



Current status of disaster risk management and policy frameworks

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1.1 Introduction

Since 1990, over 1.6 million people have died in reported disasters around the world. Despite important improvements in the management of disasters, economic losses remain at an annual average of EUR 235 billion (USD 250 billion) to EUR 280 billion (USD 300 billion) (UNISDR, 2015). The European Union is not spared, as disasters have caused over 90 000 deaths and EUR 100 billion in economic loss since 2000 (CRED, 2017).

The impacts of disasters have significantly increased in recent years, partly as a result of climate change, rapid and unplanned urbanisation, population growth and environmental degradation (European Commission 2014). No country alone can be fully prepared for all kinds of disasters. We need to act together and benefit from a coordinated common response and to be stronger and more efficient.

Policymakers and risk managers in disaster risk management (DRM) and across EU policies increasingly rely on the wealth of existing knowledge and evidence at all levels — local, national, European and global — and at all stages of the DRM cycle — prevention and mitigation, preparedness, response and recovery. Innovative ways to carry out DRM policies and operations are necessary. In this respect, the European Commission itself recognises that ‘the challenges faced by the EU today require fast and effective solutions from the Commission, which often involve multiple policy areas’ (European Commission, 2016a).

The 2015 United Nations World Conference on Disaster Risk Reduction and its associated Sendai framework 2015-2030 (UNGA, 2015a) is an ambitious appeal for cooperation and actions to achieve substantial results at the global level. The European Commission has been instrumental in contributing to a better understanding of disaster risk in all its dimensions and defines its priorities for actions under a comprehensive Sendai action plan (European Commission, 2016b).

Natural and man-made disasters present major risks to the economy, security and well-being of citizens and society. Addressing these risks relies on robust evidence-based decision-making.

Over the years, the EU and its Member States have developed substantial experience in enhancing and mainstreaming DRM across a range of policies at national, European and global levels.

This chapter sets the policy scene for this report by highlighting some of the main policy processes and instruments at European and global levels, which contribute to the management and the reduction of disaster risks. It provides examples of how science and knowledge contribute to DRM in policy areas such as civil protection, humanitarian aid, climate change adaptation, flood risk management, earth observation, critical infrastruc-

ture protection, regional policy, health and research and innovation policies. In doing so, this chapter underlines the extent to which strengthening the contribution of science throughout these policy areas is an important step towards reducing disaster risks through robust evidence-based decision-making.

1.2 Disaster prevention and risk reduction through risk-informed policies

In the area of disaster management, the recent Union Civil Protection Mechanism (UCPM) addresses disaster risks both in the EU and in third countries by strengthening cooperation and facilitating coordination within Europe in the areas of disaster prevention, preparedness and response (European Union, 2013a). The European Commission and its Member States work to strengthen the EU’s resilience to crises and disasters through the development and use of scientific tools in crisis management, satellite image processing and analysis, DRM surveillance systems and other forms of integrated systems for risk management, situational awareness, early warning and collaborative decision-making.

The area of disaster prevention is recognised under the UCPM to be a key component to protect and build resilience to disasters, as a first and vital stage in the full DRM cycle. Ensuring the prevention and reduction of disaster risks relies on a robust knowledge base on disaster risks and efficient

sharing of knowledge, best practices and information. Strong knowledge on disaster risks and the contribution of science are important for Member States to undertake risk assessments, assess risk management capabilities and record loss and damage data on disasters. The European Commission also relies on robust knowledge and evidence to support Member States in reinforcing their prevention capacities and actions, as illustrated in Box 1.1 (European Union, 2013a).

In humanitarian policy, the EU is one of the major donors in terms of meeting response needs and reducing the risks of disasters worldwide (European Community, 1996). It relies on a strong knowledge and evidence base as well as on a growing culture of innovation. In this context, the European Commission is playing a central role to develop and promote the INFORM index for risk management, which is a global, open-source risk assessment for humanitarian crises and disasters, contributing to global efforts to reinforce risk assessments and risk reduction strategies — see Box 1.2.

Disaster prevention and risk reduction are cross-cutting to a number of key EU policies. Ensuring efficient disaster risk reduction and prevention measures relies on a robust understanding and assessment of risks.

