disasters.

Government institutions are known to work in silos, and there are multiple agencies involved in managing disasters. Therefore convergence and coordination are the major challenge for delivering an effective disaster management plan.

Disasters can be managed effectively if only there is a dedicated participation from the local communities. The local communities need to be provided with useful tools and techniques to access timely information for taking right decisions during an impending disaster.

Accuracy and timeliness of the information is the key to success in any disaster management plan. In fact the government as well as the local community depends on the information being generated from various sources. The information generated needs to be extremely accurate and timely, which also requires effective methods of data collection and compilation, accuracy of information and local knowledge on disaster history and traditional response patterns.

Capacity of personnel involved in decision making and implementation is the key to success.

Best Practices from Governments of Federal Units

With the support of donors and learning from best practices across the world, some State Governments have developed mechanisms and customized processes for managing disasters and have worked around the policy guidelines provided by Government of India. Many States (federal units) in India are vulnerable to disasters due to geographical proximity to seacoast. Some of these States have been very regularly facing disasters in the form of floods every year or every alternative year.

The example of Orissa can be given here, when after the Orissa Super Cyclone of 1999, and under the influence of reconstruction donor organizations led by the World Bank, the Government of Orissa established the Orissa State Disaster Management Authority (OSDMA). This was an institutional innovation for speedy reconstruction, disaster management planning, preparedness, training, and related matters, avoiding bureaucratic red tape. The objective of OSDMA was to have an autonomous body exclusively devoted to disaster management, to promote a culture of preparedness for different types of disasters and also to coordinate disaster mitigation activities including restoration and strengthening of infrastructure. OSDMA works in close coordination with the Government of India and its agencies, the Government of Orissa, its departments and agencies, Panchayati Raj Institutions and Urban Local Bodies Communities, Non-Governmental Organisations (NGOs), Community-Based Organisations (CBOs), funding agencies and others (World Bank 2012).

Another example is Gujarat; immediately after the Gujarat Earthquake of 2001, the Government of Gujarat acted swiftly and established the Gujarat State Disaster Management Authority (GSDMA) on the model of OSDMA (World Bank 2012). The GSDMA used a public-private partnership model and community-based disaster management systems. The GSDMA trained affected people in basic masonry, carpentry and other skills for reconstruction of their own homes. The main task of GSDMA is to take up social and economic activities for rehabilitation and resettlement of the affected (which includes new housing, infrastructure, economic rehabilitation, social rehabilitation and other related programmes).

GSDMA prepares plans to mitigate losses from disasters, as a strategy for long-term disaster preparedness. GSDMA obtains financial support in the form of

grants, aid, assistance or loans (from Government of Gujarat, Government of India, World Bank and ADB, USAID, DFID, IFRC, and bilateral donors, NGOs, and from financial institutions, public and private trusts or other organisations). It also manages the Gujarat Earthquake Rehabilitation and Reconstruction Fund.

GSDMA was awarded the UN Sasakawa award 2003 for outstanding work in the field of disaster management and risk reduction. The Sasakawa award is administered by the International Strategy for Disaster Reduction (ISDR), a specialized wing of the United Nations. The Gujarat Emergency Reconstruction and Rehabilitation Program implemented by GSDMA was awarded the prestigious "Green Awards of the World Bank" in 2004. The Green Award is given by the World Bank for promotion and maintenance of environmental concerns in the implementation of the projects funded by the World Bank. GSDMA also received a Gold Award from the Commonwealth Association for Public Administration and Management for its initiatives undertaken in governance.

A very good example of strengthening capacity to deal with disasters and cultivating the communities was demonstrated by the Bihar government in India, which is one of the units in the federal structure. The State government introduced disaster management in the school syllabus to create awareness of the issue among the common people. The government expects that this move by the government will benefit the common man and they will get to know how to protect themselves at a time of natural calamity, including flood and drought. This will help the people to pick up basic knowledge to combat disasters and to reduce human and property losses.

Participation in international efforts

India is a signatory to the Sendai Framework for Disaster Risk Reduction and taking a leading role in strengthening regional cooperation among South Asian countries for reducing disasters.

India is one of the participating countries and works closely with the UNISDR. The United Nation Disaster Management Team in India comprises of UN agencies such as Food and Agriculture Organization, International Labour Organization, United Nations Development Programme, United Nations Educational, Scientific and Cultural Organization, United Nations Population Fund, United Nations High Commission for Refugees, United Nations Children's

Fund, World Food Programme, and World Health Organization. India is participating in the Global Facility for Disaster Risk Reduction programme. India is one of the founder members of Asian Disaster Reduction Centre.

India has agreements with the several countries for cooperation in the field of disaster management. India has been working closely with many countries for the exchange of ideas and expertise in disaster management.

Conclusion

The Government's approach to disaster management must be more proactive than just being reactive, as it has been for a long time. The approach of the Government to disaster management has shifted from mere relief and rehabilitation measures to a holistic approach to disaster management. A robust institutional mechanism has been put in place for disaster management in India which includes: a legislative framework in the form of the Disaster Management Act, 2005; a National Disaster Management Authority established under the Act, with the highest political authority, the Prime Minister, as its Chairperson; provision for capacity building and training through the National Institute of Disaster Management for various stakeholders to handle disasters; Disaster Management Cells at the state Administrative Training Institutes; and so on.

There has been an increasing emphasis and focus on research and development in the area of disaster management in India. A number of research institutes are conducting active research in the field of disaster management, such as the National Institute of Disaster Management, the Tata Institute of Social Sciences, the Indian Remote Sensing Organization, the Indian Space Research Organization, and the Indian Metrological Organization.

A pioneering step has been taken by various Governments to bring in awareness of disaster management to children at a young age. The Central Board of Secondary Education has introduced the subject of disaster management in the school curriculum, spread over 8000 schools for class VIII to XII. In the process, it is not only the students and teachers who are learning about disaster management, but their families are also becoming aware of disaster management and preparing for disaster situations.

One of the greatest challenges in India in disaster management is to develop a pro-poor approach to the subject. Poverty drives people to take risks; a good

example would be the poor fisherperson who receives a warning signal and understands the gravity of the situation, yet they take risks and venture out on the sea in order to have the means to feed their family. New initiatives, such as mainstreaming disaster risk reduction in development, building capacity through education and greater awareness at all levels, and utilizing advanced technologies, have enhanced India's preparedness for each phase of disaster management.

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Chapter 14. Living on a Disaster-prone Country: Institutional Arrangements and Capacities of Disaster Management in Japan

Masao Kikuchi

Introduction

Japan is one of the most natural disaster-prone countries, with threats including earthquakes, typhoons, and heavy snow. Japan is located in the Pacific Ring of Fire, where seismic and volcanic activities occur constantly. Although the country covers only 0.25% of the total land area of the planet, the number of earthquakes and active volcanoes is quite high (Japan Cabinet Office 2011). Also, because of geographical, topographical and meteorological conditions, the country is subject to frequent natural hazards such as typhoons, torrential rains, and heavy snows. As a result, there is a great loss of people's lives and property every year due to disasters. Up until the second half of the 1950s, numerous large-scale typhoons and earthquakes caused extensive damage and thousands of casualties. With the progress of society's capabilities to address disasters and the mitigation of vulnerabilities to disasters by developing disaster management systems, promoting national land conservation, improving weather forecasting technologies, and upgrading disaster information communications systems, disaster damage has shown a declining tendency.

However, in spite of such efforts, in 1995, more than 6400 people died in the Great Hanshin–Awaji Earthquake. Also, more than 15,000 people died in the Great Eastern Japan Earthquake in March 2011 (Japan Cabinet Office 2011; Ministry of Economy, Trade and Industry 2012). There is also a high probability of the occurrence of large-scale earthquakes in the coming decades. Natural disasters remain a menacing threat to the safety and security of the country.

Against the background stated above, this chapter tries to illustrate the disaster management policy in Japan from an institutional perspective. Protecting the lives and properties of the people in its jurisdiction is a primary task of both central and local governments. Although it is universal that each government has risk-reduction policies and management, how it is capacitated in the form of government institutions differs (Light 2009; Waugh 2000). Such public capacities for crisis and contingency management in government make a difference in protecting people and property. This chapter tries to identify the key characteristics of institutional capacities in crisis management in Japan. The first section explains the national institutional structure for crisis management in Japan. The second part further elaborates the role of local government, which is the most fundamental body for the government's crisis management capacities. The final part concludes with lessons from Japanese experience and collaboration with other stakeholders, mainly with private entities amid the fiscal constraints and socio-economic change in Japanese society.

National Institutional Structures and Processes for Crisis Management

The basic institutional structure and disaster management policy framework was set in 1961 with the enactment of the Disaster Countermeasures Basic Act, which formulates a comprehensive and strategic disaster management system (Japan Cabinet Office 2011). The Act came after the immense damage caused by the *Ise-wan* Typhoon in 1959, which caused extraordinary high surges and left some of the worst damage in the history of Japan, including more than 5000 people dead or missing (Japan Cabinet Office 2011). The disaster management system has been further strengthened following the lessons learned from large-scale disasters such as the Great Hanshin-Awaji Earthquake in 1995, and the Great

East Japan Earthquake in 2011. The Act defines the responsibilities of national and local government and identifies relevant stakeholders in the public and private sectors for disaster management in all disaster phases.

Central disaster management council and basic disaster management plan

As protecting citizens' lives and property is the top priority for the government, the disaster management system outlined in the Act employs the top-down style of governance in its institutional arrangements. The prime minister chairs the Central Disaster Management Council, which promotes comprehensive disaster countermeasures, including deliberating important issues about disaster reduction at the request of the prime minister or Minister of State for Disaster Management. One of the main functions of the council is to formulate and promote implementation of the Basic Disaster Management Plan and Earthquake Plan. This Basic Disaster Management Plan provides a basis for disaster reduction activities.

The council is administered by the Minister of State for Disaster Management, and the disaster management section of the Cabinet Office. The Minister of State for Disaster Management position was first established with the central government reforms in 2001. The main role and responsibilities of the minister are to integrate and coordinate disaster reduction polices and measures across relevant ministries and agencies at the central level. The minister is supported by the Director–General for Disaster Management in the Cabinet Office, which is mandated to undertake the planning of basic disaster management policies and the response to large-scale disasters, as well as to provide overall coordination. Also, resulting from the lessons learned from the Great Hanshin-Awaji Earthquake in 1995, risk management and information collection functions were strengthened with the appointment of the Deputy Chief Cabinet Secretary for Crisis Management and the establishment of the Cabinet Information Collection Centre in the Cabinet Secretariat.

The Basic Disaster Management Plan defines the broadly defines two categories of disasters. One is the A) Natural Disasters which are further categorized into: a) Earthquake, b) Storms and Floods, c) Volcano Disaster, and d) Snow Disaster. The other is the B) Accident Disasters, and they are further

classified as: e) Maritime Disaster, f) Aviation Disaster, g) Railroad Disaster, h) Road Disaster, i) Nuclear Disaster, j) Hazardous Materials Disaster, k) Large-Scale Fire, and l) Forest Fire. For all these types of disasters, the plan describes tangible countermeasures that all stakeholders, including national ministries, local governments, public corporations and other entities, take, according to the disaster phase: prevention and preparedness, emergency response, recovery and rehabilitation.

The other relevant ministries that have disaster management responsibilities include: the National Police Agency, which coordinates the prefectural police forces in a large-scale disaster; the Fire and Disaster Management Agency, which coordinates the fire service administration and the headquarters for disaster response in a large scale disaster; the Ministry of Land, Infrastructure, Transport, and Tourism, which is in charge of disaster management and rehabilitation of national land; the Geographical Survey Institute, which provides data for earthquake prevention and mitigation; the Meteorological Agency, which provides information for prevention and mitigation of natural disasters; the Ministry of Education, Culture, Sports, Science, and Technology, which promotes research on earthquake and disaster reduction; the Ministry of Health, Labour and Welfare, which monitors and controls health issues at a disaster location; and the Ministry of Defence, which provides disaster relief operations. Of these ministries, the Fire and Disaster Management Agency, under the Ministry of Internal Affairs and Communications, and the Ministry of Defence are the primary agencies in implementing necessary emergency measures to protect the lives and property of citizens.

Fire and disaster management agency

As one of the primary agencies in implementing emergency measures at the central level, the mission and role of the Fire and Disaster Management Agency is basically coordinating fire service administration and providing the headquarters for disaster response when a large-scale disaster occurs. The agency only has 169 employees, including the fire and disaster management college, as of April 2014. The agency maintains and drafts necessary laws and regulations for fire and disaster management, and it deploys fire fighting vehicles and equipment to the fire departments in local governments across the country.

During natural disasters that cannot be overcome by local firefighting forces, such as large scale earthquakes and typhoons, the Disaster Countermeasures Headquarters headed by the Commissioner of the Fire and Disaster Management Agency are promptly established in the agency to implement the disaster response through information collection and operation of emergency fire response teams coordinated by the Commissioner (CLAIR 2011). In response to the Great East Japan Earthquake, the First Call Out order to The Emergency Fire Response Team by the Commissioner for Fire was at 15: 40 on March 11, 2011, which was 54 minutes after the earthquake occurred.

Ministry of defence and Japan self-defence force

The other prime national agency in implementing disaster management is the Ministry of Defence. If a disaster actually occurs, prefectures and municipalities are to implement the necessary emergency measures to protect the lives and property of citizens. In a case where local government cannot manage the disaster by themselves and the governor of a prefecture asks the Self-Defence Forces to send members as a disaster relief mission, the ministry dispatches the disaster relief mission to the area. In response to the Great East Japan Earthquake and following Fukushima nuclear crisis, the Japan Self-Defence Force (JSDF) dispatched a total of more than 10 million personnel for more than 170 days. In the case of the Great Hanshin-Awaji Earthquake, the JSDF sent total more than 2 million personnel over about 100 days (Ministry of Defence 2012). The majority of the missions were rescue relief, recovery of bodies, water supply relief, bathing service relief, airlift and cargo relief, and feeding service relief. Until the Great Hanshin-Awaji Earthquake, the JSDF's disaster relief missions were strictly operated due to the stringent civilian control over the JSDF. The JSDF could dispatch a disaster relief mission only when the JSDF received a request from prefectural governors. When the Great Hanshin-Awaji Earthquake occurred, early in the morning at 5:46 on January 17th 1995, the prefectural governor at the area could not collect sufficient information on the damage and loss, and it took more than 4 hours to send the request order. Most of the JSDF troops in the area had to wait and be inactive until then. This delay of the requests from the governor was later criticized by the media, which argued that more people could have been saved if the requests had been sent to the JSDF earlier. In response to

the outcry, the Ministry of Defence revised its disaster management operation plan and clearly defined the criteria under which the JSDF can send disaster response troops without requests from governors (The Sasakawa Peace Foundation 2012).

Local Government: Fundamental Public Actor in Crisis Management

If a disaster actually occurs, prefectures and municipalities are called upon to implement the necessary emergency measures to protect the lives, bodies and property of citizens, as well as to ensure the safety of the area in which they live. In particular, as the fundamental local public body, municipalities are required to establish evacuation orders and hazard areas, and to take measures for dispatching teams for fire and flood prevention (OECD 2009). In Japan, municipalities are unambiguously in charge of disaster prevention (Disaster Countermeasures Basic Act), while prefectures and the central government are positioned as backup and support organizations. Municipalities have the primary obligation to deal with disasters and provide firefighting organizations to perform appropriate duties. Table 21 provides the division of responsibilities among the levels of government under the disaster countermeasures basic act.

As the Municipalities have the primary obligation to deal with disasters, they provide firefighting organizations to perform appropriate duties. Each municipality provides two types of firefighting organizations: Full-time Professional Fire Fighting Organizations, and Part-time firefighting organizations (Fire Brigades). Full-time firefighting organizations are fire department headquarters and fire stations established by municipalities where full-time staffs are employed. As of fiscal year 2016, there are more than 160,000 full time officials working in 1,714 fire stations under 733 fire departments in each jurisdiction (Fire and Disaster Management Agency 2016). The number of full-time officials includes more than 4,500 female officials.

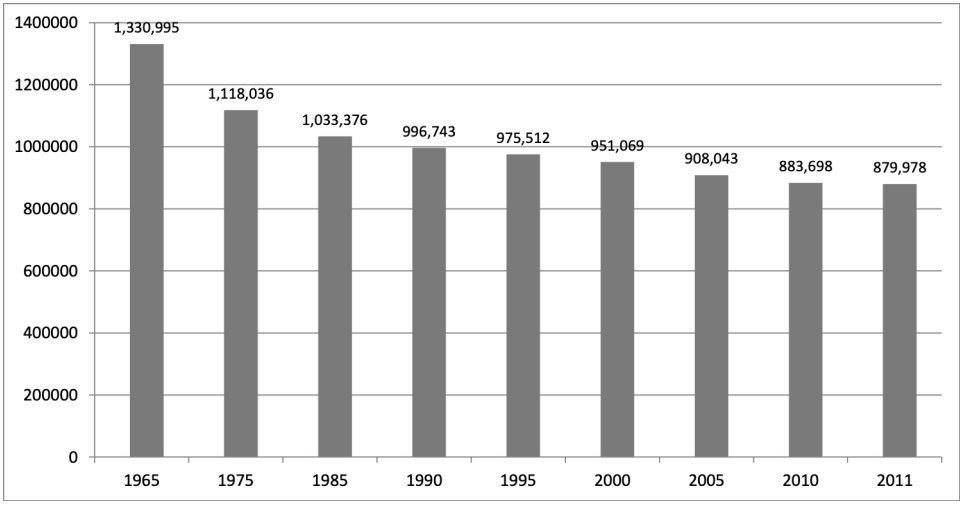
Table 21 - Division of Government Responsibilities in Dealing with Disasters

Central Government	General Coordination of disaster prevention plans, establishing disaster prevention infrastructure such as dams and seawalls, and communicating disaster predictions and information.
Prefectural Government	Coordination of disaster prevention plans, requesting the implementation of emergency measures to the relevant ministries and agencies, and supporting and coordinating the implementation of municipal duties and affairs.
Municipal Government	Municipalities have the primary obligation to deal with disasters. Establishing disaster prevention plan and preparing emergency supplies to protect residents and organizing and maintaining fire services and flood prevention teams. Grants municipal mayors the authority to establish evacuation instructions and hazard areas, and to provide funds for public emergencies.

Source: CLAIR (2011)

Fire brigades are part-time firefighting organizations in municipalities where members participate in firefighting and disaster activities, in addition to having regular jobs, based on a spirit of local patriotism in which one protects one's own area. There are 2211 Fire Brigades and there were more than 850,000 part-time firefighters in 2016. This number was a drop from more than 1,300,000 part time firefighters in 1965 (Fire and Disaster Management Agency 2016). Traditionally, most part-time fire fighters making up the fire brigades have been business or shop owners in each community. As the number of employees who commute to their workplace outside of their home community has been on the increase, traditional community-level participation in fire brigades has decreased over a time as a result (see Figure 18).

Figure 18 - Number of Fire Brigades



Source: CLAIR (2011)

Inter-municipal cooperation agreements in crisis management

Although any natural disasters may happen anywhere on this globe, the impacts and consequences may vary according to government capacities to deal with disasters. Also, natural disasters may occur more frequently in peripheral areas of the nation/local government than in central areas, as natural features such as high mountains, rivers, and oceans often form the boundaries between jurisdictions. There are therefore certain limitations on the ability of local governments on their own to respond immediately to large scale disasters. Especially for a small-sized local government, when a large-scale disaster occurs, it may be more difficult to identify the damage and provide necessary assistance to the victimized area, as the whole community is affected and thus the government officials themselves becomes victims. Inter-municipal cooperation, as an interdependence scheme of resources among governments, is a key element in responding to the disasters (Suzuki and Kaneko 2013). With this

background, local governments in Japan have been making inter-municipal cooperation agreements in crisis management. Especially after the Great Hanshin-Awaji Earthquakes in 1995 and the Mid-Niigata Prefecture Earthquake in 2004, the number of agreements has been on the increase. Similarly, after the Great East Japan Earthquake in 2011, local governments made agreements with geographically disconnected local governments to prepare for large-scale natural disasters.

Table 22 - Number of Municipalities with Inter-Municipal Cooperation Agreements in Crisis Management[1]

2004	2,305 (73.8%)
2006	1,457 (73.2%)
2008	1,656 (91.4%)
2010	1,571 (89.8%)
2012	1,645 (94.4%)
2014	1,602 (93.3%)

Source: Fire and Disaster Manangement Agency (2013, 2013b, 2014, 2014b)

Effective inter-governmental cooperation is imperative for dealing with large scale disasters that extend beyond borders. Typical Agreement elements are:

1. Providing food, water and other necessities of life, and necessary materials and equipment. A prime example is to send stockpiled food, water, blankets, and other necessary goods, or to send a water tank truck to the affected area.
2. Providing materials and equipment for the rescue of the victims, medical supplies, materials and equipment for control of epidemics, materials and equipment for emergency rehabilitation of facilities, such as sending emergency kits, public nurse teams, septic tank trucks and other support of this nature.
3. Providing vehicles for rescue activities, such as fire trucks and ambulances.
4. Providing necessary staff to assist local government activities.

[1] Note 1: Proportion of Municipalities with agreements in parentheses. The total number of municipalities has been in decline due to the nationwide municipal merger movement in the 2000s
Note 2. The number excludes the inter-municipal cooperation agreements that cross prefectural boundaries.

5. Coordinating volunteers.
6. Taking care of children from the affected area.
7. Providing temporary housing for victims.

A cooperation agreement is activated once an affected local government sends a request to the other local government in the agreement. In the case that the affected local government cannot send requests due to the interception of communications, local governments in the agreement can voluntarily dispatch materials and equipment without requests. In principle, the receiving local government must bear the cost of the received goods, materials and equipment. However in many cases, the sending local governments fully or partially bear the cost, especially if the receiving local government is small.

Table 23 - Inter-Municipal Cooperation in Crisis Management: Local Government General Staff Numbers Dispatched to Devastated Area (excluding Fire and Police)[2]

	To Iwate Area	*To Miyagi Area*	*To Fukushima Area*	*To another devastated area*	*Total*
From other Prefectural Government	5,625	13,981	7,618	951	28,175
From Designated Cities	3,931	9,215	1,197	132	14,475
From Cities, Towns and Villages	9,607	20,203	5,833	814	36,457
Total	19,163	43,399	14,648	1,897	79,107

Source: Fire and Disaster Management Agency (2013b)

In the case of the Great East Japan Earthquake, a total of more than 79,000 local government officials were sent to support the local governments in the

[2] Cities listed in Cities, Towns and Villages category do not include designated cities.

devastated area (see Table 23). This number excludes fire and police officers. Other than the general inter-municipal cooperation scheme, a total of more than 380,000 police officers were sent to the affected area to support rescue and public safety activities through the Inter-prefectural Emergency Rescue Unit, coordinated by the National Police Agency. A total of more than 11,000 public health nurses were also dispatched to support health for the victims in temporary shelters.

Emergency response teams of fire-fighting organizations

Apart from the inter-municipal cooperation, which provides mutual support among general local government services and officials, there are emergency response teams of firefighting organizations established in 1995, based on the lessons learnt from the Great Hanshin-Awaji Earthquake. The emergency response teams are a rescue system involving mutual support among firefighting organizations nationwide so that survivor rescue operations and other measures can be implemented more efficiently and rapidly when a large-scale disaster such as an earthquake occurs in Japan. In the event of a large-scale disaster in Japan, under this system, fire brigades are requested to converge on a disaster area from all over the country by the Commissioner of the Fire and Disaster Management Agency in order to respond to the disaster and to provide relief operations such as rescuing survivors. As of 2016, there were 726 municipal firefighters' headquarters, and 5301 fire fighters organizations are registered. Since its inception in 1995, there have been 32 cases of emergency response teams being formed to respond to wide area floods, earthquakes, train accidents and other serious events, including the dispatch to the Great East Japan Earthquake in 2011, which was the first mobilization order issued by the commissioner of the fire and disaster management agency.

Picture 1 - Collapsed Fire Dispatch Station Destroyed by Tsunami

Source: Fire and Disaster Management Agency (2013a)

As the Great East Japan Earthquake was the most powerful earthquake in Japanese history, the human losses and physical damage caused by the tsunami were immense. The human losses and physical damage included damage to firefighting activities in the devastated area, especially in the tsunami-devastated area. A total of 23 firefighters died and 4 are still missing following the earthquake. Fire brigade losses are even bigger. 241 fire brigade members died, and 12 are missing. 130 fire headquarters or stations were totally or partially destroyed, or partially damaged. In terms of firefighting facilities, 77 trucks, 2 boats, and 1 helicopter were damaged (CLAIR 2011).

Picture 2 - Rescue Activities of Emergency Response Team (Osaka City Fire Headquarters in Otsuchi Town (Tsunami Devastated Area))

Source: Osaka City HP

Immediately after the earthquake occurred in 2011, emergency response teams from the other 44 prefectures were instructed to dispatch teams to the three prefectures that were directly affected: Iwate, Miyagi, and Fukushima. For a period of 88 days, from March 11, 2011 until activities finished on June 6, the total number of personnel dispatched reached 30,684, equivalent to one in every five or six of fire fighters nationwide. The total number of people rescued stands at 5,064, including those rescued in cooperation with local fire departments (Fire and Disaster Management Agency 2013a).

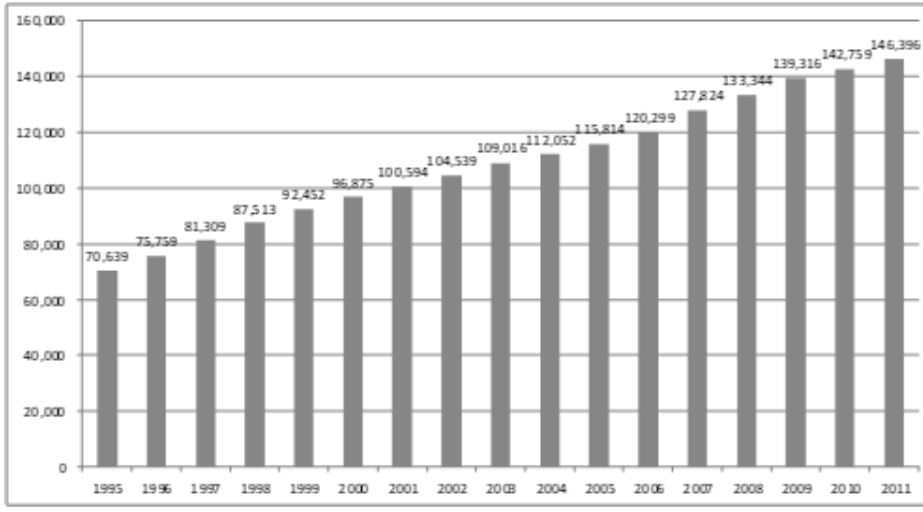
Interaction with Non-Governmental Actors

There are certain limits to the ability of government acting alone to have effective disaster management. Disaster management is a complex process and there needs to be cooperation and collaboration with non-governmental actors in civil society. In the Japanese context, local governments – which are the primary agent for managing disasters – are under severe financial challenge due to socio-economic change in their communities. In order to sustain effective disaster management, it is crucial to establish collaborative relations with civil society actors. This section describes the current state of collaboration in crisis management in Japan.

Voluntary disaster prevention organizations

In contrast with the declining number of fire brigades, which are based on traditional communities, there are a number of Voluntary Disaster Prevention Organizations that are organized based on various social groups including schools, companies, neighbourhood associations and others. Their numbers have been steadily increasing (CLAIR 2011). Contrary to the fire brigades, these organizations are purely private voluntary groups based on the spirit of mutual aid. Voluntary activities for disaster management first received special attention among Japanese when the Great Hanshin–Awaji Earthquake occurred in 1995. Many people, especially the youth, admired the volunteer rescue operations and restoration assistance to help the earthquake victims. This later led to legislation to support the volunteer and non-profit organizations, called the NPO law, in 1998. In the event of the Great East Japan Earthquake, many individuals and non-profit organizations went to the affected area to provide volunteer services.

Figure 19 - Number of Voluntary Disaster Prevention Organizations



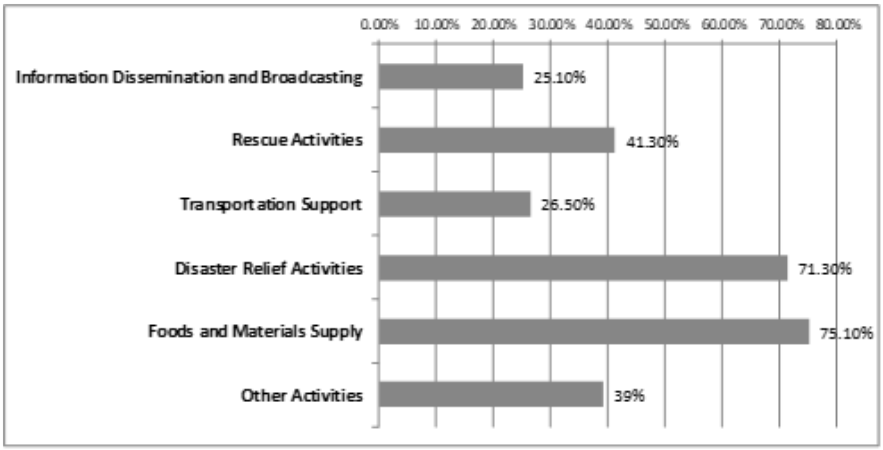
Source: CLAIR (2011)

Collaboration with companies and non-profit organizations

In the event of a natural disaster, government depends on other key stakeholders in the conduct of rescue and crisis management activities. Especially in the case of small local governments, due to financial difficulties and low capacity, the government collaborates with companies, local resident groups, professional groups and others. In response to the Great East Japan Earthquake, the Japan Medical Association, which is a professional organization of medical doctors in Japan, sent more than 6000 medical staff to the affected area to support medical activities. The Japanese Red Cross sent about 900 ERU (Emergency Rescue Units) as well. In addition, a total of 2,200 pharmacists were dispatched under the coordination of the Japan Pharmaceutical Association (Ministry of Health Labour and Welfare 2011). As these prime cases in the Great East Japan Earthquake imply, collaboration with private groups is key to effective rescue activities in a crisis. Such public private partnership is imperative in the government's crisis management. Figure 20 summaries the proportion of

municipalities that have agreements with private sector organizations in various fields of crisis management.

Figure 20 - Ratio of Municipalities Making Cooperation Agreements with Private Companies and Non-Profit Organizations as of 2012



Source: Fire and Disaster Management Agency (2013a)

The agreement on information dissemination and broadcasting is between local governments and local television and radio stations and cable TV to distribute disaster information and evacuation orders to the citizens in the community. Transportation support agreements are concluded with the trucking association and various freight suppliers to support the transportation of rescue and relief goods and to provide vehicles to deliver food and relief materials to evacuation centers. Disaster relief activities agreements are concluded with the utilities suppliers and construction companies' associations to provide relief for essential utilities such as gas, electricity, water, roads, bridges and others. A prime example of other activities is agreements with local gas stations to provide the fuel to rescue and relief vehicles.

Concluding Remarks: Government Capacity Limits and Self-Help, Co-Help and Public Assistance

Japanese government has dealt with the various disasters in its history. As Japan is one of the most natural disaster-prone countries, including earthquakes, critical lessons from each disaster that it has faced have enabled the government to determine how best to mitigate, respond to and manage crises. For instance, the basic national institutional framework for disaster management was established after the immense damage by major typhoons in the 1960s. The lessons from the Great Hanshin-Awaji Earthquake strengthened the government's information collection and centralized risk management, which led to the establishment of the Cabinet Information Collection Center in the Cabinet Secretariat.

As has been discussed, the primary government agency for dealing with disasters and for protecting the lives and property of the Japanese public is local government, not the central government agencies. For instance, while the number of employees in the fire and disaster management agency is just 169, more than 160,000 full-time firefighters work on the front line in local governments. The Japan Self-Defense Force dispatches disaster relief missions only in a large-scale disaster and at the prefectural governor's request. Most of the crisis management capacity is in the local governments, not in the central government (OECD 2009).

However, these features of the Japanese approach to institutional arrangements and capacities for disaster management have certain limitations to their sustainability. Japan is currently a depopulating society. Regional disparities within Japan in the magnitude and speed of societal ageing and fewer children make the situation more complex. While urban areas still enjoy vital economies, with the influx of working population from rural areas, depopulation and ageing society are accelerating in rural areas. Taking prominent examples, 43.8% of the total population in 2010 of the City of *Yubari*, a city that officially went bankrupt in 2007, belongs to the aged populace (Kikuchi 2009). While elders are more vulnerable to natural disasters, the number of firefighters in the city of *Yubari* was temporarily cut by more than 25% after the bankruptcy. Since most welfare policies and costs are shouldered by local governments, an ageing

population in a locality with limited financial resources undermines the self-sufficiency principle of local public finance. This is true for crisis management and policy as well. Local governments are also keenly perusing more sustainable ways of maintaining service standards when partnering with non-governmental organizations.

To sustain Japan's crisis management capacity, the trichotomy of the country's crisis management into Self-Help, Co-Help and Public Assistance, and collaboration among these, is significant (Nakamura and Kikuchi 2011). In the first instance, securing safety and protecting lives is seen as a self-responsibility. It is the fundamental philosophy in crisis management. In the case of large-scale natural disasters, one cannot expect an immediate rescue response by the government. Preparing survival and stockpiled goods, checking evacuation areas, participating in emergency drills, and other such self-help preparedness and actions are the foundation of crisis management. Co-help refers to community or association-based mutual aid activities such as voluntary disaster management organizations and community maps to identify disaster- prone areas and also to identify vulnerable people such as the elderly or disabled citizens living alone. Strengthening community resilience with self-help and co-help is the key to transferring crisis management capacities from the government sectors. Networking and collaboration with the private sector and non-profit professional organizations also contributes to making up for the weakening capacities of local governments. The crisis management approach suggests that during the initial 72 hours (three days) after a natural disaster has occurred it is critical to have self-help and helping each other (Co-Help) by the victims themselves. The citizens and the community as a whole must prepare for the possible disasters in order to mitigate and respond to them in the initial 72 hours. In a large-scale disaster, it can take up to 72 hours for government to identify the extent of damage and to deploy rescue teams, while most survivors in need of help can only survive three days without food or water under stressful circumstances. In the case of the 1995 Kobe Earthquake, 85% of survivors in need of help were rescued by fellow citizens, and 5% of them were rescued by the fire brigades.

While central government tasks concentrate more on coordination, local governments have played a vital role in crisis management in Japan. The national framework for crisis management places local governments, especially municipalities, as the fundamental public bodies for establishing evacuation

orders and hazard areas and for taking natural disaster-prevention measures. In the case of large scale disasters that go beyond small local government capacities, neighbouring local governments work together by sharing resources. As the local public finance situation has deteriorated, governments have more recently tried to share responsibilities with private actors. This trend is seen to be irreversible due to fundamental socio-economic change in Japan's population structure. The necessity of developing approaches to establishing sustainable public private partnerships in order to make up for weakening government capacities in an appropriate manner is an important lesson from Japanese experience.

