



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700342.

**Topic: DRS-10-2015: Disaster Resilience & Climate Change topic 2:
Natural Hazards: Towards risk reduction science and innovation plans
at national and European level**

Project number: 700342

**Project name: *Enhancing Synergies for disaster Prevention in the
European Union***

Project acronym: ESPREsso

Start date: 01/05/2016

Duration: 30 months

**Deliverable reference number and title:
D5.4 ESPREsso Guidelines**

Version: FINAL

**Due date of deliverable:
31/10/2018**

**Actual submission date:
31/10/2018**

Dissemination Level		
PU	Public	X
CO	Confidential, only for members of the consortium (including the Commission Services)	
EU-RES	Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)	
EU-CON	Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)	
EU-SEC	Classified Information: SECRET UE (Commission Decision 2005/444/EC)	

Oct.
2018

ESPRESSO Guidelines



ESPRESSO

Enhancing Risk Management Capabilities Guidelines

(October 2018)



ESPRESSO

Enhancing Synergies for disaster PREvention
in the EurOpean Union

Guidelines

Cover and illustrations design: Satz & Logo, ESPREsO project
Layout: Satz & Logo

Legal notice

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700342. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Project Coordinator: Giulio Zuccaro (AMRA)
Project Officers: Denis Peter, Nicolas Faivre (since July 2018)
Partners: Analysis and Monitoring of Environmental Risk (AMRA Scarl)
German Committee for Disaster Reduction (DKKV)
Helmholtz-Centre Potsdam (GFZ) German Research Centre for Geosciences
Swiss Federal Institute of Technology in Zurich (ETHZ)
The French Geological Survey (BRGM)
University of Copenhagen (UCPH)
University of Huddersfield (HUD)

Copyright notice

© ESPREsO - Enhancing Synergies for Disaster Prevention in the European Union, 2018.
Reproduction is authorised provided the source is acknowledged.

More information on the ESPREsO Project is available on the internet
(www.espressoproject.eu).

ISBN 978-88-943902-0-9
ISBN-A 10.978.88943902/09

Recommended citation: Lautä, K. C., Albris, K., Zuccaro, G., Grandjean, G., (Eds.) (2018).
ESPRESO Enhancing Risk Management Capabilities Guidelines. Available at:
www.espressoproject.eu.



Table of Contents

Acknowledgements		5
Preface:	About these guidelines	8
Introduction:	Disaster risk management for the 21st century	11
Chapter 1:	Sharing knowledge	15
Chapter 2:	Harmonizing capacities	21
Chapter 3:	Institutionalizing coordination	29
Chapter 4:	Engaging stakeholders	35
Chapter 5:	Leveraging investments	43
Chapter 6:	Developing communication	51
Summary:	Recommendations and checklist questions	57
References		63
Figure credits		65
Appendix	Foldout poster of ESPREssO guidelines	66



ESPRESSO

Enhancing Risk Management Capabilities Guidelines



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700342. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Acknowledgements

These guidelines illustrate results and findings from the ESPRESSO project “Enhancing Synergies for Disaster Prevention in the European Union” (www.espressoproject.eu), a Coordination and Support Action for the European Commission which has received funding from the European Union’s Horizon 2020 Research and Innovation programme under grant agreement No. 700342.

The ESPRESSO Consortium:

Angela Di Ruocco, Mattia Federico Leone, Lucia Malafrente, Casimiro Martucci, Alfonso Rossi Filangieri, Giulio Zuccaro, Analysis and Monitoring of Environmental Risk (AMRA Scarl), Italy
 Kevin Fleming, Stefano Parolai, Bojana Petrovic, Massimiliano Pittore, Helmholtz-Centre Potsdam (GFZ) German Research Centre for Geosciences, Germany
 Jaime Abad, Audrey Baills, Gilles Grandjean, Susanne Ettinger, Nicolas Chauvin, The French Geological Survey (BRGM), France
 Gonzalo Barbeito, Jaqueline Hemmers, Sina Marx, Stefan Pickl, Lynn Schüller, Reimund Schwarze, Benni Thiebes, Annegret Thieken, German Committee for Disaster Reduction (DKKV), Germany
 Laura Booth, Anna Scolobig, Swiss Federal Institute of Technology in Zurich (ETHZ), Switzerland
 Dilanthi Amaratunga, Nuwan Dias, Georgina Clegg, Richard Haigh, University of Huddersfield (HUD), UK
 Kristoffer Albris, Maja Fisker Kielberg, Kristian Cedervall Lauta, Emmanuel Raju, University of Copenhagen (UCPH), Denmark

The ESPRESSO Enhancing Risk Management Capabilities, edited by Kristian Cedervall Lauta, Kristoffer Albris, Giulio Zuccaro, Gilles Grandjean, were written and compiled by:

Kristian Cedervall Lauta, Kristoffer Albris, University of Copenhagen (UCPH), Denmark
 Giulio Zuccaro, Mattia Federico Leone, Casimiro Martucci, Analysis and Monitoring of Environmental Risk (AMRA), Italy
 Gilles Grandjean, Audrey Baills, The French Geological Survey (BRGM), France
 Lynn Schueller, Annegret Thieken, Jaqueline Hemmers, Benni Thiebes, Reimund Schwarze, Stefan Pickl, German Committee for Disaster Reduction (DKKV), Germany
 Laura Booth, Anna Scolobig, Swiss Federal Institute of Technology in Zurich (ETH), Switzerland
 Kevin Fleming, Helmholtz-Centre Potsdam (GFZ) German Research Centre for Geosciences, Germany
 Dilanthi Amaratunga, Nuwan Dias, Georgina Clegg, Richard Haigh, University of Huddersfield (HUD), UK

The Coordinator Prof. Giulio Zuccaro and the partners of the ESPRESSO Consortium wish to thank the Project Officers and the Advisory Board for their precious support along the project:

Denis Peter	European Commission (EC) (from May 2016 to June 2018)
Nicolas Faivre	European Commission (EC) (from July 2018 to October 2018)
Daniela Di Bucci	National Department of Civil Protection, Italy
Abhilash Panda	United Nations International Strategy for Disaster Reduction (UNISDR)
Bridget Hutter	London School of Economics and Political Science, UK
Jochen Zschau	Helmholtz-Centre Potsdam (GFZ) German Research Centre for Geosciences, Germany
Alberto Alemanno	School of Management (HEC Paris), France

Francois Gerard	French Association for the Prevention of the Natural Disasters (AFPCN), France
Jerry Velazquez	United Nations International Strategy for Disaster Reduction (UNISDR)

Moreover, we wish to thank all the external contributors that have actively participated as stakeholders to the ESPRESSO's networking events and workshops in the last three years, showing a great interest in identifying relevant gaps, needs and possible solutions in the fields of Disaster Risk Reduction and Climate Change Adaptation:

Virginie Audige	Regional Directorate for Environment, Development and Housing (DREAL) Nouvelle-Aquitaine, France
Franco Barberi	Roma Tre University, Italy
Peter Baxter	Cambridge Institute of Public Health, UK
Sukaina Bharwani	PLACARD Project, The Stockholm Environment Institute (SEI), Sweden
Maria Luisa Carapezza	National Institute of Geophysics and Volcanology (INGV), Italy
Maksim Cipi	University of Tirana, Albania
Dug Cubie	University College Cork (UCC), Ireland
Glenn Fieldhouse	Environment Agency (EA), UK
Clemente Fuggini	RINA Consulting (formerly D'Appolonia), Italy
Kate Green	Greater Manchester Resilience Forum (GMRF), UK
Joske Houtkamp	PLACARD Project, University Utrecht, The Netherlands
Alessandro Jazzetti	Court of Appeal of Naples, Italy
Niels Johan Juhl-Nielsen	Nordic Advisory Team (NAT), Denmark
Richard Klein	The Stockholm Environment Institute (SEI), Sweden
Markus Leitner	Environment Agency, Austria
Orsola Lussignoli	Federal Ministry for Economic Cooperation and Development (BMZ), Germany
Maya Manocsoc	German Federal Environment Agency (UBA), Germany
Paola Mercogliano	Italian Aerospace Research Centre (CIRA), Italy
Davide Miozzo	CIMA Research Foundation, Italy
Jaroslav Mysiak	Euro-Mediterranean Center on Climate Change (CMCC Foundation), Italy
Maria Laura Nardinocchi	RINA Consulting (formerly D'Appolonia), Italy
Augusto Neri	National Institute of Geophysics and Volcanology (INGV), Italy
Roland Nussbaum	"Association Française pour la Prévention des Catastrophes Naturelles" (AFPCN), France
Boris Orłowski	CARITAS, Switzerland
Chantal Pacteau	University Pierre and Marie Curie (UPMC), France
Filomena Papa	Italian Civil Protection Department, Italy
Rodolphe Pannier	European Center for Flood Risk Prevention (CEPRI), France
Massimo Pecci	Department of regional affairs and autonomies, Italy
Jon Percival	Greater Manchester Resilience Forum (GMRF), UK
Roberto Peruzzi	Kurmann Cretton Engineers, Switzerland
Mário Pulquério	PLACARD Project, University of Lisbon, Portugal
Jean-Christophe Putallaz	AMARIS Project, Switzerland
Chaim Rafalowski	National emergency medical, disaster, ambulance and blood bank service "Magen David Adom" (MDA), Israel
Jakob Rhyner	United Nations University (UNU), Germany


Florian Roth	Swiss Federal Institute of Technology in Zurich (ETHZ), Switzerland
Olivier Rubin	Roskilde University (RUC), Denmark
Reimund Schwarze	Helmholtz-Centre for Environmental Research (UFZ), Germany
Yves Steiger	Federal Department of Defence, Civil Protection and Sport (DDPS), Switzerland
Roger Street	University of Oxford, UK
Christine Tobler	Cantonal Emergency Organization (KKO), Basel-Stadt, Switzerland
Lucio Trifiletti	PLINIUS Study Centre, University of Naples Federico II, Italy
Tomasz Walczykiewicz	Institute of Meteorology and Water Management (IMGW-PIB), National Research Institute, Poland

Finally, a special thanks goes to the members of the international community who have devoted a great effort in reviewing and integrating the ESPRESSO Enhancing Risk Management Capabilities Guidelines:

Roger Street	University of Oxford, UK
Mário Pulquério	PLACARD Project, University of Lisbon, Portugal
Daniela Di Bucci	National Department of Civil Protection, Italy
Abhilash Panda	United Nations International Strategy for Disaster Reduction (UNISDR)
Roberto Basili	National Institute of Geophysics and Volcanology (INGV), Italy
Peter Baxter	Cambridge Institute of Public Health, UK
Kelvin R. Berryman	Institute for Geological and Nuclear Sciences (GNS Science), New Zealand
Clemente Fuggini	RINA Consulting (formerly D'Appolonia), Italy
Niels Johan Juhl-Nielsen	Nordic Advisory Team (NAT), Denmark
Markus Leitner	Environment Agency, Austria
Augusto Neri	National Institute of Geophysics and Volcanology (INGV), Italy
Rodolphe Pannier	European Center for Flood Risk Prevention (CEPRI), France
Massimo Pecci	Department of regional affairs and autonomies, Italy
Chain Rafalowsky	National emergency medical, disaster, ambulance and blood bank service "Magen David Adom" (MDA), Israel, Israel
Olivier Rubin	Department of Social Sciences and Business, Roskilde University (RUC), Denmark
Thanasis Sfetsos	"Demokritos", Greece
Robin Spence	University of Cambridge, UK
Tomasz Walczykiewicz	National Hydrological and Meteorological Service, Poland
	Roskilde University (RUC), Denmark

To the memory of Paolo Gasparini, whose commitment and tenacity in the scientific research have been inspiring this project so as generations of researchers.

The Project Coordinator
Prof. Giulio Zuccaro



Preface

About these guidelines

These guidelines, together with the ESPRESSO Vision Paper (deliverable D5.5 “ESPRESSO Vision Paper”) are the final outputs of the project ESPRESSO - “Enhancing synergies for disaster prevention in the European Union”, a Coordination and Support Action funded by DG RESEARCH under the H2020 Programme. ESPRESSO’s aim is to contribute to a new strategic vision on disaster risk reduction (DRR) and climate change adaptation (CCA) in Europe and to promote new ideas upon which a future roadmap and agenda may be based for natural hazard research and policymaking over the next ten years in light of changing climatic patterns and new risk landscapes. More details can be found on the project website (www.espressoproject.eu).

The project has focused on three main challenges by proposing ways to identify gaps in the capability of member states to overcome barriers in enacting disaster management, risk reduction and mitigation within the EU:

- Challenge 1: Integrating Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR), to propose ways to create more coherent national and European approaches to DRR, CCA and resilience strengthening;
- Challenge 2: Integrating Science and Legal/Policy issues in DRR and CCA, to enhance risk management capabilities by bridging the gap within these domains at the local and national levels in six European countries;
- Challenge 3: Improving national regulations to prepare for transboundary crises, to address the issue of efficient management of crises requiring a coordinated effort from two or more countries in the EU, and/or the support of the EU Civil Protection Mechanism.

These guidelines on enhancing risk management capabilities have been drafted in light of the call made in the Decision on a Union Civil Protection Mechanism for EU Member States to assess their risk management capabilities. In ‘the Decision’, risk management capabilities are defined as “the ability of a Member State or its regions to reduce, adapt to or mitigate risks (impacts and likelihood of a disaster), identified in its risk assessments to levels that are acceptable in that Member State”¹. Other guidelines on the assessment of risk management capabilities have been formulated, including by the EU itself, namely the Risk Management Capability Assessment Guidelines².

1 European Parliament. 2013. Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism, pp. 919. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D1313&from=EN>

2 European Commission. 2015. Risk Management Capability Assessment Guidelines (2015/C261/03). Official Journal of the European Union. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015XC0808\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015XC0808(01)&from=EN)

The EU guidelines share important key messages with our own proposals. Yet, the present guidelines also add new dimensions by insisting on the need for a stronger governance focus, aiming at enhancing risk management capabilities rather than assessing them.

These guidelines are based on a body of knowledge acquired through a number of different research and participatory activities in the ESPRESSO project.

First, the ESPRESSO project partners have reviewed the published literature and interviewed key stakeholders within the domains of disaster risk management (DRM) and CCA. These stakeholders include academics, government officials, NGO representatives, independent consultants, and others. This research resulted in country reports for Italy, Denmark, Germany, Switzerland, France and the United Kingdom, and involved analysing legal, policy and scientific approaches to DRM and CCA in each country. Similar reports were produced for the EU and the global levels. A synthesis of the main gaps, needs and barriers present under the three ESPRESSO challenges as found in these reports were compiled in a synthesized report³. Second, ESPRESSO hosted four events with the participation of the project's stakeholders, who included disaster management practitioners, policymakers, academics and NGO representatives. At the Stakeholder Forum in Bonn, Germany, on May 4th, 2017, stakeholders contributed their perspectives on the three ESPRESSO challenges in plenum and focus group discussions. Additionally, three Think Tanks were held in Berlin, Germany, on October 12th, 2017, in Zurich, Switzerland, on January 21st, 2018, and in Naples, Italy, on April 24th, 2018. During these three events, project members and stakeholders engaged in a serious game based on a table top scenario exercise, known within the project as RAMSETE (Risk Assessment Model Simulation for Emergency Training Exercises⁴) prepared and designed to stimulate discussions about each of the three challenges, which was then followed by an open forum. Third, the ESPRESSO team set up an Action Database ('the ADB'), an online repository for collecting actions relevant for addressing the three challenges. Here, stakeholders and other relevant actors were invited to insert good case histories and good practices. The ADB was also used to harvest and systematize outputs from the Think Tanks and the other outputs from the project. This has been summarised in a report outlining the results of the ADB⁵. Fourth, an online questionnaire survey was conducted where stakeholders were invited to answer a range of questions to elicit their perspectives on the needs and key priorities for disaster prevention, generating 100 responses from 13 different countries⁶.