Science also plays an important role in enhancing the resilience and performance of vital and critical infrastructures and services. In the case of the European programme for critical infrastructure protection (European Commission, 2006), several research projects have been financed to develop fresh knowledge and innovative concepts in this area. This has led to progress in the development of risk assessment methodologies and other tools for critical infrastructure protection, in the analysis of interdependencies and cascading effects and in

responses to man-made threats and natural hazards. The programme has led to a better understanding of the issues related to critical infrastructure protection and has helped Member States develop their own national strategies and research projects.

Disaster risk reduction (DRR) and climate change adaptation are intrinsically linked in reducing risks and vulnerabilities to climate-related hazards. Both rely on the availability of robust knowledge and data at all levels. Knowledge and data are key in defining scenarios and projections according to which adaptation measures are developed, in monitoring progress of implementation and in developing innovative instruments/tools to increase resilience. The development of appropriate methodologies and the sharing of good practices are key in carrying out national risk assessments and the assessment of risk management capabilities. Improving the recording of loss and damage data relies on robust systems, models and methodologies. Science will help improve the understanding of risks and the undertaking of the vital first steps to-

BOX 1.1

EU Overview of natural and man-made disaster risks

The European Commission is mandated under the UCPM to develop a comprehensive overview and mapping of natural and human-induced disaster risks in the EU as one of its key disaster prevention actions (Article 5.1(a), *ibid.*). The overview, published in 2017 and to be updated on a regular basis, builds on national assessments of disaster risks and extensive scientific input (European Commission, 2017).

Science plays a central role in developing a comprehensive understanding of disaster risks across Europe, with a particular emphasis on cross-border, emerging and new risks and taking into consideration climate change.

wards DRM and adaptation planning. The global threat of new and re-emerging infectious diseases and man-made and natural disasters requires reinforcing the infrastructure of public health response through strengthening health systems and the global health security framework. The EU decision on serious cross-border threats to health (European Union, 2013b) provides the framework to improve prevention and preparedness and to strengthen the capacity to coordinate response to health emergencies across the EU; emergencies caused by biological, chemical and environmental agents and threats of unknown origin aiming to contribute to a high level of public health protection. The EU health programme provides scientific support and capacity building in Member States through training and exercises, sharing experiences, guidelines and procedures, and technical support and expertise with preparedness planning or for implementation of improvements in certain areas such as maritime traffic or specialised laboratories. In the field of

emerging and re-emerging infectious diseases, science and innovation play a key role in vaccine, diagnostics and drug development and in risk modelling and assessment, as well as in identifying effective prevention and control strategies at the population level. The EU Early Warning and Response System is instrumental in notifying alerts as well as measures undertaken by the Member States.

Major industrial accidents can have consequences beyond the limits of industrial establishments and the human, ecological and economic costs of an accident are borne not only by the establishment affected, but also by the society concerned. It is therefore necessary to establish and apply safety and risk reduction measures to prevent possible accidents, to reduce the risks of accidents occurring and to minimise the effects if they do occur, thereby making it possible to ensure a high level of protection throughout the Union. The Directive 2012/18/EU on major accidents hazards involving dangerous

substances (European Union, 2012), also known as ‘Seveso III’, sets risk management goal-oriented objectives based on the fact that operators are obliged to take all necessary measures to prevent major accidents and to limit their consequences for human health or the environment. The directive is focused on the unintentional (accidental, including natural hazards) potential events in the establishments, thus usually not related to the intentional acts (attacks), and excludes the military establishments and pipelines, as well as the transportation outside establishments.

In recent years, and in particular following the Fukushima accident in Japan, the EU significantly strengthened its legislative framework on nuclear safety by adopting the amended directive on nuclear safety in 2014 (European Union, 2014), the revised directives on basic safety standards in 2013 (European Union, 2013c) and the directive on radioactive waste and spent fuel management in 2011 (European Union, 2011). Altogether, this

BOX 1.2

INFORM – Index for Risk Management

INFORM is a global, open-source risk assessment for humanitarian crises and disasters. It can support decisions about prevention, preparedness and response. It is the first global, objective and transparent tool for understanding the risk of humanitarian crises. When all those involved in crisis prevention, preparedness and response use a shared risk assessment, they can work more effectively together. It has been developed in response to recommendations by numerous organisations to improve the common evidence basis for risk analysis as well as the real demands of Inform partner organisations. It is a way to simplify a lot of information about crisis risk so it can be easily used for decision-making. The Inform model is based on risk concepts published in scientific literature and envisages three dimensions of risk: hazards & exposure, vulnerability and lack of coping capacity dimensions (INFORM, n.d.).

represents the most advanced legally binding and enforceable regional legal framework in the world.