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Chapter 15. Crisis and Contingency Management System in Poland

Piotr Matczak and Jacek Czaputowicz

Introduction

Among the categories of natural disasters, floods cause the biggest material losses in Poland. In the last few decades, there have been several devastating floods (the Millennium Flood in 1997, and the flood of 2010). Transportation catastrophes (the presidential airplane crash in 2010), and industrial accidents (particularly in coal mines) also occurred. The term 'civil security' depicts the (non-military) processes and organizations in place to prevent, respond to and recover from crises and disasters. This includes several institutional and administrative arrangements, such as crisis management, civil defence, citizen protection and rescue, etc. The Polish system has many features in common with other countries, although the administrative details and naming vary, in accordance with differences in administrative traditions, political changes, types of risks etc.

Defining the Polish civil security system requires caution, since it is still under reconstruction. There is no clearly defined area that can be called 'the civil security system'. This expression is present in the literature (Gorski 2007), yet in the legislation other notions such as civil defence, citizen (civil) protection, crisis management, and rescue can be found as well. The current system is based on the Act on Crisis Management, which defines crisis management as:

> *Activity of public administration authorities as an element of the national security management system, which consists of preventing crisis situations, preparing to take control over them by way of planned activities, responding in case of emergencies, removal of their effects and the reconstruction of the resources and critical infrastructure. (Poland ACM 2007)*

According to this definition, public authorities are responsible for crisis management.

The civil defence system was moved in 1997 from the Ministry of Defence to the Ministry of Interior. In 2000, the Chief Commandant of the State Fire Service became the Chief of Civil Defence (Malinski 2012). However, the shift from the functional role of the preparation for the protection of civilians in case of armed conflict to a purely civilian role is not clear. Citizen (civil) protection is also in the grey zone, as several attempts to define this area via the law have failed.

In this chapter, the Polish civil security system is presented with a particular emphasis on crisis management. The emergence of the current form of the system, and main public sector capacities are presented. Then, the system in action is described, followed by the role of key actors and the relationship with the international system. Finally, the public administration context is provided and conclusions offered.

Formative Influences on the Polish Crisis Management System

In the Strategy of the National Security of the Republic of Poland (Poland Strategia Bezpieczenstwa 2007), several types of challenges to national security are pointed out: demographic changes and economic inequalities in Poland and in the international perspective; weaknesses of the legal system (particularly – the lack of property rights clarification); inadequate technical infrastructure; lack of diversification of energy resources and dependence on the import of energy resources; the collapse of the European integration process; the rise of authoritarian regimes in the European neighbourhood; international terrorism; economic crises; organized international crime; ecological catastrophes. These threats are recognised as serious in terms of national security in general.

In terms of crisis and contingency management, a list of risks is presented in the National Crisis Management Plan of 2012 amended in 2013 (Poland RCB 2012, 2013b), where the following 17 areas of risk are indicated: floods; epidemic risk; chemical contamination; disruptions in electric energy supply; disruptions in liquid fuels supply; disruptions in gas supply; strong frosts/heavy snowfall; storms/hurricanes; forest fires; epizootic diseases; epiphytic diseases; construction failures; landslides; droughts; radiation contamination; violent protests; terrorism. In 2013, the National Critical Infrastructure Protection Programme (Poland RCB 2013a) was prepared, with the aim of preventing disruption and to ensure the reconstruction of critical infrastructure.

In the recent 25 years, floods have been widely acknowledged as the most devastating events in terms of losses and disruption (in 1997 – approx. 3 billion euro; in 2010 – approx. 3 billion euro). In terms of casualties, floods killed 55 persons in 1997 and 6 in 2010 but hundreds of thousands of people were affected. Other serious risks comprise storms, transport accidents, wildfires, and frosts. They cause significant losses in terms of human lives. Extreme low temperatures have killed people - 298 in January 2009, and 200 in November 2010. The AH1N1 Virus killed 182 persons in 2019/10. Industrial accidents occur, particularly in the mining sector. A methane explosion in the Halemba coal mine in 2006 killed 23 miners. Transportation accidents include train crashes (train crash in Szczekociny in 2012 caused 16 deaths) and airplane crashes (plane crash in Miroslawiec in 2008 killed 20 high ranking army officers; the presidential airplane crash in Smolensk in 2010 caused the deaths of 96 state officials, with the president among them).

The Polish crisis management system evolved gradually after 1990, following the political and economic regime change after the fall of Communist system. Until 1990, the main institution responsible for civil contingencies was the civil defence. It is still in operation, unlike in some other post-Communist countries. Civil defence was abolished in Estonia (in 1991), the Czech Republic (1992), Bulgaria (1992), Lithuania (1992), Slovakia (1993), Romania (1996) (Abgarowicz 2011). In Poland, its role has been marginalised, and responsibility for it was moved from the Ministry of Defence to the Ministry of Interior and later to the State Fire Service.

The profound reforms of the state capacity to deal with crises started after the 1997 flood. It is based on the Constitution of the Republic of Poland (1997), which defines the following states of emergency: martial law, state of emergency, and

natural disaster emergency, and on the Act on the State of Natural Disaster (2002). The Act defines other basic terms: natural catastrophe, which includes weather-related events, seismic events, fires, pests, infectious diseases of humans and animals, and others; and technical failure such as sudden, unforeseen damage or destruction of assets/built properties resulting in a break in use or loss of property. According to the law, large scale catastrophes are called disasters and they require extraordinary measures and help from specialised institutions (Bac 2011). The main aim of the law was the clarification of responsibilities for action in case of an emergency, as the 1997 flood revealed ambiguities in the regulations (Wojnowska-Ciodyk 1997).

The new crisis management system is based on the Act on Crisis Management of 2007. The Act provides the definition of crisis as a situation that has negative impact on the security of people, on property of considerable size, or on the environment, causing a significant reduction in the operation of the competent authorities of the public administration because of the inadequacy of the possessed power and resources.

The definition puts an emphasis on the inability of the public authorities to cope with the consequences of an event. Thus, the emphasis is put not on severity of impacts, nor severity of losses but on institutional capacity. In this respect, building this capacity appears a fundamental task. In the crisis management system, the role of the State Fire Service became prominent. The State Fire Service is also the skeleton of the national rescue and firefighting system dealing with small scale, everyday accidents.

The crisis management system has been criticised with respect to the reaction to the flood of 2010, which caused significant losses. Also the presidential plane crash in 2010 caused fierce discussion about the quality of the security system and aviation security in particular. The discussion has been highly politicised. The reform of the Polish civil security system has been evolutionary and has included several steps. The system has the basic contours, but it is not finalised.

National Institutions within the Crisis Management System

The skeleton of the Polish crisis management system consists of the system of linked public administration bodies – crisis management centres. They are coherent with the administrative levels and the general organization of the state.

Administrative and legal background of the Polish crisis management system

Poland is a republic and a unitary state (The Constitution of the Republic of Poland 1997: article 3). The Prime Minister and the Council of Ministers constitute the Polish Government. The executive power rests with the Council of Ministers and the President (elected in popular elections). There are two houses of Parliament: the Sejm (Lower Chamber) and the Senate (Upper Chamber), which are the legislative bodies. The Council of Ministers is responsible to the Prime Minister and the Parliament. The Council of Ministers is responsible for law enforcement and national security and defense. The President has limited responsibilities (taking into account that he/she is elected in general elections) but has some competences in the area of national security.

The subsidiarity principle is declared in the Constitution. Territorial self-government is the primary organizational structure of local government. Poland consists of 16 provinces (wojewodztwo – on average about 20 thousand km2 and 2 million inhabitants), 380 counties (powiat), and 2,478 municipalities (gmina), including 892 towns. Local governments, as legally recognised bodies having their own property, were restored in 1990 (after the fall of communism) and it was considered as one of the major elements of the political system change. The heads of the local governments (marszalek – for a province; starosta – for a county; wojt/burmistrz – for a commune) are elected in popular elections (Czaputowicz and Sakowicz 2013: 295-300).

At the provincial level two authorities co-exist: marszalek as elected head of a province and governor (wojewoda) as the representative of the central government. The power of the regional governors has significantly shrunk since 1990, however they have retained their responsibilities in the area of security. Public authorities at all levels of administration have relevant responsibilities

related to security issues. Their roles and responsibilities are defined and assigned by legislation.

The current civil security structure

The Act on Crisis Management (2007) is the legal foundation of the crisis management system in Poland. This act established the composition and function of the system by attributing the tasks to be conducted by the authorities (Gorski 2007). It is supplemented by The Act on National Emergency Medical Services (2006) and by the Fire Protection Act (2009). These three acts constitute the national system of rescue and citizen protection for everyday (non-crisis) operations (Ploskonka 2012).

The system of crisis management operates at each level of administration: national; ministerial/departmental; provincial; county; and communal. There are three bodies at each level: the crisis management authority; the consultative and advisory team and the crisis management centre (Table 24).

Table 24 - Crisis Management System in Poland

Administrative level	*Crisis management authority*	*Consultative and advisory body*	*Crisis Management Centre*
National (central)	Government, the Prime Minister	Governmental Crisis Management Team	Government Centre for Security
Ministerial/ Departmental	Minister, Head of the Central Authority	Crisis Management Team (In ministry, or central office)	Crisis Management Centre (In ministry, or central office)
Provincial	Governor (wojewoda)	Regional Crisis Management Team	Regional Crisis Management Centre
County	County head (starosta)	District Crisis Management Team	District Crisis Management Centre
Communal	Mayor (wojt/burmistrz)	Communal Crisis Management Team	Municipal/city Crisis Management Centre (is not mandatory to create)

Executive bodies, in particular the Council of Ministers, are responsible for the operation of the system. The Parliament and the President act only when extraordinary measures need to be taken, e.g. during a state of natural disaster.

The Council of Ministers is responsible for the maintenance of public order and the internal security of the state. It is empowered to declare a state of emergency. In urgent cases, the minister responsible for internal affairs executes crisis management and informs the Prime Minister of his actions. The national authorities for civil protection are: a) the Ministry of the Interior; b) the Government Centre for Security (GCS); c) the National Headquarters of the State Fire Service, with the Chief Commandant acting also as Chief of the National Civil Defence (subordinated to the Ministry of the Interior).

At the provincial level, the governor is responsible for civil security. A governor heads a crisis management team (CMT) and has wide authority in coordination and in linking the local system with the central government. Governors coordinate the prevention of all types of hazards and assist lower governmental levels if their resources are inadequate. Operationally, and in practice, the role of governors is crucial. Governors coordinate and supervise planning and response at county and municipal levels.

At the county level a county head is responsible for crisis management within the county territory. This includes planning, response, organization of exercises, prevention etc. At the municipal level, the main tasks include fire protection, the maintenance of public order, the monitoring of threats, early warning systems, alarms and the coordination of rescue operations and evacuations. The head of a municipality (wojt/burmistrz) defines civil protection tasks for all institutions that are operational within the municipality.

At the lowest level, the municipal, establishment of a Crisis Management Centre is not mandatory. Thus, more responsibility for security rests at the county level.

Crisis management planning

In the Act on Crisis Management (ACM) civil planning is understood as: a) the overall organizational projects involving the development of plans, including emergency response plans, and programs designed to optimize the use of available forces during crises, states of emergency and during war, in the fields

of crisis prevention, in order to take over control of a crisis, to react in crisis situations, to restore infrastructure and re-establish its original character; b) planning in support of the Polish Armed Forces in case of their deployment, and planning the use of the Armed Forces for tasks in crisis management.

The ACM defines the National Emergency Rescue System. It is understood as being implemented through tasks and procedures assigned to the state administration and the Armed Forces for crisis prevention, preparation for taking control over crises through planned activities, and response in case of an emergency. The National Emergency Rescue System is supplemented by Civil Emergency Plans. They are prepared at the national, provincial, county, and municipal levels. For the national level, each minister is responsible for actions in the field of Civil Emergency Plans within their own area of competence.

Civil Emergency Plans comprise: a) gathering and processing information on capabilities and resources that can be used in crisis situations, during states of emergency, and during war b) developing procedures, which shall be applied in case of emergencies; c) preparing crisis response plans.

The tasks of the GCS include assessment, analysis, monitoring of risks, and also communication in this regard. The Centre's role is to monitor and analyse the situation in the field of national security and associated risks; to prepare information and analysis for the assessment of risks or the possibility of their development; and to develop conclusions and proposals on how to cope with threats. The Centre prepares reports and evaluations on risks and actions undertaken in this area. The director of the Centre is responsible for preparation of the Report on Threats to National Security. Mapping risks is part of the report. At the level of provinces, counties, and municipalities risks mapping, and assessment are parts of Civil Emergency Plans. These plans also contain characteristics of resources including the status of state reserves (oil, medicines, food stored for emergency situation) and evaluation of the possibility of their use. Plans are generic and are to be prepared every second year.

Established Processes for Crisis and Emergency Management

Crisis management implementation agencies

Operationally, during a crisis, the Minister of the Interior has a vital role in the crisis management, as they are responsible for the maintenance of public order, the protection of the population in emergency situations and the prevention of disasters. Although most of the emergency services are subordinated to the Minister of the Interior, each minister is responsible for acting in the field of civil emergency planning within their own area of competence. The GCS coordinates efforts in the field of crisis and emergency management. This includes, e.g., a detailed presentation of methods and means of reacting to threats and mitigating their results, gathering information on threats and analysing collected materials as well as developing conclusions and recommendations for preventing and counteracting threats. The Director of the GCS is the secretary of the Government CMT. The Government CMT performs its tasks in line with the Defence Response Plan, unless martial law is introduced and the system of managing state defence is activated.

At each administrative level, the CMT supports the head of authorities (wojt, burmistrz, starosta, prezydent) at the given level. At the provincial level they are headed by the governors, representing the government. They coordinate the prevention of all types of hazards, support efforts of local governments, and assist lower levels if their resources are inadequate. Operationally, and in practice the role of governors is crucial.

At the municipal level, the main tasks of the administration include fire protection, the maintenance of public order, the monitoring of threats, early warning systems, alarms and the coordination of rescue operations and evacuations. The head of a municipality defines civil protection tasks for all institutions that are appropriate within the municipality. In an operational sense, within the crisis management system the important roles are played by the state fire service, specialised services (under different ministers), and the armed forces. They report to their appropriate minister.

According to the ACM military assistance to civil authorities may be provided if necessary in case of an emergency situation. Nevertheless, the use of the

Armed Forces for domestic purposes is potentially controversial and strict limitations are placed on their employment. This is a result of the role of the armed forces during martial law in 1981, when they were used to pacify the Solidarity movement. The armed forces can be employed only if civil capacities are overwhelmed and on formal request from civil authorities. Yet the armed forces still play a very important role in emergency operations.

The system assumes that response is centralised to the extent necessary in a given situation. It means that the actions are adjusted to the territorial scale of an event. In case of a disaster, the response basically starts at the local, municipal level. Declaration of a disaster is undertaken at the level where a crisis occurs, with upper and lower levels of the crisis management system informed immediately.

Collaboration with societal/non-profit organizations

The Volunteer Fire Service has a significant importance in the civil security system, and at the same time it is a substantial part of the Polish third sector (Poland. Kancelaria Prezydenta 2011). There is a close cooperation between the State Fire Service and the Volunteer Fire Service. There are more than 16 thousand brigades of the Volunteer Fire Service, with more than 600 thousand members (Poland ZOSPRP, N.D.), and around 3 thousand brigades are within the national rescue and fire fighting system. However the Volunteer Fire Service exists basically in the countryside and smaller towns - in the bigger cities it is almost absent.

In addition, the Headquarters of the State Fire Service has 18 agreements with non-governmental organizations. Some of them specialize in addressing certain threats (e.g. Volunteer Water Rescue), while others have specific skills and resources that are useful regarding a range of threats (e.g. the Polish Medical Air Rescue). Categories and examples of these organizations are enumerated in Table 25.

Table 25 - Non-governmental Organizations Having Agreement with Headquarters of the State Fire Service

Type of activity	*Organizations*
Rescue activities	- Volunteer Fire Brigades Association of the Republic of Poland - Tatra Mountains Volunteer Rescue Service - Mountains Volunteer Rescue Service - Volunteer Water Rescue - Polish Aero Club - Polish Mountaineering Association - Central Mine Rescue Station
Humanitarian aid activities	- Caritas Poland - Polish Humanitarian Action - Polish Red Cross - Polish Committee for Social Welfare - Polish Ecumenical Council - Polish Scouting Association - Scouting Association of the Republic of Poland
Firemen's trade unions and firefighters foundations	- The National Fire Service Section of the Independent Self-Governing Trade Union "Solidarity" - Fire fighters Trade Union "Florian" - Independent Self-Governing Trade Union of Fire fighters - Rescue Education and Technology Foundation

The Chief Commandant of the State Fire Service cooperates with several non-governmental organizations, without a formal agreement (Association of Fire Engineers and Technicians; Association of Polish Firemen; Pensioners Association of the Polish Fire fighters). There are also other non-governmental organizations cooperating with the civil security system at regional and local levels (Military Charity Caritas, Polish Amateur Radio Union; the Gymnastic Society "Sokol").

The Volunteer Fire Service is by far the biggest part of the third sector in Poland. It is decentralized and often can be the first to respond in a crisis. Organizing cooperation with volunteer fire brigades is the task of the Government CMT assigned by the ACM. Generally, however, civil society organizations (non-governmental organizations) are much weaker compared with many countries in the Western Europe. The non-governmental organizations have an important role in information provision, education, and training. Some of them are fundamental in specific areas, for example: rescue

operations in the mountains, on inland waters, and in mines. Their roles and responsibilities are defined in the plans prepared at all the levels of administration.

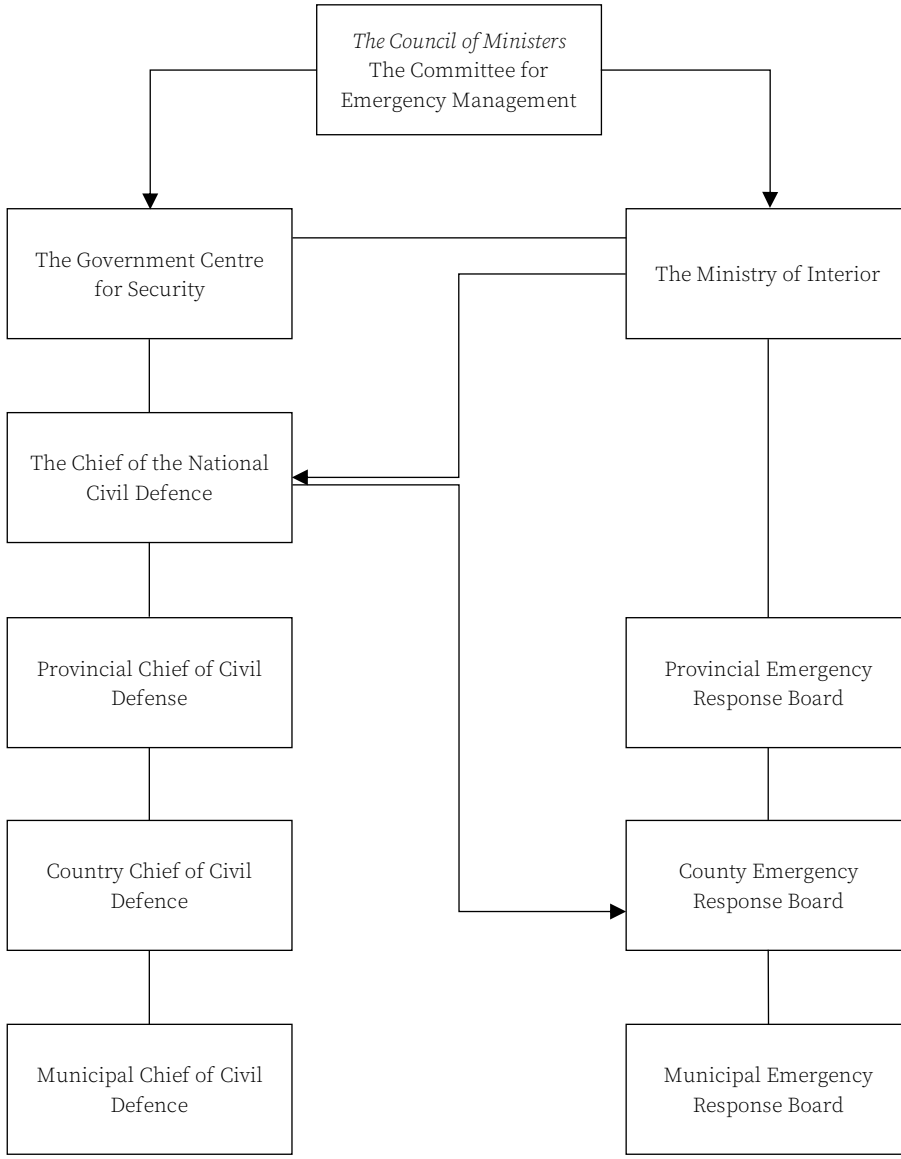
The activities and equipment of the non-governmental organizations are substantially financed by the government. Thus, the inclusion of the nongovernmental organizations in crisis response is based on a deal: there are obligations assigned to them but at the same time they can demand subsidies.

Role and Interaction of Key-Actors within the Polish Crisis Management System

Responsibilities within the crisis management system

Constitutional responsibility for crisis preparedness and response, as confirmed in the ACM, rests with the Council of Ministers. The Government CMT is formed in order to consult and advise the Council of Ministers concerning initiation and coordination actions to manage crises. The team consists of: a) The Prime Minister – as Chairman; b) the Minister of National Defence; c) the Minister responsible for internal affairs; d) the Minister for Foreign Affairs; and e) the Minister Coordinator of Special Services - if one is appointed. The Secretary of the team is the Director of the Government Centre for Security. The centre is subordinated to the prime minister and provides support for the Council of Ministers, the prime minister and the team in managing a crisis.

Figure 21 - Main Authorities of Crisis Management



Box 2 - Competences of the institutions within the crisis management system

Director of the Government Centre for Security

- Improving the operations of authorities and organizational structures responsible for crisis management
- Ensuring the coherence of the defence planning and crisis management, improving the quality of strategic planning
- Implementation of civil emergency planning
- Implementation and updating, in cooperation with relevant ministries and other bodies, of the National Critical Infrastructure Protection Programme, the National Emergency Management Plan and the Report on Threats to National Security
- Implementation and improvement projects, implementation mechanisms and procedures of the crisis management system
- Ensuring consistency of actions planned within the crisis management plan
- Developing mechanisms to supporting the public administration bodies by the Polish Armed Forces in crisis situations
- Implementation of projects within the framework of civil emergency planning, including planning for the time of raising the defence readiness of the state and the periods after the introduction of the state of emergency.

Provincial governors:

- Improvement of cooperation principles between national authorities and local governments at the level of a province, for the detection, prevention and monitoring of threats and counteracting effects of crises
- Improvement of policies and procedures for supporting the public administration by the Polish Armed Forces in case of an emergency
- Implementation of projects related to the establishment of the Government Strategic Reserves Programme
- Implementation and execution of tasks related to safeguarding the population's everyday needs, including water supply, civil protection and civil defence in case of a crisis situation.

Local government bodies:

- Detection, prevention, and monitoring threats to the state in administered areas and counteracting effects of a crisis
- Implementation and execution of tasks related to safeguarding everyday needs, including water supply, civil protection and civil defence in the event of a crisis situation.

Source: Poland The Crisis Managament Act

The ACM defines the roles and responsibilities of appropriate public authorities at all levels of administration. At the provincial level the responsibility for crisis management rests on governors (wojewoda), who are representatives of the central government and have supervisory power in the area of crisis

management. County heads, and mayors are responsible for crisis management within their territories. If a crisis exceeds the given territorial boundaries and capacities, the responsible bodies of the higher administrative level are activated. The GCS is responsible for overall information exchange among the bodies responsible for crisis management. The Director of GCS is the secretary of the Government Crisis Management Team (Box 2).

Policies on civil security are formulated by the Ministry of the Interior, particularly within the Department of Rescue and Civil Protection. Also, the GCS, the Ministry of Defence and the State Fire Brigade are involved in policy making. The GCS is located close to the prime minister and its coordinative role also gives it some influence.

Relationships among actors involved in crisis management

The Polish crisis management system can be considered to be rather sectoral with some elements of an all-hazard approach. There are several, relatively independent services focused on individual risks. Despite certain attempts to establish an all-hazard structure, the sectoral approach prevails. The crisis management system, which could be considered as an all-hazard device, is only a coordination platform, and in practice an intervention is undertaken by the related specialised agencies. It can be argued that after 1990 the State Fire Service has widened its area of competence. The establishment of the national rescue and firefighting system was an element of unifying the system, based on the state fire service. It includes also Voluntary Fire Service brigades, the Mountain Rescue Service and the Water Rescue Service, hospitals, ambulance service etc. The National Firefighting and Rescue System, which deals with everyday actions, is activated in case of a crisis. However, this system is focused on response and rescue and it does not cover all risks.

The Polish crisis management system is basically civilian, with a major role for the fire brigades. There are several specialized services, and agencies under civil control as well. Those having an auxiliary role in crisis management are: the State Police (supplementary role in emergency situations); Municipal Police (uniformed local government formation established to protect public order and peace in a municipality); Military Police (police for the armed forces); the Border Guard (agency that performs border control); the Government Protection Bureau (provides antiterrorism and security services for the Polish Government);

Internal Security Agency (domestic intelligence agency); the Intelligence Agency; and the Central Bureau of Investigation (police force fighting organized crime).

State-to-citizen and citizen-to-state expectations and obligations

Citizens' obligations are formulated in several legal documents: the Act on the General Obligation to Defend the Republic of Poland (1967); the Fire Protection Act (1991); the Act on Crisis Management (2007); the Act on the State of Natural Disaster (2002); the Act on the State of Emergency (2002); and the Act on Martial Law (2002). Obligations include education in schools and obligatory first aid training. They also involve helping in case of an evacuation. Plans indicate that more than half of the citizens are expected to use their own transportation in such a case. Some obligations arising from the Act on General Obligation to Defend the Republic of Poland (1967), related to civil defence (for instance – obligation to take part in training) are not enforced in practice.

As far as threat perception is concerned, Poles perceive natural disasters (floods, earthquakes) and man-made disasters as the most threatening (respectively 86% and 82% are concerned about them). The level of concern about terrorist attacks and military conflicts is also relatively high (European Commission Eurobarometer 2012).

Poles have ambivalent attitudes towards the state crisis management services. On the one hand, the state is expected to deliver security and these claims are strong. On the other hand, there is distrust towards the state and the state's abilities and performance. This poses difficulties in emergency situations, as people typically do not trust that they would be fairly compensated by the state - if they are required to abandon their properties.

Poles are also sceptical about the ability of the state to cope with floods. Research conducted after the floods in 1997 and 2010 (CBOS 1997; CBOS 2010a) about reasons for the damage show that Poles blame poor infrastructure protecting against high water. However, part of the blame goes to the state's capabilities (Table 26).

Table 26 - Answers for the Question "What are, in your opinion, the main reasons for the huge damages caused by the flood?"[1]

Reason	Flood in 1997	Flood in 2010
Weak preparedness for the possibility of a major flood	36%	39%
Deficiency of equipment in case of such disasters	35%	14%
Organizational deficiency in such situations	31%	9%
Poor action by central authorities	17%	15%
Deficiency of funds	12%	14%
Poor action by local authorities	11%	13%

Source: CBOS 2010a.

In both flood cases, respondents indicated deficiency of preparedness for a major flood. Compared to 1997, in 2010 improvement of the organization of activities was noted. The state has acquired the proper equipment. Evaluation of the activities of the different levels of government is more or less at the same level. The shifts in public opinion between the two large floods could be explained by the major reform (in fact – the establishment) of the crisis management system. It was obsolete and weak during the flood of 1997, and this led to new legislation (Act on Crisis Management of 2007) and building new crisis management administration and capabilities. As a result, the flood of 2010 was a test for the newly established system. It was assessed that the new system passed the exam. This could explain why deficiencies in terms of equipment and organization were perceived smaller during the flood of 2010, compared with the one of 1997. Nevertheless, the overall opinion – that of "weak preparedness for the possibility of a major flood" – increased. It could be attributed to the public expectation that the state should provide a high level of security.

Asked to evaluate activities of the different levels of government (municipal, provincial, central), during the floods, Poles ranked municipal authorities as the more effective (score 4.48 out of 7), followed by the provincial authorities (4.29) and the central level (4.09). It is in accordance with increasingly (since 1990) positive perceptions of local governments (compared with the central government).

[1] The sample is representative for the national population. Percentages do not sum to 100% because interviewees could choose more than one option.

Role of private sector organizations

Private sector organizations play an important role within the critical infrastructure protection system and in some other areas. According to the ACM, protection of critical infrastructure includes cooperation between the public authorities and the owners of buildings, installations and infrastructure equipment. The principles of this cooperation are based on established plans (on the national and the provincial levels). Owners and holders of buildings, installations or equipment designated as critical infrastructure (electricity generation, grid, telecommunication and computers network infrastructure etc.), are required to maintain backup systems and ensure the operation of the infrastructure.

The ACM defines the tasks of critical infrastructure protection, creates a market for training, and prescribes procedures to be followed. Training is delivered mainly by the private sector.

Relationship with the International System

International cooperation is included in several legal provisions. The Ministry of the Interior, the headquarters of the State Fire Services and the GCS all cooperate with partners from other countries.

In terms of operational cooperation, bilateral agreements are of particular importance. There are nine agreements signed between Poland and other countries related to cooperation and mutual assistance in case of a disaster. As far as neighbouring countries are concerned, there are six agreements: with the Czech Republic, Germany, the Russian Federation, Ukraine, Lithuania, and Slovakia (among Poland's neighbours there is no agreement with Belarus). The main rationale for agreements is the similarity of risk and benefits from wider availability of services. Also, as there are river borders and rivers crossing borders, cooperation is required in case of floods. Since 2000, Poland has twice requested foreign help under the provisions of the bilateral agreements: during the floods in 2001 and 2010. The Minister of Interior has the authority to make such requests.

Additionally, Poland has agreements on mutual assistance during emergencies, natural disasters and other serious accidents with bordering

German states (länder): the Saxon State Ministry of the Interior, and the Ministries of Internal Affairs of Brandenburg and of Mecklenburg - Western Pomerania. An agreement was also signed between the Polish State Fire Service and the German Federal Emergency Management Technical Service. There are also agreements between governors at the province level and their counterparts abroad.

Poland ratified the multilateral aid mechanisms, operating within the EU (Treaty on the Functioning of the EU - Article 196; Council Decision 2007/779/EC, Euratom establishing a Community Civil Protection Mechanism); NATO (the scheme to provide assistance during disasters to protect the population during war and natural disasters and resulting from human activities, approved in 1953; the Euro-Atlantic Disaster Response Coordination Centre - EADRCC, established in 1998); the UN (Resolution "Strengthening the Effectiveness and Coordination of International Urban Search and Rescue Assistance," 57/150 of 16 December 2002); the INSARAG Hyogo Declaration (adopted at the Global Meeting of the INSARAG in Kobe in 2010). Poland is also a member of three mostly consultative bodies: the Visegrad group; the Salzburg Forum; and the Proliferation Security Initiative.

Poland actively participates in the European Union civil security cooperation. In 2002, Poland signed a memorandum of agreement with the European Community on Polish participation in the Community mechanism to facilitate the strengthening of cooperation on the protection of civilian rescue operations (memorandum on cooperation in the field of civil protection). Within the memorandum, the National Centre for Coordination of Rescue and Civil Protection, located in the Headquarters of the State Fire Service, was specified as a unit appropriate to serve as contact point, responsible for coordinating rescue operations in the country, and as a relationship point of contact with the Member States of the European Union.

After accession to the EU (in 2004), Poland increased engagement in the work of committees and working groups dealing with the EU's civil protection. At the beginning of 2010, the Committee for European Affairs, at the request of the Minister of Interior and Administration, decided to designate the Headquarters of the State Fire Service as the lead Polish agency in the working group on EU Civil Protection (PROCIV).

Crisis Communication was the priority of the Polish EU Presidency in the second half of 2011, in the area of citizen protection. On December 13, 2011, the

EU Council for Justice and Home Affairs (JHA) adopted conclusions on a comprehensive approach to effective risk communication and communication in emergencies and crises. Poland proposed an approach pointing to the need for effective crisis communications and the use of modern technologies for disaster prevention, early warning, alerting, monitoring, and reducing the risks of disasters.

The EU Carpathex exercise organized by the Polish Presidency in September 2011 was an opportunity to check the functioning of international aid coordination procedures. The scenario assumed that a number of serious events occurred at the same time. In 2010 Poland activated a Monitoring and Information Centre (MIC), the operational arm of the Community Mechanism for Civil Protection, and sent a disaster assistance request to EADRCC, as rescue capacities became overwhelmed.

Public Administration Dimension of the Crisis Management System

Legal background of the crisis management system

There are apparently no significant conflicts among legal aspects of the civil security system. The Supreme Audit Office report found only some administrative problems with overlapping responsibilities in reporting between civil protection and the State Fire Service. There are also some problems with the law on procurement, but these are not considered to be major.

The more serious discussion has concerned the definition of crisis in the law on crisis management. The Constitutional Court's judgment of April 21st, 2009 (K 50/07) questioned the definition of "crisis" in Article 3.1 of the ACM and postponed the entry into force of the judgment for a period of 12 months from its promulgation. The definition of crisis as formulated in the Act on Crisis Management (2007) was based on the concept of “social ties,” the notion of “breaking or significant impairment of social ties” as the condition for a crisis referred to a sociological concept, which was considered imprecise. Eventually, it was argued, the conduct of state institutions might lead to the possibility of using force and resources in a way that undermines civil rights and liberties. As

a result, the law in this respect was declared unconstitutional. According to the amendment to the law of 2009, the occurrence of a crisis depends on hazards that adversely affect the safety of people or the environment to such an extent that the actions in response of the relevant departments and local government are no longer sufficient.

The ombudsman expressed serious concern about the avian flu situation in the country in 2010. According to him, the government "did not take any measures to prepare the health care system for the epidemic." Also there were several requests from the ombudsman for clarifications about shelters designed as places where the population is evacuated in case of a crisis, from the perspective of the citizens' right to have protection. As the shelter system is obsolete, the ombudsman expressed concern.

Efficiency of the system

Efforts to improve efficiency can barely be found in Poland in the area of civil security. Public debates concerning civil security are focused on underfunding, not on efficiency. The report of the Supreme Audit Office on implementation by the state authorities of their tasks with respect to crisis management considers underfunding as a source of inefficiency. Assessment of the costs of civil security is difficult since they are parts of the budgets of several different ministries.

Experts assess that overall spending on civil security has not varied in recent years, although there were occasional fluctuations. Altogether, the state budget spending for public security and fire protection in 2011 equals 3,078 million euro (4,3% of the state budget). It is smaller than spending for national defence, which equals 4,565 million euro (6,3% of the state budget). Most of the spending within the public security and fire protection budget section goes to policing. The main spending at the central level is the following (on average, in recent years): the headquarters of the State Fire Service has a budget of 30 million euro; voluntary fire brigades: 5,5 million euro; mountain and water rescue systems: 3 million euro; crisis management at the central level: 1,5 million euro. Nevertheless, a clear assessment of spending for civil security (particularly for fire brigades) is difficult as it is also incurred within environment protection and through various European Union granting schemes. Moreover, in the case of crisis management

and the fire service the spending also goes through the provincial, county and municipal budgets. These are parts of general public administration.