-
- 3 ESPRESSO. 2017. Overcoming obstacles for disaster prevention: Challenges and best practices from the EU and beyond. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D2.2_FINAL.pdf
 - 4 ESPRESSO. 2018. Report on existing methodologies for scenario development and stakeholders knowledge elicitation. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D3.2.pdf; ESPRESSO 2018 Scenario Design Toolbox. http://www.espressoproject.eu/images/deliverables/ESPRESSO_D3.3.pdf.
 - 5 ESPRESSO. 2018. Proposal of solutions to overcome the three ESPRESSO challenges. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D4.7_final.pdf.
 - 6 ESPRESSO. 2018. Stakeholder Engagement process - understanding stakeholders needs, perspectives and opinions, and identifying the priorities of stakeholders for innovation. Available at: <http://www.espressoproject.eu/dissemination-results/deliverables.html>. Respondents from the following countries participated in the survey: Denmark, Germany, Hungary, Switzerland, UK, France, Sweden, Italy, Austria, Portugal, Jordan, Slovenia and Romania.

The insights gained from all of the above research and outreach activities have been used as the basis for developing these guidelines. In addition, key policy documents, frameworks and studies regarding disaster prevention, management, risk reduction and climate change adaptation, including the Sendai Framework for Disaster Risk Reduction 2015 - 2030⁷ and the EU's Action Plan on Sendai⁸, have been closely consulted.

7 United Nations. 2015. The Sendai Framework for Disaster Risk Reduction 2015 – 2030. Available at: https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

8 European Commission. 2016. Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030 A disaster risk-informed approach for all EU policies. Brussels, 17.6.2016 SWD(2016) 205 final/2. Available at: http://ec.europa.eu/echo/sites/echo-site/files/1_en_document_travail_service_part1_v2.pdf

Introduction

Disaster risk management for the 21st century

Over the last 30 years, societies have become increasingly efficient at *managing* natural hazards. Nevertheless, global vulnerability has increased dramatically because of population growth, urbanization and the increasing dependence on infrastructure. Europe is no exception in this regard. In order to reduce risks further in the future, Europe needs to address three challenges:

Climate change and variability is changing the world, and with it, the disaster risk profile for Europe⁹. This means that more extreme weather events, probably including in locations traditionally well shielded from such hazards, are to be expected. The complexities that climate change brings with it, and the difficulties associated with measuring its impacts, will also influence the ability to forecast, model and ultimately manage natural hazards. European platforms for cooperation in forecasting and warning, such as COPERNICUS, are showing a path forward. Yet, the forest fires that ravaged the Iberian Peninsula in 2017 and those that surprised Scandinavia in 2018 are but a few indicative examples of the potentially disruptive future that will force EU states to be more proactive across the board.

European societies are becoming more complex. In order to mitigate disaster risks today, it is not enough merely

to have the means to respond to a hazard or damaging event. An advanced understanding of all aspects of a modern, technological society, from electricity systems, urban planning, public risk awareness and their attitudes to such risks, and governmental structures is needed¹⁰. Thus, responding effectively to natural hazards means involving all parts of society: citizens, NGOs, the private sector, the academic community, the insurance industry, as well as all entities within national and sub-national governments, including the various governance levels tasked with civil protection. Finally, because disasters can cross national boundaries, it is important to strengthen the role of the EU in finding common solutions and ways forward for individual states.

Because of these changes, the *consequences of events are getting more complex*, and as a result, the ability to prepare and respond to them is today a complex task. A flood today, for example, affects not only homes and people, but also infrastructure and industries, which in turn may impact regions distant from the areas directly affected. Managing disasters is, in other words, ultimately about risk management and reduction, and we are beginning to realize that in order to do so, we need long-term strategies with the aim of building resilient institutions, human systems and societies that are able to both absorb shocks, and to recover from them in a way that makes society as a whole stronger.

9 European Environment Agency. 2018. National Climate Change Vulnerability and Risk Assessments in Europe, 2018. Available at: <https://www.eea.europa.eu/publications/national-climate-change-vulnerability-2018>

10 European Commission. 2017. Commission Staff Working Document Overview of Natural and Man-made Disaster Risks the European Union may face. Brussels, 23.5.2017 SWD (2017) 176 final. Available at: http://ec.europa.eu/echo/sites/echo-site/files/swd_2017_176_overview_of_risks_2.pdf

Objectives of the guidelines: from management to governance

These guidelines take as their point of departure the idea that in order to enhance the risk management capabilities of countries and the institutions responsible for carrying out disaster risk management tasks, new ways and forms of governance must be utilized.

“From management to governance” is an often used dictum, and is embodied in priority two of the Sendai Framework, “Strengthening disaster risk governance to manage disaster risk”. The presumption of these guidelines is that governance is central to a 21st century form of DRM. This is increasingly becoming clear as the field of actors in DRM is expanding and becoming more complex¹¹, and as the private sector and civil society will play larger roles in the future, not least as a consequence of the focus on resilience¹². Disaster risk governance means using governance measures to support disaster risk management and risk reduction activities¹³. For instance, rather than only addressing disasters by strengthening emergency response actors or building preventive measures such as dikes, disaster risk governance means arranging, coordination and organizing activities, priorities and strategies across all sectors and domains of society with the intent

of reducing and managing disaster risks. The key message embodied in the following guidelines is thus that governance measures are needed to optimize disaster risk reduction, preparedness, prevention, and response.

The above statements also imply that EU Member States must develop a new set of capabilities. While it remains crucial to have expert knowledge on the traditional DRM cycle and its associated phases (i.e., response, recovery, prevention, preparedness), legislative frameworks and a strong organizational structure enforcing it, new sets of skills, tasks and duties such as a cross-sectoral coordination and public engagement activities must be developed to meet the challenges of the current century. Although the DRM model should be seen as a model *for* managing disasters rather than a model *of* the way they unfold, the four phases in the cycle can never in reality be discretely separated, but will always overlap. The DRM cycle has nonetheless been a useful model for emergency managers and planners to deal with and prepare for any type of emergency. It is therefore crucial to improve upon it.

In acknowledging this fact, these guidelines address how governance and management measures can support work in each of the DRM phases and across them. Enhancing risk

11 Tierney, K. 2012. Disaster Governance: Social, Political, and Economic Dimensions. *Annu. Rev. Environ. Resource* 37, pp. 341–63.

12 Chandler, D. 2014. Resilience: The Governance of Complexity. *Critical Issues in Global Politics* 7. London/New York: Routledge.

13 This is a definition of disaster risk governance that resonates quite closely with the scientific literature. For instance, the sociologist and leading disaster risk expert Kathleen Tierney defines disaster risk governance as consisting of “the interrelated sets of norms, organizational and institutional actors, and practices (spanning predisaster, transdisaster, and postdisaster periods) that are designed to reduce the impacts and losses associated with disasters arising from natural and technological agents and from intentional acts of terrorism.” (Tierney 2012: 344).

management capabilities is thus about adjusting, investing in, and prioritizing the measures by which we can address actions within the DRM phases through governance.

The target audience of these guidelines are the EU Member States, and specifically public officials and institutions that produce national risk assessments, emergency response plans and civil protection frameworks. The guidelines should be seen as a set of recommendations, and checklist questions that Member States can use as a common starting point are included in this document. At the same time, however, the guidelines also aim to provide input to *all levels of government*, making them relevant not only at the federal or national level, but also at the sub-national (regional and municipal) levels. In effect, the guidelines are scalable, making them relevant for anyone working with the risks identified from natural hazard and vulnerability assessments, across the sectors of DRM, disaster risk reduction (DRR), CCA and sustainable development. Where necessary, the guidelines specify degrees of relevance for the various governance levels and sectors.

The SHIELD model

These guidelines are built around what is referred to as the SHIELD model (see Figure 1), developed by the ESPEssO team. This model encompasses a set of general recommendations for how to optimize risk management capabilities through disaster risk governance. As illustrated, the six domains in the model revolve around the four traditional DRM phases, highlighting how practices involved in response, recovery,

prevention and preparedness are themselves dependent upon a range of institutions, policies and structures. The model thus illustrates the interlinkages and interdependencies between management and governance in DRR and CCA.

Each chapter of these guidelines covers one theme of the SHIELD model. Chapter 1 concerns how *sharing knowledge* can support DRR and CCA. Chapter 2 deals with *harmonizing capacities* across regions and municipalities within Member States. Chapter 3 discusses *institutionalizing coordination* for both prevention and response, including the perspective of transboundary crisis management in the EU. Chapter 4 is concerned with the challenge of *engaging stakeholders* in DRR work, while chapter 5 deals with the difficult subject of *leveraging investments*. Finally, chapter 6 addresses the issues of raising public risk awareness and building resilience by *developing communication*.

Each chapter contains first a number of identified key issues, and a series of recommendations. Under each recommendation, a follow-up question has been inserted. Towards the end of the guidelines, all questions are provided as a table, which serves as a comprehensive checklist that can be used to probe and assess how readers can enhance their own risk management capabilities. Finally, at the end of each chapter, a case study using a project, strategy, idea or framework for dealing with the issues at hand is provided, which serves to inspire good practices. A detachable foldout poster of the SHIELD model and all the recommendations can be found at the end of the guidelines.

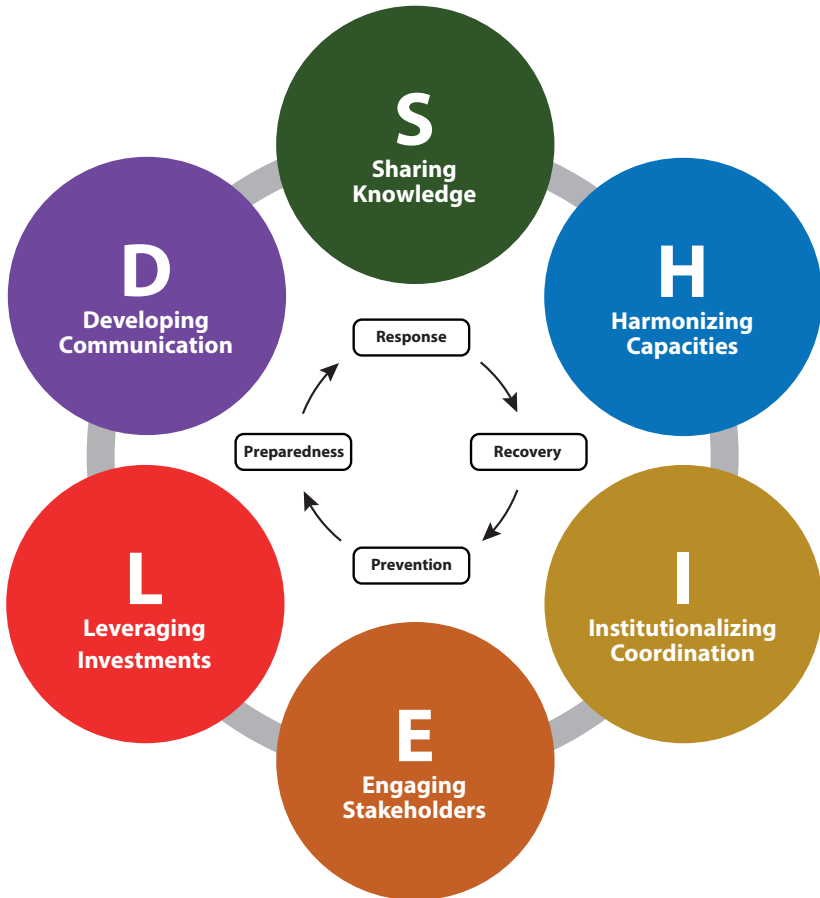


Figure 1: The SHIELD model revolving around the four disaster management phases.

Chapter 1

Sharing knowledge

Today, any effective DRM and DRR efforts depend heavily on different sources of knowledge. Accordingly, effective actions depend on the ability of institutions, organizations and agencies in the public as well as the private domains to share knowledge and information, which can take the form of anything from forecast model outputs, risk assessments, policy analyses, to local knowledge of past events.

Sharing knowledge is important across the disaster management phases. In the prevention and preparedness phases, common understandings of the central ideas and concepts are critical for producing consistent and comprehensive risk assessments or engaging with local communities to build resilience. In the response phase, effective crisis management relies on accurate and timely information that enables coordination and the effective targeting of response actions. In the recovery phase, event analysis and the most up-to-date knowledge is needed in order to create coherent recovery efforts, both within Member States and across borders. Yet, sharing knowledge within the context of disasters and emergencies is not just about the sharing itself, it is about knowing what to share, with whom, when, how, and most importantly, why sharing knowledge is critically important. Thus, being able to share knowledge for DRM/DRR requires first that the actors involved recognize what type of knowledge they need and for what purpose, what barriers exist across national and sub-national

(regional and local) levels that hinder such sharing, and finally how to qualify processes of knowledge management/sharing so that the right actors and institutions are involved.

Key issues

Issue 1: Lack of awareness of the need to share

While public concern with issues related to climate change, disasters and other crises appears to be on the rise across Europe, public officials, researchers and NGOs report that there is a lack of awareness of how and with whom knowledge and information can best be shared. Many more platforms, networks and structures for sharing exist today compared to a few decades ago. Yet, these will only serve their purposes if government employees and public institutions are aware of why and how to best share knowledge and information, and are able to see the benefits and results of good knowledge sharing.

Issue 2: Risk of information overload

Knowledge sharing is not about creating a set of mechanisms whereby more information and data is disseminated automatically. The problem of information overload is almost as big as the lack of information¹⁴. A lack of synergies between existing platforms for knowledge and information sharing is a related problem, as it tends to lead to duplication, redundancy, contradiction and therefore to confusion. What needs to be developed is a qualified practice built into the workflow of relevant institutions and organizations. Government institutions are swamped with requests to read and consult reports,

¹⁴ Bawden, D. and L. Robinson. 2008. The dark side of information: overload, anxiety and other paradoxes and pathologies. *Journal of Information Science* 35(2), pp. 180–191.

or participate in workshops and seminars. The issue is therefore not just about sharing more knowledge and information (e.g., data), but sharing relevant, credible and legitimate types of knowledge and information in an optimal manner in order for it to be useful.

Issue 3: Data and information as value

In some cases, creating platforms and networks might not be sufficient in itself, as public agencies and institutions, as well as private sector actors, have been known to be reluctant to provide others with access to sensitive data sets, hence creating barriers to increased knowledge and information sharing¹⁵. Although protection of data for security reasons or for safeguarding general public interest are necessary, many kinds of data sets, such as land use data, are only economically valuable from the point of view of those who have the data, while it might be beneficial for local authorities or local communities in drawing up flood protection plans or earthquake risk assessments. A major issue is to find ways whereby both public and private actors can see value in creating more open data policies and therefore are incentivized to share their knowledge and information without violating privacy or security issues.

Issue 4: Knowledge siloes

Effective knowledge sharing is challenged by the fact that different knowledge domains tend to operate in siloes. A recurring example hereof is the overlap of DRR and CCA. Organizations tend to focus on either CCA or DRR and often fail to communicate or agree on practices that could enable a more cohesive effort in combating climate-

related risks. As a result, relevant data-sets and scientific conclusions remain contained within specific knowledge communities. Another example is the siloing between health services and DRR work, where data and information on citizens are hardly shared in many countries due to legal restrictions, but could be highly beneficial in preparedness and response work. While acting in such siloes might be useful in order to distribute and organize tasks more easily within institutions, sectors or domains, sharing knowledge is critical for identifying the best possible strategies for safeguarding society as a whole from disasters.

Recommendations

1: Map the field of relevant actors

Making it clear with whom it is relevant to share knowledge and information with in the future is the first and a vital step in optimizing disaster risk governance. In order to do so, an institution will need to invest the necessary resources to map out who they cooperate with presently, and whom they might benefit from cooperating with in the future. Special attention should be placed on establishing links between where DRR and CCA presently overlap, and where they do not (but should) overlap within a local and/or national context.

Question 1: Do you know who should both give and receive knowledge and information on DRR and CCA, and has this task been delegated to one or several capable organizations, institutions or entities?

¹⁵ Nelson, B. 2009. Data sharing: Empty archives. *Nature* 461(7261), pp. 160-163.

2: Bridge knowledge gaps between science and policy

Identifying partners who could enable knowledge sharing between the science and policy domains should be a high priority, as input from scientific experts are vital in relation to questions such as risk assessments and raising public risk awareness. Locating those 'mediators of science' - such as relevant NGOs, science communication outlets, interest groups, grassroots movements or public intellectuals, that can help ease the transfer of knowledge from science to policy - is crucial, especially for government bodies that are responsible for implementing policies for DRR and CCA, where a high level of scientific input is needed. Conversely, translating and communicating issues facing policy-makers to scientists and researchers is an equally important goal.