By the summer of 2017, EU Member States have agreed to implement the provisions of the amended nuclear safety directive in their national laws. An ambitious EU-wide safety objective for all types of nuclear installations has been introduced in this revised directive, with the aim of reducing the risk of accidents and avoiding large radioactive releases. This EU-wide safety objective will have a global impact via the 2015 Vienna Declaration on the International Atomic Energy Agency's Convention of Nuclear Safety.

In addition and in the post-Fukushima environment, the new Basic Safety Standards Directive modernises and consolidates the European radiation protection legislation and takes into account recent international recommendations and standards. Once fully implemented, the revised standards will bring the highest level of protection of workers, patients and the general public across Europe. It will also foster improvement in emergency preparedness and response regimes across Europe and will lead to better coordination and cooperation between Member States.

Specific policy instruments are also in place in the water sector related to extreme hydrometeorological events such as floods and droughts. Complementing the Water Framework Directive (WFD) (European Community, 2000), flood prevention and management are tackled by the European Union Flood Directive (European Community, 2007). In this framework,

Member States should carry out a preliminary flood risk assessment on the basis of a methodology and accounting for historic floods, establish mechanisms to assess the flood hazard (e.g. extent and depth of water) and flood risk (i.e. the impact of significant flooding on health, the economy, the environment and cultural heritage) in Europe. This requires, for instance, knowledge of the location of floodplains and receptors within them, the use of advanced digital elevation models and the ability for elaborate modelling of the propagation of water during a flood — and the know-how to calculate damages arising from flooding. Based on the mapping, the design and implementation of a flood risk management plan with objectives and measures leading to the reduction of flood risk is carried out, which requires the use of prioritisation methods (e.g. based on cost/benefit) and an estimation of the likely impact of climate change in the longer term.

Water scarcity and droughts are also considered in the policy context. A European assessment of water scarcity and droughts has been conducted by the European Commission in this framework to monitor changes across Europe and to identify where further action is needed in response to climate change (European Commission, 2007). The successive steps of the WFD river basin management planning and the related flood and drought policy frameworks may conveniently incorporate adaptation to climate-related water risks through risk assessment, monitoring, environmental objective setting, economic analysis and action programmes to achieve well-defined environmen-

tal objectives. In addition, while the protection of the (coastal) marine environment is covered by the WFD, EU environmental policymakers considered there was a lack of strategy underpinning the policies to protect the marine environment. A strategy was thus developed in the sixth environmental action programme (2002-2012), which resulted in setting up environmental objectives for the marine environment. The related protection regime is regulated under the EU Marine Strategy Framework Directive, which was adopted in 2008 (European Community, 2008).

Finally, through its European Structural and Investment Funds, the EU provides important contribution to disaster prevention and management (European Union, 2013d); see Box 1.3. The regional dimension is central to disaster prevention, as local and regional authorities are the first to be confronted with the impacts of disasters. Disaster prevention is also important for regional development and cross-border action. Prior investment is safeguarded, as it is important in maintaining local growth and jobs. Investment in risk prevention itself can also develop new professional fields, foster innovation, support small and medium-sized enterprises (SMEs) and boost the transition to a low-carbon and climate-resilient economy.

1.3 Enhanced preparedness and response through timely, relevant and reliable information

The European disaster response coordination is ensured by the Emergency Response Coordination Centre (ERCC) to bring together scientific and operational communities in Europe in order to improve the planning of disaster response operations, including scenario building for disaster response, asset mapping and the development of plans for the deployment of response capacities. Timely, relevant and reliable information is vital for detection and alert systems at the core of disaster response activities. Forecasting and early warning tools supporting ERCC activities include the European Forest Fire Information System (EFFIS), the European Flood Awareness System (EFAS),

the Medical Information System (MedISys), the Tsunami Assessment Modelling System and the European Drought Observatory (EDO).