In the case of civil defence, the current measures provided in the state budget for civil defence in 2009-2013 amounted to around 7.5 million euro. The Chief of National Civil Defence does not have the authority to participate in the distribution of funds for the implementation of civil defence tasks in the provinces.

Assessments of the system

The effectiveness of the Polish civil security system is assessed by several bodies and from various points of view. First of all, the Supreme Audit Office evaluates the crisis management system, the civil defence system and the water rescue system. Secondly, there are reports on accidents prepared by the related specialised bodies (such as the State Commission for Investigation of Railway Accidents; The Commission for Investigation of State Aviation Accidents etc.). Thirdly, there are more general reports on security prepared by institutions like the National Security Bureau, the Government Centre for Security, etc.

The reports are mainly descriptive – in terms of presenting the case and in terms of actions undertaken. The National Crisis Management Plan prepared by the GCS does not include effectiveness measurement or assessment. However, in the document, responsibilities are assigned to the ministries and various bodies concerning particular risks. It can thus be assessed whether the tasks were carried out, and procedures were followed. Moreover, the procedures for assessing and documenting losses caused by disasters are also defined. This document has a purely planning character. It does not give attention to effectiveness assessment of future actions.

The report on security in Poland in 2010 contains mainly information on law enforcement. Information on "common security" (bezpieczenstwo powszechne, i.e. risks of fire, industrial risks, risks of transportation accidents, flood risks, and technical and construction risks) is also presented, however mainly in the form of the number of incidents, events and interventions, with some general guidelines for future improvement. The report by the Chief Sanitary Inspector deals with the general sanitary status of the country in 2010. The sanitary situation of the country was assessed as stable. The AH1N1 epidemic, an

important crisis in 2010, is one of approximately 50 other types of sanitary risks. The organization and methods of coping with the risk situation and some suggestions for the future improvement of the system are also presented. Hardly any assessment of effectiveness of preparedness and response is included in the three reports. This can be attributed to the function of the documents, and to the fact that they focus on low-scale (non-crisis) risks. In the report on the Halemba mine methane explosion, irregularities leading to the accident were identified. Similarly, in other cases, the types of causes and misbehaviour of people were analysed. Criticisms vary from lack of proper regulations to non-compliance.

The Supreme Audit Office's report on "Preparation of civil defence structures for the tasks in time of war and peace" (Poland NIK 2012) negatively assesses the existing civil defence system, particularly the preparation of civil defence protective structures. The existing civil defence plans were incomplete and contained outdated provisions. The current system of civil defence is said to be inadequate. In a report on implementation by the state authorities of tasks concerning crisis management, the Supreme Audit Office positively assessed the system's operations in the cases of crises (Poland NIK 2011). However, several irregularities were noted, such as not completing a coherent planning system for response to crisis and the failure of some administrative units to comply with established procedures. In addition, the audit of the water rescue service (Poland NIK 2010) gives a positive assessment of the service's operations (with several reservations).

From the general security perspective, insufficient coherence of the system of the state defence and crisis management system is notified along with weaknesses of the defence system: low mobilization capacity and delay in reaching full operation by the National Forces Reserves (Soloch 2013). In all cases it is not effectiveness which is assessed but compliance with the law. To conclude, the existing system of evaluation hardly allows for analysis of civil security system effectiveness.

System capacity

The floods in 2001 and 2010 demonstrated that Poland's national response capabilities were insufficient. In 2010 Poland asked for help through the European Community Civil Protection Mechanism. Additionally, bilateral help

was provided by the Czech Republic. Technical equipment was mainly requested, particularly pumps, as it was impossible to move the available equipment quickly enough to all places in need.

At the same time, a state of "natural disaster emergency" has not been declared as yet in Poland. The Prime Minister is in charge of declaring the state of natural disaster emergency, in accordance with the constitution and the Act on the State of Natural Disaster Emergency. Up to now, it has not been declared, as customary operations have been considered sufficient. One may see the reluctance to declare a state of emergency in connection with the bad memories of martial law in 1981.

Polish Crisis Management System: Lessons Learned

Within the Polish civil security system as it evolved after 1990, the crisis management system was established as an information and coordination framework, with the National Rescue and Firefighting System responsible for operations. In general they are considered to work well, as the operations during the flood of 2010 showed. It could be argued that a disastrous flood of 1997 created a window of opportunity for the civil security system reform. It was built on the existing administrative structure and operational capabilities.

A problematic issue is the relationship between the crisis management system and the civil defence system. Civil protection is derived from the tasks expected in case of armed conflict. The current regulations on civil defence are in this respect hardly operational. There are no legal provisions to ensure effective coordination of activities related to civil protection with tackling natural disasters and environmental hazards and removing their effects, which are an integral part of the tasks carried out by the civil defence. Moreover, the notion of citizen protection is not defined, although it is present in the doctrine. There is a lack of proper organization of the civil defence system (mainly as a result of regulatory shortcomings). Civil defence tasks, and thus the protection of the population, have been assigned to different bodies without a precise determination of the division of powers, a clear indication of priority tasks, or identification of those responsible for their performance. Therefore, there is a lack of the necessary

mechanisms to ensure coordination and control in the civil defence system led by the Head of Civil Defence, including implementing the rules and regulations in conjunction with other state bodies performing the tasks of civil protection, protection against natural disasters and other extraordinary events.

Despite successful completion of the crisis management system, it can be argued that the reforms of the civil security system in Poland were principally reactive. The predominant focus on combating natural disasters, including special arrangements for crises, seems to stem from a period of a relatively stable international position for Poland, after 1990, with its accession to the EU and NATO. Lack of international tensions put civil security high (as a response to catastrophic events), and issues of civil protection low, in the political agenda. One could hypothesize that the emergence of international tensions could speed up legal and organisational clarifications in this area.

Although it could be argued that the policy in the area of crisis and contingency management is reactive, driven by external pressures and events, there is a procedure for preparing a National Crisis Management Plan that includes identifying risks and defining responsibilities. It would help to go further and provide evaluative mechanisms that enable proactive crisis and contingency management policy planning.

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Chapter 16. Disaster Prevention and Recovery System: Lessons and Experiences in Taiwan and Japan

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Introduction

In recent years, extreme weather events have frequently occurred in Taiwan. Numerous natural disasters occur in Taiwan. Floods, landslides, and other natural disasters, resulting in casualties and property losses, often accompany hurricanes. Floods in particular persistently affect the largest areas of Taiwan for long periods.

Compared to other countries, Taiwan's domestic disaster rescue systems are more specialized, with different types of disasters falling under the responsibility of different ministry supervisors (for example, fires and earthquakes fall under the responsibility of the Department of Interior, floods are under the Department of Economics, and landslides are under the Council of Agriculture). Historically, when natural disasters have happened in Taiwan, information and resources related to the disaster relief system have tended to lack the proper coordination, leading to the misallocation of resources, limited relief efficiency, and other questions so that timely rescues cannot be achieved and businesses and people suffer greater losses.

Despite such extensive damage, the government focuses exclusively on the post-disaster provision of high-level reconstruction funding and assistance payments for remedial work. How can government agencies and private organizations become more active to ensure common disaster mitigation and preparedness? A national disaster prevention system provides the most effective solution. Japan, Mainland China, the Philippines, and other countries in East Asia located near Taiwan face a similar disaster situation. To date, Japan has developed the most effective disaster prevention, thereby offering an example worth following for Taiwan.

In 2011, a major 9.0-magnitude earthquake occurred on March 11 in Japan, subsequently causing a 30-meter high tsunami in at least 5 places, and leading to extensive fires and mudslides. Not only were homes destroyed, but the Fukushima nuclear power plant was also flooded, resulting in a disaster. When the great compound disaster hit Japan, the Japanese media's self-regulated control impressed the public worldwide. In addition to offering shelter facilities and access to messages about daily needs, private businesses provided refuges and free material goods to the victims. Japan's unity and resilience were admirable, and its disaster prevention systems have been analysed for comparison with Taiwan.

In this paper, we first introduce Taiwan's disaster management system, then highlight some challenges as well. In terms of the lessons from Taiwan and Japan, particularly the catastrophic disasters of the Typhoon Morakot in Taiwan in 2009 and the 3.11 Earthquake in Japan in 2011, we address the directions of disaster rescue and rehabilitation for government. The major conclusions drawn from this paper are relatively simple but provide inspiration for disaster management. First, we note the importance of collaborative governance in disaster management. Second, we argue that citizens and the private sector should also share responsibility in disaster management.

The Development of Taiwan's Disaster Management System

The development of Taiwan's disaster prevention and response systems can be divided into four periods, marked by major disasters: (1) natural disaster

prevention, rescue and rehabilitation period; (2) disaster prevention and rescue program period; (3) Disaster Prevention and Protection Act period; and (4) the amended Disaster Prevention and Protection Act period (Hsiung, Wu, & Yeh 2010:7).

During the first period, the efforts were based on the rule of "natural disaster prevention and relief and rehabilitation" and did not pay attention to disaster response. There was no overall concept of disaster management (mitigation, preparedness, response, and recovery). The structure and operation contingency mechanism was led by the police system. During the second period, the Executive Yuan[1] promulgated the Order of Disaster Prevention and Response Plan, referring to the United States, Japan, and other countries and disaster prevention and rescue systems in 1994. The National Fire Agency was founded, which played a main role in the national efforts. However, the agency mainly relied on fire-based processing efforts and was supplemented by other disaster prevention programs. The third period started after the 921 Earthquake[2] in 1999, when it became urgent for a dedicated Disaster Prevention and Relief unit to be established. In the following year, the legislature passed the Disaster Prevention and Protection Act. The Executive Yuan also formally established the Disaster Prevention and Relief Committee. The policy advisors for the Central Disaster Prevention and Response Council or the National Disaster Prevention and Relief Committee mostly came from the National Fire Agency during this period, and their professional backgrounds still focused more on preparedness and response phases. As a result, the overall disaster prevention function was not completely effective (Hsiung et al. 2010: 7).

[1] There are five branches of the power under the Constitution of Taiwan, R.O.C. The Executive Yuan is the highest administrative power, which has a premier, a vice premier, a number of ministers of commissions or councils, and several ministers without portfolio. The Legislative Yuan is known as the Congress, which is the highest legislative organ and exercises legislative power on behalf of the people. The Judicial Yuan is the highest judicial organ, under which are courts and administrative courts at all levels. The Examination Yuan is the highest authority for the administration of all national exams and is responsible for the examination, employment, and management of all civil servants. The Control Yuan is the highest watchdog body and exercises the powers of impeachment, censure, and audit.

[2] On September 21, 1999, the Chi-chi Earthquake (also known as the 921 Earthquake) occurred in central Taiwan, affecting more than 2,000 victims. As there were no specific provisions that referred to disaster management before this earthquake, most local governments could only respond reactively. Consequently, the Disaster Prevention and Protection Act was passed and announced in July 19, 2000.

The Typhoon Morakot[3] in 2009 brought extreme rainfall to southern Taiwan and resulted in the development of the fourth period of Taiwan's disaster management system. The legislature amended the Disaster Prevention and Response Act and promoted the National Disaster Prevention and Protection Commission to the Central Disaster Prevention and Protection Committee. Under the committee, the law allowed the Executive Yuan to set up a disaster prevention and response office. In 2010, the Legislative Yuan passed the third amendments to the Disaster Prevention and Relief Act, and the name of the National Disaster Prevention and Protection Commission was changed to the Central Disaster Prevention and Protection Commission. In 2012, the final amendment, Article 26, of the Disaster Prevention and Protection Act was enacted: to define the assignment of disaster prevention and protection staff: "Various tiers of governments and related public enterprises shall assign full-time staff to execute disaster prevention works; while township (city) offices could assign part-time staff before assigning full-time staff to execute disaster prevention works" (Hsiung et al. 2010: 10). This article highlighted the importance of full-time staff for disaster prevention.

After saving those in immediate danger after a disaster occurs, the primary task is to stabilize those affected and help victims rebuild their homes. Taiwan currently has disaster relief, post-disaster recovery, and reconstruction mechanism norms, although its policies are scattered throughout various laws (such as Articles 36, 37, and 48 of the Disaster Prevention and Response Act, Articles 25 to 27 of the Social Assistance Act, and Typhoon Morakot Post-disaster Reconstruction Ordinance), and no specific complete system exists.

The government organizational reform has been planned since the 1990s. To streamline the central government and improve its effectiveness, while simultaneously enhancing flexibility within its departments, the Cabinet proposed several government-restructuring bills to the Legislative Yuan, which were enacted and promulgated in early 2010. As a result, the number of Cabinet-level organizations were reduced from 37 to 29 by December 31, 2014 (Executive Yuan 2014). The organizational reforms of the central government significantly affected the operations and functions of Taiwan's disaster management system. For example, if Article 3 of the Disaster Prevention and Relief Act cannot clarify

[3] Typhoon Morakot hit Taiwan on August 8, 2009, resulting in 693 deaths and 74 missing persons; 500 residents in Xiaolin village were buried alive by a large-scale landslide (Central Emergency Operation Center 2009).

the categories of disasters and the responsible agencies after administrative reforms, it can result in ineffective disaster management. Therefore, such plans should be classified as priority reform issues (Li, Huang, Jen, Shih, & Ma 2012).

In view of the ministries' organizational transformation, it is important to explore how existing disasters are responded to by the new competent authority so as to solve the resulting problems. According to the Disaster Prevention and Response Act and draft amendments to the provisions of the disaster prevention system, responsibilities are approved by the competent authority, according to disaster types, for the designated disaster prevention; these responsibilities are categorized under emergency-response and recovery reconstruction-related agencies, as shown in Table 27.

Table 27 - Disaster Operation Management System in Taiwan before Typhoon Morakot

Competent Authority	*Respond to Disasters*
Ministry of the Interior	Hurricanes, earthquakes, fires, and explosion disasters
Ministry of Economic Affairs	Floods, mining disasters, drought, utility gas and oil pipelines, and transmission line disasters
Council of Agriculture	Chilling injury, landslides disasters, forest fires, and animal and plant epidemic disasters
Ministry of Transportation	Crashes, shipwrecks, and land traffic accidents
Environmental Protection Administration	Toxic chemical substances
Department of Health	Biological pathogenic disasters
Atomic Energy Council	Radiation disasters

Source: Authors

After the organizational reform of the Executive Yuan in early 2010, types of disasters addressed were re-categorized for each authority, as shown in Table 28.

Table 28 - Disaster Operation Management System after the Organizational Reform[4]

New Competent Authority	*Respond to Disasters*
Ministry of the Interior	Hurricanes, earthquakes, fires, and explosion disasters
Ministry of Economic Affairs	Public gas and oil pipelines, transmission line disasters, and mining disasters
Ministry of Agriculture *	Chilling injury, animal and plant epidemic disasters
Ministry of Transportation Construction *	Crashes, shipwrecks, and land traffic accidents
Ministry of Environment and Resources *	Floods, droughts and landslides, forest fires, and toxic chemical substances
Ministry of Health and Welfare	Biological pathogenic disasters
Ministry of Science and Technology *	Radiation disasters (currently is responsibility of Atomic Energy Council)

Source: Authors

The greatest change after the organizational reform occurred in the Ministry of Environment and Resource. The work scope of disaster management and workloads were increased in the newly established ministry. Li et al. (2012) identified several problems related to the disaster management system stemming from the organizational reform of Taiwan's central government. For example, first, does the competent authority for various types of disasters need to be re-examined? Second, the tasks and duties of disaster management in a single ministry are blurred, particularly when facing multiple disasters. For instance, the competent authority for biological pathogens disasters under the reorganization is the Department of Health and Social Affairs, which deals with disasters in asylums, but its role in determining their causes and related relief work needs to be clarified. Third, the workload and experience of disaster management in the newly established ministry will differ from those in the past. Fourth, the Disaster Prevention and Relief Act provides for a specific disaster management framework for each type of disaster. In other countries, an all-hazard (a common management structure) orientation is predominant.

Finally, in terms of the organizational perspective, two critical issues emerge. The first one concerns whether other ministries and agencies (e.g., Department

[4] * means the organizational reform or the ministerial merging is ongoing.

of Defence, Ministry of Education) develop an individual disaster management plan. The other one relates to the problem of collaboration and integration among agencies when facing multiple disasters (Li et al. 2012).

Japan's Experience: Disaster Management After the 3.11 Earthquake in 2011

Every year there is a great loss of people's lives and properties in Japan due to natural disasters. Until the second half of the 1950s, large scale typhoons with earthquakes caused extensive damage and thousands of casualties. In 1961, the Disaster Countermeasures Basic Act was passed because of the influence of the *Ise-wan* Typhoon in 1959 (5,000 people dead or missing). Further measures to strengthen the disaster management system were adopted after the Great Hanshin-Awaji Earthquake in 1995 (Japan Cabinet Office 2015). The earthquake that occurred on March 11, 2011, has impacted the Japanese disaster management system again.

Japan's devastating earthquake on March 11, 2011

On March 11, 2011, at 14:46 JST, an earthquake of an unprecedented 9.0 Mw magnitude occurred under the ocean near the northeast coast of Japan; this is known as the Great East Japan Earthquake or 3.11 Earthquake. The resulting tsunami surged the coastal regions of North-eastern Japan and flowed far inland, up to 40.5 meters above sea level, devastating the towns, fisheries, and social infrastructure (Utani, Mizumoto, & Okumura 2011). The tsunami caused nuclear accidents—namely, level 7 meltdowns at three reactors in the Fukushima Daiichi Nuclear Power Plant complex—and the associated evacuation zones affected hundreds of thousands of residents. According to a report by the Japanese National Police Agency in early 2014, the disaster resulted in 15,884 deaths, 6,148 injuries, and 2,633 missing people across 20 prefectures, in addition to 127,290 totally collapsed buildings (Japan National Police Agency of Japan 2014).

Japan uses a three-level (i.e., national, prefectural, and municipal) disaster prevention system. The Japanese government has from the beginning included citizens' self-help and mutual help responsibilities in this system. The Central

Disaster Prevention Council is responsible for establishing and promoting the basic disaster prevention plan, which is coordinated by the prime minister. The main council members include appointed governors of the state (e.g., president of the Bank of Japan, president of the Red Cross Society, and other participants, such as prefecture governors and heads of public enterprises) in addition to the private sector. The Central Disaster Prevention Committee has also set up a professional investigation committee and a secretariat to oversee professional consultation services.

Under the concept of network governance in disasters (Comfort, Okada, & Ertan 2013; Moynihan 2009), finding the means to integrate diverse actors engaged in response operations is another challenge that the Japanese disaster management system has faced in the aftermath of the Great East Japan Earthquake. Public agencies are not the only organizations involved in disaster response, as is assumed in majority of current plans (Okada & Ogura 2014). At least 391 private organizations and 115 non-profits were active during the first 3 weeks of the response to the Great East Japan Earthquake (Comfort et al. 2013). Therefore, engaging citizens and the private sector to participate, contribute, or devote themselves to disaster management is a significant issue.

The current Japanese disaster management system has two characteristics distinct from Taiwan's system. First, Japan's disaster prevention plans are all integrated; in addition to the central settings, all levels of government and designated administrative organizations, and public utility authorities all establish independent disaster prevention plans. Second, the disaster prevention business plans in Japan can be divided into natural disasters and accidental disasters (Huang, Li, & Jen 2011).

The ideas of self-help, co-help, and public help have inspired Taiwan's disaster management system as well. Japan realized the limitations of a system that considers the central government at the core of disaster prevention and response after the Great Hanshin Earthquake in 1995. The basic disaster prevention plan includes three dimensions: the type of disaster, the stage of the disaster, and disaster prevention efforts. Enterprises and citizens play a very important role in terms of disaster prevention. Thus, the Basic Plan of Disaster Prevention not only includes local citizens as the core network of the disaster prevention policy, but also promotes the concepts of self-help, co-help, and public help (which considers local citizens as the first line of defence, the

communal organization as the second line of defence, and the governmental rescue as the last) (Li et al. 2012).

Because the Japanese government has actively promoted the idea of disaster prevention, Japanese citizens have come to understand the importance of self-help and mutual help during disasters. Many autonomous disaster prevention organizations exist in Japan's civil society, including firefighting groups, flood-fighting groups, and fire prevention groups for women/youth/children. These organizations not only offer disaster prevention exercises, education on disaster prevention, and disaster prevention patrols, but also consider the community as the subject of disaster prevention (Taiwan's Industrial Technology Foresight Research Project Team 2011). Indeed, the Japanese government not only asks the institutions in charge of disaster prevention (e.g., municipal and firefighting organizations) to explain the possible threat of the disaster to local citizens, but also arranges for group discussions between regional emergency groups and citizens regarding emergent situations during disasters.

Lessons from the great East Japan earthquake for Taiwan's disaster management

The disaster prevention system in Taiwan is very similar to the system in Japan, which includes the central government, the county (the metropolitan city), and the township (the town, the city, and the area), ranging from the central to the local. However, the system in Taiwan does not include or clearly order the roles and responsibilities of the private sector and citizens in disaster prevention and response activities.

The Japanese disaster prevention system also emphasizes self-help, co-help, and public help, offering a system for inspiring Taiwan's system. However, instead of merely copying Japan's system, Taiwan should first understand its context, operation, and spirit. In order to establish an effective disaster prevention network that is increasingly holistic, it is important to comprehend the status quo of the arrangements and preparations as well as the needs of local enterprises and citizens concerning disaster prevention in an enlightened spirit. In addition, in order to provide clear information about disaster prevention to civil society, the capacity of disaster prevention and response at all levels of governmental organizations should be measured and clarified. In this way, the

needs of the government during disaster management will be understood under network governance.

Regarding the ideas of self-help, co-help, and public help, at least four perspectives may provide Taiwan good lessons from the Great East Japan Earthquake. First, strengthening disaster prevention awareness will promote awareness of the risk for people in Taiwan. More specifically, urban design, cultural and creative industries, and disaster prevention can be effectively integrated to develop the idea of collaborative disaster governance (Kuo, Wang, Chang, & Li 2015). For example, through collaboration with the Ronald McDonald House Charities, the Taipei City Fire Department issued children with disaster-prevention passports for the Republic of China (Taiwan), enabling them to earn rewards by completing missions as well as collecting and exchanging bonuses. Through collaboration with the Education Bureau of Taoyuan County, the Fire Bureau of Taoyuan County communicated with students and parents about a disaster prevention questionnaire and homework through students' contact books. Both examples have been successful.

Second, in order to make the enterprises and citizens more involved autonomously in the arrangement and preparation of self-help and co-help disaster prevention, we have to establish incentives in a simple and straightforward way, clearly ordering and thoroughly announcing the self-help and co-help roles and responsibilities of the government, enterprises, and citizens. For example, with regard to floods, the Japanese Central Disaster Prevention Council published a Report on Dealing With the Floods of Tokyo City and clearly described the self-help and co-help responsibilities of the public and the private sectors while preparing for disasters (see Table 29) (Jan 2011; Li 2012).

Third, in order to reduce the impact of a disaster, government may provide incentives for non-governmental agencies to get involved with the system. For example, government may provide assistance and subsidies for the managing organization and the service centre of industrial parks, commercial areas, or shopping malls to encourage the establishment of self-help and mutual help systems to promote the co-prevention of disasters among retail shops, local governments, charity groups, and related communities (Busch & Givens 2013; Liu & Chen 2015).

Finally, it is necessary to carry out trans-regional and trans-municipal co-prevention disaster arrangements and preparations, which will not only disperse the risk in any one place, but also prepare strategies for use in other places. Such

strategies not only lead to the holistic and efficient deployment and distribution of resources, but they also strengthen the power of disaster prevention for all citizens (Chang 2014; Lee, Ma & Tseng 2014).

Table 29 - Shared Responsibilities in Japanese Experience

Sector	*Non-governmental actor roles (e.g., enterprises and citizens)*	*Public sector roles (e.g., central and local government)*
Shared Responsibilities	- The correct analysis and messaging about large-scale flood risk: In order to prepare for evacuation and proper shelter facilities during a disaster, you have to know the flood risk and the capacity of disaster prevention of the area in which you live and prepare food and drinks, if needed. - You have to consider available sources of emergency shelter, based on information provided by public sectors. - You have to participate in the education and training about disaster prevention. - You have to participate actively in local disaster prevention and relief activities and organizations. - You have to notify your neighbors and collaborate with them through public transportation, strengthening mutual cooperation within the area in which you live.	- You have to assess the capabilities for responding to a disaster: You have to assess the current readiness of disaster prevention capabilities of the public administration and review the content of collaboration and degree of execution of self-help and co-help arrangements. - You have to strengthen the disaster prevention preparation of the self-help and co-help of enterprises and citizens. You have to provide the information required to assess the risk to enterprises and citizens, provide the action plan for enterprises and citizens during disasters, provide opportunities for disaster prevention education and training for enterprises and citizens, buy the machines and tools necessary for disaster prevention, and reward the enterprises that practice the management of disaster prevention.

Source: Taiwan's Industrial Technology Foresight Research Project Team, 2011.

Table 29 highlights the shared responsibilities between the private and public sectors in Japan. The private sector emphasizes capacity, education training, participation, and collaboration for disasters. Similarly, the public sector emphasizes capacity, strengthens disaster prevention, and provides an action plan for enterprises and citizens. Therefore, the public and private sectors must cooperate with each other.

Ongoing discussions and debates in Taiwan

Controversy has recently emerged about disaster prevention. The current article summarizes some feasible directions for the reform of Taiwan's disaster prevention system. These can be identified as follows (Huang et al. 2011; Taiwan's Industrial Technology Foresight Research Project Team 2011):

1. To maintain the existing authorities responsible for disaster prevention, the activities of these authorities need to be enumerated in relation to all powers and responsibilities related to disasters in disaster prevention plans. Ministries and departments have comprehensive disaster management plans. In addition to plans for dealing with important types of disasters, a disaster prevention and response plan should be added to the designated ministries' countermeasures plans.
2. Experts in the allocation of authority among government agencies need to re-check the appropriateness of the plan with regard to whether radiation disasters should be included in the Ministry of Economic Affairs, in addition to the inclusion of specific disasters (e.g., industrial disasters).
3. Each ministry should have a specific independent disaster prevention plan written for each type of disaster. To eliminate any single ministry from being in charge of the disaster-specific support framework, a comprehensive disaster prevention plan should be developed. The business plan for specific disaster countermeasures should be available to all ministries and departments.
4. The Japan 2011 earthquake demonstrated the need to think about how to adjust Taiwan's systems and countermeasures to deal with catastrophic disasters. Catastrophic disasters cause multiple simultaneous disasters; thus, disaster preparedness and relief must create another set of approaches and programs to handle such scenarios.

5. The Disaster Prevention and Relief Act adopted a framework for the management of a specific disaster. However, when facing multiple disasters, other overseas governments have started adopting an approach with an all-hazard (common management structure) orientation. Taiwan should consider modifying its structures for facing disasters to follow this same approach.

Based on these points, the disaster management system, including organizations and institutions, should be adjusted for better disaster management. This point is also consistent with Comfort, Waugh, and Cigler's (2012) underscoring of the importance of complex adaptive systems for disaster prevention. In other words, Taiwan's disaster prevention and response has been controversial in terms of its structure, organization, and plan because of the adoption of single hazard approach. A more effective disaster coordination and cooperation will be the next steps for Taiwan's disaster management system.

Next Steps for Taiwan's Disaster Management System

The Disaster Prevention and Protection Act in Taiwan was passed and announced in July 2000. Although it has been amended several times in the past decades, a single hazard approach to disaster management is still the dominant feature of the system. With the development of recent organizational reforms at the ministerial level in Taiwan and the trend of network governance, there are at least two points that can be considered as the next steps for Taiwan's disaster management system.

Integrate disaster assistance system into social welfare system

Given that Taiwan and Japan are prone to natural disasters such as earthquakes, typhoons, and floods, it is critical that both countries be able to handle such events through rapid emergency response systems. According to Article 43 of the Republic of China (Taiwan)'s Constitution,

> *In case of a natural calamity, an epidemic, or a national financial or economic crisis that calls for emergency measures, the President, during the recess of the Legislative Yuan, may, by resolution of the Executive Yuan Council, and in accordance with the Law on Emergency Decrees, issue emergency decrees, proclaiming such measures as may be necessary to cope with the situation. Such decrees shall, within one month after issuance, be presented to the Legislative Yuan for confirmation; in case the Legislative Yuan withholds confirmation, the said decrees shall forthwith cease to be valid (ROC Const. art. 43).*

Empowered by the Constitution, the president can issue "emergency decrees" to initiate rapid operating mechanisms for handling serious disasters. Historical tragedies have led to the enactment of the Provisional Act Governing 921 Earthquake Post-Disaster Reconstruction, which defines how to react in terms of legal institutions. This act was issued by the president immediately after the 921 Earthquake. In 2000, Taiwan enacted the Disaster Prevention and Protection Act; however, this act failed to address the serious damages, financial losses, and rampant homelessness caused by Typhoon Morakot in southern Taiwan. Thus, in 2009, the Legislative Yuan enacted the Post-Disaster Reconstruction Act of the Typhoon Morakot. Meanwhile, despite the existence of the Social Assistance Act, enacted in 1980, only Articles 25 through 27 have further regulated the conditions and methods of disaster response as well as any assistance provided by civil organizations or institutions. In light of this situation, addressing the problems of disaster response, rehabilitation, and recovery through legal institutions has become critical at this stage.

Network governance among governments and different sectors

As more and more private enterprises and non-profit organizations become involved with disaster management, a network governance approach of dealing with disasters should be considered. Networks have been widely recognized by both scholars and practitioners as an important form of multi-organizational governance and require an array of interdependent competencies (Moynihan 2009; Provan & Kenis 2008). Some challenges still face Taiwan's central and local governments, including disaster-reducing operations being distributed in different departments of the Executive Yuan, resulting in ineffective control and

management of the disaster prevention budget and operational efficiency of policy enforcement due to the lack of an integrated environmental crisis and risk assessment mechanism. The central government also lacks a large-scale coordination mechanism and procedures for the mobilization of the labour force and material goods during serious disasters, meaning that state-level, trans-departmental, and trans-municipal distribution of resources cannot be effectively achieved. Response strategies have also been distributed in different operational plans for disaster prevention; the content of these plans not only differs, but also lacks any common frame (i.e., there is no all-hazard approach). The responsive efficiency has been reduced. Furthermore, the role of the army during serious disasters (e.g., task assessment, dispatch procedures, distribution of the operating zones, problems concerning machines and equipment) has not been clarified. Finally, because the established system of notification of disaster circumstances in every government department is not under central control, not only can the government not effectively handle the mobilization of civil society groups, but the entire disaster rescue process has also been directed by mass media. Civil organizations can only recruit the labour force and resources by themselves (Ma 2009).

Policy for disaster prevention and the reconstruction process is still based on the government's decision-making process. Non-profit organizations, communities, and enterprises are providing resources and delivery services in the reconstruction process. Due to limitations in manpower, resources, and information, governments' reconstruction decision-making processes often encounter difficulties in meeting community and individual needs. Including non-profit organizations, communities, businesses, and disaster victims might increase the costs of communication and coordination, but they can improve the quality of decisions and recognition of results in the reconstruction process for disaster victims. The reconstruction experience during Typhoon Morakot also showed that, when the non-governmental actors participate in the decision-making process, conflicts can emerge among the multiple objectives. This often leads resource owners to influence policy direction, but the accountability mechanisms are not constrained by those owners. Therefore, the inclusion of non-government actors in decision-making processes in addition to non-profit organizations can ensure the available of resources and enterprises; in addition, the decision-making process should be an open discussion involving local grassroots organizations and community opinion leaders. Such a situation can

help ensure the comprehensiveness and understanding of the formation of the various actors' positions.

Conclusion

Japan's experience with the 3.11 Earthquake in 2011 revealed two problems in disaster management. First, due to the central government's inability to handle disaster situations, the decision-making process became more difficult. As more than cities and counties were damaged, the central government set up two regional command centres during the disaster. However, it still caused ambiguity in the responsibility on the part of cities and counties. Second, regional functions were impaired as a result of the disaster, and problems arose related to the loss of the operators of the first line of defense and evacuation (Nakamura & Kikuchi 2011; Norio, Ye, Kajitani, Shi, & Tatano 2011).

Based on the lessons and experiences gleaned from the 3.11 Earthquake in 2011, we believe that there are still many aspects that the Taiwanese government can improve in the future. Researchers (Li et al. 2012) have pointed out some suggestions, but the authors would like to emphasize several additional perspectives. First, in reference to the Japanese nuclear accident, Taiwan's central government should establish a command centre and assist the municipal governments. If the scale of the damage of a disaster is beyond the capability of the local government, then—with the local government's agreement—the premier should be authorized to assign control of the response centre for the local disaster of the damaged areas of the state to a commander sent by the central government for a specific time period.

Second, the government's professional knowledge and skills in disaster management need to be upgraded continuously. This includes developing a disaster management framework for those involved with these tasks. For example, the central government department responsible for disaster rescue and prevention operations should set up special groups. The corresponding cities and counties should also establish their own offices of disaster management, as should the disaster prevention divisions of villages and towns. Group work among different cities and counties should be developed to facilitate integration and communication among the response centres at different levels.

Third, when facing challenges from multiple disasters, the single-hazard approach should be replaced by an all-hazard approach (a communal framework for managing change). Disaster prevention and rescue operations should allocate the rights and responsibilities of the participating organizations while emphasizing the all-hazard framework—that is, reconstruct and redefine the institutions responsible for the operation in terms of disaster prevention, preparation, arrangement, response, and recovery. At the same time, the executing organization for the operation of disaster rescue and prevention should be adjusted, organizing the central government, counties, and cities of the municipality directly under the jurisdiction of the central government to set up a committee for disaster prevention and rescue (i.e., an independent organization).

Fourth, regarding public communication and performance evaluation, the standards for the establishment of the response centre should be codified (established in both the central and local governments). Public announcements for seriously damaged areas should be set up, and the support system from the government and relief payments following the disaster should be clear for the citizens, particularly for the victims of disasters. Emergency recovery procedures should also be corrected to include provisions for urgent repair and certain items concerning the recovery and reconstruction after the disaster.

Finally, based on the idea of network governance, the operational plans for disaster rescue and prevention should be integrated. A state-level strategic framework for disaster management system should be established and is a critical issue not only for Taiwan's central and local governments, but also for the private and third sectors.

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Part D.

Crisis Case Studies

Chapter 17. Right to Security and Safety and the Role of Professionals: Lessons from the Italian L'Aquila Earthquake

Hiroko Kudo

Introduction

In October 2012, the Italian Court of L'Aquila found guilty the National Commission for the Forecast and Prevention of "Major Risks," which met just before the 2009 L'Aquila earthquake and decided not to warn – and thereby alarm – the residents. The court ruling caused international debate on the role of scientists, scientific experts and government authorities in such situations, when a small number of professionals are in a position to access data, consult information and opinions, and make scientific judgments on the risks. The ruling was strongly criticized by the international scientific community, arguing that in this way scientific independence is at risk.

However, many juridical experts in the country welcomed the judgment, especially on the point that the ruling clarified the responsibility of experts and of government authorities towards the citizen. Mayors of municipalities and presidents of provinces, as well as governors of the Regions involved, welcomed the verdict too, mainly on the same grounds and with relief that their responsibilities were limited compared to those of the Commission.