Question 2: Have you put into place strategies or plans for employing or enabling people to act as intermediaries in the science to policy interface on DRR and CCA, and have you identified scientific institutions and teams that could create valuable knowledge for your organisation?

3: Build diverse networks for knowledge sharing

Knowledge sharing networks have greater impact if they cut across different domains, from government institutions, to the private sector and NGOs. In some cases, knowledge sharing might be more effective if organized around smaller networks

with highly specialized areas of expertise. Within other contexts, knowledge sharing might be organized with a defined group of stakeholders, policy and decision makers, or with the public at large. Importantly, building diverse networks means sharing relations with organisations and institutions across established sectors (DRR, CCA, sustainable development, urban planning, social services, public health, etc.). In any instance, if carefully mapped out, building and participating in such networks enables an institution to develop strategies about with whom it is relevant to share information with, and how to do so.

Question 3: Are you aware of information and knowledge sharing activities being done by your national platform for DRR and have you identified whether existing or planned networks for DRR and CCA knowledge sharing include actors across political domains and organizational sectors?

4: Create frameworks and platforms

Effective knowledge sharing for DRR requires not only identifying with whom to share knowledge and information, but also how to share it. This in turn depends on the ability to set up the necessary structures and frameworks. Making knowledge sharing a core practice of DRR work will require that those working on emergency response, civil protection, disaster prevention, crisis management, CCA and resilience can work through shared platforms that can be linked to the national DRR platforms. These can be in the form of, for example, online virtual networks

with databases (risk web-platforms are an example of this ¹⁶), regular meetings between representatives of the involved partners, or the creation of a more open culture where, at least at ministerial level, interactions between departments is encouraged and rewarded, rather than a “safe-guarding of territory” mentality that often prevails. The objective of such platforms should be to exchange data, knowledge, share experiences of good practices, and align relevant elements of strategies and plans. The INSPIRE directive has, for instance, set up a set of standards for data sharing and analysis across Member States that can be used in crisis situations.

Question 4: Have you put into place, or planned for, platforms (such as online portals) and/or face-to-face fora, and frameworks (such as guidelines) for knowledge sharing that can help networks to operate more effectively?

5: Provide incentives for sharing

As outlined in the recommendation above, platforms and networks need to be put in place to ensure that institutions collaborate rather than compete for data and information. If existing structures can be utilized to some extent, this is highly recommended. However, it is important to not only create and facilitate such networks and platforms, but also to create incentives by

showing the value that the involved actors would gain from sharing their data (mentioned above for government ministries). In some cases, legal frameworks, and political leverage might be necessary to create the enabling conditions for networks and platforms to prosper. This might be especially necessary in terms of getting private sector actors to be less hesitant to cooperate and share data, while respecting their interests.

Question 5: Have you made the effort to show the value of data and knowledge sharing for both public and private actors, for instance through workshops, conferences, or via the evaluations of successful outcomes of knowledge sharing, and have you reviewed existing national legislation on data and information sharing in relation to DRR and CCA?

6: Balance national and local scales

Sharing knowledge across the vertical and horizontal scales of government and self-government is a crucial underlying precondition for ensuring that the right balance is attained between national synergies and standards on the one hand, and local practice and know-how on the other. Accordingly, political arrangements that favour either centralized or decentralized governance structures that exist in different forms across the EU should be reconsidered in the light

¹⁶ Antofie, T. E., B. Doherty, and M. Ferrer. 2018. Mapping of risk web-platforms and risk data: collection of good practices. EUR 29086 EN, Publications Office of the European Union. PUBSY No. JRC109146.

of how they might benefit or hinder CCA, DRR and emergency response. This is a tremendously complex challenge. However, a solution is to engage all relevant actors at an early stage to create trusted, sustainable and reliable platforms that enable a continuous link between science and policy, and science and practice.

Question 6: Have you made efforts to ensure that there are credible and relevant knowledge sharing platforms, networks, and/or events horizontally across government entities and sectors, as well as vertically between the national, regional and municipal/local levels?

Case Study:

KomPass - Climate Impacts and Adaptation in Germany

The competence centre 'KomPass – Climate Impacts and Adaptation in Germany' was established by the Federal Environment Agency in Germany in 2006 to support the development and implementation of the German Adaptation Strategy. Sharing and disseminating knowledge dealing with climate risks and adaptation measures are key functions of the centre.

KomPass comprises a set of tools relating to how to deal with CCA, also enhancing risk awareness and increasing preparedness for DRR work in order to support communication and collaboration among stakeholders. This competence centre also supports local authorities and decision-makers in developing adaptation strategies which can be tailored to the specific needs of local communities and municipalities. The centre has published a set of guidelines called the 'Climate Navigator' (German: Klimalotse) that municipalities and local authorities can consult for advice on addressing climate change. The Climate Navigator is structured in five modules which start with basic knowledge about climate change and identified vulnerabilities. Building on general knowledge, the guidelines help to develop the actions to be taken, as well as their implementation. Furthermore, evaluation methods are presented which help communities and authorities to evaluate and improve their strategies and measures.

As the impact of climate change in terms of both individual extreme events and long-term changes to weather and climate varies between regions and cities, the requirements of adaptation and preparedness measures may also differ. The so-called 'Tatenbank' (transl. deeds bank) has been developed within KomPass to collect and make available various local and regional measures and adaptation projects that address climate change. Interested stakeholders can register and upload descriptions of measures and projects, while assessing and being inspired by the ideas of others. The best local and regional adaptation projects are awarded at the competition "Blauer Kompass" (transl. blue compass).

Adaptation measures implemented by scientific institutions, private enterprises, foundations or non-profit organisations are invited to compete for the award. Thereby, actions conceived and implemented at the local level are encouraged, and stakeholders are given incentives for acting.

In 2018, a new concept was developed to increase public engagement - citizens were able to vote for their favourite climate adaptation project. To ensure networking and the participation of a broad range of stakeholders, including the general public, KomPass also facilitates the sharing of experiences to enhance cooperation and to develop synergies at workshops, seminars, stakeholder and national dialogues, online surveys, and collaboration markets. Information is spread through several channels, such as newsletters, informative leaflets and research reports. It also serves as a link between different stakeholders such as decision-makers, scientists and the general public. Overall, KomPass provides the opportunity to collaborate between different stakeholders, provide access to information and raises risk awareness in order to meet the challenges of CCA from local to national perspectives.

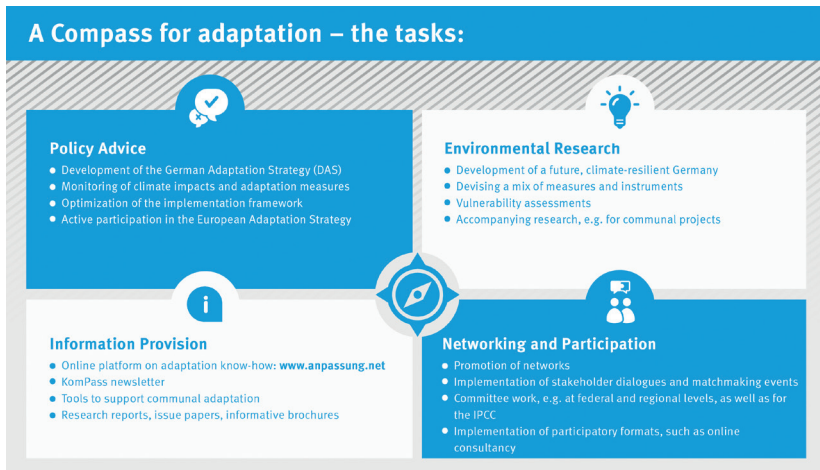


Figure 2: Tasks of KomPass

Chapter 2

Harmonizing capacities

A high-performing disaster risk governance system requires specialised capacities, however, this is not only in terms of tools or equipment. People are the main capacity within any governance system, and it is their expertise, experience, and local knowledge that are just as important as, and often more so, than the physical and technological assets (e.g., pumps, fire trucks or the latest technology). Accordingly, identifying and ensuring the necessary expertise, equipment, and other forms of capacities within public institutions is crucial for implementing disaster risk governance.

While it might seem obvious that the right balance of capacities governing DRM is immensely important, the analysis that the ESPEssO team conducted on legal, policy and science issues in relation to DRR and CCA, revealed a lack of balancing capacities across government levels vertically and horizontally.¹⁷ In particular, public officials with expertise in, and experience with, hazard, risk and vulnerability assessments and management are in demand. Thus, building and maintaining the necessary breadth of expertise, knowledge and skills among employees in all types and at all levels of government bodies is vital, and needs continuous prioritization and investment. Developing ways to think more strategically and to be innovative about how to make better use of existing capacities is a key recommendation. This is especially important with respect

to the responsibilities and demands placed on different levels in a national and local government systems. Making sure that there is a coherent distribution of preparedness, response and recovery resources and mandates across regions at risk is a core objective when harmonizing capacities. Importantly, this pertains not only to public institutions from the national to the local level, but also to private actors and civil society as a whole, as is apparent from the recent attention that local community capacities has attracted from researchers in recent years.¹⁸

Key issues

Issue 1: Lack of skilled employees at different government levels

For many EU Member States, there are ample capacities and resources available. However, due to budgetary restraints and other pressing priorities, local governments often lack the necessary employees with the skills to address risks and the building of resilience. This is only emphasised by the fact that national governments often delegate the responsibility for the implementation of CCA and DRR plans to regional and local authorities, in some countries by law. Within this context, it needs to be thought through (as part of a prevention focus) as to whether authorities have the resources, knowledge or ability to manage all of the principles, policies and practices that have been bestowed upon them, including the ability to integrate the required efforts within DRR and CCA. This should be undertaken as part of a prevention focus and not be left to the last minute as an event is approaching.

17 ESPEssO. 2017. Overcoming obstacles for disaster prevention: Challenges and best practices from the EU and beyond. Available at: http://www.espressoproject.eu/images/deliverables/ESPEssO_D2.2_FINAL.pdf

18 Kuhlicke, C. and A. Steinführer. 2015. Preface: Building social capacities for natural hazards: An emerging field for research and practice in Europe. *Natural Hazards and Earth System Sciences* 15(10), pp. 2359-2367.

Issue 2: Adapting to new hazards, risks and vulnerabilities

The changing risk landscapes triggered by, e.g., societal developments and climate change, brings about new challenges and uncertainties for risk managers. In these new risk landscapes, an effective, scalable and flexible use of resources will potentially become even more pressing. To address this challenge, it is crucial that institutions at the same governance levels – municipalities, regions and national – have a coherent strategy for the use and allocation of resources and capacities, relative to their present and future hazard and risk profiles, such as for instance projected in climate models.

Issue 3: Disasters do not respect administrative structures or borders

While some regions and municipalities in Member States have made large investments in CCA in terms of both material and human resources, others might have dedicated funds to other priorities. Yet disasters and the effects of climate change do not respect administrative borders. This can create problems when national or local governments have to plan to accommodate events that cross jurisdictions, for instance, through coastal adaptation plans that address storm surge risks along coastal areas that accommodate not only different

municipalities, but also different authorities (e.g., maritime and shipping zones, fisheries, military, etc.) across administrative borders. This holds true as much inside national borders as it does between them.

Issue 4: Lack of continuity

A common problem with the way government systems manage disasters is that funding and attention might be abundant in the wake of an individual event or after the adoption of a large international agreement such as the Sendai Framework or the Paris agreement. However, when attention fades, often so too will funding and political backing.¹⁹ This has obvious and direct implications on capacities to deal with risks in public institutions. Public institutions need to sustain a continuous supply and mastery of materials, data, models, equipment and expertise as part of any prevention strategy, including through changes in the makeup of staff members. Similarly, the use of external consultants may mean documents and expertise are disparate and remain outside of the responsible institution, in some cases hampering continuity. Capacities need to be ensured in the long run. For example, tracking vulnerability cannot be achieved if the relevant experts do not monitor these assessments over several years, as vulnerabilities are dynamic and change over time.²⁰

19 Walker, P, B. Wisner, J. Leaning, and L. Minear. 2005. Smoke and mirrors: Deficiencies in disaster funding. *British Medical Journal* 330(7485), pp. 247-250.

20 Global Facility for Disaster Reduction and Recovery. 2014. *Understanding Risk in an Evolving World: Emerging Best Practices in Natural Disaster Risk Assessment*. Washington, DC: World Bank. Available at: https://www.gfdr.org/sites/default/files/publication/Understanding_Risk-Web_Version-rev_1.8.0.pdf

Recommendations

1: Map existing capacities

The first step is to create an overview of what technical and human capacities already exist in key organizations and institutions governing the prevention of, preparedness for, response to, and recovery from disasters. Governments at the national and sub-national level need to create an overview of the different forms of expertise and resources that are available, in order to obtain an overview of what risk planners, emergency managers and other relevant actors have access to, including that requested from governments in recent years. Specific focus should be placed on where actors have indicated a lack of specific resources and skilled employees in addressing different risks and the associated tasks to reduce and manage them. In conducting the capacity mapping, it might be helpful to distinguish between two different types of capacities: *Material capacities* are the physical infrastructures that enable response capacities, structural forms of prevention such as flood protection dykes and sea walls, geo- and meteorological monitoring and early warning systems, and communications capacity, including the data-sets and models that go along with these. *Human capacities* include a skilled workforce with the proper types of expertise and skills for implementing prevention, preparedness, response and recovery actions in DRM. It is in the combination and balancing of both, material and human capacities,

that governments and public entities ought to focus upon. Indeed, the Sendai Framework specifically calls for the strengthening of scientific and technical capacities at the national and local levels, which implies the combined capacities of scientific and technological infrastructures and human forms of expertise.

Question 7: Have you conducted, or made plans to conduct, a thorough mapping of existing capacities for disaster prevention, risk management and risk reduction in your country, both in terms of technical/material capacities and human capacities?

2: Assess and balance capacities

Although funds are always limited and not every need can be met, understanding which types of capacities are required and which are in surplus is also an important part of knowing what capabilities exist in risk management and governance systems within a country or a municipality. Obviously, a good starting point is to listen to the key staff with specialized knowledge in emergency and disaster response, and to take their concerns and evaluations seriously. There are benefits in balancing capacities across regions and local administrative levels, as well as between ministries and divisions at the national government level. Skills and degrees of expertise among employees should be synchronized across the various administrative levels, so that public

officials at the ministerial level are able to convey messages downwards to the municipalities. Ensuring that municipal public officials have the necessary skills applies also to knowledge sharing and exchanging information at the horizontal level between municipalities, cities and towns (see the previous chapter).

Question 8: Have you made a comparison of capacities across national and sub-national government entities, in order to assess whether they are balanced, thereby ensuring harmonized efforts to deal with disaster risks?

3: Match capacities to risks

Capacities also need to be weighed against existing hazard, vulnerability and risk assessments. Harmonizing capacities in this sense is not a question of spreading out capacities in equal measures across a country, but to link those capacities to the hazard, vulnerability and risk profiles that each region or municipality faces. In other words, capacities and the resources needed, must be based on risk profiles rather than on the resources available for each Member State. It is impossible to precisely predict the risk management needs of every region or municipality, as there is always a large degree of uncertainty surrounding natural hazards and risks. Yet, Member States should be mindful of patterns of asymmetry between sub-national government entities. What is clear, however, as also stated in the Union Civil Protection

Mechanism, is that the risk profile of Europe as a whole is changing, not least due to climate change, but also because of changes in vulnerabilities and socio-economic conditions, security threats such as terrorism and demographic changes such as migration.

Question 9: Have you ensured that plans for improving capacities at the national and sub-national levels are in accordance with the hazard and risk profiles of the region at hand, and corresponds to the most up to date risk assessments, including regionally downscaled climate model projections from international bodies, such as the IPCC?

4: Evaluate and learn

Mapping existing capacities also entails assessing whether the present setup suffices. Learning from previous disasters is crucial in this context, as also called for in the Sendai Framework. Importantly, a great deal can be learned in terms of what the needs are for capacity and identifying potential bottlenecks from disasters unfolding elsewhere, even outside the EU. Importantly, this also means that identifying needs should be done continuously, and should not be reserved to a specific part of the DRM cycle (i.e., recovery or prevention). Part of the equation must be that there is continuous updating on where harmonizing capabilities and redistribution is needed. Platforms that enable cross-sectoral comparisons for different types of capacities,

such as risk assessment expertise or numbers of emergency vehicles, are a vital instrument in this regard. Establishing horizontal and vertical governance platforms for ongoing dialogue between regional and local government entities is a good way to ensure continuity, such as the Greater Manchester Resilience Forum (see chapter 4), as is the investment in educational programmes on risks and vulnerabilities in relation to disasters, which would enable a future skilled workforce to be cultivated (see chapter 6).