The development and better integration of transnational and multi-hazard early warning systems by bringing together scientific centres around early warning systems is being strengthened through the EU project ‘all risk integrated system towards’ (Aristotle). The holistic early warning (INGV, 2016) is a unique project that has created a European scientific natural hazard partnership following a multi-hazard approach — consisting of 15 institutions, the majority of which are legally mandated to provide scientific advice in their national civil protection authorities as well — to support the ERCC. Aristotle is designed to be scalable in order to expand in the future to include other hazards and institutions, under the condition that the partnership and its structure prove to be solid and well functioning during this pilot phase. Aristotle

was launched on 1 February 2016 and will last until 31 January 2018. Since 1 February 2017, it has become fully operational, providing the ERCC with 24/7 multi-hazard scientific analysis and advice for selected hazards (earthquakes, tsunamis, volcanic gases/ashes, floods and severe weather including tropical cyclones). This aims at increasing both preparedness and response levels of the ERCC and the UCPM participating states, all the while respecting the national responsibilities of the latter.

Disaster preparedness and response measures depend on the support of tools and instruments to provide timely, relevant and reliable data for operational decision-making.

BOX 1.3

EU Cohesion policy contributions to disaster risk prevention, 2014-2020

With EUR 8 billion for climate change adaptation and risk prevention and management, the cohesion policy is one of the most important sources for funding in this area. Twenty Member States have selected risk prevention as a priority for the 2014-2020 funding period, depending on their specific needs. Furthermore, risk prevention, disaster resilience and climate change adaptation are integrated into other cohesion policy-funding priorities, such as innovation, energy efficiency and water management. The planned investments increase Europe’s resilience to disasters and climate change and aim at protecting 13.3 million people from floods and 11.8 million from forest fires (European Commission, 2016c).

Other tools are central to the operational activities of the European Commission, via the ERCC, such as the Copernicus programme (see section on Earth observation), and the Global Disaster Alert and Coordination System (GDACS), which provides key information on disasters worldwide and a platform for structured information exchange to facilitate decision-making in emergency responses (GDACS, n.d.).

Reinforcing access and use of sound data, evidence and DRM knowledge is also contributing to the development of an EU voluntary pool of pre-committed response assets to provide a basis for the identification of potential response capacity gaps and buffer capacities for use in extraordinary situations. Indeed, to increase the effectiveness and efficiency of the UCPM, the European Commission endeavours to foster technological innovation in response operations by encouraging the registration of innovative capacities in the ERCC.

The Copernicus programme provides accessible and global Earth observation through high-quality satellite mapping and services (European Union, 2014). Environmental information is of crucial importance to its activities and helps to understand how our planet and its climate are changing, the role played by human activities in these changes and how they will influence our daily lives. The Copernicus services address six thematic areas: land, marine, atmosphere, climate change, emergency management and security. The main users of the Copernicus services are policymakers and public authorities that need the information to develop

environmental legislation and policies or to take critical decisions in the event of an emergency, such as a natural or human-induced disaster or a humanitarian crisis. In the area of DRM, Copernicus provides products such as maps identifying the extent of the disaster (e.g. delineation of the flooded area) and the level of damage (e.g. destroyed buildings in case of an earthquake).

Last but not least, better access to knowledge also benefits training networks, including the EU Trainet set up under the UCPM, which seek to create synergies through the exchange of experience, best practices, relevant research and other activities.

The EU Trainet is Lessons learnt activities also aim at providing a broader basis for knowledge development, also contributes to enhance the knowledge base in DRM (European Union, 2013a).

1.4 A robust knowledge base for disaster risk management

The Union's multiannual research and innovation framework programmes support a range of research and innovation projects relevant to disaster management (European Union, 2013e); see Box 1.4. Multinational and interdisciplinary research in the field of natural and technological disasters has led to the development of innovative tools and methodologies to forecast and monitor man-made and physical hazards.

On the other hand, research efforts in support of risk management and crisis management have largely contributed in the preparedness and response to major crises and have therefore helped reduce the toll on human lives and economic assets.

A risk-informed approach to DRM is built upon a robust and extensive knowledge base: research, innovation and scientific projects are central components

The European Commission's Community of Users on Secure, Safe and Resilient Societies aims to make better sense of available research and identify research needs through stronger networks and exchange of information.

The Community of Users built around EU research and the Disaster Risk Management Knowledge Centre will be mutually reinforcing the EU's efforts to strengthen the interface between policy and science and pave the way for a risk-informed approach to EU policies.