The 2012 judgment was overturned in Appeal Court on November 10, 2014 (Italy Corte di Appello dell'Aquila 2014). Six out of seven who were found guilty

in 2012 were fully acquitted; only one person, Bernardo De Bernardinis, who was senior manager of the central government Department of Civil Protection at the time of the earthquake, was sentenced, but for a much shorter period. The reasoning was rather simple: in short, that there was not enough proof to confirm all accusations (Italy Corte di Appello dell'Aquila 2014). Upon taking a closer look, the Appeal Court determined that the members of the Commission have only "formal qualifications" as members, but are not directly responsible for the deaths and injuries just because they participated in the meeting in question; that it is difficult to blame individuals just because they were members of the Commission, while the responsibility was that of the Commission as a whole; and that it is impossible to identify the contribution of single members of the Commission during the meeting, since there are no minutes available (Galluccio 2015).

Searching for those responsible for the damages from a natural disaster is not an easy task, nor is it a fruitful solution for disaster relief and/or reconstruction. Among recent natural disaster cases, including floods and avalanches, many politicians, in particular, governors and mayors, have been found guilty by Italian local courts for not taking sufficient measures to prepare for and/or to prevent the disaster. However, most of these rulings were based on evidence of corruption and/or negligence during and after the event, and not because the politicians failed to inform local residents about the possible risks in advance.

In the context of these events, research questions addressed in this chapter include the following:

1. Who (or which government body) is responsible for what, to what extent, and to whom in case of natural disaster?
2. Does the citizen have the right to security and safety as one of their fundamental rights? If so, how can a citizen claim his/her right, to whom, to what extent?
3. If the government or a government institution is responsible for the citizen in case of natural disaster, how should it act? Is it possible to improve organizational capacity?

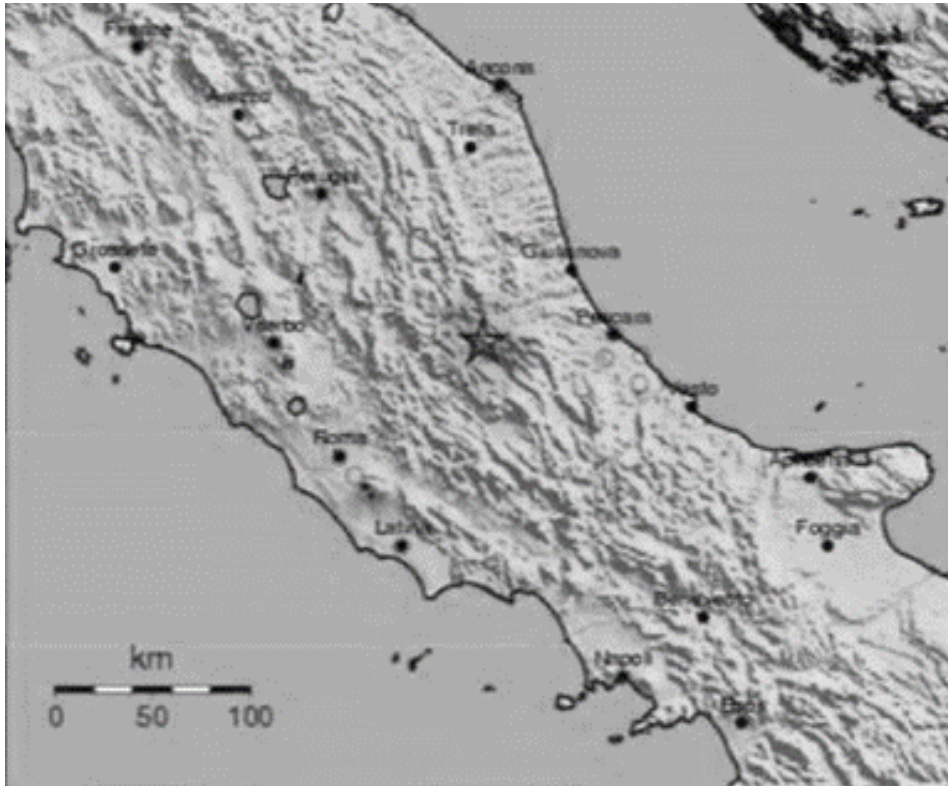
The research first studies the 2012 court ruling above mentioned and various interpretations which followed (Barbieri 2013; Notaro 2013; Galluccio 2014). The author examines the critiques expressed by international scientific communities in this regard. Then the chapter analyses the recent Italian reforms of local government, including changes affecting provinces and Prefects, which are

important in terms of civil protection. Finally, the paper tries to answer the above research questions.

Earthquake of L'Aquila

The earthquake hit L'Aquila at 3:32 on April 6th, 2009. The size was not so great: its magnitude was 6.3 and the depth of its origin was 8.8 km, which is not so deep. The major damage was concentrated in the historical centre of the city of L'Aquila. It resulted in 309 recorded deaths, 1,600 wounded – of whom 200 seriously – and 100,000 had to be evacuated (Italy Tribunale dell'Aquila 2012).

Picture 3 - Earthquake of L'Aquila



A major part of the historical centre of L'Aquila was still inaccessible in 2015 because of the dangerous conditions of the buildings. Reconstruction was slow and caused many debates. The residents, who had to be evacuated from their homes in the city centre, were assigned housing in new towns in suburban areas.

L'Aquila is a medieval city, which means that its historical centre is full of stone and brick buildings, which are constructed without any anti-earthquake measures and thus were seriously damaged. According to the Department of Civil Protection, 48.1% of the buildings in the city were classified after the earthquake as not-possible-to-access, because all or part of the buildings were damaged and were dangerous to access (Italy Protezione Civile, 2009).

L'Aquila is situated northeast of Rome. The surrounding territory is full of small municipalities. The impact of the earthquake was recorded even in Rome, damaging some historical buildings, including churches.

The earthquake offers interesting questions. First, responsibility for forecasting has been seriously discussed for the first time. A group of experts, who made up the National Commission, met a week before the earthquake to discuss possible measures. The Commission, knowing the danger of an earthquake, decided not to warn the population about the risk, mainly because they underestimated the risk, but also because they feared overreaction and possible panic among the residents. Since the earthquake hit during the weekend, many believe that if the Commission had properly warned of the risk, many of the students who lost their lives in the collapse of their dormitory would have remained with their families in their home town, so that they could have avoided the tragedy. In reality, the Commission was fully conscious of the risk, based on the data and information they had gathered; however, the final decision was not to inform the residents about the risk, influenced by political opinions (Notaro 2013).

In the 2012 judgment pronounced by the L'Aquila court, it ruled that the Commission was guilty for not informing the civil protection authorities and the population at large of the risk, even though it was scientifically fully aware of that risk (Italy Tribunale dell'Aquila 2012; Barbieri 2013).

Second, the crisis management after the earthquake was questioned. Since Italy is a country frequently hit by earthquakes and other natural disasters, including floods, civil protection and related institutions have formed the basis for the crisis management system. After the earthquake, not only domestic, but also international aid teams arrived at the earthquake location, only to create

confusion and further problems. The earthquake experience led to questioning of the coordination functions of the civil protection services and of the Prefect, who is responsible for public safety, public order, civil protection, and cooperation with various authorities, including the police. This led to reform of the office of Prefect and of provincial administration (Kudo 2015 – see also the discussion of administrative reform in Italy later in this chapter).

Third, the issue of illegal construction was discussed. After 1980, Italy introduced various anti-earthquake standards for newly constructed buildings; however, the student dormitory which collapsed and caused many deaths was an illegal building, in that it did not comply with the new construction standards. This means that some of the victims could have survived if the building had respected the standards. In this regard, the L'Aquila Court found guilty those who were involved in renovating the student dormitory (Italy Tribunale di L'Aquila 2013) and this judgment was confirmed by the Appeal Court as well (Italy Corte di Appello dell'Aquila 2015).

A final set of questions concerned the issue of multi-level governance, in terms of coordination of crisis management and reconstruction. The role of the responsible Prefect is essential in coordinating aid forces after a disaster and in the process of reconstruction, but the role of civil protection is also important. The latter is a department under the central government Cabinet Office but enjoys a certain independence. Its director is a civil servant, not a politician, nor a political appointee. Because of its independence, it can act even above the law when needed in crisis management, but this characteristic has also created many issues.

2012 and 2014 Judicial Rulings on the Responsibility of the National Commission

The L'Aquila court ruled on October 22nd, 2012, that the seven members of the National Commission for the Forecast and Prevention of "Major Risks" were guilty of having murdered, injured and brought damage to public offices. In doing so, the judge noted that the Commission had the competence of "analysing and evaluating a risk and giving information to civil protection authorities and to the population" (Barbieri 2013).

The judgment was accompanied by a background opinion of 943 pages, which is very long, even by Italian standards of giving relatively long opinions. A major part is the reconstruction of the event and the role of the National Commission for the Forecast and Prevention of "Major Risks" (Italy Tribunale di L'Aquila 2012).

The first part of the opinion is dedicated to the reconstruction of the earthquake, the origins of which could be traced back to tremors of small and medium intensity in June 2008 and had increased to magnitude 4.1 at 15.38 on March 30th 2009. There is then a long historical analysis of earthquakes in the territory by technical consultants, in order to understand whether the April 6th earthquake could have been forecast as an exceptional, unusual, and unique event. The judge decided, however, that it was not possible to do so. Indeed, the earthquake in question, according to the registered scientific data, is classified as "strong," of an intensity that is registered about 120 times a year. According to the National Earthquake Information Center, of the U.S. Geological Survey, the registered data show that the 2009 earthquake is not one of the exceptional ones in L'Aquila's history; there were similar or more severe earthquakes in 1349, 1461, and 1703. According to the Italian anti-earthquake regulations (1937, 1962, 1975, and 1996), the city of L'Aquila is classified in the second category of earthquake-risk areas, which means that it has medium intensity of earthquakes. Based on the regulations and the registered data, the technical consultants to the court concluded that the April 6th earthquake was of the size forecast in the regulations and the two technical advisors to the Commission evaluated it correctly. The judge, however, also noted that the series of earthquakes since June 2008 in L'Aquila could have been interpreted differently, that is, as carrying some major risks (Barbieri 2013; Notaro 2013; Galluccio 2014).

Then the judgment analyses the role and function of the Commission in depth. Indeed, it dedicates many pages to this. In its view, the Commission should have assumed a more active role in building a culture of prevention, at least in terms of scientific registration of data, after the earthquake in Irpinia on November 23rd, 1980. It also has the mandate to inform and give scientific assistance to the civil protection agency, which in turn has to act more actively on prevention activities and not only coordinate aid forces after the event occurs. Cabinet Decree n.1282 of 1982 defined that an interdisciplinary technical and scientific commission has to collaborate with the civil protection agency, identifying the risks that should be considered by the civil protection. In 1986, the Commission acquired the role

of consultant and assistant to the Ministry, and with the Ministerial Decree of July 2nd, 1986 it was divided into seven sectors, each assigned a specific risk to evaluate. The role was redefined with Article 9 of Law n.225 of 1992 (Italy Tribunale di L'Aquila 2012; Barbieri 2013).

All these developments indicate that the Commission and its staff had acquired the official public function of evaluation of risks, in particular the risk of an earthquake, in the case mentioned. Indeed, after knowing the level of risk, even though they evaluated it as "normal" to the territory, they had the obligation to inform the competent organizations and work with them to prevent damage from the event (Italy Tribunale di L'Aquila 2012; Barbieri 2013; Notaro 2013).

A group of experts from the Commission met on March 31st, 2009. Those who were involved stressed that it was not a meeting of the Commission but just a meeting of experts who have only consultative functions and are not in charge of analysis, forecasting, and prevention of risks, as described in Articles 2 and 3 of Law N.22 of 1992. The ruling, however, after examining the transcript of the meeting as well as the convocation letter, decided that the meeting was subject to the full obligations of the law and, in this regard, it did not act properly, especially on the point that it had to evaluate and provide information about the risk (Barbieri 2013; Galluccio 2014).

The most crucial point was that the Commission informed the related administrations, including the city of L'Aquila and its mayor that the risk of earthquake was low so that the population did not have to evacuate. The ruling concluded that the Commission underestimated the impact of the earthquake, though their scientific analysis was largely correct. As a matter of fact, much of the criticism after the ruling, especially from the scientific community, which criticised it on the grounds that a legal evaluation cannot judge the scientific forecast of earthquakes, was criticising something that the ruling did not say. Indeed, the ruling acknowledged the difficulty of making forecasts and evaluations, however it pointed out the responsibility of the Commission for having informed the population that there was no risk and that they did not have to take any measures (Italy Tribunale di L'Aquila 2012; Barbieri 2013; Galluccio 2014). Because this information was announced by a group of experts based on scientific analysis, the majority of the population, as well as public institutions, trusted the information, which resulted in a tragedy.

The Court's judgment has been discussed since then from many points of view. The role of mass media and politicians had to be clarified. It has been

reported that the announcement was the result of pressures from some politicians. The ruling, however, limited its reasoning about the role of the Commission to one of evaluating risk and delivering information. Even the scientific analysis of the earthquake made them aware that there was rather low risk, however once the scientific commission announces such a fact, the social impact is great. The Court should have considered this point. The way the Commission delivered the information should also be also reconsidered. The judgment focused on the original role and function of the Commission, in effect the scientific experts, and ruled that in this case they failed to deliver properly their responsibilities, which were to serve the safety and security of the population, contributing to the forecasting and preventing natural disasters (Notaro 2013).

The debate on this ruling has continued (Notaro 2013; Galluccio 2014), even after the Appeal Court verdict (Galluccio 2015). Not only legal, but also political as well as scientific interpretations are possible in understanding this case. The chapter, though, will not follow all these debates but instead moves on to other points of discussion in relation to the issue of coordination among governments and institutions. Although the judgment was overturned by the Appeal Court (Italy Corte di Appello dell'Aquila 2014), it does not mean that all the issues raised by the 2012 judgment did not exist or were resolved.

The main argument of the Appeal Court was as follows: first, there was not enough proof to confirm all accusations (Italy Corte di Appello dell'Aquila 2014); the members of the Commission had only "formal qualifications" as the members and are not directly responsible for the deaths and the injuries, just because they participated in the meeting in question. In addition, it was difficult to blame individuals just because they were members of the Commission; instead the responsibility was that of the Commission as a whole, and it was impossible to identify the contribution of individual members of the Commission during the meeting, since there were no minutes left (Galluccio 2015).

The Appeal Court examined the Commission's responsibilities from two different points of view: the responsibilities for scientific evaluation during the meeting; and the responsibilities for providing information to L'Aquila residents. The Court concluded that the Commission's evaluation was adequate and that it was not possible to evaluate the earthquake risk differently than they had; it also concluded that the Commission did not have the obligation to inform the public of the results of the meeting, and thus the problems regarding the public

communication should be addressed only with respect to the person in charge and should not be attributed to all because of general imprudence (Galluccio 2015).

This ruling opened new debates, which have continued and will probably continue in the future. The first and second court rulings were divided on the scientific evaluation of a natural disaster, especially an earthquake, while the importance of responsibility and accountability for information to the public seems to be confirmed by both rulings, although the interpretations of the responsibilities of the Commission members were different. The rulings and the current debates highlight the role of government in protecting citizens from possible natural disasters in two areas: using the government's expertise and informing citizens of the possible risk. The two rulings differed in interpreting the role of the Commission members, especially those who participated in the Commission for their scientific qualifications, thus not directly representing the government authority (Galluccio 2015). Both acknowledged, however, the responsibilities of the representative of the Department of Civil Protection, for his judgement as well as for the communication to the public, confirming the responsibilities of the government towards citizens in these cases.

The rulings, given the nature of the accused, did not, however, discuss the relationship among various institutions and actors involved. Examining the debates (Notaro 2013; Galluccio 2014), it emerges that one of the issues with respect to the 2009 earthquake was the missing coordination among the various institutions involved (the Commission, Department of Civil Protection, the Prefect of L'Aquila, the Region, the Province, and the municipality), mainly because of the lack of adequate communication and of a clear distribution of responsibility among them. Thus, the chapter now analyses local government structures and reforms in Italy to understand the issues.

Local Government Reforms in Italy

The chapter now analyses the major reforms of Italian local governments, which began in the early 1990s and resulted in reorganising multi-level governance and in reform of provinces and the role of Prefects. These developments have been strongly influenced by the requirements of public service provision, in particular those of civil protection; they had an influence on

the administrative environment in the lead-up to the L'Aquila earthquake and they are especially important because reform of civil protection has been accelerated after the L'Aquila earthquake.

Public administration reform

The first series of reforms was implemented in the field of public administration at the beginning of the 1990s (Bertonazzi 1998) and itself was considered as a "miracle", since Italian public administration had been considered too old-fashioned to be reformed (Cassese and Franchini 1994; Cassese and Galli 1998). The pressure to enter the Euro Zone was the major motivation to reform public finances (Bernasconi and Marenzi 1998; Bianchi 1996, 1998, 1999; Majocchi 1997, 1998, 2000), and in order to achieve those goals, it was necessary to implement public administration reform and decentralisation reform.[1]

Decentralisation reform has been one of the major reforms in Italy since the beginning of the 1990s. It has been promoted through the federalist movement, with political, administrative, and fiscal dimensions[2]. Political reform has been supported through various electoral system reforms, which started in 1993 with local elections (direct election of municipality mayors and provincial governors)[3] and national elections (introduction of an additional member system)[4]. This was followed by institutional reform (Italy Presidenza del Consiglio dei Ministri,

[1] There are many research publications and bibliographies about these reforms. Among them, some have dealt with simplification of administrative procedures, for example, see: Arsi, M. Coronas, M.G. and De Luca, P. (eds.) (1998), de Caprariis, G. and Vesperini, G. (eds.) (1998), and Vandelli, L. and Gardini, G. (1999). Others have dealt with decentralisation of institutions and functions, see: Brosio, G. (ed.) (1995), and Gambino, S. Guerino, D.I. and Moschella, G. (eds.) (1998).

[2] On this issue, there are many references. See, for example: Arachi, G. and Zanardi, A. (1998, 2000, 2001), Brosio, G. Pola, G. and Bondonio, D. (1994), Fausto, D. and Pica, F. (eds.) (2000), Fossati, A. and Levaggi, R. (eds.) (2001), Fraschini, A. (1998, 1999), Giarda, P. (1995), Osculati, F. (1995), Pica, F. (1995), Tremonti, G. and Vitaletti, G. (1994), and Zanardi, A. (1999).

[3] Italy Legge 25 marzo 1993, n. 81

[4] Italy Legge 4 agosto 1993 n. 276 and Italy Legge 4 agosto n. 277 (Legge Mattarella). This electoral system was replaced completely by Legge 21 dicembre 2005 n. 270 (Legge Carderoli). The latter abolished the majority vote-based constituencies, kept closed lists, introduced a block-voting system that was nationwide-based for the House and regionally based for the Senate, and party-list representation thresholds.

Dipartimento della Funzione Pubblica 2001) during the 1990s and then especially managerial reform of public institutions (Azzone and Dente 1999; Italy Presidenza del Consiglio dei Ministri, Dipartimento della Funzione Pubblica 2001) during the second half of the 1990s.

Why is decentralisation the key factor?

Why has decentralisation been one of the key issues in recent government reform? Decentralisation is one of the characteristics of New Public Management (NPM), as changing the decision-making structure as well as the service delivery system is an important element of NPM. Decentralisation is also associated with multi-level-governance, another characteristic of NPM as well as of the policy strategies of modern States.

Many authors have focused their research efforts on the analysis of decentralisation and devolution processes, following the public governance approach. This has looked at devolving activities and responsibilities from central to local governments and at the relational features existing between and within the different institutional levels (Ongaro 2006; Mussari 2005, Hutchcroft 2001; Christensen 2000; Pollitt *et al.* 1998).

Following the implementation of public sector reforms based on NPM, the dimension of public administrations, especially at the local level, has prompted renewed interest, both practical and academic. At the political level, the dimension of local governments has become very important, for two main reasons: regional competitiveness and capacity to provide public services.

In terms of public services, it is important to highlight the impact of the devolution process especially on public administrations at the local level (Fedele-Ongaro 2008; Grossi-Mussari 2008). First, the number of public services to be provided by local governments has increased. Secondly, the devolution process has also had an impact on the system of funding local governments, which has changed from an indirect to a direct system, that is to say, local governments are increasingly financed directly by their citizens. As a consequence, many local governments do not have sufficient financial resources to fund the provision of the services needed. These changes are also accompanied by a demand for increasingly complex public services, which are very difficult for a single local government to provide. These individual administrations therefore need to

resort to agglomeration processes or mergers in order to exploit their financial, material and human resources more efficiently, with the aim of satisfying citizens' demand for increasingly complex services.

At the academic level, the devolution process has confirmed a new interest in institutional models of governance among both public administrations operating at different levels and public administrations operating at the same level. All this interest has grown within a theoretical framework known at the international level as "Public Governance" (Kettl 2000; Peters and Savoie 2000).

This theoretical background demonstrates the importance of decentralisation in relation to public management, especially public service delivery. Provinces in Italy, as an intermediate local government unit, have changed their functions and roles during the reforms. They have gained more coordination functions in relation to municipalities, and especially in metropolitan areas, they were designed to become a new entity called "metropolitan cities". The reform process has been influenced by the Constitutional Reform of 2001 and especially by the role of Regions and the changing roles of Prefects (Kudo 2015).

Multi-level governance

In terms of the pressures from EU integration, decentralisation reform has been the most important reform. Here follows the major chronology of this reform.

Box 3 - Decentralisation Reform in Italy

- 1990 New Local Government Law (Law N.142)
- 1993 New Local Election Law (Law N.81) (direct election of mayors and governors)
- 1993 Local taxation reform (property tax)
- 1996-2001 Fiscal and taxation reform (fiscal federalism)
- 1997-1998 Local public administration reform (simplification, delegation, managerial reform, accountability)
- 1998 Introduction of Regional Productive Activity Tax (related to Healthcare reform)
- 2000 New Local Government Codes (D.LGS. N.267)
- 2001 Constitutional Reform of local governments

The EU integration procedure influenced Italian public administration reform, especially during the period of 1997-1998. Many significant reforms were

implemented, which included: delegation of functions (Brosio, ed. 1995; Gambino Guerino and Moschella, eds. 1998); simplification of procedures (Arsi Coronas and De Luca eds. 1998; de Caprariis and Vesperini, eds. 1998; Vandelli and Gardini 1999); managerial reform (Azzone and Dende 1999; Italy Presidenza del Consiglio dei Ministri Dipartimento della Funzione Pubblica 2001); and improving efficiency and accountability (Italy Presidenza del Consiglio dei Ministri Dipartimento della Funzione Pubblica 2001).

Public administration reform was followed and completed with public finance reform of 1996-2001. This was a fruit of pressures to enter the euro zone as part of the first group. The reform included: fiscal reform (Majocchi 1997); taxation reform (Bordignon 1997; Giannini and Guerra 1999, 2000; Guerra 1997); local public finance reform (Fraschini 1998, 1999; Giarda 1995; Italy Ministero delle Finanze Commissione di studio per il decentramento fiscale 1996; Italy Ministero dell'Interno Direzione Generale dell'Amministrazione Civile Direzione Centrale per la Finanza Locale e per i Servizi Finanziari 1996); and fiscal decentralisation (Arachi and Zanardi 1998, 2000, 2001; Fausto and Pica, eds. 2000; Pica 1995; Zanardi 1999), with their related advantages and disadvantages.

Italian decentralisation reform was completed with constitutional reform in 2001.[5] This was considered to be a legitimating procedure of the previous reforms. The reform introduced fundamental changes in the status of ordinary Regions[6] and changed the relationship between the State (i.e., the national government) and the Regions. It gave legislative powers to the Regions, which created new and numerous disputes between the Regions and the State, thus increasing the power of the Constitutional Court and its rulings. This also resulted from the lack of clear definition of the legislative competences of the Regions (Kudo 2006).

One of the achievements of the constitutional reform is that it introduced the EU principal of subsidiarity into the Italian constitution. It also delegated various functions from the State to the Regions, including healthcare, education, and police (Kudo 2006). Fiscal federalism finally became part of the constitution with this reform.

[5] Italy L.C. (Legge costituzionale) 18 ottobre 2001, n. 3, "Modifiche al titolo V della parte seconda della Costituzione", pubblicata nella Gazzetta Ufficiale, n. 248 del 24 ottobre 2001.

[6] Among 20 Italian Regions, there are five autonomous Regions with special statutes, which distinguishes them from other parts of the country in territorial, historical, geopolitical, ethnic, and thus linguistic characteristics; the remaining 15 Regions are "ordinary" Regions.

However, implementation of constitutional reform has been rather slow, strongly influenced by frequent government changes. In fact, after the constitutional reform proposal in early 2001, in June of the same year, a centre-right government came into power. With the October 2001 referendum, the centre-left government's proposal passed. Then in 2005, further constitutional reforms were proposed; in April 2006, a centre-left government came into power and a June 2006 referendum did not approve the previous centre-right government proposal (Kudo 2009). Finally, the centre-right government that followed (2008-2011) was less active in this regard.

It is possible to draw some observations from the above facts.

The first observation is about Italian domestic political stances and reforms in line with EU policies (Kudo 2009). During the late 1990s, there was strong promotion of decentralisation under centre-left governments, and this policy continued until 2001, interestingly under both centre-left and centre-right governments. During the first years of the 2000s, there was a general slowdown in the process with centre-right governments. The Northern League (Lega Nord) played an interesting role among central-right coalition governments. It has been a historical coalition partner in the centre-right governments and was a decentralisation driver, yet at the same time it had an anti-EU stance (Jori 2009).

It is also possible to observe that EU pressure has been "utilized" by Italian domestic politics as "outside" and neutral pressure and as a learning process, especially at the sub-national government (Region) level. EU pressures have been utilised by both political groups as "outside" pressure to convince voters and have been a comfortable scapegoat and way of avoiding "their" own responsibilities. Indeed, the pressures provided a comfortable explanation to the voters, which later created strong doubt and/or sceptical views towards the EU (influences, but cannot influence).

EU structural funds have played an interesting role; that is to say, they have offered a rich learning process for the Regional administrations and their managers. Through their exercise, competitiveness and networking power in the Regions has improved, accelerating "hollowing out" of the State[7].

In order to understand Italian decentralisation, there is also an historical element to consider: the notion of "federalism" in Italy. A 19th Century historian and thinker, Carlo Cattaneo, wrote first about "federalism" in 1850s. He talked

[7] The questionnaires and interviews conducted by the author in various Regions confirm this tendency. See: Kudo (2013).

about a "United States of Europe", referring to "European" federalism,[8] after his study on the United States of America.[9] There is a rich historical literature on "regionalism" in Italy, which mostly refers to the southern Mediterranean regions,[10] while historical notions such as "campanilismo" express a strong sense of local identity. There is a modern and historical question, however: is Regional identity an historical one with a locality or is it with a modern institution?

Since the 19th century Italian Unification process led to the constitution and institutionalisation of the modern State, it is not easy to clarify the "modern" identity of the Regions, which in turn, could be a key for Italy to be part of the EU.

Reform of Prefects and Provinces

The reform of Prefects and provinces has recently accelerated. The idea of reform has been under discussion for many years; however serious reform plans have never been introduced, due to strong political resistance. Political parties have their bases at the provincial level and many productive activities, including agriculture and commerce, are still managed at the provincial level. The L'Aquila earthquake and related critiques of the roles of the civil protection authorities, Prefects, and provinces accelerated the reforms.

Provinces have had limited authority and responsibilities and thus have managed limited budgets. They each have an elected president, an elected parliament, a president-nominated junta, and an administrative body with civil servants. The direct election of the president was introduced with Law N.142 of 1990 and has been implemented since then. However, the cost of politics at the provincial level has become a serious issue in a time of austerity budgets. The administrative cost of provinces has never been an issue, since it had been limited.

Mainly for financial reasons, the provinces are to be abolished in order to cut political and administrative costs, leaving only two levels of local administration: Regions and municipalities. However, in order to maintain and possibly improve

[8] Another important figure, who supported this idea, was Giuseppe Mazzini.

[9] See, for example, Vimercati (ed.) (1991) and Cattaneo and Bobbio (2010)

[10] See, for example, Mangiameli (ed.) (2012) and Carabba and Claroni (eds.) (2012)

the quality of public services and their delivery, coordination and collaboration of municipalities is to be supported by the creation of metropolitan cities and the promotion of the union and merger of municipalities. This is because the national government has been trying to maintain public services while trying to cut expenditures. The delegation of many functions to Regions and municipalities, implemented through Constitutional Reform, will help this process of abolition of the provinces, since these have already lost many competencies and major functions are distributed to municipalities and Regions.

The "Delrio" Law, Law N.56 of 7 April 2014 spells out the detailed design of the future of the intermediate-level local governments, which are to be metropolitan cities and unions of municipalities. Under this plan, provinces will be abolished, while small municipalities are encouraged to merge.

It is interesting to note that this institutional reform, which has been repeatedly discussed but has failed many times over many years, is to be realised, thanks to pressure from the EU and for financial reasons, not for domestic political reasons. As discussed in earlier sections, major reforms in Italy have been, indeed, strongly influenced by the European integration process.

Related to this reform, but also linked to civil protection and police reform, the role of Prefects is to be revised. The details are still to be decided, but this reform would also be implemented soon, according to the government. Indeed, the role of Prefects has changed after the introduction of the direct election of presidents of the provinces. Prefects were the unique governing figure before that, however since the presidents were substituted in the place of this figure, the responsibilities of Prefects were reduced. The current major responsibilities of Prefects are: public security, public order, civil protection, and cooperation with various authorities, including police forces. Considering the historical characteristics of the office of Prefect, which is based on Napoleonic tradition, this reform could mark an interesting change.

With the delegation of functions to Regions from the State, implemented through the Constitutional Reform, local offices of the State – the national government – have been rationalised and reorganised under the offices of the Prefects. The future of these functions should be discussed during the reform process.

The Italian reform of provinces will start shortly, thanks to external pressures, mainly from the EU and for financial reasons. This is a similar process to other major reforms. Regarding the Prefects, the previous reforms have had

contradictory effects: on the one hand, they have fewer responsibilities than before the Law N.142 of 1990; but on the other hand, they have been regaining power through important functions such as public security and civil protection, as well as because of changes in delegated functions. So far, reform of Prefects has not yet begun, even though it has been discussed on many occasions, including after the L'Aquila earthquake, but it will be interesting to follow from various points of view.

Conclusion and Lessons Learned

The 2009 earthquake has, so far, raised many issues as well as debates. The ruling on the scientific forecast and the obligation to provide information divided the scientific community as well as legal experts, however it provided an important occasion to consider the role of experts in disaster prevention and crisis management. This also reminds us of the right of citizens to security and safety. The right has been considered to be one of the fundamental rights of citizens, thus the government has to guarantee it using all possible means. The 2012 ruling stressed the importance of the right of access to proper and timely information. On the other hand, the responsibilities of the Civil Protection Department and the related authorities were recognized as playing an important part in guaranteeing this access. The institutional relationships among the Civil Protection Department, the National Commission for the Forecast and Prevention of "Major Risks", the Region, the province, the municipality and their respective political representatives, especially governors and mayors, have been revised and were partially re-established through institutional reorganization and review of functions. The Civil Protection Department, along with the Commission responsible for the scientific judgement of an event, is expected to coordinate with all levels of local governments involved, to give information to the residents, to coordinate an evacuation when needed, and to give first-aid and shelter. Local governments are to execute all these actions.

The right of citizens to claim security and safety after a disaster, however, especially for those who lost their housing and whose housing is not-possible-to-access, has not been sufficiently discussed, although it has been questioned by many, given the slow reconstruction and revival process. Accordingly, the role of government in the phase of reconstruction and re-entry of residents to a disaster-

hit territory has been discussed without clear conclusions. There are various juridical issues, including property rights and privacy issues, which need to be discussed.

Crisis management is a matter of multi-level governance, highlighting the issue of coordination among institutions, but in Italy we are also reminded of the changing role of Prefects and the functions of provinces. The aftermath of the L'Aquila earthquake has contributed to the reform of Prefects, in relation to the abolition of provinces, which was initially promoted in response to EU austerity measures. The series of reforms respecting local governments in Italy started prior to the earthquake, but a part of them has continued after the earthquake, partially influenced by it. The role of Prefects, as coordinators of local governments and responsible for civil protection, public order, and security in general, has de facto been strengthened. While local governments, as well as central public administration, have been conditioned by austerity budgets, the Prefects' functions have extended and strengthened, especially in terms of crisis management. In this multi-level governance setting, a clear vertical and horizontal division of roles and functions is almost impossible, especially in situations like crisis management, and thus the coordination capacity of Prefects is the key to making the involved institutions and organizations work.

Decentralisation reform, public governance reform, and attention to public services are typical elements of post-NPM or New Public Governance (NPG). On this theoretical level, consideration of the right to security and safety of the citizen as a public service could be understood as interesting evidence that Italian public governance has entered New Public Service (NPS) stage. And the consideration of the role of professionals, especially that of technical experts, is connected to the discussion of public service motivation (PSM). The L'Aquila case has opened many issues, most of which have not yet been discussed, thus the case offers interesting opportunities. Crisis management needs prompt and timely decision-making, coordination of a range of institutions and organizations, and implementation of decisions; it might therefore be possible to review the L'Aquila case not only in the framework of public service governance, but also from a network governance perspective. Thus, the case is also interesting from a theoretical point of view.

The court discussions of the L'Aquila case demonstrate that it is not easy to establish the roles and the responsibilities of scientific experts in predicting natural disasters; however they also argued for the responsibility of public

officials to warn properly the general population about risks. The event reconstruction by the L'Aquila court demonstrates that coordination among various institutions was necessary; however, this essential requirement was mostly ignored. At the same time, however, since current science cannot predict everything, the responsibilities of scientists for mis-prediction or wrong-prediction are not in question. But the right to proper information by citizens is the most important right to be respected.

In addition, the case also attached rights to the often-ignored building standards and illegal buildings. Since these practices involve city planning departments of municipalities, which issue permits for construction projects, the core issue is lack of professionalism and often there is a link to corruption. The regulation of these processes and greater transparency are needed.

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Chapter 18. The Tragedy of the Serrana Region in the State of Rio de Janeiro in 2011: Looking for Answers

Amarílis Busch and Sonia Amorim[1]

Introduction

The natural disaster that took place in the Serrana region in the Brazilian State of Rio de Janeiro, on January 12th and 13th in 2011, when heavy rain triggered flooding and landslides in seven counties, was considered at the time the country's biggest climatic and geotechnical catastrophe. Classified by the United Nations as the 8th largest landslide that has occurred worldwide in the last 100 years, the disaster was comparable, in size and damage, to other major disasters, such as the one that devastated the region of Blumenau-Itajaí, in the Brazilian State of Santa Catarina, in 2008, and Hurricane Katrina, which destroyed the city of New Orleans, USA, in 2005.

Although dealing annually with some landslides and floods, the region had never faced a situation of this gravity where entire neighbourhoods were covered in a matter of seconds. After a state of emergency and public disaster was

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declared, an extensive support network was established, composed of local public agencies, state and federal agencies, private organizations and volunteers.

Despite this effort, the losses were enormous: more than 900 dead, 345 missing and thousands left homeless, in addition to serious damage to infrastructure, as well as to the economy and geography, of the affected region (Folha de São Paulo 2011).

Serious doubts remained: What caused the disaster to occur in such great proportions and, particularly, what factors led to so many casualties? Were the preventive measures insufficient? What was the quality of the immediate response to the disaster by the responsible agencies? Who commanded the operation? How did the actors interact, and which were the difficulties faced in this process?