Question 10: Have you put in place mechanisms that ensure that evaluations are done after crises, emergencies and disasters (i.e., Lessons Learned), and that the relevant actors are involved in such evaluations through bottom-up participatory processes and are expected to adopt the resulting recommendations?

5: Create local partnerships

One way to relieve the strain on local governments could be to foster the engagement of the private sector in DRR and CCA. Private actors often have the financial capacity to contribute, and in some cases, have taken a leading role in DRR and CCA efforts. Insurance companies, for example, have vested interests in natural hazards due to the

large volume of insurance claims that may result. Yet, if the goals and priorities of public and private actors can be aligned, it may form an important component in ensuring the necessary continuity of risk management capacities and capabilities in Europe. Creating partnerships between cities (or regions) that can provide mutual assistance in case of emergencies is already a widely used policy in many European countries, and is a concrete way of addressing this issue. Platforms or networks for city-to-city exchanges through coordination and sharing knowledge can increase technical capacity and knowledge in regions where these are currently lacking and can also contribute to providing further horizontal links between localities, as exemplified by initiatives such as the Rockefeller Foundation 100 Resilient Cities ²¹, C40 Cities ²² and the Covenant of Mayors for Climate and Energy ²³. It is, however, important to remember that national governments have a key role in enabling such sub-national cross-border partnerships by incentivizing and advising cities and regions to pursue international cooperation.

Question 11: Have you encouraged and supported the creation of local partnerships across the public and private sectors, and the participation in partnerships between cities or municipalities both within your country and internationally?

21 100 Resilient Cities — Pioneered by the Rockefeller Foundation (100RC) is dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century. Available at: <https://www.100resilientcities.org/>

22 C40 is a network of the world's megacities committed to addressing climate change. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change. Available at: <https://www.c40.org/>

23 The Covenant of Mayors for Climate and Energy was set up by the European Commission in 2015, merging the Mayors Adapt and the Covenant of Mayors in an effort to promote an integrated approach to climate and energy action between cities. Available at: <https://climate-adapt.eea.europa.eu/eu-adaptation-policy/covenant-of-mayors>

6: Create continuity for capacities

While assessing, mapping and monitoring existing capacities, and balancing these across government levels are fundamental steps, such actions alone cannot guarantee that DRR and CCA policies and plans will have a (positive) long-term sustainable impact on society. It is therefore vital to ensure that after capacities have been mapped and balanced, any identified gaps are filled, ensuring that the continuity of capacities is secured. As stated in the Sendai Framework, there needs to be a plan which enables and defines what expertise that is needed, and also to ensure that experts in one field, for instance emergency health workers, understand the overall strategic risk management approach

of the national to subnational governments.²⁴ Creating continuity is thus in equal parts about sustaining funding and support for the right technical and human forms of expertise in the long run, as well as about creating synergies between different kinds of first responders, emergency managers, risk assessment experts and public officials across areas such as DRR, CCA, land-use planning and sustainable development.

Question 12: Have you made plans that will ensure the continuity of risk management capacities in your country/region, both by committing the necessary long-term resources and by enabling synergies across different knowledge and policy sectors?

Case Study:

CADRI – Capacity for Disaster Reduction Initiative

The Capacity for Disaster Reduction Initiative (CADRI) was launched in 2007 by the United Nations Development Programme (UNDP), the Office for Coordination of Humanitarian Affairs (OCHA) and the United Nations International Strategy for Disaster Reduction (UNISDR). The objective of the CADRI program is to enable the United Nations and other members of the UNISDR system to support governments in their efforts to implement a coherent framework for strengthening national capacities for DRR and preparedness.

While CADRI is specifically implemented within the context of developing countries, there is much to learn in the tools and recommendations for EU Member States as well, such as multi-stakeholder inclusion, awareness raising and training programmes.

24 United Nations. 2015. The Sendai Framework for Disaster Risk Reduction, pp. 19. Available at: <https://www.unisdr.org/we/coordinate/sendai-framework>. "To enhance the resilience of national health systems, including by integrating disaster risk management into primary, secondary and tertiary health care, especially at the local level; developing the capacity of health workers in understanding disaster risk and applying and implementing disaster risk reduction approaches in health work;"

The objectives for implementing a framework are as follows:

1. **Technical assistance** to governments – and other national stakeholders – to develop national frameworks for capacity building, in a coordinated and coherent way.
2. **Elaboration and dissemination of training modules**, tools and methodologies for capacity-building for DRR at the national, regional and local levels.

The CADRI program has been designed to acknowledge the comparative progress of each national partner in supporting capacity building through a coordinated, coherent and partnership-based approach that avoids duplication of efforts and optimizes resources. This support is based on a three-step approach:

Step 1: Undertake an assessment of DRR capacities through a multi stakeholder process.

A capacity assessment to identify a country's strengths and weaknesses in its ability to reduce disaster risk also involves assessing the extent of the capacities needed to do so. The country capacity assessment team is made up of government representatives and staff from CADRI. The applied methodology, carried out by the National Team, is based on i) interviews with government officials, UN agencies and other national stakeholders; ii) analysis of strategic and programmatic documents; and iii) review of available information on DRR in the country. A National Assessment Report is then produced summarizing recommendations on national DRR capacities.

Step 2: Support the Government in developing a National Action Plan for Capacity Building in DRR.

The National Action Plan for Capacity Building in DRR addresses priority actions as identified in the National Assessment Report. It takes the form of a matrix that includes: effects and outputs, planned activities, responsible parties, resources required, and implementation plans. The implementation of the National Action Plan presents the roles and responsibilities of the main actors, with the support of appropriate regional and global support mechanisms. The development of the plan is entrusted to the same national team in order to ensure the coherence and sustainability of the process.

Step 3: Provide assistance to implement and monitor the National Action Plan.

Once the National Action Plan has been validated by the government and national stakeholders, its implementation is supported by the national team. The CADRI program provides a set of tools, methods and networks of experts to support the capacity building aspects of this

implementation. This promotes greater coherence and improves the quality of capacity-building support provided by partners in the delivery of their country programs. The technical support provided by the CADRI program includes the organization of training and awareness-raising workshops aimed at empowering the government, the national team and stakeholders to gain an operational concept of DRR. The CADRI program monitors the impact of capacity building measures implemented under the National Action Plan.



Figure 3 and 4: An example of coordinated UN program on disaster risk management in Namibia: A workshop to explore the UN System's comparative advantage in supporting the government on DRM issue.

Chapter 3

Institutionalizing coordination

In evaluations after disasters, what is often highlighted is how communication and coordination between stakeholders failed.²⁵ By definition, disasters challenge the ordinary institutional set-up, and require new kinds of cooperation and coordination. Accordingly, there is no such thing as a predefined, perfect set-up for coordination in disaster situations. Nonetheless, as recent reports, research publications and international frameworks highlight, coordination is such a central aspect of DRR, that improving and prioritizing it might also contribute to solving other problems, such as ensuring stakeholder inclusion (see chapter 4) or raising public risk awareness (see chapter 6).

Importantly, coordination is not only an aspect of the emergency preparedness, response and recovery phases. Effective disaster risk governance requires well-planned and comprehensive coordination efforts across the traditional disaster management phases. Thus, a key element for successful coordination is to work towards aligning and engaging the actors involved in all DRM phases: prevention, preparedness, response and recovery. In this context, the institutions involved and any associated relationships play a crucial role.

To optimize the risk management capabilities of a country or a sub-national government entity, it is crucial to create governance structures able to facilitate and create coherence in on-the-ground coordination. Making intelligent

structural changes within government systems is often part of achieving this. However, practicing, challenging and testing this system is necessary. Moreover, successful coordination requires that necessary policies and agreements are in place, in particular for transboundary crisis response, where coordination language, the timing of response efforts, request agreements, etc. are central issues that must be resolved before a crisis arises.

In this chapter, a number of recommendations and steps for addressing disaster coordination will be highlighted, with a specific focus on how government institutions' performance can be improved. The guidelines are directed towards solving a number of challenges traditionally inherent in coordination: vertical coordination between national and sub-national governments; horizontal coordination between sub-national governments; transboundary coordination between countries; and finally, coordination issues between public entities and civil society, private companies, insurance companies and NGOs.

Key issues

Issue 1: Mandates

As researchers have noted for decades, disaster emergencies such as flash floods or earthquakes usually give rise to problems not dealt with by traditional mandates²⁶, and accordingly, uncertainties often arise as to who should act, pay or, even worse, be liable. This issue is a recurring one, not least because of the new kinds of problems

25 For a general discussion of post-disaster evaluations and failures of communication, see Birkland, T. 2006. *Lessons of disaster, policy change after catastrophic events (American governance and public policy)*. Washington, D.C.: Georgetown University Press.

26 See for example Dynes, R. 1970. *Organized behavior in disaster (Disaster Research Center series)*. Lexington, Mass.

that emerge with new disasters. Thus, while clarifying mandates and introducing new regulations might solve some issues, the issue is an inherent feature of disaster situations.

Issue 2: Coordinating between governance levels

For Member States it is a challenge to create good, vertical coordination and cooperation between national and sub-national levels of government. Disconnections between the central or national government and local levels can often result in conflicting decisions and decisions that may not necessarily reflect local needs.

Issue 3: Coordinating tasks across DRR and CCA

Establishing effective procedures and rules for coordination between government bodies that work on similar or related issues pertaining to DRR and CCA, horizontally and vertically, is a challenge that many EU Member States face. Divergent government structures are widely acknowledged as one of the major challenges faced when integrating DRR and CCA. In many countries, DRR and CCA are managed by different government entities that operate separately.

Issue 4: Coordination issues between EU Member States

Coordination issues are not only present within different levels of national governance systems, but also between governments. EU efforts to ease transboundary coordination have

increased greatly over the last 15 years.²⁷ Nonetheless, cross-border coordination remains a substantial challenge in many regions, including, as researchers have noted, whether the EU should have a lead role in crisis and disaster response, or should it be a network facilitator.²⁸

Recommendations

1: Clarify mandates for coordination

As a first step when institutionalizing coordination, it is crucial to analyse the current mechanisms of coordination and to clarify mandates. This requires governments to take stock and review evaluations of coordination issues that arise following disasters and emergencies. Specifically, such reviews should aim to identify specific situations, in which mandates and roles were unclear, and study why they occurred, and explore how greater clarity may be invoked.

Question 13: Have you identified institutional barriers and made steps towards clarifying or revisiting the roles and mandates of different organizations and entities involved in emergency response and risk management activities?

2: Acknowledge the need for balance and flexibility

Disaster coordination is not necessarily solved through stronger formal hierarchies. There is a difference between formal coordination and actual coordination that may include informal or ad hoc relationships. While these two do not exclude one from the other,

²⁷ Boin, A. and M. Rhinard. 2008. Managing Transboundary Crises: What Role for the European Union? - *International Studies Review* 10(1), pp. 1-26.

²⁸ Boin, A., M. Busuoc and M. Groenleer. 2014. Building European Union capacity to manage transboundary crises: Network or lead-agency model? *Regulation & Governance* 8(4), pp. 418-436.

they are often found to be in tension.²⁹ It is therefore crucial to recognize that in crises, coordination efforts will often circumvent or even challenge formal coordination pathways. In order to avoid such coordination challenges causing more friction than benefit, it is important to identify, integrate and facilitate effective coordination, rather than to force only the use of formal pathways. Thus, it is crucial to balance clarity with flexibility to allow actors to utilize the most effective coordination pathways.

Question 14: Have you brought together actors involved in emergency response and risk management with the purpose of making mechanisms and structures more flexible through the incorporation of non-government and civil society actors?

3: Practice and exercise roles

Coordination does not take place on an organizational diagram – it is like a muscle that needs to be exercised in order to develop and stay strong. Exercises and training are useful occasions to explore coordination gaps, or even identify new situations and constellations in need of clarification. Such activities put roles, tasks and responsibilities to the test, in turn also contributing to developing effective and sustainable coordination structures and cultures. Training for disasters and emergencies might be in the form of full-scale real action deployments, nationally as well as internationally. DG-ECHO, for example, provides a framework and funding for such

exercises. However, training might also be in the form of simulations including serious games and workshops testing different scenarios and roles. As an example, ESPRESSO has developed a set of table top exercises for these purposes, which were played during three think tanks and workshops in Berlin, Zürich and Naples between 2017 and 2018. The three exercises, referred to within the project as RAMSETE (Risk Assessment Model Simulation for Emergency Training Exercise) I-III³⁰, were designed to test the integration of CCA and DRR (RAMSETE I), international transboundary cooperation in emergency management (RAMSETE II), and the science-policy interface for DRR (RAMSETE III). Importantly, training, whether in the form of exercises or simulations, should include a diverse group of stakeholders, including emergency management work forces, technical logistics planners and instigators, as well as volunteers who almost without exception converge on a scene of disaster. Such exercises or simulations have also been explicitly called for within the Sendai Framework.

Question 5: Have you ensured that emergency response and risk management professionals train and simulate crisis scenarios, in terms of both real-time simulations, serious games, and other relevant formats?

4: Set up coordination forums

Institutionalizing coordination depends on the creation and sustaining of networks while continuously revisiting and evaluating previous coordination

²⁹ Scanlon, J., I. Helsloot, and J. Groenendaal. 2014. Putting It All Together: Integrating Ordinary People into Emergency Response. *International Journal of Mass Emergencies and Disasters* 31(1), pp. 43–63.
³⁰ ESPRESSO. 2018. Report on existing methodologies for scenario development and stakeholders knowledge elicitation. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D3.2.pdf

experiences. As also stated in the Sendai Framework, governments should be instrumental in setting up coordination forums composed of different stakeholders at the national, local, and international levels. For instance, in order to build up the evidence base required to develop more efficient decision-making schemes for DRR, risk management and emergency response, the mobilization of existing networks and forums is required, as well as creating new ones that cater for the integration of science into policy for DRR. This is particularly relevant with respect to the sharing of knowledge and improving cooperation and coordination of strategies and plans for risk reduction between policy-makers, scientific advisors, and emergency response professionals.

Question 16: Have you put in place forums that allow for the coordination of activities and tasks both between the responsible emergency management entities, as well as between governmental and non-state actors in emergency response, such as NGOs and the general public?

5: Align and streamline priorities

Streamlining priorities, strategies, policies, mandates and terminology in DRR and CCA between public institutions, and with non-government entities, both horizontally and vertically should be a core priority of Member States. A reasonable place to start is to align funding priorities at the local and national levels, and to support local governments

in the identification of funding priorities, proper budget allocation, and cost-benefit assessment over time (including the maintenance of developed schemes, programs or actions).

Question 17: Have you made steps towards ensuring that government entities (national and sub-national) have aligned their strategies and use the same terminology and understanding of concepts, such as risk and vulnerability, for example, through the creation of common terminology and risk assessment methods that can work across hazard types?

6: Build partnerships for transboundary crisis management

Coordination across borders is crucial. While the transboundary element has received substantial regulatory attention in recent years, not least with the adoption of the EU Civil Protection Mechanism (UCPM), actual coordination is still an issue. What is needed more are enhanced training and continued efforts to integrate the mechanism and the Emergency Response Coordination Centre³¹ (ERCC) into national systems.

Question 18: Have you made agreements with neighbouring governments for transboundary crisis management, including the clarification of mandates, and have you done, or do you plan to do, crisis and emergency response exercises with relevant counterparts in these countries?

31 EU Emergency Response Coordination Centre (ERCC). Available at: https://ec.europa.eu/echo/what/civil-protection/emergency-response-coordination-centre-ercc_en

Case Study:**Institutionalizing Transboundary Coordination and Cooperation in Basel, Switzerland**

Basel-Stadt is a city and canton in northern Switzerland, covering 37 km² and sharing borders with France and Germany. The river Rhine flows right through the city, which has close to 200'000 inhabitants. Basel-Stadt is highly frequented during the day by cross border commuters as well as tourists. Statistically speaking, around 100'000 workers come to Basel-Stadt on weekdays, adding 50% to its resident population.