The importance of knowledge for climate change adaptation planning is recognised in the EU Adaptation Strategy: one of the pillars of the Strategy rests on refining the knowledge gap for adaptation to promote better-informed decision-making (European Commission, 2013b). The development of the one-stop-shop for adaptation, Climate-ADAPT,

contributes to improving accessibility and usability of information on and relevant to climate change adaptation. This public platform contributes to strengthening the knowledge base and providing valuable data and sources to inform policymakers and other stakeholders (Climate-ADAPT, n.d.).

European efforts towards enhanced urban resilience to disasters also risks requires strengthening the contribution of science and innovation to enhance the resilience of urban settings as well as integrating urban risk management into national DRR strategies and sustainable develop-

ment planning. The Global Human Settlement Layer (GHSL) framework, developed by the European Commission will produce new global spatial information, evidence-based analytics and knowledge describing urban settlements on the planet. This information will be instrumental in assessing the impacts of DRM policies on development trends and patterns in a consistent and detailed manner.

In the field of humanitarian relief, the European Commission contributes to building the capacity and to shaping the governance of the international humanitarian system through the Enhanced Response Capacity funds,

which aim to support coordination structures for the delivery of humanitarian assistance like the global humanitarian clusters and stand-by expertise for emergencies, as well as studies and guidelines on specific aspects of humanitarian assistance and platforms and networks for learning and knowledge sharing (European Commission, 2015). The European Commission also ensures, through scientific tools such as the EU Aid Explorer, to make aid data easily accessible to ensure aid effectiveness and accountability and to reinforce the evidence base for policymaking. Maps and graphs are developed to support operations as well as to

BOX 1.4

Examples of relevant Horizon 2020 research priorities

Under the current EU framework programme for research and innovation Horizon 2020, the societal challenge chapters on 'Secure societies' and 'Climate action, environment, resource efficiency and raw materials' address the research needs across prevention, preparedness and response actions in the areas of crisis management, disaster resilience, climate change, critical infrastructure protection and sustainability. In light of this new direction, vulnerability studies, integrated risk assessments and DRM strategies are increasingly considering the social, economic, environmental and health dimension of the risk.

Developing the awareness and demonstration of the added value of risk mitigation and adaptation approaches in terms of co-benefits for local economies, social cohesion and the broader environment will be further supported by demonstration projects and other EU funds programmes.

Research needs for humanitarian aid are also addressed by Horizon 2020, such as with calls focused on advancing theoretical and practical knowledge on EU response mechanisms and their effectiveness (INT-5-2015) or the development of civilian humanitarian mission personnel tracking (BES-10-2015).

Climate services, nature-based solutions for building more resilient cities or territories, and dynamic earth observations are examples of promising sectors. Heightened emphasis in DRR and resilience building in urban areas is also becoming increasingly central to sustainable urban development (European Union, 2016). The Horizon 2020 research programme has a strong focus on social, technological, digital and nature-based innovation in urban planning and policy formulation.

visualise the distribution of aid across countries and sectors worldwide (EU Aid Explorer, n.d.).

The EU was one of the first development donors to develop a dedicated resilience policy aiming to strengthen the resilience of communities and their livelihoods and ecosystems as a core objective for humanitarian and development aid (European Commission, 2012, 2013a). A new European consensus on development has been made to guide all of the EU and its Member States' development policy activities (European Commission, 2016d) and under which they should increase efforts to build resilience and

adaptability to change.

In this context, the EU is committed to reinforcing the science and policy dimension of DRR both within the EU and in support to crisis-prone developing countries in line with priority areas of the Action Plan for Resilience in Crisis Prone countries. The EU supports developing countries, in particular Least Developed Countries (LDC) and Small Island Developing States (SIDS), to develop DRR policies capacities and mainstream DRR, climate change adaptation and the protection of ecosystems or protected zones (see Box 1.5).