This case study is intended to provoke discussion about the variables and actors that influenced the process of crisis management, contextualizing the disaster in the regional scenario, and, especially, reconstructing the process of immediate response to the tragedy given by the agencies involved. The case also addresses historical prevention problems in the area and reports the difficulties in the rebuilding process of the affected areas. The case uses as sources of information statements given by authorities, experts and victims, as well as data provided by the press and reports and studies on monitoring, preventing and responding to natural disasters.[2]

The Disaster: An Overview

Between the evening of January 11th, 2011, Tuesday, and the dawn of the 12th, Wednesday, intensive rain fell on the Serrana region of the State of Rio de Janeiro, hitting the municipalities of Nova Friburgo, Petrópolis, Teresópolis, Bom Jardim, São Jose do Vale do Rio Preto, Sumidouro and Areal, in an estimated area of 2,300 km^2, around 20% of the area of the State where over 713,000 inhabitants live (4.46% of the population in the State). The Highlands is a mountainous region covered with Atlantic Forest, around 100km distant from the

[2] The case also used as sources the debates carried on at the International Seminar on Integrated Risk and Disaster Management, organized by the Minister of National Integration and the World Bank, on April 11-13, 2011.

State capital – the city of Rio de Janeiro. It is an area with historical sites remaining from the Portuguese monarchy and former Swiss settlers, which makes the region a tourist attraction.

The National Institute of Meteorology (Inmet) recorded an index of 130 mm of rainfall per day, when the normal for the period is 60 mm. According to experts, at some locations, the index must have exceeded 200 mm. In 24 hours, it rained half of the expected amount for the month.

The Inmet issued a Special Weather Warning at 4:23 p.m. on January 11th to the Civil Defence of the state of Rio de Janeiro, to be passed to municipalities, which did not have their own early warning alarm systems. The National Institute for Space Research (INPE) also released on the same day, at 3 pm, a report to alert the risk of landslides in the mountainous region of the State of Rio de Janeiro. The State Civil Defence, however, followed the recommendations of the Department of Meteorology of the State of Rio, which did not foresee a storm.

One day after the disaster, criticized for not giving importance to the warning raised by these agencies, the governor of Rio de Janeiro complained to federal authorities about the characteristics of the alarm: "The State Civil Defence passed the cities the same warning that they receive every day of moderate to heavy rain. What can you interpret of moderate to heavy rainfall, if every time you receive the same report?" According to the description of specialists, heavy rains, lasting for 32 hours, caused flooding of rivers, forming waves that swept rocks and houses. Landslides hit the hills in both occupied and sparsely inhabited areas. The rain uprooted ancient trees and moved rocks, which fell into small rivers, creating dams. These dams burst, forming waves of mud, which explains the power that pushed the barriers.

Entire regions were covered by mud, hundreds of homes were swept away by landslides and dozens of people were buried. The magnitude of the tragedy caused changes in the geography of the affected area: rivers, streams and canals have changed their courses; roads, bridges and streets disappeared. The region was without power, drinking water and communications of any kind. Public buildings and hospitals were damaged. Rescue teams operated without the use of cell phones, radios, or satellites.

The tally of disaster victims, published on March 23rd, recorded 905 dead, 345 missing, 34,600 left homeless or displaced in the region. Among the dead were firefighters who were buried when seeking access to areas in which landslides occurred. The municipalities of Nova Friburgo, Teresópolis and Petrópolis

registered the largest number of deaths, in the former the phenomenon focused more on the urban area but in the remainder also on the rural area. This finding led the president of the Department of Mineral Resources of the State of Rio de Janeiro (DRM-RJ), which was, by that time, responsible for the geological service in the State, to say that the tragedy had changed the criteria for risk areas in the country: it was no longer possible to consider only the urban areas. Rural areas should also be classified as vulnerable to risks.

The region's economy, whose main sector is services, especially those related to tourism, trade, industry and agriculture, was hit hard. The total of the financial losses, including losses in these sectors and in infrastructure, has not been finalized to this day, but it is estimated that it will take the region years to recover.

To address a tragedy of such dimensions, an extensive network of assistance, comprised of government officials, private companies, nongovernmental organizations, and volunteers was formed. The media monitored and reported in detail all phases of the relief actions, including testimony and analysis that raised factors that could have contributed to the scale of the tragedy. In order to evaluate the responsibility of government for the prevention and management of the disaster, the Legislature of the State of Rio de Janeiro established a Parliamentary Commission of Investigation on March 3rd, 2011.

A Tragedy Foretold?

The vulnerability of the Serrana Region led, since 2004, governments, managers and social groups of some of the municipalities to discuss strategies that would allow a realistic understanding of the risks and planning actions needed to minimize and control them through the construction of the local Agenda 21. The Agendas 21 were the result of the United Nations Conference on Environment and Development in 1992 (UNCED – Rio 92), and were proposed as programs of action to encourage governments, together with society, to adopt sustainable development strategies, including social and environmental diagnostics, mapping of risk areas and development of sustainable action plans. The Brazilian Agenda 21 was formulated from 1996 to 2002 by the Committee for the Policy of Sustainable Development, associated with the Brazilian Presidency, after long discussion with States and Regions. The Committee, having a parity feature, was made up of representatives from the government, productive

sectors and civil society. The coordination and technical and financial support role was assigned to the National Fund for the Environment.

Then, local Agenda 21 started to be developed in municipalities or territories, with National Agenda 21 participative principles and guidelines as parameters, and utilizing Local Sustainable Development Permanent Forums instituted by governments, with the support of State Secretariats for the Environment and participation of private parties and representatives from civil society.

Not every municipality took part in the Program, mainly those in less developed regions. In the most developed regions, among them the Southeast where the State of Rio de Janeiro is located, local Agenda 21 got more mobilization from the population and more involvement from public institutions and initiated activities, although it faced great technical and financial challenges to implement the actions planned. One of the obstacles was the limited sharing of experiences among the localities involved in the Program.

In Nova Friburgo, the Local Agenda 21 was developed from 2006 to 2008, and a forum was held for leadership training and sensitization of residents, involving about 200 people. The socio-environmental diagnosis identified landslide risk areas and illegal occupation of hillsides, in areas at risk of erosion and fires. In 2010, based on this work, the municipality's Plan of Action for Sustainable Development was prepared and resources of the National Fund for the Environment were approved, but not released until the end of 2010.

Teresópolis also built its Local Agenda 21, which denounced deforestation and occupation of risk areas. The City hall, in 2009, initiated preventive actions, removing 200 families from risk areas, and presented in 2010 the Plan of Action for Sustainable Development, based on Agenda 21. In January 2011, the city was still awaiting the release of R$ 15 million (U$8.8 million dollars, exchange rate of January 2011) from the National Environment Fund for slope retention and relocation of families.

Petrópolis started building its Agenda 21 in 2005, however it has not been completed due to logistical and organizational difficulties. The risk mapping has been prepared in one of the four districts of the city, and in 2010 resources from the Growth Acceleration Program No. 02 (PAC2) were approved to complete their studies.

Another study conducted in Teresópolis and Petrópolis within the Agenda 21 context emphasized the lack of control and accuracy of environmental agencies and the fragility of infrastructure to enable effective monitoring.

The Secretary of Environment of the State of Rio, speaking after the landslides about the local Agenda 21, said the Secretary had helped to point out problems, but that municipalities needed resources. Still, he said that the Agenda 21 led to improved monitoring. Approached on the same subject, at that time, a senior official from the Ministry of Environment (MMA) said the agency helped develop the methodology of Agenda 21, but it was up to the municipalities to take action and seek funding sources.

In the international context, Brazil participated, in 2005, in the World Conference on Disaster Reduction, in which 168 countries adopted the Hyogo Framework for Action (HFA) 2005-2015: *Building the Resilience of Nations and Communities to Disasters*. Brazil and the other countries committed themselves to develop a plan for reducing risks in coping with disasters, including the identification and assessment of risk areas, reduction of basic risk factors, installation of advance early warning alarm systems, and promotion of community participation in the reduction of risks. They committed to submitting bi-annual reports to the United Nations on the situation in the country concerning activities for protection from disasters.

The difficulties in dealing with natural disasters were recognized by the Brazilian authorities in 2010, in a report sent by the National Secretary for Civil Defence to the United Nations, released by the press after the disaster in the Highland Region. According to this document, in 2009 only 77% of Brazilian municipalities had official bodies created to deal with disasters. Limitations in financial resources and operational capacity undermined risk assessment. The Brazilian government acknowledged limitations in its ability to monitor and disseminate data on the vulnerability of the territory and also recognized that the lack of planning for the occupation and use of geographical spaces, disregarding risk areas, coupled with the lack of local monitoring, contributed to an increase in the vulnerability of the communities involved.

In addition, the report indicated that few preventive measures had been implemented, which resulted in higher costs to respond to the disaster's event, compared to what would have been spent on prevention. It acknowledged that Brazil had not yet begun implementing the National Alarm System, one of the commitments made by the country during the Hyogo conference, action that was initiated only after the 2011 disaster. Concretely, few preventive actions occurred post-Hyogo conference, accumulating deficits that contributed to the tragedy of 2011.

Explaining the unexplainable?

The scale of the 2011 tragedy aroused a lot of criticism and analysis. A Report prepared by the Geological Service of the State of Rio de Janeiro, published in January 2011, identified as factors in the disaster the geology of the region, the irregular occupation of the soil and the high intensity of the rains. In a newspaper interview two days after the disaster, the state governor pointed to the populism of previous municipal administrations in the mountainous region, which gave certificates of ownership to residents in areas at risk, as a major cause of the great proportion of the disaster. The removal of occupants already installed in risk areas also faces numerous obstacles in legislation. According to a statement made to the press by a high-ranking advisor to the State government, a resident is only required to vacate their property in case of imminent danger. However, it is difficult to define imminent risk when dealing with natural phenomena, and in practice, no-one can be removed from the so-called risk areas without their consent. A removal action requested by the Public Prosecutor, as appropriate, requires from 10 to 20 years to be completed.

On March 4th, 2011, the Environment Minister, at a meeting of the Council of Economic and Social Development, released a study carried out by the MMA that states that failures in the enforcement of the current Forest Code were also directly linked to many of the more than 900 deaths in the mountain region of Rio. Several houses were destroyed in areas of permanent preservation, and many were of them were built within the range of 30 meters from the waterfront, an area that, according to the Forest Code, should have native vegetation preserved.

According to the leader of the NGO *Contas Abertas* (Accounts Opened) in 2010, the Ministry of National Integration (MI), which is responsible for the National System of Civil Defence, has spent 14 times more during emergencies than in emergency disaster prevention. For him, the Civil Defence structure in Brazil is hooked on a "culture of emergency," and not a "culture of prevention", and he claimed: "Along with the need for professionalization of the activity in the country, this cultural change is a big challenge." One of the great difficulties, he said, is to develop well-structured projects: "local governments cannot do sanitation projects, what to say about complex projects involving studies of geology and drainage. It is essential to mobilize the resources that exist in the universities, in the Army, in the private sector" (Vaz 2011).

Replying to criticism about the lack of effective prevention, the State Secretariat for Construction Works claimed that municipalities have difficulties in formatting projects and mapping risk areas: two conditions for the release of funds for prevention work. In addition, the Department of Mineral Resources (DRM) had only 19 geologists available throughout the state, which prevented further assistance to municipalities.

The director of the Centre for Research on the Epidemiology of Disasters (CRED), in Brussels, Belgium, has stated that factors such as infrastructure, urban settlement, development of public institutions and level of poverty and education help explain the disparity in the number of flood victims in Brazil and Australia, for example. According to the expert, institutions and more democratic mechanisms that can reach all of society, including the poorest, who are at highest risk, can mitigate the consequences of natural disasters (Estado de São Paulo 2011).

The structure of civil defence

The National System of Civil Defence (Sindec) was created by the 1988 Federal Constitution and was launched in 1993, with the objective of planning and promoting actions to prevent disasters, minimize damage and help victims. Since then, the system has gone through several changes attempting to improve its operation. In 2011, the system was governed by Federal Law 12,340 of 2010. This Law regulates, among other situations, the transfer of federal funds to agencies and entities of the states, the Federal District and municipalities for the implementation of response and recovery activities in the areas affected by disaster; it also provides for the Special Fund for Public Calamities.

The System was structured, starting with the 1993 legislation, as a matrix structure that develops in the three levels of government – Federal, State, including the Federal District, and Municipal – linking the public, private and civil society entities responsible for civil defence activities. It has as its central organ, at the federal level – with roles of networking, coordination and technical supervision – the National Civil Defence Secretariat of the Ministry of National Integration (MI). It has, as a superior body, the National Council of Civil Defence, which has a consultative and deliberative nature and which deliberates and

formulates governmental policies and guidelines for the National System of Civil Defence.

The Secretariat has an advisory and deliberative nature, presides over the Council, and provides technical and administrative support to the Board of the Deliberative Public Trust Fund for Disaster (Funcap). The National Centre for Risk Management and Disaster was created within the structure of the National Civil Defence Secretariat to structure, through a computerized system, the management of preventive and response actions and mobilization, in disaster situations, of human resources, materials and equipment. However, in 2011 the Centre had not yet begun to develop follow-up and monitoring activities of natural disasters in the country. It only started operating in 2012.

The National Council of Civil Defence is composed of the Ministry of National Integration, which coordinates it, representatives of the three Secretariats in the Presidency of the Republic and representatives of the Ministries of Health, Cities, Defence, Planning and Budget, Social Development and Hunger Reduction. It is also composed of two representatives from the States and Federal District, three representatives from municipalities and three representatives from civil society.

In addition to this central structure, the National System of Civil Defence has coordinating offices at three levels: regional, state and city. There are few Regional Coordinating Offices and they play only a limited visible role. In the states, there are State Civil Defence Coordinating Offices (Cedec), with higher profile. They do not follow a unique pattern, and have, in general, little autonomy and resources, largely staffed with officials who do not have permanent status.

One of the tasks of Cedec is to encourage municipalities to join the system, creating a Municipal Civil Defence Coordinating Office (Comdec) and joint community centres of Civil Defence, which also support activities of local organization, planning, training and execution.

The Municipal Civil Defence coordinating offices are fundamental elements at the front line of the system, as they articulate, coordinate and manage civil defence activities in the municipalities. However, similarly to what happens in states, these municipal coordination offices do not have the autonomy to develop their actions. Their budgets are very small, there are few vehicles and equipment, and teams are too small, with no permanent status and high turnover, which undermines the training to qualify the staff.

According to official information, among the seven counties affected by the disaster, only Petropolis, Teresópolis and Nova Friburgo, the hardest hit towns,

had a Comdec that was well-structured and linked to municipal departments. One of the state secretaries said, however, that, in general, the Comdecs in the state were weak and with little capacity for action. The National Integration Minister himself has publicly acknowledged: "The Civil Defence has a lot to restructure. We want to eliminate the permanent criticism that the Civil Defence is slow, late and when the money arrives, the tragedy is over. This is true and continues" (Sandri 2011).

In 2012, the persistence of weaknesses in prevention and response to disasters led to new legislative changes, by Federal Law 12.608, which established the National Policy for Protection and Civil Defence, creating the National System of Protection and Civil Defence and the National Council of Protection and Civil Defence, and also authorizing the creation of a system dedicated to gathering information and monitoring disasters. The new legislation was characterized by the creation of a policy in the area of prevention and disaster response, which includes coordinated action by several sectoral ministries and prioritizes preventive measures. The National System of Protection and Civil Defence was strengthened along the same lines, reinforcing the municipal units.

The Immediate Response to the Disaster

According to the general rules of civil defence, the response to a disaster is divided into two phases. In the first phase, the goal is the immediate control of the situation and reduction of the suffering through search and rescue actions, isolation of critical and risky areas, evacuation of the population and provision of shelter, food, clothing, medical care, control of means of transport and communication and the maintenance of public order.

The second phase is the rehabilitation or restoration of the affected area, which includes emergency response in order to restore destroyed areas and infrastructure, and restoration of minimum requirements for survival – clean water, electricity, telephones, etc. – and safety. In each phase, supervision is vital to define what to do, who should do it and how. After the disaster response is finished, the reconstruction begins, which requires sustainable actions, developed over the long term.

Several actors took part in the immediate response to the disaster, notably the interventions made by federal, state, and municipal governments and civil

society. However, despite its scale, the assistance did not reach the necessary level of effectiveness. The manner in which the relationships amongst the various actors involved in the response developed, and the role actually played by each of them, are factors that may help understand the governance of crisis management, in particular the possibilities for coordination, collaboration and conflict.

State actors

During the first moments of tragedy, amid the general destruction, the mayor of Areal, a town of 10,000 inhabitants, took a creative approach. Upon learning that the rain was flooding the cities, the mayor issued a warning of "maximum alert" using a sound car and, with the support of the local radio station, urged people to withdraw from the banks of the two rivers that cross the town and to head to safe locations. Eighty houses were destroyed, 300 people were left homeless, but no one died in Areal.

In Nova Friburgo, on the 11th, when the rain started, the local Civil Defence coordinator phoned the mayor and the Residents Association to inform them about possible damage and removed 300 people from a dangerous area. He also sent messages via Radio Fribourg and Twitter – a virtual social network. However, this was not enough to warn the entire population. According to him, there was lack of perception of risk. Forty people died in the city centre; an area that was not considered vulnerable.

On January 24th, homes located in risky areas began to be demolished in Nova Friburgo, after an inspection conducted by the Civil Defence. According to the city hall, the next step would be the construction of state-subsidized houses. The restoration of affected areas was also slow. On January 25th, almost two weeks after the disaster, at a meeting with the mayor of Teresópolis and community leaders, residents complained that they still had no electricity, water, or telephone in their homes.

The state government of Rio de Janeiro, in turn, initially focused its resources on rescuing victims and clearing roads. On 12th January, the governor requested the Navy to make available two helicopters to transport to the Serrana region men and equipment from the State Fire Department. On January 13th, the government sent to Nova Friburgo the vice-governor of the state and the president of the State

Public Works Company to assume command of response activities, divided into two fronts. The first, led by the vice-governor, was responsible for caring for victims and revitalization of the region's economy. The second, led by the president of the Company, was responsible for dealing with physical damage and promoting rehabilitation of the region. Other state agencies were activated to support the population in the affected area.

The government also announced the creation of a rental subsidy for the homeless families, developed in partnership with the bank, Caixa Economica Federal (CEF), and the Ministry of Social Development (MDS), in the amount of R$ 500 (about US$ 294 at the time) over the period of 12 months, until a permanent solution was found.

The Secretariat for Social Action and Human Development of the State worked primarily in conjunction with government, private and voluntary partners involved in emergency response actions such as storage, collection and distribution of food, and with shelter organization, as well as providing support and guidance actions to the public, such as issuing new documents and other bureaucratic arrangements. It also developed integrated measures with the departments of Social Action of the cities, creating integrated crisis offices and a central operations room for monitoring and controlling activities.

On January 17th, the governor published a decree declaring a state of emergency in seven affected cities. On the 19th, this situation was recognized by the National Civil Defence Secretary, which facilitated the implementation of emergency measures by easing the procurement and execution of construction works and the purchase of materials; it also enabled the release of federal funds, such as the Guarantee Fund for Length of Service (FGTS), in anticipation of the *Bolsa Família*. (The Bolsa Família is a government program that benefits families in extreme poverty), among others.

The federal response came to the affected region on January 14th, when the President of the Republic, accompanied by the Minister of National Integration and other ministers and state government officials, visited the region. On the same day, 225 men of the National Public Security Force, linked to MJ (Ministry of Justice) were sent to the region to assist in the search for victims and the maintenance of public order in the affected areas, mainly in Teresópolis. At the end of the day, the number of armed forces personnel moved to the region totalled 556. The MD released military personnel, aircraft, and vehicles. Their activities included clearing roads and removal of debris in three cities, as well as

supporting the distribution of donations by the Civil Defence and providing medical care in a Campaign Hospital installed by the Brazilian Air Force (FAB) in Nova Friburgo.

On the same day, the Minister of Defence centralized federal operations in a single command. The operations of the federal forces began to be coordinated by the general of division commander of the 1st Army Division of Rio de Janeiro, which had under his command an officer from each of the Armed Forces involved in the operation. It was determined that the operational monitoring of the federal troops would be made by the chief of the Armed Forces of Brazil (FAB) of the MD. On January 15th, FAB organized measures to support air and ground transport, and provided food, communications and fixed or radio telephony to be used in aid activities. Furthermore, an Operations Search and Rescue sub-centre was established in Petrópolis, located at the 32nd Motorized Infantry Battalion.

Regarding financial support, the federal government, through MI, transferred R$ 100 million (US$ 58,823,529) to the Government of the state of Rio de Janeiro and the affected cities. The victims of the rain were authorized to withdraw up to R$ 5,400 (US$ 3,176) from the FGTS, per person. The MDS advanced the Bolsa Família fund to 31,000 registered families in the region.

At the same time, the Brazilian government requested an advance loan of US$ 485 million from the World Bank. These funds were used for removal of people from vulnerable at-risk-areas, construction of new houses to assist the homeless and training personnel to deal with disasters. The national banking system also played a role. The National Bank of Economic and Social Development (BNDES) created an emergency program for the reconstruction of the affected areas of the state of Rio which provided funding to entrepreneurs and micro entrepreneurs. In turn, the Bank of Brazil (BB) extended by 180 days the payment terms for financing farmers in 11 districts affected by rain. Facilitated lines of credit were created for the recovery of agricultural production, industry, and trade in the Serrana highlands region.

On January 27th, the President announced the construction of 6000 houses for families affected by the rain, subsidized by the program "*Minha casa, minha vida*" (My house, my life) and the state government. Businessmen from construction companies also donated workers to build 2,000 houses for the victims of the disaster.

In order to coordinate the activities of federal agencies, the federal government created an office of mobilization to help victims, coordinated by the

National Civil Defence Secretariat. The Secretariat also sent to the region 30 members of the Disasters Support Group (Gade), a civil group specialized in rescue and recovery.

Non-state actors

Residents played an important role in immediate relief for victims, supporting each other. According to a local newspaper, in the face of the authorities' lack of strategy and logic, the volunteers became the true protagonists of the rescue.

A commentary on the Website of the Brazilian Association of Soil Mechanics and Geotechnical Engineering (ABMS) portrayed the fragility of the response to the disaster by affected municipal governments:

> *On the morning of the 12th, the survivors could not believe their eyes. The search for child, parent, sibling or relative was made through their own efforts. 'In the early hours, there was nothing', said a resident of Nova Friburgo – 'neither firemen, nor Civil Defence. The help came from other residents'. Long hours passed before there was more direct action to help the victims. According to a resident of one of the affected rural areas of Nova Friburgo, help came only seven days after the event and people had to struggle alone for survival. (ABMS 2011)*

As a result of the wide coverage of the tragedy by the media, social and private organizations that worked in the municipalities and state, as well as NGOs, churches and businesses joined these efforts, forming a large network of solidarity. According to information from the state government, more than 500 actors were involved in the disaster response.

A large quantity of donations was sent to the region, including drinking water, non-perishable food, clothing, blankets, mattresses, personal hygiene items and cleaning supplies. Bank accounts were also created by several entities to collect financial donations. Hundreds of volunteers headed to the affected areas to assist in searches for victims and the organization and distribution of donations from members of the public.

Limitations of responsiveness

According to a local newspaper, when the aid activities began, there was no central direction. Each municipality and each Civil Defence unit acted according to its own vision. There was a lack of coordination and command.

Members of the public complained about the disconnect between the Civil Defence and the Armed Forces. The Armed Forces were criticized for excessive bureaucracy and lack of agility in supporting the Civil Defence. Its slowness led the press to get to places deemed inaccessible by the Civil Defence. It was admitted by some authorities that this institution's responsiveness was still fairly limited (Sandri 2011).

The mayor of Nova Friburgo, when talking about the relationship between the city and the state, said: "it was well defined what was the vice-governor's and what was the municipality's responsibility in order to make the city work." This positive view regarding the coordination of actions among the different federal levels, however, seemed not to be shared by the President. According to a newspaper, concerned about the disconnection among government agencies and upset about the delay in the immediate response, she stressed her intention to give greater prominence to the military in disasters. The military should command response activities or support states and municipalities affected, since they possess a greater capacity for organization and command. Since then, the federal government has announced its intention to invest R$ 600 million (almost US$ 353 million) in structuring civil defence in the municipalities which are most vulnerable to environmental disasters (Sandri 2011). The project foresees the restructuring of the entire national system of Civil Defence, giving greater responsibility to the Armed Forces, and the construction of five regional military centres specialized in immediate aid to people affected by natural disasters.

In the case of FGTS withdrawals, many bureaucratic steps have needed to be fulfilled, requirements that, in a disaster situation, cannot always be met. Moreover, the city halls of Petrópolis, São José do Vale do Rio Preto, Sumidouro and Bom Jardim did not receive the promised federal money immediately, due to problems in their accounts.

An obstacle to granting social rental subsidies was speculation. After the decision to grant social rents, housing rents in the affected area increased up to 100%, preventing access by most families. There were also difficulties in the

registration process and slowness from the bank CEF to release the financial aid. Some families only received rent money months after the disaster.

There were also problems with the first delivery of donations received from various regions of the country. Conflicts were reported between the city of Teresópolis and organizations, such as the Red Cross and the Catholic Church, which claimed that the government was obstructing the delivery of donations from the public. On January 28th, the executive director of the Red Cross stated that the excess of donations, combined with a declining number of volunteers, interfered in the organization's logistics and led to a collapse of its operations.

The Reconstruction Process

The federal and state governments allocated a large volume of resources in their budgets for 2011 and 2012 for the reconstruction process, especially for slope stabilization, drainage of rivers and other infrastructure construction works, such as bridges, roads, and homes. However, the implementation of these resources has been extremely slow and not many construction projects have been completed.

Authorities alleged delays in contract bidding, poorly designed projects, and bureaucratic hurdles.

The Audit Court of the State of Rio de Janeiro, in an audit report covering the period from January to September 2012 and published in February 2013, also reported numerous irregularities in the application of resources and accountability by municipal and state authorities. Among them was the lack of implementation of integrated systems of financial management and control. This would allow the disclosure of expenditure by providing greater transparency of the process to Brazilian society.

Warning systems had been implemented in the area, and technicians were mobilized for the preparation of risk maps, but in one of the main measures – the removal and resettlement of the population in need from risk areas – made little progress due to delays in the construction of houses and other support measures. The result was the return of large numbers of families to their homes, restarting the cruel cycle of the disaster.

The consequences did not take long: on March 17th, 2013, heavy rains caused landslides and flooding in the city of Petrópolis, leaving human and material

losses again (Uol noticias 2013). The Minister of National Integration identified, as factors directly related to the event, construction delays and resistance of occupants of risk areas to leaving their residences. On the other hand, he pointed to development in many areas of the civil defense capacity (Coelho, B.F 2013).

Final Remarks and Lessons Learned

The objective of this case study is not to exhaust all human and natural factors that contributed to the worsening of the consequences of the high rain levels that hit the Serrana region in mid-January 2011. This is not a unique case, having many common features with other events in Brazil and worldwide. It seeks, instead, to stimulate reflection on the event and to draw lessons that enable the creation or improvement of public policy instruments for effective risk and disaster management in Brazil.

The following lessons can be drawn from the tragedy of the Serrana region in 2011:

1. **Prevention policies:** an adequate program of risk and disaster management should prioritize prevention activities. In Brazil, there is an historic prevention deficit, and the Serrana region is a clear indicator of this situation. It is necessary to invert the logic of the Civil Defence, from a reactive to a proactive position, so that in conjunction with other public agencies, it is possible to develop permanent and constructive actions for permanent monitoring, protection of vulnerable areas and removal of settlements in areas of recognized risk.
2. **Intra-Federative Relations:** The federal system, due to the complexity of the relationships among their public bodies - municipal, state and union - requires a high level of cooperation and a clear definition of the responsibilities of each actor in public policies that require intra-federative coordination; this requirement is the case with respect to policies for prevention and disaster response. As demonstrated by the case study, the response to the disaster in the Serrana region was slow and disjointed and lacked a single command structure, which affected the synergy between the actions of the various organs, preventing information from circulating among agents and between them and the affected population. A national policy on civil defence must be based on linking together various entities and public

policies and must provide complementary experiences of continued communication between the bodies and experiences of working together.

3. **Institutional and technical capacity:** Municipalities, as the front line in natural disasters, lack institutional and technical capacity, as well as the resources to respond to the needs of prevention, relief, and reconstruction in situations of high complexity. The effectiveness of preventive measures and disaster preparedness requires close collaboration among local, state and federal bodies, providing expertise for geological mapping, preparation and implementation of infrastructure projects and training of personnel in the preparation of contingency and training plans In this context, Álvaro Rodrigues dos Santos, a Brazilian geologist, regards the municipal governments as the critical bottleneck that inhibits risk management development in Brazil (Santos, 2013).
4. **Communication:** In a crisis situation, the existence of effective means of communication to circulate information among the various actors and between them and the public is crucial, not only to pass on commands, but also to generate knowledge about the population's urgent requirements.
5. **Bureaucratic Procedures:** In emergency situations, it is important to ensure that there is some loosening of bureaucratic procedures established for a normal situation, in order to streamline the actions. Although rules for the declaration of a state of emergency and a state of public calamity in Brazil already contemplate exemptions from bidding for contracts, bureaucratic routines of the agencies involved have limited the speed of response and reconstruction.
6. **Cultural changes** - In order for a policy of risk management to come off the paper and be implemented, it is necessary to have a strong conviction in the population and all public officials in order to generate a collective commitment. The leniency of political actors in situations of risk and preventive actions and the lack of awareness by the risk population is a cultural issue and needs to be reversed with actions at the level of education and dissemination of information by the media.

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Chapter 19. Great East Japan Earthquake Disaster in 2011: Lessons for Public Management

Mika Shimizu and Toshiyuki Yasui[1]

Introduction

The Great East Japan Earthquake Disaster (the Tohoku Disaster) on March 11th, 2011 articulated the interconnected interaction of mega-risks through tripartite (earthquake, tsunami, and nuclear power plant disruptions) disasters. The unprecedented large-scale "complex" disaster caused not only human (approximately 16,000 deaths and 3,300 missing) and physical but also social and economic impacts in short to long terms: the affected areas have faced tremendous social and economic problems, ranging from removal of tons of debris, shelter management, relocation to new residence areas, public health (not only for radioactive concern over health but also psychological issues), to the local economy (e.g. fishery, agriculture, tourism) in interconnected ways. While the direct cost is estimated to be 16.9 trillion yen according to the Cabinet Office in 2013, the indirect cost is estimated to be between 35 and 60 trillion yen (World Economic Forum 2012). As another key aspect, the interconnected issues

[1] The studies from which this paper has come were partly supported by Kyoto University in Japan and East-West Center in the United States. Some studies were also partly supported by Kakenhi (15K11973 and 15K00679) Grant-in-Aid for Scientific Research (C) through the Japan Society for the Promotion of Science (JSPS) and MEXT.

tend to be affected by changing circumstances, such as the spread of radiation, which brought about tremendous uncertainties across society at different levels (see details in section II. *Policy Problems*).

The above multidimensional impacts on multiple timescales indicate that the Tohoku Disaster posed a structural challenge to public management,[2] in that issues are so interconnected and complex that traditional methods of public management alone cannot cope with the challenge in a timely and appropriate manner. What kinds of challenges are drawn from the Tohoku Disaster? Where do the gaps exist between the governmental responses or efforts and better roles of public management? The paper aims at tackling these questions by reviewing the responses to the Tohoku Disaster in both the response and recovery phases through case studies. Lessons drawn from those case studies aim at better and effective public management in addressing especially complex disasters rather than "normal" disasters. Public management in this paper refers to management in the public domain, including practices, institutions, and processes at the national governmental level, on which this Chapter focuses.

As an important background in understanding the Tohoku Disaster, it was overall beyond the capacities of local communities to handle: more than 14 city, town or village government buildings (Sankei News 2011) were significantly destroyed, including local "disaster management centres," and the disaster resulted in tremendous loss of human and disaster management resources which are supposed to support local people. For example, Minami-Sanrikucho in Miyagi prefecture had to relocate in order to restart their operations, and the city building of Otsuchi-cho in Iwate prefecture was swept away by the tsunami and key city officials including its mayor were killed by the Tohoku Disaster. Thus, the size and impacts of the Tohoku Disaster required the central government to play a central role in disaster management.

At the same time, it should be noted that the "central role of the government" in this Chapter does not mean control by the government. Rather, it is argued that the central role should be focused on management and coordination of information and other resources which are critical factors in addressing the unprecedented complex disaster, as shown in case studies in the following sections. Although management and coordination tend to be taken for granted,

[2] Public management in this paper refers to management in the public domain, including practices, institutions, and processes at the national governmental level, on which this Chapter focuses.

the Tohoku Disaster demonstrates that these are key aspects for addressing complex disasters.

To reach the goal of drawing lessons learned from the Tohoku Disaster through the lens of the nexus of complex disasters and public management, this paper consists mainly of three pillars. First, the paper will articulate the structural policy problems with respect to public management in order to elaborate on the nexus of the "complex" disaster and public management and to provide an underlying conceptual background for this paper. Second, the paper will review case studies of the Tohoku Disaster, focusing on how Government responded to the complex and interconnected disaster risks, with the focus on public management. Thus, the paper will articulate what kinds of gaps exist between the actions taken during the Tohoku Disaster and public management with reference to the structural policy problems and the conceptual background in the first pillar. Third, based on the review, the paper will provide implications and recommendations for improving public management for complex disasters which can be learned not only in Japan but also internationally.

Readers may consider that the Tohoku Disaster is an isolated extreme disaster event and the lessons drawn from the Tohoku Disaster will not be applicable to other countries. On the contrary, as seen in the International Strategy for Disaster Reduction (ISDR) in the Hyogo Framework of Action (HFA) 2005–2015 and the follow-up Sendai Framework for Disaster Risk Reduction 2015-2030, which highlighted the evolving dynamic changes in the disaster risk environment, driven by compounding risks such as changing demographic, technological and socio-economic conditions, unplanned urbanization, environmental degradation, climate variability and climate change, complex disaster risks are a major challenge for all of our societies. Thus, the authors believe not only Japan, but also other countries can learn lessons from the Tohoku Disaster and apply those lessons to their own disaster risk situations.

Policy Problems: Nexus of "Complex" Disasters and Public Management

What kinds of structural characteristics are seen in complex disasters such as the Tohoku Disaster? How are those characteristics related to public management? What are the policy problems?

Specific cases in the Tohoku Disaster will be sketched in Section III, but the key aspects indicated in the Introduction suggests the characteristics of the structural challenge in complex disasters which are systemically summarized in the left column in Table 30:

Table 30 - Characteristics of the Structural Challenge and Relevant Key Public Management Factors

Characteristics of the Structural Challenge in "Complex" Disasters	*Key Public Management Factors to Adapt to the Structural Challenge*
- Multi-dimensional (human, physical, social and economic) impacts	- Balanced and systemic approach given the multi-dimensional impacts
- Complex effects of interconnected risks and linked effects on issues and sectors in short to long term	- Renewing specific public management institutions and processes to adapt to managing interconnected risks and linked effects on issues and sectors - Systemic approach with pre-defined principles and institutions
- Uncertainties	- Institutions and processes to synthesize information, knowledge and experience throughout public management for actionable policies

This structural challenge requires public management to adapt to it, and in examining this challenge systemically from a public management perspective, the key public management factors required to adapt to the challenge can be drawn as the ones listed in the right column in Table 30. Specifically, possible pathways to this adaptation include providing a systemic approach and revitalizing public management with the focus on a systemic approach with pre-

defined principles, institutions, and processes to adapt to changing circumstances and overcome related challenges. Regarding category 3) uncertainties, which is derived not only from natural risks but also from human-induced risks and linked effects which are related to the above 1) and 2), relevant information, knowledge and experience need to be synthesized through institutions or processes of public management for actionable policies (Shimizu 2013).