Its civil protection system is an integrated management, protection, rescue and relief system. The primary intervention resources are the police, fire service and first aid service. For larger disasters or emergencies, the Cantonal Crisis Organisation (Kantonale Krisenorganisation KKO) provides the joint management structure and network. The KKO in Basel-Stadt consists of over 140 persons working in all fields of the cantonal administration. However, only three people work full-time on the structure, education and operational capability of the KKO system. Among their main tasks is risk analysis for the canton in terms of (natural) disasters and wider emergencies.

Basel-Stadt has chosen a militia system (military units used for emergency activities only), which is beneficial in times of actual emergencies as it unites experts from various fields with the most up-to-date knowledge, delivering a service to their hometown. Almost all KKO members are employed by the cantonal administration of Basel-Stadt. However, this similarity is only on the surface: the cultures of the seven cantonal departments differ greatly in their understanding of hierarchy, operational management and responsibility. This poses a challenge as well as an opportunity to an organization trying to unite its various members and expertise. Diversity needs to be seen as a key to achieving sustainable results.

Another disadvantage of the militia system is that the necessary preparation measures and educational activities require a considerable amount of time away from the members' actual day-to-day job. Ultimately, a strong political will as well as a strong consensus on citizenship duties are required for such a structure. It is a tradition in Switzerland to cooperate rather than merely coordinate. Cooperation refers to the voluntary collective effort to achieve a greater good.

Coordination is defining how an action is to be carried out to pursue a common purpose, usually overseen by a higher function. It is customary for Switzerland to delegate competencies to the lowest possible level and to have strong local involvement, as well as a certain freedom in how to achieve an aim. Basel-Stadt makes a strong case that structure comes first, then deal with any problem that may arise.

Given the geographic setting of Basel-Stadt, crises quickly develop a trans-boundary or international dimension. During an incident, lines of communication across the borders are established - there are, for example, common reporting forms and liaison

officers in place in the different headquarters. The priorities during an incident are to contain, manage and solve the problem. Existing structures have so far sufficed in achieving these priorities, and in comparison to other regions, the institution of the Oberrheinkonferenz (ORK) seems to be a well-functioning group with strong ties to the three countries, showing an ability to encourage coordination and cooperation trans-nationally.

Another challenge, apart from different languages and cultures, are the different national approaches to managing a crisis situation. As an example, it is the intention of the ORK and the three countries to hold joint exercises across the three countries. However, the scenario needs to be chosen in such a way that all three countries are concerned for their own territories, not merely coming to the aid of a neighbour offering free resources. Secondly, the scenario needs to pose enough challenges that the countries must actually work together and forge bonds of cooperation. Thirdly, the scenario needs to be sufficiently limited in scope so that no international involvement or national override excludes the local authorities from the decision and management process.

Similarly to the intra-cantonal challenge, it is in preparation and education where more cooperation, working up to coordination, should be established. It is here that upcoming challenges, extraordinary events and major emergencies, are anticipated and prepared for. The 3K motto "In der Krise Köpfe kennen" (knowing the heads or persons to contact in crisis situations) can only be achieved through common activities before a real crisis arises. To this end, different experts are encouraged to become engaged in working groups of the Oberrheinkonferenz, for the KKO - mainly the working group "aid in catastrophes" - to be more involved with the sub-groups "Trinat", "exercises", "communications" and "enhance security and avert hazards on the river Rhine".

To date, cooperation has been established, but it requires continuous work to stay in place and in order for it to remain current. Personal commitment is essential - for people to cross the border, to join exercises in other countries and get to know the routines of everyday life. Regular visits and lectures in neighbouring trans-boundary communities and partner organisations should also be encouraged more. Wider challenges, such as tackling CCA, can then be met by stepping-up adaptation and DRR, using these established structures as a template for engagement.



Figure 5: Practise exercise held on 25th April 2018 in Basel-Stadt.

Chapter 4

Engaging stakeholders

Today, the traditional command-and-control approach does not hold a monopoly in the way disasters are managed, but is complemented by a host of supporting bottom-up initiatives and multi-stakeholder forums. Calls for resilient societies and adaptive communities signal a desire and a need for the mobilization of all kinds of actors in society to govern disaster risks. Governments, private sector, NGOs, grassroots organizations, local associations, interest groups and individual citizens all have a stake in how we deal with individual disastrous events and the effects of a changing climate.

The calls for stakeholder inclusion and engagement are at the heart of international agreements and frameworks on DRR, including the Sendai Framework. While national governments are still central, including enabling the required stakeholder engagement, creating resilience and reducing risks are becoming more complex, involving multiple stakeholders from the private sector, civil society, NGO communities and individuals. Including, or at least mentioning, such actors in DRR and CCA policies, programmes, plans and projects is now almost taken for granted.

Several issues are, however, consistently being reported across Europe and indeed around the world

with respect to the lack of stakeholder involvement. The challenge is also complex, given the very different kinds of stakeholder involvement needed in the four different DRM phases (prevention, preparedness, response and recovery). While good intentions are almost always present, creating, enabling and empowering sustained stakeholder participation, engagement and commitment, is challenged by a number of issues, which are listed below.

Key issues

Issue 1: Who are the stakeholders?

Significant efforts have been made in recent years towards developing stakeholder involvement and engagement within the context of DRR across EU Member States. Yet, as identified in the research conducted by the ESPRESSO team³², there is often a lack of awareness within national governments and local authorities of who the potential stakeholders are. Since DRR concerns the well-being of society as a whole, all institutions, organizations and citizens are potential stakeholders. Yet, effective DRR planning is not about including every type of actor, but the right ones. Consequently, deciding who is a stakeholder and who should be included and how to engage them in the consultation process is challenging because it necessarily means excluding some groups in the process of including others. Deciding which stakeholders to include also depends on many other factors, including the type of natural hazard

³² ESPRESSO. 2017. Overcoming obstacles for disaster prevention: Challenges and best practices from the EU and beyond. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D2.2_FINAL.pdf

threat, and the different kinds of risks it poses to individual stakeholders. To address this challenge, the purpose of stakeholder engagement and the stakeholder mandate should be made clear from the very beginning. The same holds true for the use of the results of these processes. Balancing the right number of stakeholders is also a challenge, as too large a number will yield ineffective and unfocused results, while too few will undermine broad societal engagement. The engagement of stakeholders in both DRR and CCA furthermore suffers from the fact that the roles and responsibilities of stakeholders might not be clearly defined. Vague definitions of the expectations and responsibilities of stakeholders challenges the clear identification of what their roles are (i.e., in which phase of the DRM cycle), and what they are expected to bring to the table for a given problem setting.

Issue 2: Lack of common understandings

Even when stakeholders have been successfully involved and platforms for cooperation have been established, the large number of different types and capacities of stakeholders often makes it difficult to find a common language and understanding. As DRR and CCA involve a range of very diverse actors, different stakeholders define DRR and CCA concepts as per their knowledge spectrum. This has created many diverse terminologies, such as the understanding of risk, impacts,

vulnerability and resilience. Beyond lacking a shared understanding of a key terminology, the lack of aligned interests and a common understanding of the objectives, aims and strategies of DRR and CCA when stakeholders are included has also been noted as an issue.

Issue 3: Competing interests

It is important to realize that stakeholders have different priorities, interests and agendas that go beyond DRR issues. Many institutions and groups, whose roles in DRR work are important, also have other reasons to exist, for example, to support certain special interests, or to service a public good, such as urban planning or tourism. Conflict arising over economic or political interests, between different public entities, as well as between public and private actors, have been known to be major obstacles for the effective integration that is required to facilitate sustainable stakeholder forums and cross-sectoral cooperation. Risk targets and strategies by private actors are potentially set too low compared to public ones if the expected economic outcomes outweigh general public concerns. Yet, depending on the context, they might also be set higher than what the public sector has chosen to prioritize in order to protect assets and economic interests. Coordination and alignment of the varying interests between different stakeholders, especially when it comes to economic concerns, is an area that is need of innovative approaches.

Issue 4: Lack of sustained engagement

Although stakeholder inclusion and engagement need to be at the heart of DRR, they also need to be realistic and smart. Governments should be mindful of the fact that stakeholder engagement does not become a window dressing exercise that primarily serves the purpose of attracting public support for policies. Far too many stakeholder inclusion projects might generate publicity and support at the start-up and implementation phases, but lose momentum and die out as political commitment and initial interest starts to wane. There is, in other words, a risk that stakeholder engagement (especially when they are seen as projects) do not serve their purpose, even when evaluations and assessments proclaim their success. Ensuring that stakeholder engagement is sustained and can spur real change and commitment are thus key issues.

Issue 5: Addressing barriers in stakeholder engagement processes

Stakeholder engagement processes face a number of challenges such as ensuring the robust and representative consideration of diverse stakeholder perspectives, translating qualitative information into technical quantitative DRR options, identifying and taking advantage of potential synergies, and accounting for stakeholders' conflicting interests in the pursuit of a compromise solution or using new technologies for stakeholder

engagement in an effective way³³. Researchers of DRR and CCA ought to play a key role in this regard, but as with many other areas and issues, the knowledge transfer from academia and research to policy and practice needs to be prioritized to a larger degree than it is now.

Recommendations

1: Clarify the roles of stakeholders

As aspirations, motivations and interests differ widely in the field of DRR, governments should recognize the complexity of involving and engaging stakeholders. It should be a key priority for governments to conduct a thorough analysis of who the stakeholders are (for different tasks/problems within DRR and CCA), what their interests are, what they can offer, and what their potential roles and responsibilities are. While it is often straightforward to map the field of stakeholders, actually clarifying or specifying what their roles and obligations should be can be a more challenging task. Governments should strive for a clearer and more realistic approach to stakeholder inclusion, in which the roles of each stakeholder are more clearly defined and agreed upon, and the expectations between the various parties have been balanced. A formal way to begin doing this might be to include stakeholders within governance frameworks, and to ensure that they are explicitly acknowledged in policies. Their participation and inclusion must be ensured through strategic planning rather than on an ad hoc project basis. Thinking strategically

33 Stringer, L.C., A.J. Dougill, E. Fraser, K. Hubacek, C. Prell and M.S. Reed. 2006. Unpacking "Participation" in the Adaptive Management of Social-ecological Systems a Critical Review. *Ecology and Society* 11(2), pp. 39.

about the role of stakeholders in all parts of the DRR and CCA system, which also entails granting them access to resources, will sow the seeds of engagement and motivation through acknowledgment and recognition.

Question 19: Have you undertaken efforts to a map all relevant stakeholders for emergency response, DRR and CCA in your country, and have you simultaneously assessed whether the roles of stakeholders are clear and comprehensible to them?

2: Create incentives for stakeholder participation

Governments need to demonstrate to stakeholders the value of their engagement. Long-term DRR planning can only be done in alignment with stakeholder interests. The guiding principle should be to purposefully include conflicting stakeholder perspectives in DRR decision-making. Public interest and publicity might be an incentive for some actors to be involved, while direct economic incentives or access to data and information might be desirable for others. There needs to be an alignment of interests between stakeholders, where each clearly benefits from the efforts of others, and where their actions can be seen to clearly add value to future societies.

Question 20: Have you ensured that the value and mutual benefits for participating in networks, platforms and events have been communicated to stakeholders?

3: Create web-based online platforms

The effective incorporation and engagement of stakeholders requires the use of multi-stakeholder and multi-sectoral processes for building common understandings, commitment and consensus. Web-based knowledge portals and multi-stakeholder coordination platforms can be designed to help communicate and share consistent and complementary knowledge for DRR and CCA. Platforms should also ensure effective multi-stakeholder coordination, both horizontally and vertically. They should increase bottom-up communication from the local level to the federal or national level, and allow greater participation of local stakeholders in the decision-making process.

Question 21: Have you set up web-based online platforms that will allow for efficient and easily accessible participation and inclusion of stakeholders, at all relevant government levels in your country?

4: Locate mediators and experiment with roles

While many platforms and networks for stakeholder participation and inclusion exist, what is often lacking are mediators who can connect the different actors and sectors in the “middle”. Locating and engaging such mediators who can bridge the gaps between the wider stakeholder environments with government entities should be prioritized. Furthermore, to enhance the value of

the engaging stakeholders, it might be useful to experiment with new models of governance such as the US model in which one NGO leads other NGOs, focusing especially on providing sheltering, feeding and clothing to those in need during emergency operations.³⁴ This type of coordination does not exist in Europe at present, and while the US system has a different tradition in acknowledging the role of volunteer collectives and associations such as the The National Voluntary Organizations Active in Disaster³⁵, inspiration and lessons from the role of such actors could be pursued within the EU context. There is also a lack of representation of NGOs in the EU system, with no one at the EU level looking into the resources of the response mechanisms used by NGOs. Representatives from the most important NGOs – deemed important ultimately by the European Commission itself – could therefore have a role in the coordination institutions at EU and at the national levels, while their independence would also need to be assured.

5: Utilize local stakeholder knowledge for DRR actions

Stakeholder engagement and inclusion should also yield concrete outputs that optimize and enhance DRR efforts. Governments at the national and sub-national levels can benefit greatly from cooperating with local stakeholders on a number of key activities, such as incorporating local knowledge of risks and vulnerabilities into risk management policies.³⁶ Local NGOs, interest groups and civil associations have important insights into local cultural understanding, making them ideal for raising public risk awareness. Stakeholder representatives from groups such as youths, disabled people, elderly and ethnic minorities should be incorporated, since for these groups, risk information and awareness raising might need special attention. Local stakeholders can also be useful for producing better risk assessments, utilizing their own (important) knowledge of an area’s history and landscape, which scientific risk assessments often fail to incorporate, even where relevant.

Question 22: Have you made strategic efforts to identify, include and strengthen the role of mediators between policy and stakeholder domains, and have you made efforts to include NGOs in decision-making processes where this might be relevant?

Question 23: Have you made efforts to use local stakeholders as resources for making better decisions on DRR and CCA, and have you set up mechanisms that ensure that the voices of minority groups are heard by policy and decision makers?

34 Sylves, R. 2008. Public Managers, Volunteer Organizations, and Disasters. *Public Manager* 37(4), pp. 76-80.

35 See more at Available at: <https://www.nvoad.org/>.

36 Renn, O. 2015. Stakeholder and Public Involvement in Risk Governance. *International Journal of Disaster Risk Science* 6(1), pp. 8-20.

6: Ensure sustained commitment

In order for the inclusion of stakeholders to have a long-term and lasting impact on DRR practices by countries and the various communities within a country, there is a need to go beyond merely incorporating stakeholders, but rather to move towards gaining a commitment from all parties. Fundamentally, this entails creating new cultures of risk awareness and perception, while setting out to ground DRR in the relationships between stakeholders. The interplay between the scientific and political stakeholders in the run up to a disaster seems key to maintaining a trustworthy stakeholder engagement strategy. Governments need to consider the potential benefits of setting up multi-stakeholder think tanks and

risk partnerships across the different government and sectoral levels, and using these instruments to consolidate knowledge and approaches that have worked in the past (although still under continuous reassessment given the changing circumstances and environment). Synthesizing and building upon lessons learned from previous stakeholder engagement projects can also reduce the risk that useful knowledge of practices and tools will be lost.

Question 24: Have you made efforts to make stakeholder inclusion and engagement more sustainable and self-producing by ensuring the necessary governance and financial support?

Case Study:

The Greater Manchester Resilience Forum, United Kingdom

In the United Kingdom, Local Resilience Forums (LRFs) are used to coordinate a response to emergency incidents at the local level. Across England and Wales, there are 43 such multi-stakeholder forums, comprised of members from the emergency services as well as public, private and voluntary organisations. One example is the Greater Manchester Resilience Forum (GMRF), which serves one of the largest metropolitan areas in the UK. The GMRF is exemplary in having developed a strong multi-stakeholder partnership for the management of emergencies in Greater Manchester.

Initially, LRFs were formed under the Civil Contingencies Act 2004, a legally binding Act of Parliament that provides a framework for the UK's approach to disaster response. Under the Act, Category 1 responders are legally obliged to participate in the forum, ensuring coordination amongst emergency services. However, drawing upon a variety of knowledge, skills and expertise is key for developing successful emergency plans, therefore engaging a broader range of stakeholders is also important. The engagement of other stakeholders in the GMRF has been an iterative process over time and since its inception in 2004, it has expanded to include specialist agencies, utilities companies and academic institutions among others, so that now there are over 100 partners.