1.5 Coherent international processes and the role of science

The European Commission is fully committed to being a frontrunner in the implementation of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs). Science and innovation contribute to several SDGs and their associated targets; for instance, they feature prominently within SDG 17 on means of implementation and

BOX 1.5

Examples of programmes and projects to support implementation of DRR and climate change policies in EU development cooperation

The global thematic project, 'Building capacities for increased public investment in integrated climate change adaptation and disaster risk reduction: 2012-2015', covers 40 vulnerable developing countries that were supported between 2013 and 2016 in a partnership with the United Nations Office for Disaster Risk Reduction (UNISDR) to build and improve national disaster loss databases for disaster loss accounting. Among these 40 countries, 30 have progressed further in capacity building to develop and use probabilistic risk assessments

and 20 have been supported in integrating risk-informed planning in different sectors of development, with a focus on public investments. This partnership project further supported the preparation of the Global Assessment Reports (UNISDR, 2015) by providing the means to conduct modelling and investigate disaster risk from the national to the global level.

In addition, the EU supported the elaboration and publication of the African, Caribbean and Pacific (ACP) Compendium of Risk Knowledge

(Morinière and Zimmerman, 2015) through the 10th European Development Fund intra-ACP programme as part of its support for DRR in partnership, among others, with the ACP group of countries and regional organisations.

Since 2007, with the launch of the Global Climate Change Alliance (GCCA), more than 50 projects in 35 countries have been implemented under its flagship programme contributing to the resilience of the communities and their livelihoods and vulnerable ecosystems.

the global partnership, SDG 9 on resilient infrastructure and inclusive, sustainable industrialisation and SDG 11 on making cities inclusive, safe, resilient and sustainable. The European Commission will support the implementation of the 2030 Agenda for Sustainable Development, firstly by mainstreaming the SDGs in the European policy framework and current European Commission priorities and secondly by launching a reflection on further developing our longer-term vision and the focus of sectoral policies after 2020 (European Commission, 2016d, 2016e).

The Addis Ababa Action Agenda (an integral part of the 2030 Agenda for Sustainable Development) sets out a comprehensive range of policies and actions, including science, technology and innovation, which are needed to achieve the ambitious vision set out in the SDGs (UNGA, 2015a).

The World Humanitarian Summit, organised in 2016 as a response to an unprecedented increase of people affected by conflict and natural disasters, put forward a number of key commitments to place the safety of people, dignity and the safeguard of human rights at the heart of decision-making (WHS, 2016). In its support to the commitments made, the EU will rely on the support of a number of scientific tools and platforms, some of which were developed by the European Commission and its key partners; see Box 1.6.

The United Nations Sendai Framework for DRR shifts the emphasis from response-oriented disaster management to comprehensive DRM, in which a more systematic and reinforced science-policy interface strengthens the contribution of DRM to smart, sustainable and inclusive growth globally (European Commis-

sion, 2016a). The framework calls for a strong interface between science and policy to build a strong knowledge of disaster risk; make efficient use of data to better understand the economic impacts of disasters; and develop adequate preventive policies to reduce the risks of disasters (UNGA, 2015b); see Box 1.6.

At a global level, science and technology play a central role in the 2030 Agenda for Sustainable Development and other international agreements addressing DRM

In the context of the Paris Agreement on climate change (UNFCCC, 2015), the importance of data collec-

BOX 1.6

UNISDR Science and Technology Conference on the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR, 2016)

The outcomes of the 2016 UNISDR Science and Technology Conference underline that the science and technology community should support the implementation of the Sendai framework through:

- original research and investigation;
- the assessment and analysis of hazards and the consequences of cascade effects;
- the development and validation of applied tools and standards;
- the design and use of new technologies;
- a range of education and communication roles.

More generally, ensuring the integration and promotion of a holistic approach to the science of hazards will be an important contribution to reinforcing the science-policy interface around DRM.

tion, evidence-based approaches and the contribution of science was recognised. Science is needed to inform and provide tools to achieve the target specified in the climate deal, both for adaptation and mitigation, and to contribute to taking stock of progress. The Intergovernmental Panel on Climate Change (IPCC) was invited to produce a special report by 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways.

As illustrated by the New Urban Agenda agreed at the Habitat III Conference on Housing and Sustainable Urban Development, the international community has come to acknowledge how essential greater attention to urban needs is when addressing DRM, climate adaptation and urban resilience. Unique and emerging development challenges facing all countries are given particular attention for the implementation of the New Urban Agenda. Commitments such as the support for disaster risk assessments; the development of standards for levels of risks and of quality infrastructure and spatial planning; and most of all the mainstreaming of data-informed DRR and DRM at all levels reinforce the relevance of an integrated science-policy interface to ensure environmentally sustainable and resilient urban development (UNGA, 2016).