In light of this challenge, in fact, the aforementioned HFA 2005-2015 has identified a) the risk-multiplying interaction of natural, human-induced and technological hazards and their interaction with an ever more complex set of physical, social, and economic vulnerabilities, b) the need to foster disaster resilience by introducing and integrating disaster risk reduction into policy, planning and programs as a critical component of disaster management, and c) the need for accelerating efforts to manage and reduce risk. The aforementioned Sendai Framework 2015-2030 points out that implementation of the HFA has identified gaps in the need to foster disaster resilience at all levels and in ensuring adequate means of implementation.

Thus, overall, the global frameworks recognize the challenge this paper focuses on; disaster management experts and policy communities are still struggling with *how* to manage and reduce those interconnected risks and their impacts both at national and international levels. This is one of the major policy problems in disaster management, and public management needs to help overcome this challenge.

Conceptual Background

Multiple and inter-connected risks in complex social systems have drawn attention from two different fields. One comes from intelligence studies. For example, the Eurasia Group based in New York raised the issue of full global convergence of political and economic risks as the top risk of the year 2012 in their annual report (Eurasia Group 2012). Clapper (2012) underlined the multiplicity and inter-connectedness of the potential threats to the national security of the United States. Another perspective comes from the discipline of global risk: A group of researchers (Sugawara et al. 2012) have stressed that post-disaster Japan should take an integrated approach to viewing political and

economic risks together; The World Economic Forum (2012) illustrated how the mega-risk of earthquake and tsunami, as well as the nuclear accident in Fukushima, was related to operational, strategic and financial risks of global corporations (World Economic Forum 2012).

More specifically, the multiple and inter-connected nature of risks requires fundamental changes to the conventional approach to risks. That is, the risks in the complex social system are so "wicked" (Conklin 2005) that a purely analytic approach cannot optimally solve a problem in risk management (Yasui 2011). Traditional fragmented agencies often ignore pre-warned risk as noise (Wohlstetter 1962) and this represents risk analysts' lack of knowledge about risk parameters (Vose 2000). Thus, the uncoordinated and mechanical responses by stove-piped agencies (Bazerman and Watkins 2004) to disaster may cause tremendous failures in risk management (e.g., the response of the US Federal Emergency Management Agency to the Hurricane Katrina) (Lewis 2008).

Therefore, to pave the way for fundamental changes in public management, a systemic approach should be the focus in risk management. In fact, the systemic view has played a central role in business continuity plans of global corporations. In May 2012, the International Standard Organization (ISO) (2012) published its first systemic approach-related business standard as the ISO 22301 entitled "Societal Security – Business continuity management systems – Requirements." ISO published a second standard, to develop the concept of a business continuity management system (BCMS), as guidance in December 2012. The emergence of the BCMS indicates that a perplexed risk society (Beck 2009) forced institutions and corporations involved in risk management to shift their focus to the systemic approach. The systemic approach can impact the organizational structure of a government in the area of risk management, since the concept of regimes in risk regulation is related to some themes "notably in system theory and related fields of organizational and regulatory analysis" (Hood et al. 2001).

A key concept in the systemic approach is to adopt a holistic way of thinking about a social problem. Without considering the interactions of inter-connected parts, a social problem cannot be solved (Nadler and Chandon 2004). Another key concept is "resilience." Resilience is defined as the systemic "approach to disaster avoidance, survival and recovery with expertise from a multitude of disciplines to an unprecedented degree," and that is the opposite of brittleness (Jackson

2010). Jackson (2010) also noted that "resilience is an emergent property that cannot be derived from its parts, only from the systemic approach." (30)

In terms of more *operational* aspects of "resilience," *system/systems approach* and *process/change* are keys (Shimizu 2013). The systems approach brings about a holistic and analytic view, ranging from the identification of system elements to identification of system boundaries and the synthesis of the system (Jackson 2010). Resilience is also about processes (Jackson 2010) since building resilience into a system (e.g., at governmental or public management levels) needs constant change and adjustment, and keeping a system functioning requires interactions between and among the parts of the system (Shimizu 2013). Since resilience in the system focuses on how resources are managed by fostering modularity, feedback, and innovation within the system (Martin-Breen and Anderies 2011), resilience requires specific processes and long-term perspectives, where constant renewals will be undertaken (Shimizu 2013).

As a matter of fact, major industrialized countries, notably The United States and Australia have been promoting a resilience-based approach in disaster management. Balboni et al. (2011) described the case of the US Federal Government's application of a systems-based approach to mega-disaster on its operational platform for resilience. The US Federal Government established the following three pillars of resilience of critical infrastructure through the National Infrastructure Advisory Council (2009): 1) harmonizing and integrating the planning frameworks; 2) collaboratively developing and incentivizing the use of risk management practices; and 3) enhancing risk communications across the public and private sector at large. As for Australia, the ministerial council for police and emergency management agreed on November 6, 2008 to launch the National Disaster Resilience Framework (NDRF), which was succeeded by the National Disaster Resilience Strategy (Rogers 2011). The Strategy points out that application of a resilience-based approach is not solely the domain of emergency management agencies; rather, it is a shared responsibility between governments, communities, businesses, and individuals (Shimizu 2013). However, specific actions and approaches in terms of "how to" operationalize resilience is still a daunting challenge for public management even in these resilience-initiated countries.

Case Studies: Public Management in the Tohoku Disaster

This section reviews case studies of the Tohoku Disaster to identify how the government responded to the complex disaster and relevant policy issues. Based on the review, the section will articulate how gaps exist between the undertaken actions, and required actions in public management (including institutions and processes), given the characteristics of the structural challenge specified in the Section 1 and the conceptual background specified in the Section 2 (called "required actions in public management" hereinafter).

The following five cases address major issues in the Tohoku Disaster, mainly covering the response and recovery phases. Each case concisely elucidates 1) the specific issue from a public management perspective, 2) major experiences and governmental actions undertaken for each issue, and 3) gaps between the undertaken actions and the actions called for in public management.

Case 1: Disaster response organizations and professionals

Issue

Complex disasters require multi-faceted and skilful management/ coordination of different disaster response organizations and stakeholders quickly and effectively.

Experiences/actions undertaken in the response

In response to the Tohoku Disaster, the Prime Minister's office established more than 20 new offices or committees with different leaders and members after the disaster between March and April 2011. The list of major established committees or offices at the national level is shown in Table 31.

Table 31 - New Committees or Offices Established in Response Phase

Emergency Disaster Response	Emergency Disaster Response Headquarters
	Special Response Headquarters to Support Victims
Nuclear Disaster	Nuclear Disaster Response Headquarters
	Nuclear Disaster Victim Life Support Team
	Government and Tokyo Electric Power Company Integration Countermeasures Office
	Office for Response to Economic Impacts from Nuclear Power Plant Incidents
	Ministerial Meeting for Power Reform and Tokyo Electric Power Company
	Ministerial Meeting for Decontamination and Disposal of Specific Debris
Design of Reconstruction	Reconstruction Headquarters
	Reconstruction Design Council
Others	Prime Minister's Office Emergency Meeting Team
	Liaison Meeting for Ministries and Agencies
	Meeting for Reviewing Economic Affairs
	Meeting for Reviewing Power Demand and Supply Emergency Response
	Energy and Environment Meeting

Source: Cabinet Office, Reconstruction Agency, Asahi and Nikkei News Papers

Unfortunately, regarding specific activities of the above organizations, Vice Prime Minister, Katsuya Okada reported to a ministerial meeting on 27th January 2012, more than 10 months after the Disaster, that 10 out of 15 organizations did not make notes or records. As for the reason, he stated that it is likely members of the organizations were too busy to record. Thus, the specific activities in each organization are not clear and cannot be tracked in terms of what kinds of roles they played, what kinds of matters were discussed and what kind of processes they followed for decision-making.

Given the above, implications or linked effects of these newly established offices/ committees during the response phase are drawn:

- While different government disaster management-related organizations, such as the ones within the Cabinet Secretariat or the Cabinet Office for Disaster Management, have been officially established for many years, those organizations did not play a central role during the response phase. For example, the Disaster Countermeasures Basic Act stipulates the Minister of State for Disaster Management is in charge of administrative matters related

to disaster prevention, disaster response measures, and basic policies regarding disaster response and disaster recovery (Art 11.5). However, the Minister of State for Disaster Management within the Cabinet Office ended up playing a minor role during and after the Tohoku Disaster, which resulted in establishing many ad-hoc new disaster management offices/committees in the midst of the Disaster, as specified in the above

- While there is a wealth of skilled disaster response professionals in Japan, these professionals were not well integrated and incorporated into the coordinating mechanisms for the public management aspects of disaster management.
- The ad-hoc organizations led to ad-hoc disaster management operations. Because these were not founded on well-understood administrative mechanisms, their roles, processes and functions were unclear within the organizations or among organizations, which confused not only the public but also the practitioners and disaster management officials in public management.

Gaps

Pre-disaster management operations such as those within the Cabinet Office or the Cabinet Secretariat were not linked to post-disaster operations management. Few formal, well-understood mechanisms existed for coordinating multi-faceted operations during the disaster response. As a result, a balanced and systemic approach considering the multi-dimensional impacts of the Tohoku Disaster was hardly seen.

Case 2: Critical information and data for affected people and policy actions

Issue

Critical information that impacts the lives and safety of people in devastated areas must be disseminated as quickly as possible through appropriate processes and channels. Likewise, critical data which impact policy decisions should be

relayed to decision makers as quickly as possible through appropriate processes and channels so that the data can be utilized to make the best decisions during the crisis.

Experiences/actions undertaken in the response

The governmental response to the Tohoku Disaster faced different challenges, particularly in central coordination and distribution of critical information and data from the national level to the local level.

For example, in Minami-Soma city in Fukushima prefecture, where people were confined to their homes because of the crippled nuclear power plants, there was a significant shortage of food, water, medical supplies, and gasoline. Mayor Katsunobu Sakurai stated through the news media that weeks after the Disaster the city had still not had any contact with, or received any information directly from, the central government, including the status of the crippled power plant, and that as a result he had to depend on news media reports. This was not the only one case, but many similar cases were heard from local mayors including Namie-cho, Fukushima Prefecture. Mayor Tamotsu Baba, as a witness at a public meeting held by the National Diet of Japan, Fukushima Nuclear Accident Independent Investigation Commission on 21st April 2012, emphasized that he did not receive any information from the Government.

Another example is the national government's mishandling of radiation forecasts from the computer system known as the System for Prediction of Environmental Emergency Dose Information (SPEEDI). Although SPEEDI provided data on radioactive releases from the Fukushima Daiichi nuclear power plant during the continuing disaster, the data was not communicated and shared appropriately within the central government. It was later discovered that local people had evacuated, following the central government's judgement which are not based on sound data, to evacuation centres which were located right on the course of the radioactive plume (Shimizu 2013).

Why did this event happen? Although there were different stories around this event, in a word, disaggregated information-sharing and reporting systems largely contributed to this response as shown in the following example:

Before the Disaster, there was a guideline called the Environmental Radiation Monitoring Guideline by the Nuclear Safety Commission (NSC; under the Prime Minister's Cabinet Office) which specified that, through the direction of the

Ministry of Education, Culture, Sports, Science and Technology (MEXT), calculated results based on SPEEDI would be used as a basis for deciding measures for evacuations and actions. However, according to several news reports in 2012, then-Prime Minister, Naoto Kan and his office did not know about SPEEDI and did not receive any report regarding SPEEDI when he made a decision about the evacuation location for people who lived close to the Fukushima Daiichi Nuclear power plant. On the other hand, the office of the NSC had received the SPEEDI data hourly through MEXT since the first hours after the catastrophic earthquake and tsunami, but the NSC's office thought the same data had been sent to the Prime Minister's office and simply had not taken any action on the information. (Shimizu 2013 and 2014). As such, a direct communication channel did not exist to link SPEEDI-based information and analysis to the Prime Minister, who served as the Director-General of the nuclear emergency response headquarters.

Gaps

The above case demonstrates that pre-defined systemic institutions and processes are essential in disseminating critical information and data which impact the lives of people. Those institutions and processes should be well understood among relevant stakeholders, including citizens, and to make sure those institutions and processes are actionable, they should be tested and updated periodically.

Case 3: Risks in interconnected critical infrastructures

Issue

Since the elements of critical infrastructure (systems and assets whose incapacity or destruction would have critical impact on the operations of society, such as electricity, power, and the public health system) depend on each other and are interconnected in complex ways, a disruption of one component of critical infrastructure may lead to disruption of others as well, interfering with the functions of disaster management. It is critical to articulate the dependencies of critical infrastructure elements before disasters and to find out how to

minimize the risk of disruptions and how to address the issues by establishing coordination schemes among different stakeholders in the public and private sectors to address these problems beyond the traditional boundaries of geographic regions and expertise.

Experiences/actions undertaken in the response

Reviewing the Tohoku Disaster, two major relevant experiences were found:

- Immediately after the Disaster, because a major airport in Sendai city in Miyagi prefecture and other forms of public transportation were severely damaged, the devastated areas were accessed only by ground transportation. In that situation, local municipal officers and volunteers in the private sector at different locations nationwide attempted to deliver food, water, and other critical commodities by trucks and cars. However, because of the shortage of gasoline at local gasoline stations, smooth delivery of goods was suspended, which led to food and water shortages in the devastated areas.
- Disruptions of power, phone, and internet connections caused by the earthquake and tsunami severely impacted critical communications between national and local governments, and between governments and first responders who were working at the affected nuclear power sites or medical sites in the affected areas. The disruption of communications led to confusion in critical information dissemination and to delays in responding appropriately to urgent situations.

During the response phase, although stakeholders in different sectors such as communications and Information Technology worked very hard at recovering individual components of critical infrastructure, there were few specific coordinated actions by the public sector to address those disruptions of critical infrastructures, partly because few mechanisms exist for coordinating stakeholders, a deficiency that should have been addressed before the disaster.

On the other hand, some good practices were seen in the coordination at the local and the private sector levels. For example, commercial helicopter pilots across Japan recognized the delay in government-ordered deliveries of food, water, medicines, and supplies. Through the private Helicopter Conference of Japan (HCJ), pilots collected donations to cover fuel costs and used helicopters based in Miyagi to distribute supplies to shelters in the area. The pilots also

identified other communities with severe water shortages, some of them having to boil and filter pool water for drinking. By June 2011, the HCJ had completed over 300 missions, delivering more than 40 tons of supplies. (Aldrich and Shimizu 2011)

Another example is that Tono City in Iwate Prefecture has paid specific attention to Tono's unique location an hour away from the Pacific Ocean coast, and since 2007 it has initiated and promoted the coordination of logistical support to prepare for earthquakes affecting nearby coastal cities in north-eastern Honshu. As a result, immediately after the Tohoku Disaster, Tono City and a non-profit organization known as the Tono-Magokoro Network played a critical role in acting as a focal point to coordinate logistics for response and recovery efforts in devastated coastal regions nearby. The city collected and delivered more than 250 shipments of food and commodities from different cities to the region during the response phase.(Shimizu and Clark 2011)

Gaps

As indicated in the above, few specific mechanisms existed in the public sector to coordinate actions to address the risks of interconnected critical infrastructure before the Tohoku Disaster. With a few exceptions, the public sector had addressed risks of interconnected critical infrastructures as specific sectoral issues at the individual sector level.

Given the above experience in the Disaster, it is critical to review existing public management thinking on the issues and identify the roles of the public sector in terms of managing the relevant interconnected risks and complex linked effects in disasters. The focus should be on pre-disaster coordinating mechanisms with systemic and resilience-based principles and institutions that go beyond traditional geographical and expertise borders. This may be possible by linking good practices within local communities and the private sector as indicated in the above.

Case 4: Management of affected broad social and economic dimensions

Issue

In addressing recovery from complex disasters, it is essential to view the situation from a holistic spectrum of disaster recovery issues, covering both social and economic dimensions, as well as the short, medium and long terms. Again, to enable holistic views, systemic approaches in managing different resources is essential.

More specifically, systemic approaches require governments not to control different activities through separate "stovepiped" entities, but instead to focus on central coordination of resources so that different stakeholders can engage in recovery operations, including planning, drafting, and implementing specific recovery activities.

Experiences/actions undertaken in the response

The local devastated areas in Miyagi, Fukushima, and Iwate prefectures have had tremendous social and economic problems not only for the short term but also for the mid- and long terms. They have faced broad ranges of problems, which have included removal of tons of debris, relocation to new residence areas, shelter management, community rebuilding, public health, and the local economy. As a key national policy for addressing different social and economic issues, on May 24th, 2011, the Act on Reconstruction in Response to the Great East Japan Earthquake was passed, which states that the Reconstruction Headquarters shall be set up to undertake: 1) planning, drafting, and overall coordination of the Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake; 2) promotion of national support for reconstruction projects conducted by affected local governments, and 3) promotion of other reconstruction measures implemented by other concerned administrative agencies and overall coordination of such projects and measures (Article 12).

However, the Reconstruction Headquarters, which was subsequently named the Reconstruction Agency, was officially set up on February 10th, 2012, that is, eleven months after the Tohoku Disaster. Before setting up the Agency, different ministries addressed different cases and issues differently without a

comprehensive and systemic overview. It is also to be noted that many cases were seen where existing rigid regulations such as ones for use of land, budgets, and grants hindered smooth operation of broad ranges of recovery activities by local people in the affected areas.

Meanwhile, as of June 2014, overall, more than 251,000 affected people in Tohoku continued to struggle with overlong stays in small, temporary housing; delayed residential planning and construction; and confusing financial issues, including double loans (Japan Reconstruction Agency 2014). For example, in Minami Sanrikucho in Miyagi prefecture, according to a town survey, more than 80 % of the town population felt recovery had been delayed as of October 2014 (Kahoku News Paper 2014). It should also be noted that, as of March 2014, more than 3,000 deaths (cumulative numbers for three years after the Disaster) had been reported and attributed to the Tohoku Disaster, with deaths of people more than 65 years old accounting for about 90 percent of fatalities (Japan Reconstruction Agency 2014).

Furthermore, the psychological burdens on the affected people in Tohoku remain high and unrelenting, even four years after the Disaster. For example, in 2015 Tohoku University reported the results of a cohort survey in Miyagi prefecture: as of June 20, about 28% of 7,000 surveyed had symptoms of depression and 4% exhibited signs of post-traumatic stress disorder (PTSD) (Tohoku University 2015). It is also noteworthy that the psychological issues are noticeable even among the local public sector staff in towns, villages, and cities in the affected areas in Tohoku. One relevant survey reported that among the local staff in 42 cities or towns or villages in Iwate, Miyagi and Fukushima Prefectures, the numbers of local staff who had been away from work more than a month were 286 in 2011, 254 in 2012 and 147 in 2013 (first 8 months). (Yomiuri News Paper 2013)

Gaps

Broadly, three gaps should be pointed out: First, given complex and interconnected issues, it is critical to install a central coordination-focused institution which can commit to managing resources for different issues holistically and systematically from the earliest stage of recovery activities.

Second, the public management needs to use its weight in supporting or supplementing the activities by local communities and individuals by designing

schemes or procedures which enable those activities to be implemented and to be sustainable. In other words, it is important to review how existing regulations and procedures will impact local recovery activities and if necessary, the public management needs to adapt to the reality at the site and review those regulations or procedures.

Third, it is necessary to recognize the burden of heavy workloads by local public staff in cities, towns or villages during the recovery stage. Although site recovery activities tend to be considered as local or community issues, it is necessary to recognize that the size, complexity and impacts of disasters such as the Tohoku Disaster are often beyond the capacities of local communities to handle. The state of the recovery activities in Tohoku demonstrates that not only individual disaster management or recovery elements and individual resources (such as investment for specific problems), but also national-to-local systematized linkages of systems and activities need to be prioritized in order to address especially complex and cascading disaster risks(Shimizu 2015).

Case 5: Assessment and evaluation and update

Issues

To prepare for complex disasters which have a plethora of uncertain characteristics, it is essential to review (assess and evaluate) periodically the disaster management process and procedures, draw the lessons based on the review, and update public management for better disaster management. Especially when considering lessons for the nature of the public management, the review should include a third party to maintain independence and objectivity, and the review process should be open to the public. More specifically, it is important to have an open and systemic tracking mechanism so that members of the public can track how the processes and procedures are updated and how the lessons are incorporated in renewing public management. As such, the public can recognize better disaster management in preparation for future events.

In more concrete terms, it is important to understand that reviews in disaster management include 1) Hazard/vulnerability/risk assessment, 2) Rapid needs/initial (damage)/mid-term assessment, and 3) Plan/program/policy

evaluation. Generally speaking, assessment is to see what happened objectively; evaluation can be differentiated from that as follows:

"Evaluation is a systematic and objective assessment of an on-going or completed project, programme or policy, its design, implementation and results, to determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact and sustainability and to enable the incorporation of lessons learned into the decision-making process. Evaluation also refers to the process of determining the worth or significance of an activity, policy or program" (OECD 2010).

Ideally, such assessments and evaluations should be structurally formulated and incorporated into the overall disaster management process (Shimizu 2014).

Experiences/actions undertaken in the response

After the Tohoku Disaster, Government ministries and agencies have conducted their own assessments and evaluations of individual governmental activities within their institutions, however most of those assessments or evaluations have not been structurally formulated or incorporated into the overall disaster management process.

On the one hand, in terms of an independent evaluation mechanism, it should be noted that on December 8th, 2011 the National Diet established the National Diet Japan Fukushima Nuclear Accident Independent Commission (NAIIC), which was the independent investigative commission for the Fukushima Nuclear accident. The NAIIC was the first commission in Japan's constitutional history to be established by the National Diet as an independent investigative body.

According to the legal stipulations in the Law establishing the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, the chairman and Commission members (nine) were appointed by the Speakers of the House of Councillors and House of Representatives and were selected from the private sector on December 8th in 2011. The Commission conducted its investigation of government actions using investigative powers (Article 15) and insulated itself from the political influence of political parties and Diet members. Also, the Commission set a goal of about six months from the date of appointment to submit to the Speakers of the House of Councillors and House of Representatives a report listing the accident investigation results and proposals, and to make it public (Article 16).

In July 2012, The NAIIC completed the review as planned and published a long report, which is accessible to the public in Japanese and English (Japan National Diet 2012) and which played an important role in reviewing governmental actions in response to the Fukushima Nuclear Accident. However, it should be pointed out that this was an *ad-hoc* mechanism: the NAIIC has been wound up and its management office was closed in October 2012.

Thus, although the NAIIC mechanism was an important independent review body for better nuclear disaster management, overall evaluation mechanisms, including for areas other than nuclear disaster issues, were limited in terms of extent, issues covered, processes, and terms, which have not reflected the characteristics of complex disasters.

Gaps

While the NAIIC was a notable evaluation mechanism to look at the public management perspective, especially in terms of its structure, role and mechanisms, we see limitations from systemic and longer-term perspectives: The NAIIC case is not just for the nuclear power accident issue, but related to different cases in Japan where evaluations by third or independent parties have tended to be conducted on an *ad-hoc* basis: there is lack of long-term institutions which enable engagement of third or independent parties in evaluations to link evaluations with policy renewal or innovation, which is relevant to better disaster management and to the disaster management field.

Overall, the lack of formulation of individual assessments and evaluations, and especially the lack of long-term institutions to involve third or independent parties in evaluations is likely to lead to a lack of mechanisms for public management to link different kinds of information, knowledge, and experiences systematically. This situation needs to be seriously considered for future disaster management, especially as there is an evolving need to manage both more uncertainty and more complex disasters, often with limited resources, which requires increased effectiveness within both the disaster management and the policy communities (Shimizu 2013). Without the institutions to link different kinds of information, knowledge, and experiences systematically, the human and financial resources and costs and the valuable different experiences of different people will be utilized in limited ways and disaster management policies will have fewer opportunities to be feasible.

Conclusions and Policy Implications: Lessons Learned and Moving Toward Resilience-Based Public Management

The above case studies of the Tohoku Disaster highlight the fact that traditional public management has hindered effective disaster management in different ways. The stove-piped and fragmented approach led to an *ad-hoc* and ineffective response to complex and interconnected disaster risks.

To overcome these challenges that Japan has experienced during the response and recovery phases, existing public management needs to be reviewed holistically and systemically to incorporate a more systemic (holistic and resilience-based) approach to adapt to large-scale and complex disaster risks. The conventional fragmented and ill-coordinated approach lacks the resilience and capability to allocate the full range of resources (human, financial, knowledge, technology, etc.) in an appropriate and timely manner.

More specifically, to close the existing gaps in public management that were seen in the Tohoku Disaster, the following points are highlighted:

- Overall, formal well-understood mechanisms for coordinating multi-faceted operations are essential. Especially necessary is a balanced and systemic approach that takes into consideration the multi-dimensional impacts of the disaster.
- Appropriate processes and mechanisms to disseminate critical disaster information to decision-makers must be developed and articulated ahead of time.
- It is vital to set up pre-disaster coordinating mechanisms for different critical infrastructure sectors, with resilience-based and pre-defined principles that go beyond geographical and expertise borders. This may be possible by linking good practices within local communities and the private sector.
- It is critical to have a central coordination-focused institution that can make a commitment to managing post-disaster issues and projects systematically and holistically.
- The complexity and uncertainty of disasters requires independent multi-layered mechanisms to synthesize information, knowledge, and experience systematically throughout public management.

Finally, the authors provide three policy conclusions based on the above discussions:

- Public management, as part of disaster management for complex and interconnected disaster risks, should be focused on a holistic and resilience-based approach to provide well-balanced policy instruments of disaster avoidance, survival, and recovery.
- Preparedness and readiness for complex and uncertain disaster risks should be addressed ahead of time (*ex-ante)* by coordinated information and response hub institutions that bring different stakeholders and experts into the policy formation system for disasters, not by *ex-post* and *ad hoc* institutions.
- The *ex-ante* coordinated institutions should be systematically built and periodically reviewed from a long-term perspective and should include constructive cooperative mechanisms with various layers of governments, the private sector and civil society organizations.

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Chapter 20. Local Government's Approaches to Obtaining Human Resources for Crisis Management in Japan

Koichi Kawai

Introduction

The aim of this chapter is to analyse local governments' approaches, especially municipal governments', to obtaining human resources in disaster response situations as well as during restoration and recovery. Large-scale disasters exert a significant impact not only on residents' daily lives, but also on the functioning of affected local government[1]. For this reason, it is difficult for local governments rapidly to respond and engage in restoration and recovery work in affected areas using only their own resources.

The Great East Japan Earthquake of March 2011 led to serious staff shortages in the local governments of affected areas. Looking at the affected municipalities in the Miyagi Prefecture, which was located in the centre of the affected area, it can be seen that there was a shortage of up to approximately 470 staff in June 2012. Moreover, while this shortage gradually diminished as time passed, as of

[1] In Japan, there are two levels of local governments: prefectural (*to-dō-fu-ken*) and municipal (*shi-chō-son*) governments. The municipal governments have an obligation to respond to disasters at the front, and the prefectural governments have a role to supplement the action of municipalities. In this chapter, the phrase "local governments" refers to both prefectural and municipal governments.

March 2013, it still existed to some extent (Table 32). As can be seen from Figure 22, affected municipalities continued to need about 1,000 staff even after ten months from June 2012.

Table 32 - Staff Numbers Needed for Affected Municipalities in Miyagi Prefecture[2]

	6/ 12	7/ 12	8/ 12	9/ 12	10/ 12	11/ 12	12/ 12	01/ 13	02/ 13	03/ 13
Needed number	963	934	946	948	957	936	952	985	985	989
Satisfied number	494	528	537	552	667	665	680	821	848	852
Dispatched	478	487	491	503	589	584	599	700	727	730
Hired	16	41	46	49	78	81	81	121	121	122
Deficiency number	469	406	409	396	290	271	272	164	137	137

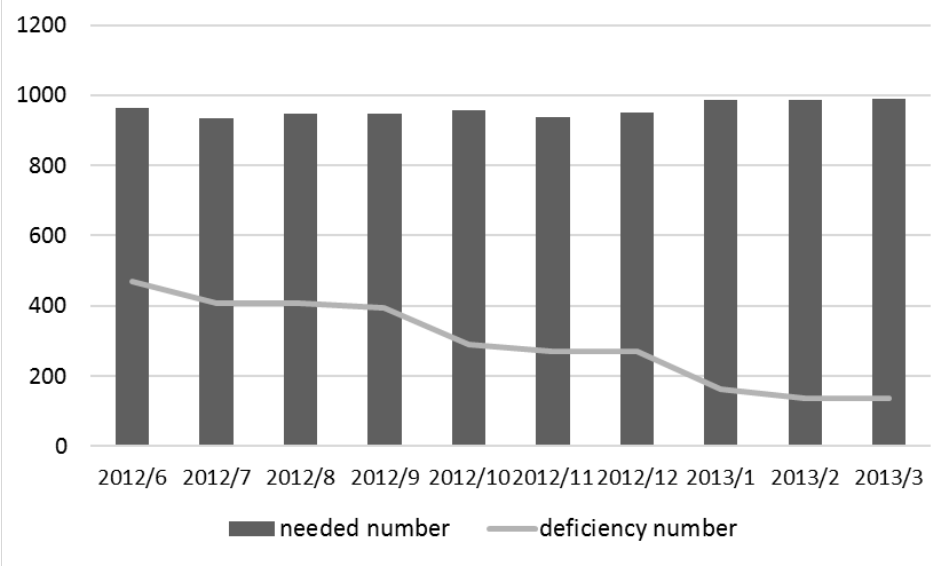
Source: Miyagi Prefecture (2013).

This staff shortage was not limited to the Miyagi Prefecture; it could also be seen in the local governments of other affected areas. To be specific, as of March 2013, there was a total staff shortage of approximately 270 people in the Iwate, Miyagi, and Fukushima Prefectures, the central areas affected by the Great East Japan Earthquake. In a survey of mayors of municipal governments affected by the earthquake, many pointed to staff shortages in all three prefectures as a factor preventing restoration and recovery. 40% of the 15 trillion yen reconstruction budget actually remained unused at the end of fiscal year 2011, because there was an excessive shortage of officials who were executing reconstruction activities. There is no doubt that this is a serious issue for affected local governments.[3]

[2] The above staff numbers are the total of figures given by 15 municipalities in the Miyagi prefecture that were affected by the earthquake.

[3] This survey of mayors is included in *Asahi Shimbun*, March 1, 2013.

Figure 22 - Progress of the Staff Numbers Needed for Affected Municipalities in Miyagi Prefecture



Source: Miyagi Prefecture (2013).

Why did this government staff shortage in affected areas become so serious after the Great East Japan Earthquake? We argue that the following three factors have a significant relationship to those shortages.

The first factor is the increase in the local governments' workload due to the disaster. Even though usable government resources reduce due to the disaster, new demands on governments arise—for example, support for affected individuals and the rebuilding of houses—that are piled on top of their routine duties. For this reason, the local governments' workload has increased excessively.

The second factor is the unique scale of damage brought about by the Great East Japan Earthquake. The Great East Japan Earthquake affected a very large area of more than 5 prefectures, or more than 500 kilometres of coastline. In total, 178 municipalities were affected. Consequently, a very large number of local governments developed staff shortages. These local governments were forced to send requests to faraway and unaffected local governments for staff instead of those nearby.

The third factor is that nationally, there is no surplus of local government staff. In Japan, a "concentrated reform plan" (*jichitai shūchū kaikaku puran*) was carried out from 2000 to 2005. This plan was directed by the central government against the backdrop of severe fiscal conditions of local governments. The fixed number of prefectural staff was reduced by approximately 5%, and the fixed number of municipal staff was reduced by approximately 10%. According to the Ministry of Internal Affairs and Communications, the total number of municipal staff peaked at 3,282,000 in 1994 and continued to decrease thereafter. In 2012, the total was 2,769,000.[4] For this reason, with the exception of those in large cities, it was also difficult for local governments in areas not affected by the earthquake to dispatch a large number of staff to affected areas over the mid- and long-term.[5]

It appears that these three factors worked together in a complex way to cause staff shortages in local governments of areas affected by the March 2011 earthquake in Japan.

Research Questions

Local governments play important roles in crisis management (Sakaki and Lukner 2013). In fact, in Japan after the earthquake, it was primarily the municipalities in affected areas that were forced to play a central role in crisis management and reconstruction. The elimination of deficiencies in the necessary manpower and expertise for crisis management and restoration became one of their top priorities. For example, Mayor Okuyama of Sendai City, one of the municipalities affected by the earthquake, strongly asserted that there was a large gap between the practical responsibilities of municipalities that are established by law, and their actual manpower (Kawamura 2014).

Assuming this to be the case, after the Great East Japan Earthquake, what kind of steps did municipal governments, especially those seriously damaged by the ensuing tsunami, take to overcome this major problem of high staff shortages?

[4] Ministry of Internal Affairs and Communications, "*Chihō kōkyō dantai no sōshokuinsū no suii*" (Changes in the Overall Number of Staff in Local Public Organizations: http://www.soumu.go.jp/).
[5] It has been pointed out that in the background of this severe financial situation, there has been a chronic shortage of both general government administrative staff and professional crisis management staff in many local governments (Nakamura 2001).

This is this chapter's first research question. As can be seen in Figure 22 above, staff shortage numbers of affected municipalities as of March 2013 are in fact less than half those of June 2012. The reason we have limited our object of analysis to municipalities is that, as previously described, they play a very important role in crisis management and reconstruction of affected areas.

The staff procurement method of municipalities affected by the Great East Japan Earthquake has already been touched upon by Japanese political science scholars. See, for example, Ichikawa (2011), Inatsugu (2012; 2017), and Kawamura (2013; 2014), as well as overseas scholars such as Samuels (2013). These previous studies point out that municipalities affected by the disaster tried to eliminate the human resource shortage by receiving support from other municipalities. This chapter confirms facts pointed out in previous studies by using statistical data and clarifies the characteristics of the staff procurement methods of affected municipalities. According to Kawai (2014), the municipalities affected by the Great East Japan Earthquake acquired the necessary resource information by constructing and using multi-layered communication channels. We also observe that, similarly, municipalities constructed and used "multi-layered disaster countermeasures" to obtain human resources.

Next, this chapter will make clear the reasons why affected municipalities were able to construct staff procurement methods in a short period of time. This is our second research question. Based on case studies of the Great Hanshin Earthquake,[6] Hashimoto (2005) points out that the disaster response activities of affected municipalities are based on the rules and systems that exist under ordinary circumstances. Aldrich (2012) also points out that the social capital that exists in non-disaster periods contributes to recovery after disasters, noting that the resources accumulated during normal times determine actors' behaviour during disasters. Based on these previous studies, we observe that affected municipalities constructed a method for staff procurement using official and unofficial systems and connections that exist during normal times. In order to answer our second research question, we will describe in detail the procurement methods of affected municipalities as well as make clear the background factors by using statistical data and the results of our interviews with relevant individuals.