Quarterly meetings are the primary method used for bringing stakeholders around the same table and are attended by senior representatives from the partner organisations. These events provide a platform for partners to interact, share knowledge and develop multi-agency plans, from conducting risk assessments through to disaster recovery. In order to do this, it is important that stakeholders are encouraged to participate and remain engaged. Partners are frequently very busy, therefore making the meetings worth their while is key. The production of an annual work programme sets out agreed priorities and areas of activity, ensuring partners align their efforts and address multi-agency priorities. Setting a clear agenda, ensuring clear outputs and keeping meetings interesting all encourage greater stakeholder participation. In addition, an organised programme of events, including workshops and training exercises, offers further opportunities for partners to interact and forge working relationships. Fundamentally, these events allow stakeholders to build an understanding of what others can do, their capabilities and what services they can provide, so that during an emergency, the appropriate resources can be brought together efficiently.

Going above and beyond the requirements of the Civil Contingencies Act 2004, the GMRF is a member of the UN Making Cities Resilient Campaign and the Rockefeller 100 Resilient Cities. Participation in these international initiatives has

provided opportunities for the GMRF to take part in global city-to-city exchanges and to learn from international partners, as well as to deepen connections with stakeholders in Greater Manchester. For example, completing the Local Government Self-Assessment tool provided by the Making Cities Resilient Campaign required communication with many different stakeholders, some of whom may not have been previously engaged with. With a broad definition of resilience, 100 Resilient Cities has widened the set of stakeholders with whom GMRF engages, bringing new expertise to the table. Overall, these international initiatives have reinvigorated and strengthened GMRF's stakeholder base.

Heavy snowfall in March 2018 demonstrated how bringing stakeholders together through the forum has strengthened multi-agency work. Vehicles became stranded overnight on the M62 motorway, a key road link to Manchester. Through coordinated efforts, organisations including mountain rescue, the police and the military were able to work together with the Highways Agency and local authorities, each contributing their own unique capabilities in a coordinated way to provide an effective multi-agency response.



Figure 6: Emergency services responding to vehicles stranded by heavy snow falls on the M62 (a key road link to Manchester, March 2018).

Chapter 5

Leveraging investments

Investing in DRM and DRR will help to reduce costs for response and recovery in the long term. A key message from international organizations like the United Nations.³⁷ and the World Bank.³⁸ is that governments should acknowledge that a sensible and cost-effective way to deal with disasters is by using financial investments aimed at not only prevention, but also at building resilience, for instance through microfinancing.³⁹ Although the cost-benefit ratios of DRR measures are hard to determine with a high level of precision.⁴⁰, studies have found that effective risk reduction investments can reduce the economic losses following disasters as well as shifts in investment strategies that can benefit the economy of a country, region, city or town even before the disaster has struck.⁴¹

Yet governments and political leaders might shy away from DRR actions if these do not provide them with upfront political gains in their constituencies. Similarly, despite good intentions and

improvements in recent years, private companies and corporations still, perhaps understandably, focus on the immediate bottom line profits rather than seeing investments in DRR as being a vested interest in society as a whole, as well as for their specific businesses.

In addressing the issue of leveraging investments, a distinction needs to be made between economic and political investments, which are different, yet interwoven. Economic investments in DRR are here taken to be the allocation of the necessary financial resources to fund specific action-oriented projects for everything from seawalls to public risk awareness campaigns. Political investment is the willingness of elected officials and governments to commit to the aims, strategies and policies necessary for implementing DRR actions. One may say that political investment and a credible and robust business case are required before an economic investment is made. Hence, economic investments, sound business cases, and political commitment are perhaps the most crucial factors if any DRR work is to have an impact in the long-term perspective, and might thus also be a focus of legislative measures.

-
- 37 Priority 3 in the Sendai Framework states that “Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation.” United Nations. 2015. The Sendai Framework for Disaster Risk Reduction 2015 – 2030, pp. 18. Available at: https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf
- 38 McDermott, T.K.J. 2016. Investing in disaster risk management in an uncertain climate (English). Policy Research working paper; no. WPS 7631. Washington, D.C.: World Bank Group. Available at: <http://documents.worldbank.org/curated/en/638091467986362765/Investing-in-disaster-risk-management-in-an-uncertain-climate>.
- 39 United Nations Office for Disaster Risk Reduction. 2005. Invest to prevent disaster. United National World disaster reduction campaign. Available at: https://www.unisdr.org/files/4029_2005presskitenglish1.pdf
- 40 Schreve, C.M. and I. Kelman. 2014. Does mitigation save? Reviewing cost-benefit analyses of disaster risk reduction. International Journal of Disaster Risk Reduction 10(part A), pp. 213-235.
- 41 Hallegatte, S., M. Bangalore and M. Jouanjean. 2016. Higher Losses and Slower Development in the Absence of Disaster Risk Management Investments. Policy Research Working Paper No. 7632. World Bank, Washington, DC. Available at: <https://openknowledge.worldbank.org/handle/10986/24205>.

Key issues

Issue 1: Who should pay for risk reduction?

The essential problem for most DRR projects concerns the question of deciding who should pay for long-term risk reduction where the benefits might not be immediately visible. Although DRR researchers have attempted to do thorough estimates (see above), it is hard to calculate and estimate the potential damage avoided due to prevention and preparedness measures because you are measuring the absence of something. Critical challenges in this area thus include actually putting a value (political, economic and social) on resilience building and preventive measures, as well as deciding who pays for it and maintaining investments in the long run. Recognizing the fact that it might not be those who pay for risk reduction measures who only immediately benefit from that investment is central. Making risk sharing a priority has been a delicate and sometimes controversial issue that decision makers tend to avoid. Following most of the recent major disaster events in Europe, for example, the Central European floods in 2013, debates about the proper financing of losses and damages between governments, insurance companies and individual citizens have surfaced. The issues that were raised in the wake of the floods are still to be resolved, but it is clear that if the future sees similar events occurring at more regular intervals, something needs to change. Events like these reveal that dealing with the economic and financial aspects is an underlying issue that all other issues in some way or another relate to.

Issue 2: Short-term political commitment

A major issue confronting the potential for investment in DRR is that political capital is rarely gained from cost-effective long-term preventive measures, as those measures tend to not show their economic, social or health effects immediately (or provide benefits in terms of ensuring re-election). Those in power seek visible and tangible outcomes for expenditure, and to seek visibility for themselves. This predisposes them to refrain from committing their political capital to long-term risk reduction measures, instead dispersing funds for response and recovery when the disaster has occurred, in order to gain politically by turning disaster relief into public relation acts.

Issue 3: Narrow focus on funding for preparedness and response

Related to the previous issue, funding made available for DRR is primarily directed at response and short-term recovery, with comparatively little for prevention, preparedness and long-term recovery (e.g., building back better). This focus on the former is problematic for two main reasons. First, although potentially seen as being responsive, it is hard to estimate the real benefits of investing in response and short-term recovery. While funding should obviously be abundant for activities in these phases of the DRM cycle, dealing with a risk when it is occurring is like acting after the fact and tends to lead to treating the symptoms of a disease rather than its causes. Second, focusing on the immediate situation can result in the response being too narrow and missing opportunities for addressing

broader options that not only address the current situation, but also expected future events (e.g., as a result of changes in risk associated with climate change). The outlook of CCA is longer than DRR, although the two domains overlap in significant ways, and thus economic investments from both public and private actors need a different outlook when it comes to hazards associated with CCA, and where DRR and CCA overlap (e.g., in the interplay between storm surges and sea-level rise). A continued focus on integrating DRR and CCA must ultimately start with the issue that there continues to be a too narrow focus on response, and to some extent, recovery.

Issue 4: Investments as hindrance to resilience building

A fourth issue follows from the previous ones, namely that national and local politicians often attempt to attract political capital by offering readymade solutions to citizen constituents, rather than engaging them in decision making and enabling them to take actions. A range of cost-effective DRR actions can easily be done by local and affected people, such as the retrofitting of homes, raising local risk awareness and acting on early warnings. Yet, if politicians, in their desire to capitalize on response and recovery efforts, merely focus on post-disaster aid and large structural forms of prevention measures, such as sea walls, people tend to be less inclined to be active actors in risk management on their own and do what they can to reduce risks. The consequence is ultimately that political attempts to appease local disaster-affected constituents does not contribute to resilience building, but instead fuels complacency.

Recommendations

1: Make the value of DRR investments visible

A core aspect of leveraging more investments and political commitment is to make visible the benefits and gains from long-term DRR and CCA investments when they can actually be estimated with some confidence. Governments, nationally and locally, should strive to get the message across that DRR investments can lead to strengthened trust in political institutions, to lives saved, to active citizen participation, to the protection of cultural heritage, and, crucially, to reducing economic and social losses. DRR investments thus contribute, if communicated properly, to building political legacies as well as resilience and more effective forms of risk financing between governments, insurance companies and citizens. A specific recommendation would be to make available a service – such as a set of algorithms – to local authorities that provides estimates of losses that would have been incurred had investments not been made. This could demonstrate to investors – both public as well as private – and to the public at large, that DRR investments can provide substantial benefits economically and socially. Very importantly, this should pertain equally to investments already made as well as future investments. Estimates should furthermore take into consideration a wide range of beneficial effects of DRR investments beyond the minimizing of material and economic risks, such as political stability, health benefits, psychological health, and social cohesion.

Question 25: Have you made efforts to estimate and demonstrate the economic and social benefits of long- and medium-term DRR and CCA measures and actions to elected officials and affected communities and are standardized procedures or guidelines for this in place?

2: Connect politicians and affected communities

Leveraging economic investments and political commitment is also about creating alliances between those affected by disasters and decision makers. Elected officials should avoid focusing on prestige projects that provide quick political publicity. Instead, solutions to disaster risks, whether discussed in the prevention, preparedness or recovery phases, should engage national and local governments with those affected, while at the same time aligning priorities across these actors. Smart DRR investments are almost by definition those that are embedded in and developed and delivered in agreement with local communities. By building connections between those affected and those deciding, accountability, trust and mutual reliance will be stimulated. As such, economic and political investments need to be concerned with how financial, social and political capital can strengthen risk cultures by promoting awareness and ownership for action among local populations. Focusing on creating risk memories is key in this respect. Previous disasters need to be made visible, rather than being forgotten. Politicians have a responsibility in this regard. Risk awareness could be

supported through the creation of monuments and commemorations, including in terms of the investments made to enhance resilience following disasters, as well as incorporating the issues into educational curricula. Governments should thus work with local communities in supporting the creation of sustainable risk management strategies.

Question 26: Have you taken initiatives to establish communication between politicians and disaster affected communities in ways that go beyond the immediate aftermath of the crisis, focusing instead on long-term investments for DRR?

3: Innovate existing disaster risk financing structures

DRM financing should be a central concern for governments in designing DRR and CCA strategies and policies. Countries differ widely in terms of the legal instruments and ethical norms that shape how risks are shared and transferred. Yet, what is evident is that new, innovative forms of disaster risk management financing need to be developed that are publicly transparent. With the increased calls for more risk responsibility for communities and individual citizens, as well as insurance companies, governments should make it clear and transparent who is carrying these risks and the responsibilities for action. Importantly, promoting the sharing of risks and the ownership for responses between different stakeholders will also stimulate more cooperation and partnerships for DRR.

Question 27: Have you conducted assessments of current disaster risk financing schemes in your country with the aim of innovating these, and have you identified how you could make risk financing more transparent?

4: Create partnerships for DRR investments with the private sector

A key aspect of the future of risk financing in DRR, as also called for in the Sendai Framework, is to get a more diverse set of actors to contribute to risk reduction. Specifically, the private sector – companies, corporations and business associations – have a huge potential when it comes to contributing to such investments. Demonstrating economic gains through strengthening tourism, industry and local development to business leaders and politicians is critical. Investments in making public infrastructure such as roads more resilient to extreme events will benefit the transportation of goods and services, which is in the interest of the national and local business communities such as the transportation and tourist industries. Conforming to safety standards, adopting standardized risk assessments and protecting critical infrastructure will support the creation of jobs, private investments in properties and attract outside investment. The EU Natural Capital Financing Facility⁴² is a concrete example of an institution dedicated to showing the benefits and economic viability of CCA to the private sector. National governments should engage with such institutions, learn from them,

and implement similar approaches within their national contexts. At the same time, public authorities should be mindful of the fact that the inclusion of investments from the private sector should serve the public good, of which the private sector is also part. While risks should be shared and dispersed among a wide set of actors, this should not mean that private actors come to define the accepted levels of risk for hazards. These should instead be based on a broad democratic mandate and an enabled shared partnership that sees the engagement of governments, the private sector, civil society, communities and individuals.

Question 28: Have you established schemes or frameworks that enable more cooperation and co-investments between the private and public sectors, in ways that comply with risk standards laid out by the authorities, and in accordance with relevant local and national stakeholders?

5: Make long-term political agreements

Disasters and climate change are issues that are much too important to be affected by political cycles and momentary populist agendas. A political system that does not include the commitments required to confront climate change and disaster prevention over the long run is doomed to fail. As such, these issues ought to transcend the traditional political divides between left and right in the European (and outside of Europe) political system. Thus, political parties and governments must accept the fact that political

⁴² European Investment Bank – Natural Capital Financing Facility. Available at: <http://www.eib.org/products/blending/ncff/index.htm>

agreements will be imperfect, and that consensus on policies and long-term planning needs to be achieved. Forging broad political alliances with actors and stakeholders inside and outside of the political system must be a core objective for building robust political agreements. This also involves creating alliances with business communities, NGOs, citizen groups and grass-roots movements. Importantly, only with such broad political alliances and agreements can the necessary foundations for continuous and long-lasting investments required for DRR and CCA be guaranteed.

Question 29: Have you made efforts to implement mechanisms and policies that ensure that continuous support and financing are consistent with the consideration of DRR and CCA activities that shield them from political election cycles?

6: Identify DRR and CCA overlaps

Investment from federal and national governments in capacity building and awareness raising at the local

level will help provide the added benefit of placing greater focus on the harmonisation and integration of DRR and CCA into related policies, programmes and programs. The clear identification of overlaps between DRR and CCA will allow resources to be allocated efficiently and reduce the risk of conflicts and duplication of efforts, thus reducing the strain on local resources. Where CCA plans, for instance, deal with flood prevention or coastal protection, there is an obvious relevance for DRR policies and for institutions and officials tasked with preparedness, risk awareness and emergency response planning to be involved. The case below of the city of Vejle, Denmark, is an instructive example of how DRR can be addressed through CCA plans and resilience building via multi-stakeholder participation.

Question 30: Have you identified areas in which overlaps between DRR and CCA activities could free up funds and resources that could be used more efficiently in either domain?

Case Study:

Investing in Resilient Vejle, Denmark

Vejle is a mid-sized Danish city in eastern Jutland, the main peninsula of Denmark. The city itself has approximately 55,000 inhabitants, while 113,000 people live in the greater municipal area. Vejle sits at the end of a long inland fjord, where several streams from the hills surrounding the town meet, and flow into the sea. The city is often impacted upon by water hazards from multiple sources: cloudbursts, flash floods, rising groundwater and storm surges.

In October 2013 Vejle responded to a call for participants in the Rockefeller Foundation 100 Resilient Cities campaign. To their surprise, they were quickly

accepted. The small size of Vejle and the clear boundaries of the city, it was argued, could make it a viable experimental model, serving as a source of inspiration for larger cities.

Funding has always been the main barrier in pushing forward plans and projects that have been related to climate change, even before such activities were classified under CCA. A few years ago, a law in Denmark was changed for municipalities, whereby funding and budgets allocated for sewer systems could be re-allocated to surface water management, which fits better with the CCA agenda, while also creating added value.

In refitting the organization of the municipality's work in becoming a part of the 100 Resilient Cities Campaign, the involvement of the private sector was deemed to be central. There are a lot of resources and funds coming from the private sector - especially LEGO money - that has been involved in creating public-private cooperation, so in that sense there was already a culture in place that the Resilient Cities campaign fitted well with. In engaging with civil society and citizens, Vejle, like all Danish municipalities, tries to undertake outreach and engagement activities through the local media and citizen hearings, as well as supporting citizen-groups that wanted to be involved, especially in outlining the flood prone areas of the city. Here, homeowners' associations have been a central focal point for the municipality to cooperate with. Part of the resilience approach that Vejle has is focused on building structures and mechanisms that can activate, involve and engage ordinary citizens. Citizens are naturally mostly concerned with floods in their own neighbourhoods. The municipality tried to engage with citizens, for instance, by providing sandbags and water tubes for citizens, and informing citizens over social media.