1.6 Towards a stronger science-policy interface

Faced with the risk of increasingly severe and frequent natural and human-induced disasters, policymakers and risk managers in DRM and across EU policies increasingly rely on the wealth of existing knowledge and evidence at all levels — local, national, European and global — and at all stages of the DRM cycle — prevention and mitigation, preparedness, response and recovery.

Many policies at EU level as well as political initiatives on a global scale include a disaster risk dimension. Ensuring a robust DRM knowledge base is essential to informing these different policy processes and to working towards effective evidence-based decision-making.

Reinforcing the science-policy interface should allow for better exploiting and translating the complexities of scientific results into useful and usable policy outputs through efficient access and uptake of knowledge and research, a networked approach across relevant stakeholder communities and continuous efforts towards innovation and new technologies and tools.

The Disaster Risk Management Knowledge Centre (DRMKC, 2017) launched by the Commission on 30th September 2015 offers a valuable platform to meet these aims and further enhance the contribution of science to DRM policymaking. The Knowledge Centre implements a networked

approach to translate complex scientific data and analyses into usable information at all stages of the disaster risk management (DRM) – from prevention to recovery – and at all levels – local, national, European and global – to provide science-based advice for DRM policies, as well as timely and reliable scientific-based analyses for emergency preparedness and response coordinated activities.

REFERENCES CHAPTER 1

- Climate-ADAPT, n.d. European Climate Adaptation Platform, <http://climate-adapt.eea.europa.eu/>, [accessed 6 January, 2017].
- Council of the European Union, 2016. Council Conclusions — Habitat III: the European Union and its Member States' objectives and priorities for the 3rd UN Conference on Housing and Sustainable Urban Development, 8824/16, 12.5.2016.
- Council of the European Union, 2014. Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations. Official Journal of the European Union L 219, 25.7.2014, 42–52.
- CRED, 2017. The International Disaster Database EM-DAT. Centre for Research on the Epidemiology of Disasters <http://www.emdat.be/> [accessed 6 January, 2017].
- DRMKC, 2017. European Commission. Disaster Risk Management Knowledge Centre. <http://drmkc.jrc.ec.europa.eu/>, [accessed 13 April, 2017].
- EU Aid Explorer, n.d. <https://euaidexplorer.ec.europa.eu/>, [accessed 6 January, 2017].
- European Commission, 2006. On a European programme for critical infrastructure protection', Communication from the Commission, COM(2006) 786 final, 12.12.2006.
- European Commission, 2007. Addressing the challenge of water scarcity and droughts in the European Union', Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2007) 414 final, 18.7.2007.
- European Commission, 2012. The EU approach to resilience: learning from food security crises. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2012) 586 final, 3.10.2012.
- European Commission, 2013a. Action Plan for Resilience in Crisis Prone Countries 2013-2020. Staff Working Document, SWD(2013) 227 final, 19.6.2013.
- European Commission, 2013b. An EU strategy on adaptation to climate change. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2013) 216 final, 16.4.2013.
- European Commission, 2014. The post-2015 Hyogo Framework for Action: managing risks to achieve resilience. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2014) 216 final, 8.4.2014.
- European Commission, 2015. Humanitarian Implementation Plan (HIP): Enhanced Response Capacity funding. http://ec.europa.eu/echo/files/funding/decisions/2015/HIPs/ERC_en.pdf, [accessed 6 January, 2017].
- European Commission, 2016a. Data, information and knowledge management at the European Commission. Communication to the Commission, C(2016) 6626 final, 18.10.2016.
- European Commission, 2016b. Action Plan on the Sendai Framework for disaster risk reduction 2015-2030: a disaster risk-informed approach for all EU policies. Staff Working Document, SWD(2016) 205 final/2.
- European Commission, 2016c. Funding opportunities to support disaster risk prevention in the cohesion policy 2014-2020 period. Factsheet, http://ec.europa.eu/regional_policy/en/information/publications/factsheets/2016/funding-opportunities-to-support-disaster-risk-prevention-in-the-cohesion-policy-2014-2020-period, [accessed 6 January, 2017].
- European Commission, 2016d. Proposal for a new European Consensus on Development — Our World, our Dignity, our Future. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2016) 740 final, 22.11.2016.
- European Commission, 2016e. Next steps for a sustainable European future— European action for sustainability. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2016) 739 final, 22.11.2016.
- European Commission, 2017. Overview of natural and man-made disaster risks in the EU. Staff Working Document, pending.
- European Community, 1996. Council Regulation No 1257/96 of 20 June 1996 concerning humanitarian aid. Official Journal of the European Communities, L 163/1, 2.7.1996.
- European Community, 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal of the European Communities, L327/1, 22.12.2000.
- European Community, 2007. Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. Official Journal of the European Union, L 288/27, 6.11.2007.
- European Community, 2008. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). Official Journal of the European Union, L 164/19, 25.6.2008.
- European Union, 2009. Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations. Official Journal of the European Union, L 172/18, 2.7.2009.
- European Union, 2011. Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste. Official Journal of the European Union, L 199/48, 2.8.2011.
- European Union, 2012. Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC. Official Journal of the European Union, L 197/124, 7.2012.
- European Union, 2013a. Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism. Official Journal of the European Union, L 347, 20.12.2013, 924–947.
- European Union, 2013b. Decision No 1082/2013/EU of the European Parliament and of the Council of 22 October 2013 on serious cross-border threats to health and repealing Decision No 2119/98/EC. Official Journal of the European Union, L 293/1,