[6] The Great Hanshin Earthquake hit Hyogo Prefecture, Japan in 1995. Especially Kobe City suffered great damage in Hyogo.

Lastly, this chapter will also make clear which type of municipal government personnel are lacking in post-Great East Japan earthquake. In other words, it is an issue of the type of staff expertise sought by affected municipalities and is the third research question in this chapter. Based on his observations of affected municipalities immediately following the Great East Japan Earthquake, Wakai (2012) points out that the type of staff sought there differed depending on the time period. Furthermore, Nakamura (2012) asserts that as time passes, human resources professionals with expert abilities come to be sought in affected areas. Using statistical data, we attempt to show the type of staff sought in affected areas for a period of three years after the Great East Japan Earthquake. As said before, this chapter focuses on municipal staff. The object of analysis of this chapter does not include national or prefectural staff, police officers, fire fighters, or self-defence force members.[7]

The chapter is organized as follows: first, in the next section, we will provide an overview of Japanese intergovernmental relationships and the staff procurement system used by municipalities in normal times to assist readers with their understanding of the results of the analysis described later. Next, to answer the above three research questions, we will carry out an analysis using statistical data and the results of our interviews with related individuals. Finally, we will end this chapter by summarizing the knowledge gained through these analyses and offering some suggestions regarding staff procurement in response to large-scale disasters.

The goal of this chapter is to present and share more widely information on areas in Japan that experienced the unprecedented large-scale disaster that was the Great East Japan Earthquake. In this chapter, we offer insights for better disaster preparedness and management in other parts of the world.

[7] Police and firefighting are functions of local governments, but the centralized schemes to mobilize police officers and fire fighters from across the country has existed since before the Great East Japan Earthquake (Inatsugu 2017).

Local Government System and Local Government Employee Dispatch System in Japan

To prepare for the discussion of the staff procurement method of municipalities affected by large-scale disasters, in this section we will explain Japan's local government system, its intergovernmental relationships, and the inter-municipal government employee dispatch system that is used on a routine basis. We will do so because the staff procurement method of earthquake-affected municipalities discussed in the next section is based on these systems.

Intergovernmental relationships in Japan

Japan's local autonomy system adopts a two-tier system of prefectural government units (*to-do-fu-ken*) and municipal government units (*shi-chō-son*) as prescribed by the Local Autonomy Law (*chihō jichi hō*). In other words, Japan's intergovernmental relationships are comprised of three layers: national, prefectural, and municipal.

While in England and the United States, the power of each level of government is strictly divided, this is not the case in Japan. The Japanese political scientist Amakawa terms the former *the separation model*, and the latter *the fusion model* (Amakawa 1983). In this chapter, according to Amakawa, we define *"separation"* as the clear demarcation of the roles and power of each level of government in providing public services. We define *"fusion"* as a situation in which local governments implement most of public service in the region, and the central government can exercise influence on local government activities.

Japan's municipalities are premised on *the fusion model* of intergovernmental relationships; thus, they resemble each other in terms of service content and form of service implementation (Kawamura 2013; 2014). This means that there are no large barriers for staff of X city to work in Y city. For this reason, inter-municipal staff dispatch is carried out on a daily basis in Japan (Ichikawa 2011; Kawamura 2013; 2014). Next, we explain how the daily staff dispatch system is legally prescribed.

The inter-municipal government employee dispatch system

In Japan, based on the Local Autonomy Law, inter-municipal staff dispatch is carried out on a routine basis. Mayors of municipal governments can request other mayors to dispatch the city officials. When municipalities affected by disasters make dispatch requests, they are also based on the prescriptions in this Local Autonomy Law. In addition, to complement the law's prescriptions, the Disaster Countermeasures Basic Act (*saigai taisaku kihon hō*) contains regulations regarding the dispatch of national public employees to municipalities.

When municipal staff are dispatched based on the Local Autonomy Law, associated costs (the dispatched staff's salary, stipend, and travel expenses) must be shouldered by the municipality receiving services. On the other hand, when national public employees are dispatched based on the Disaster Countermeasures Basic Act, associated costs are shouldered by the national government, with the exception of some stipends (for example, commuting) and travel fees. In the inter-municipal staff dispatches carried out after the Great East Japan Earthquake, while the channels may have differed, as a rule they have had their legal basis in the Local Autonomy Law and the Disaster Countermeasures Basic Act.

Multi-Layered Staff Procurement Methods

Let us now look specifically at the steps that municipalities affected by the Great East Japan Earthquake took to overcome their extreme staff shortages. Based on materials provided by the Iwate Prefecture, we have created a figure and a table that show the 2013 staff procurement status of ten municipalities in Iwate prefecture that were seriously affected by the Great East Japan Earthquake (Table 33, Figure 23). As can be seen in this table and figure, the vast majority of affected municipalities attempted to eliminate their staff shortage situations by using approximately seven to nine different procurement channels. Figure 23 also shows that depending on the municipality, there are differences in usage ratios of each staff procurement channel. For example, while Miyako City made the most use of recruitment of fixed term officials, Ofunato City made the most use of the “Ministry of Internal Affairs and Communications Scheme” (MIC Scheme) Channel. In other words, affected municipalities procured staff on a

wide scale, not through a single procurement channel but by the combination of multiple ones.

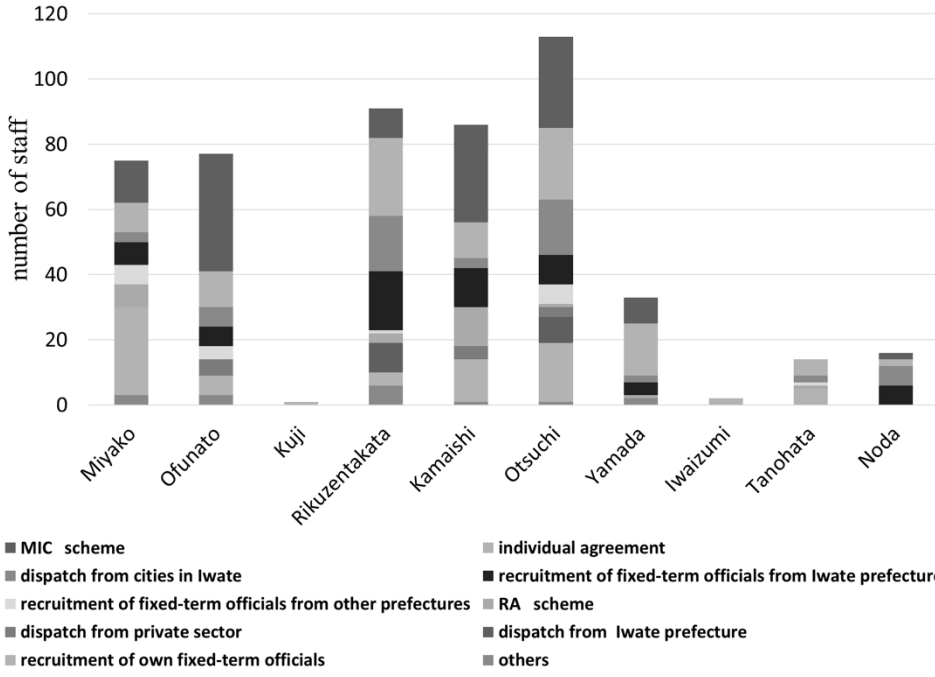
We would like to offer simple explanations regarding the channels with the highest relative rates of use: MIC Scheme (24.7%), individual agreement (20.2%), and intra-city fixed-term hiring (14.3%). The MIC Scheme is, put simply, a channel in which the Ministry of Internal Affairs and Communications (*sōmushō*, the central government ministry with jurisdiction over local governments) supports personnel exchanges of dispatched employees. We will explain the MIC Scheme in more detail below. "The Reconstruction Agency Scheme" (RA Scheme) found in the table and figure is the staff dispatch channel administered by the Reconstruction Agency (*fukkōchō*), which was established as a temporary organization after the Great East Japan Earthquake. "The individual agreement" refers to the method of affected municipalities receiving dispatched employees directly from other municipalities without going through the MIC Scheme. The individual agreement channel can be generally divided into those based on official agreements formed before disasters arise, and those based on unofficial ones. Affected municipal governments also hire personnel on their own in addition to accepting staff from outside their municipality. One method for doing so is recruitment of own fixed-term officials. The reason that affected municipalities use this as their primary method instead of normal hiring practices is to regain control of expanded personnel costs after the end of a reconstruction period.

Table 33 - Staff Procurement Status of Affected Municipalities in Iwate Prefecture

	MIC scheme	Individual agreement	Dispatch from cities in Iwate	Recruitment of fixed-term officials from Iwate prefecture	Recruitment of fixed-term officials from other prefecture	RA scheme	Dispatch from private sector	Dispatch from Iwate prefecture	Recruitment of own fixed-term officials	Others	Total
Miyako	13	9	3	7	6	7	0	0	27	3	75
Ofunato	36	11	6	6	4	0	5	0	6	3	77
Kuji	0	1	0	0	0	0	0	0	0	0	1
Rikuzentakata	9	24	17	18	1	3	0	9	4	6	91
Kamaishi	30	11	3	12	0	12	4	0	13	1	86
Otsuchi	28	22	17	9	6	1	3	8	18	1	113
Yamada	8	16	2	4	0	1	0	0	0	2	33
Iwaizumi	0	2	0	0	0	0	0	0	0	0	2
Tanohata	0	5	2	0	1	1	0	0	5	0	14
Noda	2	2	6	6	0	0	0	0	0	0	19
Total	126	103	56	62	25	25	12	17	73	16	511
Percentage	24,7	20,2	11,0	12,1	4,1	4,9	2,3	3,3	14,3	3,1	100

Source: Document provided by Iwate Prefecture on November 16, 2013.

Figure 23 - Variation in the Staff Procurement Channels of Affected Municipalities in Iwate Prefecture



Source: Document provided by Iwate Prefecture on November 16, 2013.

Factors Shaping Staff Procurement during Disasters

The previous section shows by using statistical data that affected municipalities constructed and used a multi-layered staff procurement method. This method combined multiple procurement channels. In this section, we consider why affected municipalities were able to construct such a method in a short period.

Individual agreement: Collaboration between municipalities

First, it should be noted that many affected municipalities used individual agreements to procure staff. As mentioned previously, individual agreements can be generally divided into those based on formal agreements formed before disasters arise, and those based on informal ones. One type of formal agreement is a mutual support agreement between municipal governments in the event of a large-scale disaster (*kōiki bōsai ouen kyōtei*). Before the Great East Japan Earthquake, these agreements had been signed between many municipalities. Such agreements on support measures were frequently signed during the latter half of the 1990s (Sakaki and Lukner 2013). This situation seems to have been related to the Great Hanshin Earthquake. 1,645 municipalities (94.4% of municipalities in Japan) had signed mutual support agreements in 2013. In 2010, before the Great East Japan Earthquake, 89.8% of municipalities had done so (Japan. Cabinet Office 2013). Many affected municipalities used these mutual support agreements to procure a considerable amount of staff from agreement partners.

Furthermore, affected municipalities obtained human support through friendship agreements. For example, Kensennuma City in Miyagi Prefecture signed a friendship agreement with Meguro City in 2010. This conclusion of an agreement was triggered by the "Saury Festival." Kesennuma City had provided locally caught fish, called “saury,” to the festival in Meguro City every year. Based on this agreement, Kensennuma City procured staff from Meguro City.[8]

There were also cases where affected cities made use of informal connections to procure staff. For example, Meguro City dispatched staff to Miyako City in Iwate prefecture as well, even though there was no formal agreement between the two. In our interviews with the deputy mayor of Miyako City, they said that Miyako City was also providing locally saury to the "Saury Festival," and therefore was able to obtain support.[9]

In this way, affected municipalities aimed to obtain necessary staff through not only official agreements but also informal connections. Put in another way, this fact means that if municipal governments have not formed agreements in advance or do not have such connections on a daily basis, it is difficult to construct channels for receiving dispatched staff in short periods. Here, we see

[8] *Asahi Shimbun,* November 12, 2011.

[9] Interview with the deputy mayor of Miyako, December 8, 2012.

that systems and connections established in non-disaster periods exert a considerable influence on the activities of municipalities when disasters arise. It has also been pointed out in previous study that loose connections from normal times turn into strong ones in the event of a disaster (Aldrich 2012).

MIC scheme: National government support

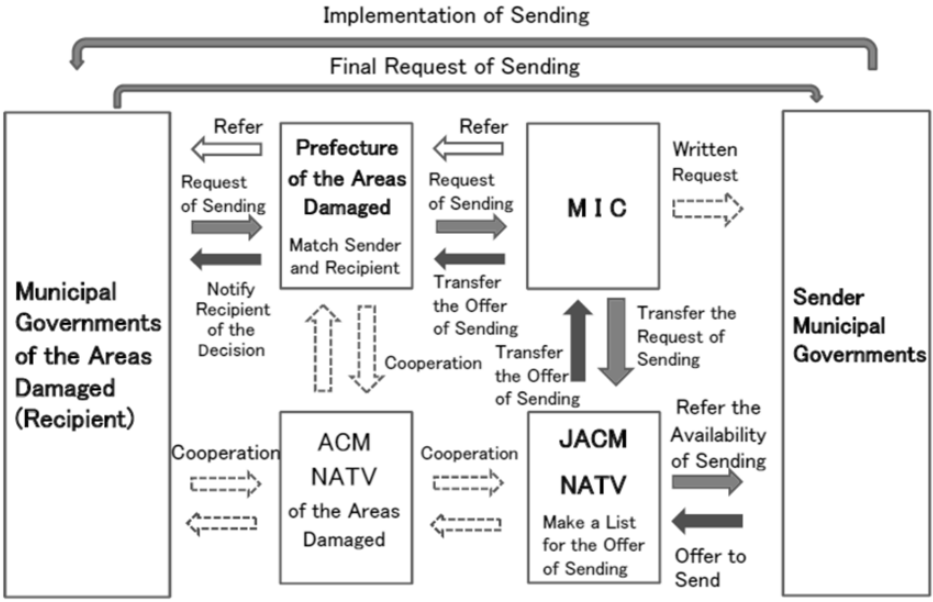
Many municipalities affected by the Great East Japan Earthquake to some extent used official advance agreements and connections established in non-disaster periods to procure personnel. However, there were differences in the situation of signing these advance agreements and connections depending on the municipality (Inatsugu 2012; 2017). For this reason, staff procurement that only made use of individual agreements led to disparities in support for affected municipalities. The scheme constructed in response to this experience by the Ministry of Internal Affairs and Communications (MIC – *sōmushō*) with the cooperation of the Japan Association of City Mayors (JACM) and the National Association of Towns and Villages (NATV) in the last week of March 2011 was termed the MIC Scheme. It was constructed in order to support the matching of municipalities that were in a position to dispatch staff with those that would receive such staff.

This dispatching scheme takes the following form. First, through prefectures affected by the earthquake, the MIC gathers the dispatch requests (type of work, time period, etc.) of affected municipalities. The MIC transmits these requests to municipalities across the country through JACM or NATV. These municipalities (including wards within them) then respond through the same organizations. MIC gathers these answers and, through affected prefectures, presents them to affected municipalities and conducts personnel matching (Susume 2013). This system is expressed visually in Figure 24.

The MIC Scheme constructed this kind of scheme to smooth out the staff procurement process in affected municipalities, and to supply a minimal level of staff to municipalities that were unable to receive sufficient staff dispatches based on agreements, etc., from non-disaster periods. In fact, the staff of the MIC stated, "This scheme is also playing a role as a safety net for affected

municipalities."[10] According to the MIC, this scheme was designed based on the experience of the Great Hanshin Earthquake. In other words, the MIC Scheme is a structure that made use of accumulated past disaster experience.

Figure 24 - The Personnel Support Scheme Designed by the MIC (MIC Scheme)



Source: Ministry of Internal Affairs and Communications (2011).

The MIC Scheme also provided financial support for all methods of obtaining staff, not only for those that make use of the MIC Scheme. For example, when affected municipalities receive dispatched staff from other municipalities, all of the staff's salary, travel expenses, insurance expenses, and so on were paid by the Special Allocation Tax for Reconstruction from the Earthquake (shinsai fukkō tokubetsu kōfuzei). This special allocation tax also dealt with all expenses related

[10] Interview with the staff of the Local Public Service Personnel Department of the MIC, March 21, 2013.

to staff dispatched from private companies to affected municipalities (Susume 2013).[11]

One of the reasons that affected municipalities were able to create various channels for staff procurement and construct multi-layered procurement methods that combined these channels in a short period of time was the strong support from the national government. In fact, from March 2011 to March 2012, there were 1,314 dispatches that made use of the MIC Scheme (Susume 2013).

While the municipalities should play an active role in the reconstruction of affected areas, when a large-scale disaster arises, the central government's supplementary support is indispensable. The existence or lack of active central government support can considerably affect the staff procurement of affected municipalities.

Changes in the Type of Staff and Expertise Sought by Affected Municipalities

Up until this point, we have discussed how affected municipalities secured necessary staff. In this section, we would like to make clear the type of staff, or the type of staff expertise, needed by affected municipalities.

Table 34 was created based on documents provided by the Iwate Prefecture. It shows the job categories of the staff dispatched to ten municipalities on the coast of Iwate Prefecture as of 2013. It can be seen from this table that many cities are receiving dispatches of a considerable number of clerical and engineering staff. Figure 25 combines the number of people dispatched to these ten municipalities and shows the proportion of dispatches by job type. Based on this figure, it can be inferred that clerical staff were the most needed and engineering staff were second most needed for these municipalities in 2013.

Why, in 2013, two years after the Great East Japan Earthquake, was the need highest for clerical staff? According to an interview with the MIC, many affected

[11] This figure counts as one case of dispatch in which multiple individuals rotate, performing the same job. For this reason, the number of individuals actually dispatched in the MIC Scheme is larger than the number shown here (Susume 2013).

municipalities started to engage in full-scale urban development from 2013.[12] The Great East Japan Earthquake led to serious tsunami damage in coastal municipalities, thus it became necessary to engage in large-scale urban development projects. For this reason, demand for clerical staff who have specialized knowledge related to land negotiations that would accompany such projects increased considerably. Furthermore, the reason for the heightened demand for engineering staff was that many municipalities started construction projects to protect against future tsunami events.

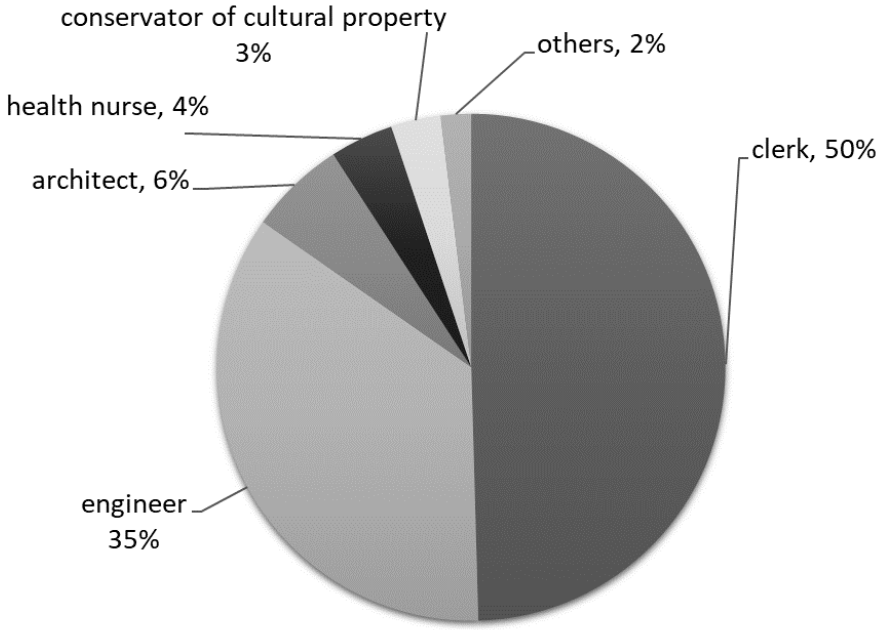
Table 34 - Type of Staff Dispatched to Affected Municipalities in Iwate Prefecture

	Clerk	*Engineer*	*Architect*	*Health nurse*	*Conservator of cultural property*	*Others*	*Total*
Miyako	36	35	7	5	6	0	89
Ofunato	37	32	3	3	4	1	80
Kuji	0	0	1	0	0	0	1
Rikuzentakata	66	19	4	3	3	0	95
Kamaishi	43	28	8	9	0	6	94
Otsuchi	83	38	6	1	2	4	134
Yamada	11	17	4	2	2	0	36
Iwaizumi	0	2	0	0	0	0	2
Tanohata	3	14	2	0	0	0	19
Noda	3	15	0	0	1	0	19
Total	282	200	35	23	18	11	569

Source: Document provided by Iwate Prefecture on November 16, 2013.

[12] Interview with the staff of the Local Public Service Personnel Department of the MIC, March 21, 2013.

Figure 25 - Job Types of Staff Dispatched to Affected Municipalities in Iwate Prefecture (Percentage)



Source: Document provided by Iwate Prefecture on November 16, 2013.

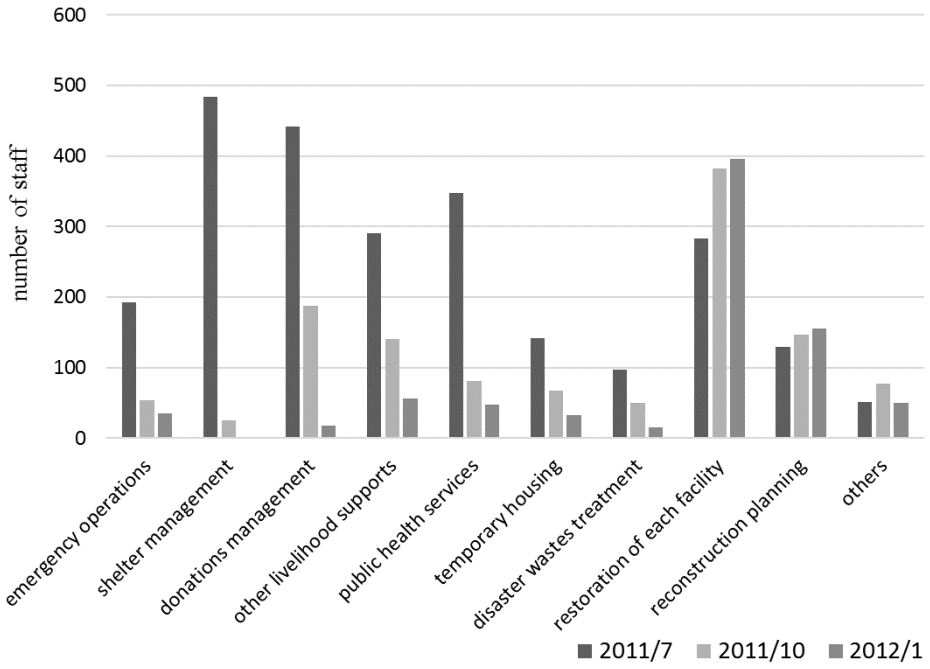
Next, let us look at how the staff needs of affected municipalities changed as the years passed. As previously mentioned, Nakamura (2012) asserts that as time passes in affected areas, there is a tendency to seek human resources with specialized abilities. As of 2013, the need for clerical staff was the highest. What about before 2013?

Figure 26 shows the number of staff by job responsibility dispatched in the year following the Great East Japan Earthquake. We do not have any documents that showed trends by job type; thus, we chose to substitute one that shows trends by job responsibility, from which job type can be inferred. Based on this figure, it can be seen that from the time of the earthquake until approximately four months later, most staff were responsible for the running of shelters and the management and distribution of relief funds. Work such as this was usually handled by clerical staff. In other words, the need for clerical staff immediately

after the earthquake was also extremely high. However, responsibilities such as running shelters does not require special knowledge, and it must be noted that therefore the type of staff needed for the aforementioned land negotiations and the type of staff sought immediately after the earthquake was qualitatively very different.

After six months passes, the number of staff responsible for the restoration of facilities reaches its highest point. The vast majority of staff with such responsibilities is not clerical staff, but those involved in engineering and architecture. In other words, after half a year had passed since the earthquake, the type of staff needed in affected areas had changed from clerical staff to specialists, such as those involved in engineering and architecture. This tendency can also be seen ten months after the earthquake.

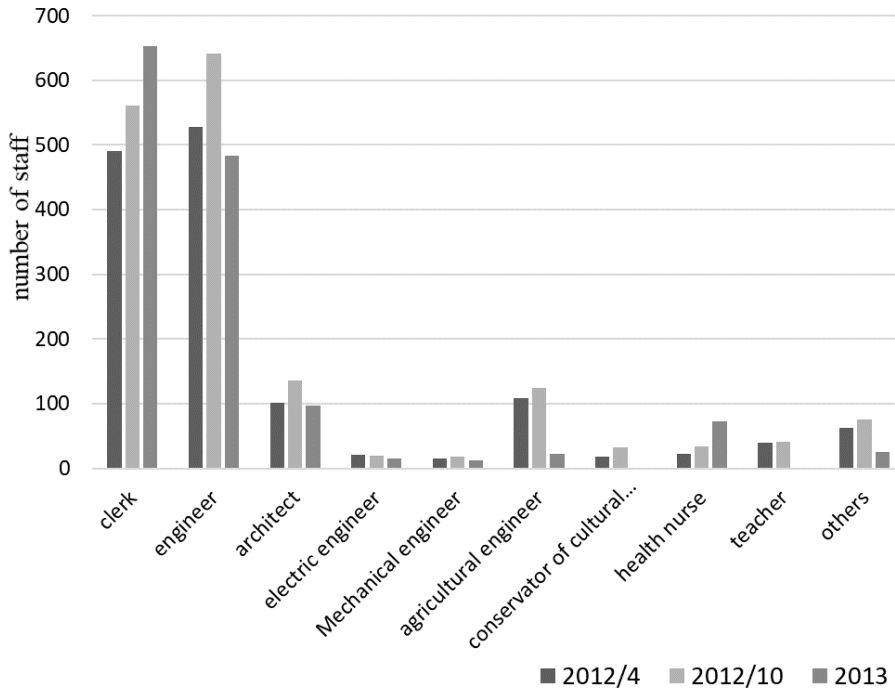
Figure 26 - Job Types of Staff Dispatched to Affected Municipalities during the First Year after the Earthquake



Source: Created based on Osada (2013).

What about a year after the earthquake? Figure 27 shows the number of staff dispatched in the second year after the Great East Japan Earthquake by job type. It can be seen from this figure that engineers were greatly needed during this time. However, as we entered 2013, this demand decreased, and the need for clerical staff eclipsed engineers to become the most needed. This coincides with the situation we saw above in the ten Iwate prefecture municipalities. In other words, two years after an earthquake, the need for clerical staff related to land negotiation increased significantly.

Figure 27 - Job Types of Staff Dispatched to Affected Municipalities in Fiscal Year 2012



Source: Created based on Osada (2013).

As shown above, the trend in the types of staff needed in areas affected by the Great East Japan Earthquake can be summarized as follows. First, up to four months after the earthquake, clerks who would run shelters were the most needed. Then, starting six months after the earthquake, the need for engineers for facility restoration and so on increased. Two years after the earthquake, the need for clerical staff with specialized knowledge in fields such as land negotiation grew. In other words, it can be said that when large-scale disasters such as the Great East Japan Earthquake arise, there are "three waves" in the staff type sought by affected municipal governments. In the case of the Great Hanshin Earthquake, while the first and second wave can be seen, the third is not present. From this, it can be inferred that the trends in types of staff sought in disaster-affected areas differ depending on the type and scale of the disaster.

Conclusion

The first research question for this chapter dealt with the nature of the steps that municipalities affected by the Great East Japan Earthquake took to overcome considerable staff shortages. This study makes clear that they constructed and used a multi-layered staff procurement method, combining seven to nine procurement channels. The second research question was why those affected municipalities were able to construct a staff procurement method in such a short period of time. We made clear that they formed staff procurement channels based on mutual support agreements, and informal connections carried over from non-disaster periods; we noted that central government support such as the MIC Scheme for providing staff procurement support to affected municipalities also contributed considerably to municipalities' staff procurement. Our third research question inquired as to the type of staff sought in affected municipalities. We made clear based on statistical data regarding the staff dispatch situation that there were three major waves in the types of staff sought by affected areas. The first wave is the need for clerks to manage shelters—they were sought immediately after the disaster. A half-year later, the second wave came in the form of a demand for engineers. Then, two years after the disaster, the third wave came, and municipalities sought clerical staff for land negotiations.

In summary, affected municipalities began by constructing a staff procurement method that combined not one but multiple procurement channels.

This suggests that when procuring staff, affected municipalities constructed "multi-layered disaster countermeasures," and this multi-layered system functioned as an effective disaster response. Furthermore, official and unofficial systems and networks formed between municipalities during non-disaster periods, and the central government's supplementary support for municipalities existed in the background of this multi-layered system. As shown in the existing research, the government's disaster response and recovery activities after the disaster were dictated by systems and networks determined in non-disaster periods. We also confirmed that when a large-scale disaster arises, the central government's active support is indispensable.

Furthermore, the staff expertise sought in affected areas changes depending on whether there is a disaster response or a restoration phase. One of the characteristics of the Great East Japan Earthquake is that there were three big changes (three waves) in the type of staff sought in affected areas. The staff needs in areas affected by disasters likely differ depending on the type and size of the disaster. Comparing the Great Hanshin Earthquake of 1995 and the Great East Japan Earthquake of 2011, in the case of the former, only the first two waves arose, whereas in the latter, all three can be seen. The construction of multi-layered systems is effective for responding to these changes, and Japan's municipalities did so during this recent disaster.

We believe that these findings can contribute to disaster response and recovery not only in Japan, but in foreign countries as well. While the systems and structures highlighted in this chapter were limited to those between municipalities, in reality there are also those set up between municipalities and private companies and between municipalities and upper-level government. These can play an important role as well.

In closing, as we prepare for large-scale disasters that may occur in the future, we would like to offer some suggestions regarding disaster response that are based on Japan's experience with this recent disaster. In this chapter, we stated that affected municipalities used multi-layered procurement channels to acquire the necessary manpower. However, the staff shortages experienced by these municipalities have not been completely resolved. Furthermore, there were also municipalities that were almost entirely unable to procure support staff for emergency response. In short, two issues remain regarding the efforts of Japanese government administration that were studied in this chapter.

The first is that expert staff are few in number and very hard to procure. Thus, efforts are needed to make existing staff procurement more efficient. Second, there is a need for a system that can address the disparity between municipalities that succeed in staff procurement and those that do not. The MIC Scheme, which was developed to address such variations in support, was unable to completely rectify such gaps between municipalities.

We believe that the following efforts would be effective in addressing the above two issues. With regard to the first, we think that the construction of a national public employee human resource database could mitigate the problem. With a database, municipalities could search for necessary human resources and obtain them in a more efficient way. Inatsugu (2012) has also previously proposed the sharing of a public employee human resource database among municipal governments across the country. There is a strong desire for its construction in Japan.

With regard to the second issue, preparation during non-disaster periods for pairing support is necessary. Pairing support refers to multiple municipal governments deciding in advance to send and receive support in pairs. This is also called “the Counterpart Method” (*kauntāpāto hōshiki*). If a pairing support network was constructed at the national level, disparities between municipalities in terms of support could be avoided. “The Taikō-Shien Support” adopted by the Chinese government after the Great Sichuan Earthquake in 2008 is a typical case of pairing support. After the Great East Japan Earthquake, the Kansai region prefectural governments provided support using “the Counterpart Method” for affected local governments, receiving considerable attention.[13] As a result, the words "pairing support" are beginning to be included in many post-Great East Japan earthquake mutual support agreements.[14] Furthermore, the MIC compiled the report of the new system of counterpart-support in June 2017. According to this report, “the Counterpart Method” will be adopted as a principle all over Japan. All local governments will be grouped into 67 units and be assigned to affected

[13] Originally, the local government's approach of personnel dispatch is that local governments dispatch staff to affected local governments after the receiving side request. In contrast to such traditional approach, the Union of Kansai Governments actively dispatched staff to affected local governments.

[14] For example, the disaster action plan formulated in 2013 by the Association of Designated City Mayors, a gathering of leaders from large cities, stated "As a general rule each designated city will carry out pairing support for affected municipalities."

municipalities when large-scale disasters occur.[15] If this new system starts to operate on a full scale, the second issue of physical support would be improved.

The ideal structure for staff dispatch in the time of disaster is still not yet complete; it can be said to be in its developmental stage. We must continue to investigate methods by which more effective support can be provided to affected areas.

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Part E.

Conclusions

Chapter 21. Conclusions: Lessons Learned and Looking Ahead

David C.G. Brown and Jacek Czaputowicz

Introduction

The subject-matter of this book is dynamic and open-ended. The academic discipline of crisis management is relatively new, as reflected by the fact that this is the first time that it has been addressed by a comparative public administration network such as the IIAS, which seeks to identify and consider emerging issues in the field. As noted in the introduction, crisis and disaster management as a sub-discipline of public administration has also evolved considerably in recent years, away from its earlier Cold War context and into the new environment that has increasingly come into focus in the early 21st century. This has led to an expansion and growing sophistication in national and international institutions and practices and a greater appreciation of the particular nature of crisis situations and the administrative and societal capacities and skills that are required to deal with them.

This volume makes clear that crisis and disaster management presents common challenges to public administration in all countries; while it cannot claim to be either definitive or comprehensive, the analysis does strongly suggest a number of conclusions of general application. The most important of these is that there is more that can and needs to be done, in both the study and the practice of crisis and contingency management.

A general conclusion is that every country has its particular combination of natural and human-generated hazards and of public and societal capacity for responding when crises occur. Public institutions are embedded in national systems of governance, and societal capacity to prepare for and to respond to disasters as they occur is broadly shaped by the state of national economic and social development. Responses to crises and disaster situations can lead to strengthened institutions and social resilience, but disasters can also be enormously destructive and costly, of national infrastructure and capacity but also of national will and cohesion. For these reasons alone this is a field that deserves continuing and sustained attention.

Several authors in this volume have argued that the situation is in fact getting progressively more complex and challenging, although the good news is that there is also a greater understanding of the nature of the challenge and of the tools available for dealing with it. In many ways this complexity is a product of the universal forces at work in contemporary societies: global warming, Climate change and environmental degradation; accelerating information and communications technologies; widening global concerns about security and terrorism; ongoing economic and social disparities within and among regions; related issues of development and migration. The COVID-19 public health crisis has brought many of these strands together and highlighted the truly global nature of the related risks.