It was not new for Vejle to work across sectors in their municipal system, and it has been an organizing principle to also work with private actors, but this was a whole new type of model and concept that the campaign brought to the table. One of the biggest challenges in this regard has been getting politicians on-board and supporting this resilience agenda. One of the recurring challenges for making sustainable policies is that politicians want to see results within their election cycles, which gives them political capital and support. CCA projects often have a longer-term perspective, which has been known in many contexts to provide a conflict between municipal planners and politicians. Politicians tend to think that when one project has been implemented, then the agenda is finished. The role of the public officials in Vejle has thus been to convince politicians that there is a need to continue with the implementation of the required projects and schemes. The public officials of Vejle have tried to attract attention to Vejle by hosting workshops and other events, including international partners who are interested in Vejle. This has put the city on the map, which has ensured the interest of local politicians. The publicity and branding side of the resilience projects in Vejle have been central. However, the political conflict lines

and disagreements in terms of rural and urban planning and between the left and right still, of course, influence the way that CCA and resilience strategies can be implemented.

Nonetheless, regardless of political conflicts that will always be present in a local (or any) setting such as Vejle, the consensus from the elected officials is that Vejle needs to be dry. This has in many ways been the mantra that the public officials working in the municipal administration have had to follow: “keep Vejle dry.” However, the practical implications of doing that are much more complex than politicians think. With rising sea levels coupled with more severe rain events, the interaction between different types of water hazards requires smarter and more innovative solutions, rather than merely opting for structural protection in the form of dikes and walls. It requires financial investments from the public and private systems, as well as a commitment from local politicians, especially the municipal parliament. This must lead to different political factions agreeing very early on that they need to find a long-term consensus on making Vejle resilient, which should transcend local election cycles.



Figure 7: Kick off meeting for Vejle's resilience strategy in March 2016, the first of its kind in Europe.

Chapter 6

Developing communication

For some time now, we have been living in what sociologist Manuel Castells called the Information Society. That is, the world depends much more upon the exchange and use of information. This change from the industrial society to the information society has had huge political, economic and cultural consequences. Politically and economically, we now speak of the knowledge society, replacing the industrial epoch, whereby knowledge is the main driver of growth and prosperity, not ploughs or steam engines.

This in turn has major implications for the way we deal with disasters, fail to address them, as well as how we might become more proficient in preparing for them. In fact, while the issue of developing and delivering communications to address risks might seem almost banal, none of the other recommendations in these guidelines will be productive if they are not integrated into practices and structures of effective communication. This is a given, not least because one of the main issues that continues to be reported again and again across Europe and beyond, is that the population at large lacks an updated awareness of hazard risks and responses. The need to develop more comprehensive and efficient forms of communication between experts, government entities and the public is thus central.

Adapting to a world where social media and digital technologies play an integral part in the lives of millions of European

citizens is an important dimension of this issue. In some countries, most young people get their news from social media platforms such as Twitter, Instagram and Facebook. These platforms can play a crucial role in case of an emergency, in particular, emergency response agencies can screen these social media sources, which may also help them in responding promptly in case of an emergency.⁴³ It thus seems that there is demand for emergency communication via social media, although legal or official operational guidelines for how to deal with this are rare. Guidelines, such as those provided by the EU research project EMERGENT, do provide an example of attempts to push this agenda forward.

Getting government-run platforms to convey effective risk messages to the public in such an environment presents challenges as well as opportunities. On the one hand, such messages can reach the relevant people in the area of the emergency, on the other, it is not clear how these people will act upon such information. Big data might have the potential to revolutionize response mechanisms, but it might also lead to information overload and communication redundancy.

Social media and the big data revolution will take the information age in new directions that are to some extent unpredictable at the present time. What this will mean for the world of DRM is still uncertain, yet some indications and trends point to where the new information and communication can assist and possibly revolutionize disaster prevention, preparedness, response and recovery.

43 Crowe, A. 2012. *Disasters 2.0: The application of social media systems for modern emergency management*. Boca Raton, FL: CRC Press.; Meier, P. 2015. *Digital Humanitarians: How Big Data is Changing the Face of Humanitarian Response*. Boca Raton, FL: CRC Press.

Key issues

Issue 1: Public risk awareness continues to be low

The lack of, or low, public risk awareness in many parts of Europe indicates a continued issue with efforts to communicate risks and warnings effectively. Even in zones where the risks from earthquakes, storms and floods are well-known and events are recurring, there is still a lack of knowledge about how to take effective action ⁴⁴ (preparedness and response). This also pertains to the need to provide people the necessary skills that can spur self-help among local communities and individuals, thus supporting bottom-up resilient processes. Furthermore, a direct link between better risk awareness and preparedness cannot be assumed, just as there needs to be a better understanding of what the effects have been of previous risk awareness raising campaigns.

Issue 2: Lack of media expertise in critical public entities

As is the case with experts in risk and vulnerability assessments, there seems to be a lack of skilled media employees in public institutions. Media landscapes are becoming more complex, while information flows more quickly than ever in times of crisis and emergency, including from different types of sources. As a result, there is a need within appropriate public entities for the capability to design and coordinate effective communication strategies. Such efforts will ensure that warnings and critical advice and response

instructions are disseminated in the event of a crisis situation, as well as communicating risk and vulnerability assessments on a continuous basis in the absence of an impending emergency.

Issue 3: Media industry priorities

Although traditional mass media organizations are generally effective at assisting authorities and the public with timely information during crisis situations, the need to demand more of these actors is evident when looking at recent cases of disasters in the EU and beyond. As private media corporations seek profits through headlines that can attract new subscriptions and sponsors for advertisements, crisis communication from these actors does not always align with what emergency managers and public official's desire. There is a need to balance the necessary freedom of the press, with a better alignment of priorities for crisis communication when it comes to these traditional, and still very important, media outlets.

Issue 4: Social media and big data trends

While issues related to traditional media actors have been well known for years, the challenges related to the rise of social media and big data are only now beginning to become apparent. More and more, people rely on social media platforms for their news, and these same platforms are increasingly becoming not only points of convergence, but also points of contention.⁴⁵ Meanwhile, the use of

44 Wachinger, G., O. Renn, C. Begg and C. Kuhlicke. 2013. The Risk Perception Paradox – Implications for Governance and Communication of Natural Hazards. *Risk Analysis* 33(6), pp. 1049-1065.

45 Alexander, D. 2014. Social Media in Disaster Risk Reduction and Crisis Management. *Science Engineering Ethics* 20, pp. 717-733.

big data in disasters and emergencies is growing rapidly: from accounting for missing persons, to making damage assessments, to predicting the behaviour of the public during emergencies, and the collection of data through smartphones. Social media platforms and analysis have the potential to yield considerable benefits, but as researchers have documented, traditional emergency response and preparedness structures struggle to cooperate with digital volunteers and vice versa.⁴⁶ However, the challenges and benefits associated with this development are becoming apparent, but need to be addressed proactively.

Recommendations

1: Create multi-media platforms for risk awareness

Risk communication needs to be designed around as many different media types and platforms as appropriate, aligned with the diversity of the public’s media habits and consumption patterns. Young people, for instance, tend to use new alternative or less traditional social media platforms (such as Facebook). Government entities working on risk communication should thus consult or hire media experts who can provide critical insights into recent and ongoing media-demographic trends.

Question 31: Have you set up multi-media platforms for risk awareness raising and early warning dissemination; enhancing alternative communication challenges and the use of social media platforms?

2: Cooperate with media partners

Government entities need to reach out to and work with media stakeholders, who include both traditional mass media outlets such as newspapers, television and radio, and community communication mechanisms, as well as social media platforms such as Twitter and Facebook. Greater cooperation between the messages and services that these stakeholders provide – for instance Facebook’s ‘Safety Check’ – should be encouraged by governments.

Question 32: Have you made efforts to make agreements with traditional and new media corporations on emergency and risk awareness raising communication, whereby a consolidated effort to make public dissemination a key priority can be achieved?

3: Strengthen and streamline early warning platforms

With the advent of smartphones and social media, warnings and crises updates are potentially enhanced, and many governments and emergency managers have already used these new platforms and technologies effectively. However, given this capacity comes also the risk of warnings being duplicated and/or misinterpreted if spread on social media networks. At the same time, more efficient forms of issuing warnings to the public still need to be developed, and governments should invest in streamlining warning systems across regions and municipalities. Importantly, with the

⁴⁶ Hughes, A. L. and A.H. Tapia. 2015. Social Media in Crisis: When Professional Responders Meet Digital Volunteers. *Journal of Homeland Security and Emergency Management* 12(3), pp. 679-706.

continued movement of people, businesses and goods within the EU, streamlining public warning systems on apps and platforms across EU states should be a specific aim for EU Member States and their emergency management agencies.

Question 33: Have you identified how you could make early warning systems and communication platforms more efficient and reduce redundancy, and how you could cooperate with neighbouring countries, and EU entities?

4: Innovate disaster risk awareness campaigns

Disaster risk awareness campaigns should not be designed around a principle of merely sending messages out to the public, expecting that they will thus automatically be more informed as a result. As research has shown, past experiences (i.e., memory) is one of the strongest factors in enabling risk perception to transform into preparedness. Raising public risk awareness, especially in hazard zones, should aim at stimulating disaster memory cultures through outreach, dissemination and participatory activities with the public. Importantly, it should be recognized that humans remember in different ways, and that the capacity to forget past events and actions taken is also strong. Experts on memory and behavioural psychology could be useful to include in making plans to stimulate a risk

(and response) memory culture, which in turn can add to the building-up of local resilience.

Question 34: Have you made the stimulation of risk (and response) memories to support preparedness a priority in your risk awareness campaigns and strategies?

5: Bring disaster risk management into the classroom

Promoting more possibilities for education on DRR and CCA in public educational systems has been identified as an area which could yield positive results for disaster prevention and preparedness. While in many developing countries that face regular disaster risks, lectures and thematic days on disasters and climate change are well known, these need to be more widespread in Europe. Greater engagement on these issues with students from an early age could imprint an enhanced awareness of risks and responses. This is in turn could be coupled with the need for educating more young people, specifically with skills in risk and response assessment and other relevant qualifications when they reach an older age.

Question 35: Have you established efforts to include disasters, risk, vulnerability and effective responses (prevention, preparedness, response and recovery) as topics at different levels in your education system?

Case Study:

Optimizing flood warnings in Germany from 2002 to 2013

Flooding is one of the more serious natural hazards to affect Germany. For the period 1990 to 2018, such events lead to around 49% of economic losses and 17% of fatalities (excluding the 2003 heatwave) arising from natural disasters in Germany. Two floods in particular have emphasized this point, namely the 2002 and 2013 events, which in Germany lead to 21 and 14 fatalities, and 11.6 and 8 billion euros in damage, respectively. The 2002 event triggered initiatives that contributed to improved flood risk reduction and management across a number of levels and led to reduced losses during the 2013 event. Below, some of the improvements surrounding the sharing of knowledge that contributed to this are presented.

The first point involves the issue of flood warnings. The German Weather Service (DWD) has considerably updated their various numerical forecast models, as well as the form of their warning levels and the dissemination of alerts. There are now four warning levels provided, including one for very severe weather events, all disseminated by various media, including the internet and social media. In general, warnings are disseminated in three time steps with increasing levels of detail and certainty: early warning – 48 to 120 hours, advanced warning – 12 to 48 hours, weather warning and storm warning – up to 12 hours before the actual event, as well as at the rural district level. In addition, forecast data, including uncertainties of the simulations, is now provided to district and regional flood warning centres as input for rainfall-runoff models. This enables improved flood forecasting and warnings, which is the responsibility of the *Länder* (states). The provision of flood warnings was greatly reorganized following the 2002 event within a number of *Länder*. For example, Saxony, one of the worse hit *Länder* in 2002, integrated their four region flood centres into one, greatly increasing the efficiency of the data compilation and issuing of warnings based on a single-voice authoritative principle. Furthermore, a nationwide information platform showing the flood warning levels throughout Germany and its neighbouring countries was established (www.hochwasserzentralen.de) allowing authorities, as well as the general public, to assess the flood situation across (regional) borders, which was impossible back in 2002.

Another result of the 2002 event, which saw a lack of continuity in the communication of risk information, was a series of information campaigns and public forums that disseminated information about what areas were at risk of flooding (including hazard maps), and the presentation of preparation and response strategies to deal with flood risk. However, this is an ongoing process since, for example, the maps were not necessarily suited for the needs of the general public, while not adequately aligned with the coping strategies suggested.

Nonetheless, when comparing the proportion of affected households and companies who had not received any warnings in 2013 compared to 2002, a vast improvement was seen with only 5% of affected households and 3% of companies in 2013 not receiving any warnings, compared to 27% and 45%, respectively, during the 2002 event. Similarly, the proportion of companies that had flood emergency plans in place increased from 10% in 2002, to 34% in 2013. Such improvements are carried through when considering the proportion of private households with knowledge of how to protect themselves, with 46% in 2013 knowing how to do so, as opposed to only 14% in 2002. Such an increase could be attributed to resulting from the relatively recent flood experience (the use of memory as a form of knowledge transfer, for example, some localities have markers indicating the height of recent and historical events), as well as the information campaigns and public forums.

In 2013, the wider penetration of the internet, as well as social media in general, also saw the rapid dissemination of knowledge about the status of various regions. This allowed the more effective mobilization of volunteers, which resulted in them acting independently or in parallel with response organizations who themselves were better prepared to respond owing to improved communications and coordination in 2013 compared to 2002.

Summary

Recommendations and checklist questions

Chapter	Recommendations	Checklist questions
Sharing knowledge	Map the field of relevant actors	Question 1: Do you know who should both give and receive knowledge and information on DRR and CCA, and has this task been delegated to one or several capable organizations, institutions or entities?
	Bridge knowledge gaps between science and policy	Question 2: Have you put into place strategies or plans for employing or enabling people to act as intermediaries in the science to policy interface on DRR and CCA, and have you identified scientific institutions and teams that could create valuable knowledge for your organisation?
	Build diverse networks for knowledge sharing	Question 3: Are you aware of information and knowledge sharing activities being done by your national platform for DRR and have you identified whether existing or planned networks for DRR and CCA knowledge sharing include actors across political domains and organizational sectors?
	Create frameworks and platforms	Question 4: Have you put into place, or planned for, platforms (such as online portals) and/or face-to-face fora, and frameworks (such as guidelines) for knowledge sharing that can help networks to operate more effectively?
	Provide incentives for sharing	Question 5: Have you made the effort to show the value of data and knowledge sharing for both public and private actors, for instance through workshops, conferences, or via the evaluations of successful outcomes of knowledge sharing, and have you reviewed existing national legislation on data and information sharing in relation to DRR and CCA?
	Balance national and local scales	Question 6: Have you made efforts to ensure that there are credible and relevant knowledge sharing platforms, networks, and/or events horizontally across government entities and sectors, as well as vertically between the national, regional and municipal/local levels?

Chapter	Recommendations	Checklist questions
Harmonizing capacities	Map existing capacities	Question 7: Have you conducted, or made plans to conduct, a thorough mapping of existing capacities for disaster prevention, risk management and risk reduction in your country, both in terms of technical/material capacities and human capacities?
	Assess and balance capacities	Question 8: Have you made a comparison of capacities across national and sub-national government entities, in order to assess whether they are balanced, thereby ensuring harmonized efforts to deal with disaster risks?
	Match capacities to risks	Question 9: Have you ensured that plans for improving capacities at the national and sub-national levels are in accordance with the hazard and risk profiles of the region at hand, and corresponds to the most up to date risk assessments, including regionally downscaled climate model projections from international bodies, such as the IPCC?
	Evaluate and learn	Question 10: Have you put in place mechanisms that ensure that evaluations are done after crises, emergencies and disasters (i.e., Lessons Learned), and that the relevant actors are involved in such evaluations through bottom-up participatory processes and are expected to adopt the resulting recommendations?
	Create local partnerships	Question 11: Have you encouraged and supported the creation of local partnerships across the public and private sectors, and the participation in partnerships between cities or municipalities both within your country and internationally?
	Create continuity for capacities	Question 12: Have you made plans that will ensure the continuity of risk management capacities in your country/region, both by committing the necessary long-term resources and by enabling synergies across different knowledge and policy sectors?