5.11.2013.

- European Union, 2013c. Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom. Official Journal of the European Union, L13/1, 17.1.2014.
- European Union, 2013d. Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No1083/2006', Official Journal of the European Union, L 347/320, 20.12.2013.
- European Union, 2013e. Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 — The framework programme for research and innovation (2014-2020) and repealing Decision No 1982/2006/EC. Official Journal of the European Union, L 347/104, 20.12.2013.
- European Union, 2014. Regulation (EU) No377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus programme and repealing Regulation (EU) No911/2010. Official Journal of the European Union, L 122/44, 24.4.2014.
- GDACS, n.d.Global Disaster Alert and Coordination System, <http://www.gdacs.org/alerts/>, [accessed 6 January, 2017].
- INFORM, n.d. Index for Risk Management — INFORM, [accessed 6 January, 2017].
- INGV, 2016. All risk integrated system towards trans-boundary holistic early warning. Project Aristotle, <http://aristotle.ingv.it/>, [accessed 9 January, 2017].
- Morinière, L. C., Zimmerman, L.S., 2015. ACP Compendium of Risk Knowledge: mapping risk in the African, Caribbean and Pacific Group of States. ACP Secretariat.
- UNFCCC, 2015. Adoption of the Paris Agreement, United Nations Framework Convention on Climate Change, 12.12.2015, FCCC/CP/2015/L.9/Rev.1.
- UNGA, 2015a. Resolution adopted by the General Assembly on 1 September 2015, 69/315. Draft outcome document of the United Nations summit for the adoption of the post-2015 development agenda. United Nations General Assembly, 15.9.2015, A/RES/69/315.
- UNGA, 2015b. Resolution adopted by the General Assembly on 3 June 2015, 69/283. Sendai Framework for Disaster Risk Reduction 2015-2030. United Nations General Assembly, 23.6.2015, A/RES/69/283.
- UNGA, 2016. Draft outcome document of the United Nations Conference on Housing and Sustainable Urban Development (Habitat III). United Nations General Assembly, 29.9.2016, A/CONF.226/4.
- UNISDR, 2015. Global Assessment Report on Disaster Risk Reduction, Making development sustainable: The future of disaster risk management. Geneva, Switzerland: UNISDR.
- UNISDR, 2016. UNISDR Science and Technology Conference on the Implementation of the Sendai Framework for Disaster Risk Reduction — Key messages. 27-29 January 2016. [http://www.preventionweb.net/files/45270_unisdrscienceandtechnologyconferenc\[2\].pdf](http://www.preventionweb.net/files/45270_unisdrscienceandtechnologyconferenc[2].pdf), [accessed 6 January, 2017].
- WHS, 2016. Commitments to Action, World Humanitarian Summit, Istanbul, 23-24 May 2016. https://worldhumanitarianissummit.org/sites/default/files/media/WHS%20Commitment%20to%20Action_8September2016.pdf, [accessed 12 January, 2017].