Lessons Learned

Contributors to this volume presented lessons from the events they have analysed in their chapters that they consider will be of interest to an international audience. This was particularly the case with respect to the disaster event case studies in Part D of the book. Such lessons reflect the nature of the disaster in question, its causes and the response to it. The individual accounts are a reminder that disasters occur in a human context and the lessons drawn from them are born of human experience that all too often has been both hard and costly. Each situation has its unique features that provide additional texture to the analysis and conclusions that the authors provide and warrants reading in its own right. However, a number of common themes do emerge, often from very different fact situations. In many cases, they address variables that make the difference

between an emergency that can be contained within relatively acceptable bounds and a disaster, where State and community resources have been overwhelmed, at least for a while. Without claiming to be exhaustive, the more common themes and insights provided throughout the book are the following:

- The ability to evaluate and learn from crises is an essential requirement for every society and system of public administration; indeed, the authors portray environments that have been able to learn from formative crisis experiences and to strengthen their disaster management capacity as a result. Although such learning is in the first instance within a national institutional environment, there usually are potential applications for other systems as well as for other sectors in society. International learning requires development and use of the tools of comparative public administration – looking at differences as much as at similarities – but every system gains by developing such a capacity. Some authors argue that the ability to evaluate and learn from disaster events needs to be institutionalized, even to the extent of establishing an evaluation and research capability that is independent of the emergency planning and response institutions (Shimizu and Yasui D19). Others warn, however, that in the absence an enabling organizational culture, learning can be missed or even regress (Valiquette L'Heureux A5).
- In every government, a central theme is the importance of having a comprehensive integrated approach – the terms "holistic" and "whole of government" are also used – that harnesses the capabilities of all levels of government and makes best possible use of national and international capabilities. This includes a clear understanding of the role of the national government in particular, notably in providing needed resources and information but also timely decision-making and coordination. Various forms of multilevel governance, including federalism, create particular dynamics that need to be understood. A general theme throughout the book is that disasters by their nature cut across established jurisdictional and societal boundaries and that ways need to be found to bring together – in the face of a common threat – vertically-oriented institutional structures that in other circumstances may not always work together. This raises issues of planning and preparedness on the one hand but also of response: for example, many countries assign a lead response role to fire services, but such agencies in turn need to be able to work with a wide range of responders, including civil defence organizations, the police, rescue services of various types and

hospitals. Another dimension is the role played by the military, which can provide significant logistical capability but which several authors state can also be politically contentious.

- From a public administration perspective, perhaps the most widespread commentary is on the importance of local government, working with local communities, as the front line in any disaster. A major challenge is that local government and local government staff in an affected area are often themselves affected, especially by a natural disaster, while also expected to take a lead role in the response and recovery. In a disaster response situation local government is faced with major logistical and capacity issues, including with respect to supplies, financial resources, information, logistical capabilities and staff. There are also issues of coordination and control within the local government: with higher levels of government, with the local business sector and community more generally, with emergency responders of numerous kinds, and with the international community, which itself encompasses a wide range of interveners, from United Nations agencies to non-governmental organizations and individuals. Several authors argue for building a robust system of disaster management on a local government foundation, perhaps the most comprehensive version being Japan's three-layered approach of self-help, co-help and community help (Kikuchi C14). This in turn links to widely-recognized goals of building community resilience and sustainability in situations where there is, as one group of authors terms it, a "loss of meaning" (Tiberghien, Vidal and Arnaud A7).
- A significant feature of disaster response in all countries is the role played by the local community, both as individuals and in groups. Volunteers are an important part of organized emergency response, such as fire services, but also play a significant *ad hoc* role. Closely related to this are businesses, ranging from small business to industrial plants, which in turn can be linked to global corporations. A common theme is the importance of education and training for such individuals and groups, both so they can be prepared and respond themselves when an emergency occurs, without waiting for the State to act, and so they can participate effectively in the wider response.
- Many of the authors comment on the vulnerabilities created by poor planning, regulation and enforcement in numerous areas of economic and social activity. Areas where such issues arise include land use and zoning, building construction, industrial plants, transportation services and public health.

Vulnerabilities are created through illegal activity, vague, out-of-date, and poorly enforced regulatory requirements, and lack of coherence among sectorally-oriented regulatory regimes. These tendencies are compounded when there is weak local government in particular and weak and poorly-financed regulatory environments in general. Additional aggravation, often systemic in extent, is provided by poverty and socio-economic disadvantage on the one hand and corruption on the other.

- All authors also agree on the vital importance of communications in crisis situations. This has several dimensions. Of critical importance is the timeliness of warnings of impending disaster, where mere moments in time can make a profound difference in terms of lives and property. This depends on the accuracy and reliability of early warning systems; the credibility of those systems in the eyes of the public is another concern. More generally, effective disaster response depends on reliable and continuing communications from emergency management authorities to the public, underscoring the importance of treating communications as part of critical infrastructure. Conversely, governments and other decision-makers need to have information about an emergency situation that is as timely and accurate as possible in order to inform their own decision-making and support the decision-making of others. Many authors link these issues to expectations that a primary role of government is the protection of lives and property. A related observation is the importance of public trust in public capacity to deal with disasters and of developing a culture of prevention in both the public administration and in society at large.
- In a closely related theme, several authors stress the importance of information quality and record-keeping about decisions taken and about the deployment and use of financial, human and physical resources. These are a major factor in the effectiveness of disaster-response operations but also provide an essential underpinning for accountability, evaluation and learning in the aftermath of a disaster as well as for the capacity to prepare for and prevent future recurrences. The widespread adoption of networked information and communications technologies, and associated use of databases and digital documents, creates both a valuable resource but also a vulnerable form of infrastructure.
- A complex set of issues relates to the role and liability of individual public officials and responsible agents within larger systemic environments. One

author (Kudo D17) discusses a case where a criminal case was brought against scientific experts who were charged with failing to provide adequate warning to the public of an impending earthquake. While this case was in the context of an individual national legal system – and led to important clarifications in the law – it serves as a clear reminder that the human actions that contribute to disaster situations can be at the level of individuals and are not just matters of systemic structure and complexity.

- That being said, all authors stress the complexity of disasters and the way in which they cross established boundaries between the State and society; an added level of complexity is that they invariably draw in an international dimension. This is most clearly the case when hazards and disaster events are on an international border and neighbouring countries are called upon to collaborate in planning and response (Brazova, Matczak and Takacs B11) or choose proactively to incorporate a possible requirement to assist their neighbours into their national disaster response capacity (Mishra and Potaraju C13). Several authors comment on the role played by the international community, in particular the United Nations system (Touchant B8 and others), in providing disaster relief but also as a major influence in developing national disaster response and – increasingly – disaster prevention and mitigation capacity. In some ways, a more challenging dimension is provided by the role of international non-governmental organizations, as well as businesses, communities and individuals from outside the disaster zone, which seek to provide assistance but can also be concerned with everything from the welfare of individuals in the affected areas to the state of property and investments. These interventions can be a source of great strength in response and recovery situations, but they can also complicate the situation enormously. In locations where local government is weak or has been severely affected by a disaster event, international organizations can and often do step in to fill the space and provide needed relief and recovery services. These situations pose potentially significant coordination and other challenges to local authorities, however, requiring additional skills and capacity for dealing with them. In the longer run, additional issues arise with respect to the continuing role of such organizations and how they fit with local groups and institutions.
- A final observation from a list that in any case is intended to be evocative rather than exhaustive, is the observation made by several authors that

actions taken before a disaster can have an important bearing on the way the disaster itself plays out and also on the response. A discussion of a transportation disaster that was at least in part attributable to regulatory failure (Valiquette L'Heureux A5) argues that the seeds of such disasters are often planted well before the events occur, with human actions creating the conditions for future crises. On the other hand, relationships developed among municipalities before a disaster greatly facilitated the obtaining of needed but scarce human resources in the response and recovery period (Kawai D20). Numerous authors point to the effects of government austerity programs on disaster management capability and even to administrative reform initiatives, which can both contribute to and help address disaster situations.

Areas for Future Work

The study of disasters and disaster management is very much a work in progress. New situations and combinations of situations are always occurring, and while historical experience offers many lessons, the interpretation of those lessons and the context in which they are applied is constantly changing. As a relatively new discipline in its own right and as a sub-discipline of public administration, the study of disasters continues to evolve, with respect both to the analytical toolkit and to the institutional and socio-economic environments in which it is used. There is therefore still work to do, including by the IIAS as an organization concerned with the comparative study and practice of public administration.

The structure of this book by itself defines several broad lines of future enquiry. There is a rich vein of literature on major natural, industrial, transportation, public health and other categories of disasters. As discussed in the previous section, every disaster event has lessons to offer, and this is certainly true of the four chapters on case studies presented in part D the book. Each new event is potentially worth recording and analyzing, for the benefit of those directly concerned but also of the wider community of researchers.

A second strand of research and analysis is the development of crisis and disaster management as a sub-field of public administration. This includes the

study of the institutional environment for disaster management, both at the national and at the international levels. There are over 190 member states in the United Nations; each one has a requirement to address national vulnerabilities and hazards, and each one has at least some accumulated experience in doing so. Five chapters in this book (part C) are specifically about national institutional arrangements and dynamics with respect to disaster management, and institutional arrangements in other countries are a significant part of several other chapters. Ideally, all national systems deserve the same kind of attention, in their own terms and with respect to how they interact with the international system, but also as they evolve over time.

Similarly, the international system itself warrants continuing attention, broadening the analysis in part B of the book. As with national institutions, there is a core of multilateral institutions that are part of the United Nations system in the areas both of prevention and of disaster response (Touchant B8). Their extent and evolution warrant further study, but there is a much wider range of organizations with global reach, some in the multilateral sphere and others that can be classified as international non-governmental organizations. Thanks at least in part to information and communications technologies and social media, a wide and growing range of NGOs, charities and religious institutions, some nationally based and others that operate on a transnational basis, are a part of the picture – one that is only likely to grow in importance. In addition, national governments are actively involved in responding to many disaster situations, whether in neighbouring countries or through official development assistance and humanitarian aid. Many of the latter group, as well as multilateral development assistance agencies such as the United Nations Development Program and the World Bank, are also involved in helping developing countries strengthen their disaster prevention and response capacities, and this is an area that particularly warrants further attention.

A related dimension of this theme is the requirement for collaboration among neighbouring countries, whether on a bilateral or a regional basis. This was in fact part of the mandate of the project group on Safety and Security, but in the end only limited attention was given to the topic. Even that much, however, clearly indicates that this is a growing area and one that warrants further study.

The most wide-open scope for further work is found in the area presented in the first part of the book, that of theoretical and cross-cutting issues. Four cross-cutting issues are presented; each one engages with a continuing literature,

adding to a debate and hopefully stimulating further reflection and insight. The topics all raise important questions: how to create resilient communities in areas with known significant hazards (Comfort A4); how to foster enduring organizational learning from disaster events (Valiquette L'Heureux A5); techniques for forecasting major disasters as an aid to planning and prevention (Hur A6) and applying organizational theory to disaster response situations (Tiberghien, Vidal and Arnaud A7).

One line of enquiry is the growing interdependence and complexity of the hazards and vulnerabilities facing individual countries and the international system, in the view of some authors amounting to a category of "catastrophic" disasters. It is tempting to suggest that this is partly a product of growing sophistication in the analytical tools that are available and the maturing of crisis and disaster management as a field of practice and of study, but there is no question that there are transnational – even global – forces that are contributing to more complex situations. In this vein, the implications of population movements and globalization of transportation and communications are all areas for further study; the nature and effects of Climate change, especially as an aggravating factor in natural disasters, is also identified by several authors as needing more attention.

A second line for further enquiry is the challenge of organizational and societal learning; this is a matter of methodology and organization but also of culture and will. The issue arises in the context of every national crisis management environment, but also within individual institutions, on the one hand, and in the international system, on the other. Part of the challenge is that room needs to be made for learning, even in the heat of disaster response, while after an emergency situation has played itself out a natural human tendency is to want to move on and not to dwell on what is now in the past. Closely related to the issue of evaluation and learning is the question of record-keeping and accountability, both during and especially after a disaster event. By definition, "regular" administrative practices and controls are difficult in the midst of a disaster event, even unrealistic, while at the same time massive amounts of public funds and other resources are in play. Decisions and actions taken can and often do have impacts that extend well beyond the time of the disaster, and for that reason alone they need to be recorded and to be accessible afterwards. In any system and under any circumstances, this provides an essential link to the mainstream of public administration and governance, but it also raises

significant risks of corruption and misallocation of resources in the short run and of undermining public administration and governance institutions and practices in the longer run.

Several other topics commend themselves. One is to consider the implications for disaster management of forces that are acting on "mainstream" public administration. An example is the use of technology, both information and communications technologies and more recent developments such as drones, robots, artificial intelligence and data analytics. A different, but potentially related, topic is the question of State and extra-governmental capacity to deal with disasters. The relationship between governance and economic and social development is the subject of extensive research and debate; similar issues play out with respect to disaster management, touching on both public institutions and capacity and that of non-governmental actors including the private sector as well as private citizens. A basic question is how to support them in becoming resilient and self-sufficient in times when core assumptions about the role and relationships of State and society do not apply. Another way of putting it is to ask whether the Japanese model of self-help/co-help/community help is applicable elsewhere and if so what is required in each system in order for it to work?

A different field of study came to the fore during the final stages of preparing the project group's work for publication: while public health is recognized as a sub-field of crisis management, none of the book chapters addresses the related issues to any great extent. While it can be hoped that the COVID-19 (SARS-CoV-2) pandemic is indeed a once-in-a-century occurrence, it illustrates the destructive power of epidemic disease and other public health phenomena.

The book's authors also point to interesting methodological issues. One paper is based on the use of laboratory research, including technologies such as virtual reality in order to examine disaster response methodologies (Tiberghien, Vidal and Arnaud A7); while another uses action research (Comfort A4). The possibilities for using digital network analysis were also discussed in the project group. These developments point to the potential for empirically and experimentally-based research to complement more traditional forms of public administration research.

One further conclusion – but by no means the last word – arises from a question raised by more than one author: how to assess the effectiveness of disaster planning and response? How do we know that we have dealt with a disaster as well as possible, or that we will be able to do better the next time?

These questions are difficult enough for public administration in ordinary times, but they are even more challenging in extraordinary circumstances. Practical questions of criteria, measurement, scope of enquiry and much more present themselves and deserve attention. In the nature of the topic there may never be a fully satisfactory or enduring answer, but as with all aspects of the topics addressed by this volume the search for an answer will be more than justified.

Part F.

Supplementary Material

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Chapter Abstracts

Part A: Cross-cutting Issues in Crisis and Contingency Management

2. Governance and Public Administration Capacities for Crisis and Contingency Management – David Brown (Canada)

The paper seeks to provide a context for the book by discussing two starting points for approaching the governance and public administration dimensions of crisis and contingency management. It begins by looking at the diversity of natural and human-shaped hazards that in certain circumstances can become emergency events and even escalate into disasters (using the terminology discussed in the Introduction to the book) and discusses the open-ended challenges that governments face in anticipating and responding to such events. The second part considers the governance and public administration capacity needed to deal with crises and disasters. This starts with a brief discussion of the emergence of crisis and contingency management as a field of public administration, followed by a more detailed consideration of the elements of a national crisis and emergency management capacity. These elements can be summarized under four broad headings. First, the institutional environment for crisis and contingency management, including planning and provisions for decision-making under stress; a core governance role is to identify the combination of hazards that a jurisdiction faces and related risks and appropriate responses. Second, managing internal and external relationships in preparing for and responding to crises, among them working with directly affected communities and with the international community. Third, administrative considerations, including information and financial management and the role of

the military. Fourth, a supporting organizational and political culture, notably an ability to learn from crisis experiences. These are issues faced by all governments, but they are particularly challenging for those in developing countries.

3. Theoretical Perspectives on Crisis Management – Lauren Touchant and Aaida Mamuji (Canada)

Whether they are human-induced or natural - or a combination of both - disasters defy geographical, social, and cultural boundaries. They wreak havoc on communities where they hit, but can also serve as windows of opportunities for improvement. While entire disciplines are centred on disaster issues, such as Disaster and Emergency Management, there are also sociological, political and international relations lenses that have been applied to uncovering disaster complexity. The literature has discussed typologies of disasters, organizational change induced by disasters, and decision-making in disaster-settings. Case studies have explored disaster-relief coordination efforts, post-disaster lessons-learned, and the role of resilient communities in disaster recovery and mitigation. Horizontal issues such as risk management, organizational learning, leadership perspectives and crisis communications are also addressed. In order to navigate through this wealth of thinking, this chapter provides a modest review of literature looking at theories of disasters and crisis management. It seeks to uncover the foundations on which theories that deal with disasters rest, by discussing: interpretations of disaster, the management of vulnerability, and steps towards a comprehensive disaster theory.

4. Managing Uncertainty in Regions of Risk – Louise Comfort (USA)

Risk from hazards, natural or man-made, constitutes a recurring source of uncertainty for human communities, and represents a long-term, global policy problem. This continuing threat creates a potential for catastrophic disruption and damage to the world's population that escalates as communities at risk increase in size, and the scale of their interactions with other communities expands. With major metropolitan regions such as Tokyo, Istanbul, Jakarta, Mumbai, and Mexico City reaching tens of millions of residents and serving as

centers of global commerce, communication, and transportation, the consequences of seismic events, for example, quickly exceed any national calculus of loss. Yet, the interdependence among global technical, organizational, economic, financial, and cultural systems also creates opportunities for redesigning existing systems into more functional, collaborative systems of systems, in which informed decisions made in one set of operations create the basis for adaptation in others. Seismic risk cannot be eliminated; it stems from the physical movement of tectonic plates, inherent in the basic structure of the earth. But it can serve as a stimulus for rethinking the policies and practices that humans develop as they construct, develop, and manage communities on this restless planet. This chapter will examine, briefly, the impact of information technology in facilitating the processes of planning, coordination, and mobilization of response operations following sudden on-set extreme events, and the potential for enabling communities to manage these hazards more effectively and efficiently.

5. Regulatory Failure and the Theory of Regression: The Lac-Mégantic Crude Petroleum Spill and Human Tragedy – Anaïs Valiquette L'Heureux (Canada)

Every industrial catastrophe is unique. However, each of them reveals something universal about the processes that generate crises and risks. The systemic analysis of the July 6th 2013 Lac-Mégantic train crash and oil spill, that caused the death of 47 persons and the largest land-based oil spill in North America, reveals various vigilance-atrophying processes that future analysis of risk governance networks should consider. The atrophy of vigilance theory is a multilevel framework developed by the late William R. Freudenburg explaining the various factors that interplay in the fomenting of events and processes of environmental destruction. Since organizations involved in the inter-organizational governance network of rail transport-related risks in Canada did not show signs of systemic learning, the author argues that the case study of Lac-Mégantic represents an anomaly that questions the atrophy of vigilance theory. The author proposes an alternate theory that overcomes the limitations in the explanatory potential of the theory of the atrophy of vigilance: the theory of regression.

6. Exploring Possible Catastrophic Disaster Scenarios and Building Korean Disaster Response Systems – Joon-Young Hur (Korea)

How to forecast and properly prepare for large-scale disasters, namely super disasters such as Hurricane Katrina and the 2011 Japan Tsunami, has become one of the top priorities not only in those countries where such catastrophes have occurred, but also in developed countries in general. To find the answers to these questions, this study adopts the methods of future research, notably environmental scanning, Delphi surveys, and scenario-building. On the basis of them, it considers whether the current Korean system of catastrophic disaster response can be improved with respect to disaster laws and institutions, governance structure, practical manuals and disaster education. The conclusions drawn from the analyses can be summarized as follows: Catastrophic disasters include not only traditional disasters (from natural, man-made and social causes), but they should also include new types of disasters (hybrid disasters), which, with the scope of their socio-psychological impact, often go far beyond the capacity of an average national disaster management system and thus seriously affect the economy, politics, culture and society. To cope with such disasters the understanding of a catastrophic disaster should be enhanced, the focus of response should be shifted from treatment on the spot to continuous measures based on basic national functions, an integrated national disaster management system mobilizing all national capacities should be prepared, and lastly networks of national and international cooperative systems based on the participation of all members of a society should be created.

7. Managing the Tension between Control and Mindfulness: The case of Wildland Firefighting in France and the USA – Bruno Tiberghien, Renaud Vidal and Charlène Arnaud (France)

The frequency and impact of large wildland fires have been increasing for the past 20 years, due to the conjunction of three long term-trends: global warming, growing wildland-urban interface and increase in biomass. As a result, enhancing organizational reliability in Incident Management Teams (IMTs) is

becoming increasingly important. Examining how firefighters face large disasters is also relevant for organizational studies and especially for public management, because these situations offer a perspective on organizing for stressful situations. Indeed, firefighters are under conflicting organizational requirements: stability for effective collective action (Control) and change to adapt to the unexpected (Mindfulness).

The central hypothesis of this research is that successful management of these opposite requirements is an important source of operational reliability. The research is based on a comparison between the American West and the South of France and combines several methods: direct observation of firefighting operations in France and the United States, direct observation of the IMTs' training, analysis of available archival data, and controlled experiments on a virtual reality-based simulation training platform. We identified four types of strategies: manipulating, alternating, specializing and diffracting. The U.S. teams, who historically have built an incident management system to contain large forest fires in wildlands, now need to be more pro-active to be able to protect people and structures in wildland-urban interfaces. The French teams, whose organizing mode is oriented towards the principle of massive initial attack, need to upgrade their processes to manage potentially larger and more complex wildland fires.

Part B. International and Regional Collaboration

8. The United Nations System and Disaster Management – Lauren Touchant (Canada)

Disaster Management has since 1971 been at the forefront of the United Nations' interests. The afflictions that hazards have caused in countries have forced national authorities to seek support beyond their borders. The United Nations system has taken on a leadership role, first through the United Nations Disaster Relief Office (UNDRO) and then its successor the United Nations Office for Disaster Risk Reduction (UNISDR), to help countries mitigate and adapt to disasters, in particular natural hazards. Throughout the years, the United Nations role has, with the support of over a hundred member countries, introduced three

successive and increasingly comprehensive regimes: The Yokohama Strategy (1995), The Hyogo Strategy (2005), and The Sendai Strategy (2015). In this chapter, we review chronologically the three strategies, particularly their goals and outcomes. The final pages of the chapter review the most recent UN Strategy, Sendai, which will be in effect until 2030. It demonstrates a needed shift in disaster risk reduction but fails to deliver on linkages with the climate change agenda, which will be an increasingly central challenge in years to come.

9. Coordination of Humanitarian Assistance within Donor Countries: A Canadian Perspective – Aaida Mamuji (Canada)

On January 12 2010, an earthquake of 7.0 magnitude on the Richter scale hit Port au Prince, Haiti. Canada's whole-of-government approach for response to natural disasters abroad was immediately set in motion. Less than twenty-four hours after the earthquake struck, Canadian personnel were on the ground assessing needs and ascertaining how best to match Canadian resources and capabilities to the humanitarian crisis at hand. Canada mobilized resources from fourteen federal departments and agencies and deployed over 2000 Canadian Forces personnel to aid in relief efforts. A fund to match donations made by the Canadian public was also launched, and the views of civil society organizations were incorporated when recommendations for relief were developed. This chapter presents a comprehensive analysis of the Canadian model for disaster-relief, highlighting both strengths and weaknesses. It argues that a well-coordinated international humanitarian effort is contingent upon proper internal coordination and efficiency of participating parties, including individual donor countries. Canadian experience offers insights for achieving: i) structural and ideational coherence; ii) joint interdepartmental decision-making; iii) shared accountability; and, iv) incorporation of civil-society when engaging in disaster-relief interventions. A cautionary note about use of military assets for relief operations is also sounded. As was arguably the case during Canada's response to the 2010 Haiti earthquake, political incentives for increased military support may serve domestic political interests over the needs of those in the disaster-affected region. Donor countries need to control the unpredictability

and arbitrariness in humanitarian assistance that can result from politically motivated disaster-relief decisions.

10. Space Tools in the Management of Terrestrial Disasters – Chris de Cooker (the Netherlands)

Space tools have become very important for a better understanding of the processes that influence our planet. They also contribute to disaster preparedness, mitigation and early warning. They have become crucial during disaster emergency relief operations, providing essential information to both decision-makers and relief workers. They are much in use during the follow-up recovery and reconstruction phases. The role of the space agencies themselves has become essential during and immediately after major disasters, when they provide up-to-date information concerning the zone struck by a disaster. The space community has in this respect adopted an International Charter on Space and Major Disasters, in which all participating space agencies are committed to provide the necessary data on a priority basis to any country or region requesting them during a disaster.

Such use of space technologies in disaster management is relatively new and still unknown to many, given that the exploration and "use" of outer space is, in fact, still young. Data are collected and analysed and turned into information. This requires extensive knowledge of the tools. More capacity building in the use of space tools in support of disaster management is therefore required, in particular at the users' end in order to make full use of the remote sensing products.

11. Civil Security Systems of the Visegrad Group: the Challenge of Adjustment – Vera–Karin Brazova, Piotr Matczak and Viktoria Takacs (Czech Republic/Poland)

The chapter deals with the civil security systems of the Central European Visegrad Group (V4) countries (Czech Republic, Poland, Slovakia and Hungary) and their capacity to deal with risks. It builds on both geopolitical similarities, as well as on the similar nature of threats that these countries are facing.

Historically, before the year 1989, security systems were closely related to military threats and the prevailing concept was the civil defense. After 1990, with the collapse of communism, the systems were gradually adjusted to the changed circumstances as well as to the new types of risks that emerged. The chapter starts with an outline of the most typical threats in all four countries after which the reaction of their civil security systems to "signature crises" is mapped. The case of large floods of 2002 and 2010 is then taken to illustrate the functioning of crisis management in practice as well as the most important lessons learned. Finally, the issue of regional cooperation is addressed. The chapter concludes that the civil security systems of the V4 countries are now in place and relatively well capable of dealing with emergencies, be it alone or within the framework of bilateral or international (EU, NATO) cooperation. Despite a large number of similarities, all of the four countries encountered somewhat different challenges in their adjustment. While the performance is assessed positively in the Czech Republic and Poland, in Slovakia and Hungary more lessons were learned, followed by changes to their civil security systems.

Part C. National Institutional Capacity Case Studies

12. Managing Disasters in Developing Countries: Perspectives from Ghana – Augustina Adusah-Karikari and Patrick Tandoh-Offin (Ghana)

Ghana as a developing country has had its fair share of the common disasters and crises such as flooding, ethnic clashes, and in recent times, an airline crash, industrial accidents and fire outbreaks. Our aim is to discuss the disaster management framework and strategies that serve as a guide for eliminating or reducing risks in Ghana and ascertain if these existing frameworks and strategies are sufficient in dealing with major disasters. In this chapter we present an analysis of the national capacities for responding to three recent disaster events namely flooding, airplane, and the Melcom building disasters, in Ghana. We also subject the overall approach and institutional resources employed in the relief efforts to critical evaluation for public management effectiveness in dealing with

disasters and emergencies in the developing world. Ghana has institutional frameworks in this field, but these arrangements have not been matched by the willpower to implement and enforce statutes that prevent or minimize the impact of disaster events. The capacity of national and district institutions charged with managing disasters can be considered to be low and weak. In spite of the institutional coordination failures for implementation and enforcement of compliance, the agencies designated to deal with emergencies in Ghana demonstrated some strengths and potential to be effective. Meanwhile, with huge technological innovations, Ghana stands to benefit from the increasing application of technology in mitigating disasters, and from easy access to well-documented internationally accepted best practice approaches for responding to disaster events.

13. Disaster Management in India: Governance Issues and Challenges - R.K. Mishra and Geeta Potaraju (India)

World-wide there are grave concerns about natural disasters, and in the past couple of years many nations have been wrecked by disasters. This paper highlights the vulnerability of India to natural disasters and the initiatives taken by the Government of India in managing disasters and in building the country's preparedness to deal with them. The paper highlights the steps taken to integrate disaster management into public policy making and to involve vulnerable communities in the planning and design of disaster management. The various measures taken by the government to strengthen required infrastructure and especially technology to deal with various emergencies is discussed in detail. The role of various State Governments (the federal units) in India is also explained and some best practices from states, including their Community-Based Approaches, are elaborated.

14. Living on a Disaster-prone Country: Institutional Arrangements and Capacities of Disaster Management in Japan – Masao Kikuchi (Japan)

Japan is one of the most natural disaster-prone countries, with hazards including earthquakes, typhoons, and heavy snow. Reflecting a series of natural disasters and ultimate sacrifice, the Japanese government has been accumulating institutional capacities for disaster management throughout its history. One of the key characteristics of institutional capacity for crisis management in Japan is that it is mostly located in local government (municipalities), not in the central government. While central government primarily has coordination and communications roles, both disaster management capacities, such as equipment and officials, and authority to issue evacuation advisories and orders to residents, are vested in local government. Nevertheless, there are limitations on the ability of local governments to respond immediately to large scale disasters on their own. Inter-municipal cooperation as an interdependence scheme of resources among municipal governments is well developed in Japan. In addition to cooperation in police and fire services among local governments, mutual cooperation agreements for sending necessary equipment and general service staff are common; these functioned well in a large-scale natural disaster such as the Great East Japan Earthquake. Disaster management is a complex process and there needs to be collaboration with various non-governmental organizations and voluntary organizations. There is a growing number of voluntary disaster prevention organizations and collaboration between local government and private companies in each locality. As local government finance is deteriorating due to demographic changes, approaches to establishing sustainable public private partnerships to compensate for weakening government capacities in an appropriate manner are necessary.

15. Crisis and Contingency Management System in Poland – Piotr Matczak and Jacek Czaputowicz (Poland)

The chapter analyses the Polish civil security system, presenting its evolution after 1990 (the beginning of the post-communist era). It starts by characterising the main hazards occurring in Poland and the major disasters that have

influenced the system. The evolution of the legal framework is also introduced. After presenting constitutional and legal aspects, the chapter discusses the institutional structure at different levels as well as the role and the interaction of governmental, non-governmental and private actors. The Act on Crisis Management defines the organisational structure, while the national rescue and firefighting system comprises the main operational resources. The civil security system was profoundly changed after 1990, however it is still being rebuilt. The efficiency and effectiveness of the system have only occasionally been reviewed. The most recent disasters (particularly the flood of 2010) demonstrate that the division of responsibilities among institutions is not clear. The international context, i.e., cooperation with neighbouring countries and mutual assistance through international organisations, is also presented. The European Union has had a profound influence on the shape of the system, as Poland's accession to the European Union (2004) was a major shift in the country's legal framework. Finally, lessons learned and proposals to improve the system are presented, emphasizing the need to clarify responsibilities.

16. Disaster Prevention and Recovery System: The Lessons and Experience in Taiwan and Japan - Chung-Yuan Jan, Tzung-Shiun Li, Chun-Yuan Wang and Yan-Yi Chang (Taiwan, China)

Taiwan and Japan are two of the most vulnerable places on the earth, where various natural disasters in past decades have led to significant loss of life and damage to the economy. Developing a more effective disaster management system has become a major task for both governments. After Typhoon Morakot, which hit Taiwan in August 2009, and a major earthquake occurring in Japan on March 11, 2011, the disaster prevention and recovery systems in Taiwan and Japan have been reformed. This article analyzes the lessons of these two serious natural disasters for the governments of Taiwan and Japan, and provides some suggestions for future reform. First, we note the importance of collaborative governance in disaster management. Secondly, we argue that citizens and the private sector should also share responsibility for disaster management.

Part D. Crisis Case Studies

17. Right to Security and Safety and the Role of Professionals: Lessons from the Italian L'Aquila Earthquake – Hiroko Kudo (Italy/Japan)

In 2012, an Italian court found guilty the members of a risk analysis committee who met just before the deadly 2009 L'Aquila earthquake and decided not to alarm the residents. The court ruling caused international debate on the role of scientists, scientific experts, and government authorities in such situations, when a small group of professionals makes scientific judgments about risks. The ruling was strongly criticized by the international scientific community but welcomed by many Italian juridical experts and government officials, especially on the grounds that it clarified the responsibilities of experts and government authorities. Identifying responsibility for damages from natural disaster is not an easy task. Previous convictions of politicians have been based on evidence of corruption and/or negligence during and after the event rather than failure to inform residents about possible risks in advance.

The paper addresses three research questions: the distribution of responsibility among government bodies and officials in case of natural disaster; whether citizens have the right to security and safety as a fundamental right, and if so how it can be exercised; and, if government is responsible for the citizen in case of natural disaster, how should it act? The paper answers these questions – in order to clarify the characteristics of L'Aquila – through an analysis of the 2012 court ruling and subsequent interpretations, interviews with Italian public law experts, an examination of critiques by international scientific communities, and comparison with international cases in which local political representatives were found guilty.

18. The tragedy of the Serrana region in the State of Rio de Janeiro in 2011: looking for answers – Amarilis Busch and Sonia Amorim (Brazil)

This case study analyzes the variables and actors involved in the crisis management of the Serrana region landslide disaster in the state of Rio de Janeiro, in January 2011. It reconstructs the process of immediate response to the tragedy by the actors involved, addressing at the same time historical prevention problems in the region and the difficulties in the reconstruction process of affected areas. Having as background the Brazilian federal system, it deals with complex issues such as coordination and collaboration among federal, state and municipalities entities, proposing reflections that enable the creation or improvement of public policy instruments for effective risk and disaster management in Brazil.

19. Great East Japan Earthquake Disaster in 2011: Lessons in Public Management – Mika Shimizu and Toshiyuki Yasui (Japan)

The Great East Japan Earthquake Disaster (The Tohoku Disaster) in March 2011 has posed a daunting structural challenge for public management (management in the public domain including practices, institutions and processes at the national governmental level). The challenge is so interconnected and complex that traditional public management alone cannot cope with it in a timely and appropriate manner. This chapter reviews the Tohoku Disaster through lenses of the nexus of complex disasters and public management. Drawing on case studies, the chapter identifies the kinds of challenges presented by the Tohoku Disaster and the gaps between the governmental responses, or efforts, and better roles of public management. Based on the analysis, the chapter highlights the fact that (1) traditional public management has hindered effective disaster management in different ways, and (2) a stove-piped and fragmented approach led to an ad-hoc and ineffective response to interconnected disaster risks. To overcome these challenges, the authors provide policy implications and suggestions for a resilience-based public management, especially in addressing interconnected disaster risks. These include that (i)

existing public management needs to incorporate a more systemic (holistic and resilience-based) approach to adapt to large-scale and complex disaster risks, and (ii) the conventional fragmented and ill-coordinated approach lacks resilience and capability to allocate resources in an appropriate and timely manner. These implications and suggestions may be applicable not only to Japan but also internationally.

20. Local Government's Approaches to Acquiring Professional Staff for Crisis Management in Japan – Koichi Kawai (Japan)

Local governments require a large number of civil servants for crisis management and reconstruction, not least when a wide-scale natural disaster occurs. This is a particular problem for municipal government, and many Japanese municipal governments in the damaged areas requested the massive dispatch of public officers after the Great East Japan Earthquake in March 2011. However, it is hard for municipal governments to secure such staff with extreme urgency. This is because every municipal government has chronic shortages of human resources in Japan. In addition, obtaining a large number of officers, notably staff with the required expertise, is not feasible for local governments under severe budget constraints.

This chapter identifies the approaches and institutions that the affected municipal governments used to secure large number of necessary staff after the Great East Japan Earthquake in Japan. It also seeks to understand the operating situation in obtaining these staff. Through analysis, we show that those municipalities secured necessary human resources by accepting staff dispatched from multiple municipalities that are remotely located – that is, by building and utilizing multi-layered disaster countermeasures. In addition, we show that the type of expertise required of the civil service changes depending on the stage of recovery process after a disaster. Lastly, the conclusion points out the implications and the resulting practical agenda, both in Japan and internationally. These discussions are essential in terms of disaster research as well as disaster response practices.

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