Chapter	Recommendations	Checklist questions
Institutionalizing coordination	Clarify mandates for coordination	Question 13: Have you identified institutional barriers and made steps towards clarifying or revisiting the roles and mandates of different organizations and entities involved in emergency response and risk management activities?
	Acknowledge the need for balance and flexibility	Question 14: Have you brought together actors involved in emergency response and risk management with the purpose of making mechanisms and structures more flexible through the incorporation of non-government and civil society actors?
	Practice and exercise roles	Question 15: Have you ensured that emergency response and risk management professionals train and simulate crisis scenarios, in terms of both real-time simulations, serious games, and other relevant formats?
	Set up coordination forums	Question 16: Have you put in place forums that allow for the coordination of activities and tasks both between the responsible emergency management entities, as well as between governmental and non-state actors in emergency response, such as NGOs and the general public?
	Align and streamline priorities	Question 17: Have you made steps towards ensuring that government entities (national and sub-national) have aligned their strategies and use the same terminology and understanding of concepts, such as risk and vulnerability, for example, through the creation of common terminology and risk assessment methods that can work across hazard types?
	Build new partnerships for transboundary crisis management	Question 18: Have you made agreements with neighbouring governments for transboundary crisis management, including the clarification of mandates, and have you done, or do you plan to do, crisis and emergency response exercises with relevant counterparts in these countries?

Chapter	Recommendations	Checklist questions
Engaging stakeholders	Clarify the roles of stakeholders	Question 19: Have you undertaken efforts to map all relevant stakeholders for emergency response, DRR and CCA in your country, and have you simultaneously assessed whether the roles of stakeholders are clear and comprehensible to them?
	Create incentives for stakeholder participation	Question 20: Have you ensured that the value and mutual benefits for participating in networks, platforms and events have been communicated to stakeholders?
	Create web-based online platforms	Question 21: Have you set up web-based online platforms that will allow for efficient and easily accessible participation and inclusion of stakeholders, at all relevant government levels in your country?
	Locate mediators and experiment with roles	Question 22: Have you made strategic efforts to identify, include and strengthen the role of mediators between policy and stakeholder domains, and have you made efforts to include NGOs in decision-making processes where this might be relevant?
	Utilize local stakeholder knowledge for DRR actions	Question 23: Have you made efforts to use local stakeholders as resources for making better decisions on DRR and CCA, and have you set up mechanisms that ensure that the voices of minority groups are heard by policy and decision makers?
	Ensure sustained commitment	Question 24: Have you made efforts to make stakeholder inclusion and engagement more sustainable and self-producing by ensuring the necessary governance and financial support?

Chapter	Recommendations	Checklist questions
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Leveraging investments</p>	<p>Make the value of DRR investments visible</p>	<p>Question 25: Have you made efforts to estimate and demonstrate the economic and social benefits of long- and medium-term DRR and CCA measures and actions to elected officials and affected communities and are standardized procedures or guidelines for this in place?</p>
	<p>Connect politicians and affected communities</p>	<p>Question 26: Have you taken initiatives to establish communication between politicians and disaster affected communities in ways that go beyond the immediate aftermath of the crisis, focusing instead on long-term investments for DRR?</p>
	<p>Innovate existing disaster risk financing structures</p>	<p>Question 27: Have you conducted assessments of current disaster risk financing schemes in your country with the aim of innovating these, and have you identified how you could make risk financing more transparent?</p>
	<p>Create partnerships for DRR investments with the private sector</p>	<p>Question 28: Have you established schemes or frameworks that enable more cooperation and co-investments between the private and public sectors, in ways that comply with risk standards laid out by the authorities, and in accordance with relevant local and national stakeholders?</p>
	<p>Make long-term political agreements</p>	<p>Question 29: Have you made efforts to implement mechanisms and policies that ensure that continuous support and financing are consistent with the consideration of DRR and CCA activities that shield them from political election cycles?</p>
	<p>Identify DRR and CCA overlaps</p>	<p>Question 30: Have you identified areas in which overlaps between DRR and CCA activities could free up funds and resources that could be used more efficiently in either domain?</p>

Chapter	Recommendations	Checklist questions
Developing communication	Create multi-media platforms for risk awareness	Question 31: Have you set up multi-media platforms for risk awareness raising and early warning dissemination; enhancing alternative communication challenges and the use of social media platforms?
	Cooperate with media partners	Question 32: Have you made efforts to make agreements with traditional and new media corporations on emergency and risk awareness raising communication, whereby a consolidated effort to make public dissemination a key priority can be achieved?
	Strengthen and streamline early warning platforms	Question 33: Have you identified how you could make early warning systems and communication platforms more efficient and reduce redundancy, and how you could cooperate with neighbouring countries, and EU entities?
	Innovate disaster risk awareness campaigns	Question 34: Have you made the stimulation of risk (and response) memories to support preparedness a priority in your risk awareness campaigns and strategies?
	Bring disaster risk management into the classroom	Question 35: Have you established efforts to include disasters, risk, vulnerability and effective responses (prevention, preparedness, response and recovery) as topics at different levels in your education system?

References

Alexander, D. 2014. Social Media in Disaster Risk Reduction and Crisis Management. *Science Engineering Ethics* 20, pp. 717-733.

Antofie, T. E., B. Doherty, and M. Ferrer. 2018. Mapping of risk web-platforms and risk data: collection of good practices. EUR 29086 EN, Publications Office of the European Union. PUBSY No. JRC109146.

Bawden, D. and L. Robinson. 2008. The dark side of information: overload, anxiety and other paradoxes and pathologies. *Journal of Information Science* 35(2), pp. 180–191.

Birkland, T. 2006. *Lessons of disaster: policy change after catastrophic events (American governance and public policy)*. Washington, D.C: Georgetown University Press.

Boin, A. and M. Rhinard. 2008. Managing Transboundary Crises: What Role for the European Union? - *International Studies Review* 10(1), pp. 1-26.

Boin, A., M. Busuioac and M. Groenleer. 2014. Building European Union capacity to manage transboundary crises: Network or lead-agency model? *Regulation & Governance* 8(4), pp. 418-436.

Chandler, D. 2014. *Resilience: The Governance of Complexity*. Critical Issues in Global Politics 7. London/New York: Routledge.

Crowe, A. 2012. *Disasters 2.0: The application of social media systems for modern emergency management*. Boca Raton, FL: CRC Press.

Dynes, R. 1970. *Organized behavior in disaster (Disaster Research Center series)*. Lexington, Mass.

ESPRESSO. 2017. Overcoming obstacles for disaster prevention: Challenges and best practices from the EU and beyond. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D2.2_FINAL.pdf

ESPRESSO. 2018. Proposal of solutions to overcome the three ESPRESSO challenges. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D4.7_final.pdf

ESPRESSO. 2018. Report on existing methodologies for scenario development and stakeholders knowledge elicitation. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D3.2.pdf

ESPRESSO. 2018. Scenario Design Toolbox. Available at: http://www.espressoproject.eu/images/deliverables/ESPRESSO_D3.3.pdf

ESPRESSO. 2018. Stakeholder Engagement process - understanding stakeholders needs, perspectives and opinions, and identifying the priorities of stakeholders for innovation. Available at: <http://www.espressoproject.eu/dissemination-results/deliverables.html>

European Commission. 2015. Risk Management Capability Assessment Guidelines (2015/C 261/03). Official Journal of the European Union. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015XC0808\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015XC0808(01)&from=EN)

European Commission. 2016. Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030 A disaster risk-informed approach for all EU policies. Brussels, 17.6.2016 SWD(2016) 205 final/2. Available at: http://ec.europa.eu/echo/sites/echo-site/files/1_en_document_travail_service_part1_v2.pdf

European Commission. 2017. Commission Staff Working Document Overview of Natural and Man-made Disaster Risks the European Union may face. Brussels, 23.5.2017 SWD (2017) 176 final. Available at:

http://ec.europa.eu/echo/sites/echo-site/files/swd_2017_176_overview_of_risks_2.pdf

European Environment Agency. 2018. National Climate Change Vulnerability and Risk Assessments in Europe, 2018. Available at:

<https://www.eea.europa.eu/publications/national-climate-change-vulnerability-2018>

European Investment Bank – Natural Capital Financing Facility. Available at:

<http://www.eib.org/products/blending/ncff/index.htm>

European Parliament. 2013. Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism, pp. 919. Available at:

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D1313&from=EN>

Global Facility for Disaster Reduction and Recovery. 2014. Understanding Risk in an Evolving World: Emerging Best Practices in Natural Disaster Risk Assessment. Washington, DC: World Bank. Available at:

https://www.gfdr.org/sites/default/files/publication/Understanding_Risk-Web_Version-rev_1.8.0.pdf

Hallegatte, S., M. Bangalore and M. Jouanjean. 2016. Higher Losses and Slower Development in the Absence of Disaster Risk Management Investments. Policy Research Working Paper No. 7632. World Bank, Washington, DC. Available at:

<https://www.openknowledge.worldbank.org/handle/10986/24205>.

Huddersfield Examiner. 2018. M62 may stay closed overnight again - and drivers urged NOT to travel at all tonight. 2nd of March. Available at:

<https://www.examiner.co.uk/news/west-yorkshire-news/m62-remain-closed-until-winds-14362332>.

Hughes, A. L. and A.H. Tapia. 2015. Social Media in Crisis: When Professional Responders Meet Digital Volunteers. Journal of Homeland Security and Emergency Management 12(3), pp. 679-706.

Kuhlicke, C. and A. Steinführer. 2015. Preface: Building social capacities for natural hazards: An emerging field for research and practice in Europe. Natural Hazards and Earth System Sciences 15(10), pp. 2359-2367.

McDermott, T.K.J. 2016. Investing in disaster risk management in an uncertain climate (English). Policy Research working paper; no. WPS 7631. Washington, D.C.: World Bank Group. Available at:

<http://documents.worldbank.org/curated/en/6380914679986362765/Investing-in-disaster-risk-management-in-an-uncertain-climate>.

Meier, P. 2015. Digital Humanitarians: How Big Data is Changing the Face of Humanitarian Response. Boca Raton, FL.: CRC Press.

Nelson, B. 2009. Data sharing: Empty archives. Nature 461(7261), pp. 160-163.

Renn, O. 2015. Stakeholder and Public Involvement in Risk Governance. International Journal of Disaster Risk Science 6(1), pp. 8-20.

Scanlon, J., I. Helsloot, and J. Groenendaal. 2014. Putting It All Together: Integrating Ordinary People into Emergency Response. International Journal of Mass Emergencies and Disasters 31(1), pp. 43–63.

Schreve, C.M. and I. Kelman. 2014. Does mitigation save? Reviewing cost-benefit analyses of disaster risk reduction. International Journal of Disaster Risk Reduction 10(part A), pp. 213-235.

Stringer, L.C., A.J. Dougill, E. Fraser, K. Hubacek, C. Prell and M.S. Reed. 2006. Unpacking "Participation" in the Adaptive Management of Social–ecological Systems a Critical Review. *Ecology and Society* 11(2), pp. 39.

Sylves, R. 2008. Public Managers, Volunteer Organizations, and Disasters. *Public Manager* 37(4), pp. 76-80.

Tierney, K. 2012. Disaster Governance: Social, Political, and Economic Dimensions. *Annu. Rev. Environ. Resource* 37, pp. 341–63.

United Nations Office for Disaster Risk Reduction. 2005. Invest to prevent disaster. United National World disaster reduction campaign. Available at: https://www.unisdr.org/files/4029_2005presskitenglish1.pdf

United Nations. 2015. The Sendai Framework for Disaster Risk Reduction 2015 – 2030. Available at: https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

Wachinger, G., O. Renn, C. Begg and C. Kuhlicke. 2013. The Risk Perception Paradox – Implications for Governance and Communication of Natural Hazards. *Risk Analysis* 33(6), pp. 1049-1065.

Walker, P., B. Wisner, J. Leaning, and L. Minear. 2005. Smoke and mirrors: Deficiencies in disaster funding. *British Medical Journal* 330(7485), pp. 247-250.

Figure credits

- Fig. 2: Umweltbundesamt. 2018. KomPass übernimmt vielfältige Aufgaben. <https://www.umweltbundesamt.de/sites/default/files/medien/2666/bilder/kernaufgaben2x.png>
- Fig. 3 and 4: Cadri. 2017. The CADRI Partnership Quarterly Communication Bulletin July-September 2017. <https://www.cadri.net/sites/default/files/CADRI-Bulletin-Q3-2017.pdf>
- Fig. 5: Courtesy of Kantonalen Krisen Organisation (KKO Basel-Stadt)
- Fig. 6: Huddersfield Examiner. 2018. M62 may stay closed overnight again - and drivers urged NOT to travel at all tonight. 2nd of March. <https://www.examiner.co.uk/news/west-yorkshire-news/m62-remain-closed-until-winds-14362332>
- Fig. 7: Mirkopol. 2016. Vejles strategi for resiliens er Europas første. <http://www.mirkopol.dk/nyheder/vejles-strategi-for-resiliens-er-europas-foerste/>

Appendix

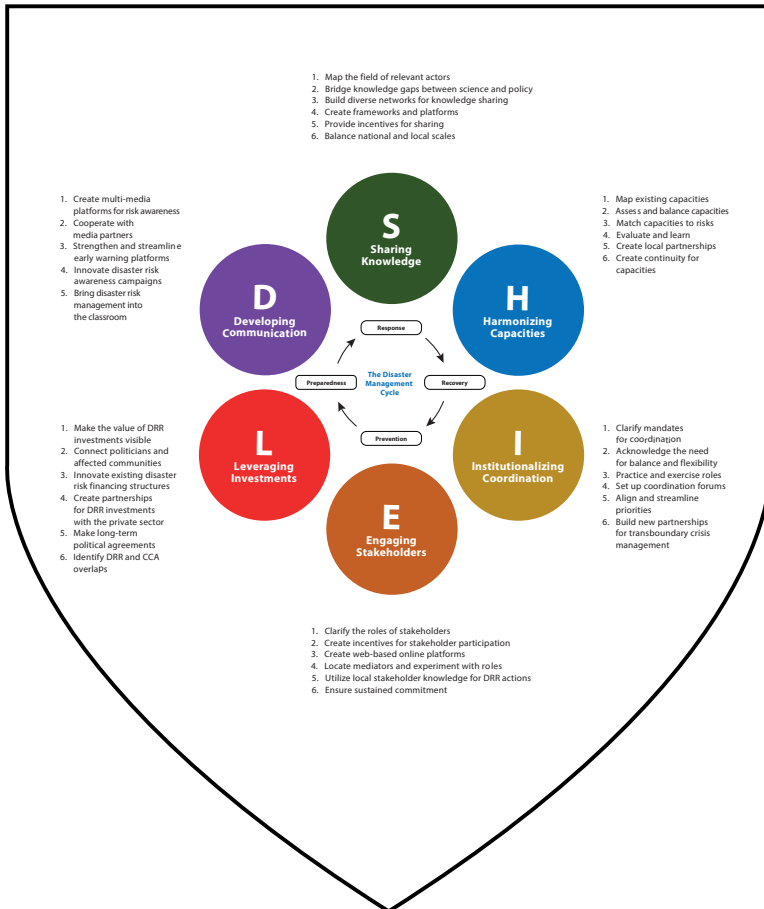
Detachable foldout poster in DIN A2 format



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700342. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

THE SHIELD MODEL

Enhancing Risk Management Capabilities Guidelines



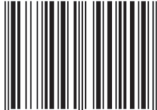
ESPRESSO

Enhancing Risk Management Capabilities Guidelines

Imprint

Publisher:	ESPRESSO – Enhancing Synergies for Disaster Prevention in the European Union
Project Coordinator:	Giulio Zuccaro (AMRA)
Project Officers:	Denis Peter, Nicolas Faivre (since July 2018)
Layout:	Satz & Logo - www.satzundlogobonn.de

ISBN 978-88-943902-0-9



9 788894 390209

