



Bonding CCA and DRR: recommendations for strengthening institutional coordination and capacities

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Work Package 4 – institutional strengthening

Task 4.2 – Elaborate guidelines to strengthen CCA and DRR institutional coordination and capacity (Deliverable 4.2)

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The PLACARD (PLAtform for Climate Adaptation and Risk reDuction) project shares knowledge and enhances collaboration between the multiple CCA and DRR research, policy and practice communities. This is currently underway through the establishment of a coordination and knowledge exchange platform that supports multi-stakeholder dialogues and consultations, across all levels of governance. In order to achieve its goal, PLACARD has set up a common and safe 'space' of discussion where CCA and DRR communities can meet, share experiences and create opportunities for collaboration.

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A tribute

With the sudden passing away of Guillaume Rohat on October 2, 2019 at the age of 28, we lost a brilliant researcher and a radiant personality who was appreciated by all.

Holder of a Master's degree in environmental sciences, and a PhD candidate at the University of Geneva and the University of Twente, Guillaume had just submitted his thesis entitled "Disentangling the contribution of socioeconomic pathways to future climate-related risks: The case of heat stress." His research had already featured in high-level publications and press articles, as well as winning several awards. His doctoral work on climatic and socioeconomic scenarios and his experience in e-learning allowed him to contribute substantially to PLACARD, besides the Foresight activities since 2016 also the work on this guidance.

An example of high scientific standards, interdisciplinarity, involvement and availability for all, Guillaume will continue to shine long after his premature death.



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Preface

In order to avoid the impacts of both, extreme weather events and long-term climate damage, human-induced climate change needs to be reduced through substantially decreasing greenhouse gas emissions and investing in decarbonising our economies. Recent events such as the 2019 heatwave across Europe and the 2019–2020 winter storms demonstrate that the climate is already changing: climate change adaptation (CCA) and disaster risk reduction (DRR) strategies are vital elements in preparing for and protecting society from the impacts.

This guidance document is the result of activity carried out within the Horizon 2020 Project PLACARD (PLAtform for Climate Adaptation and Risk reDuction). It is based on experience gained during the project (2015–2020) and provides insights and inspiration through showcasing innovative activities that target cooperation, collaboration, improved communication, increased coherence, and capacity-sharing between the CCA and DRR communities. The guidance aims to foster cooperation between institutions to strengthen interaction and collaboration. Core results presented in chapter 4 focus on a set of recommendations on how institutions in the fields of CCA and DRR can cooperate more effectively and/or effectively integrate relevant policies and measures across the CCA and DRR space. As a result, the guidance seeks to encourage initiatives and activities, which can further strengthen the coordination between, and capacity of, CCA and DRR institutions.



The target audience for this report is institutions responsible for the planning and implementation of CCA and DRR strategies and action plans. Stakeholders from many of the fields associated with CCA and DRR from academia, policy, administration, practice, business and non-governmental organisations can initiate the recommended activities and networks. The report targets various administrative levels – international, European, national, sub-national and local levels – which are in a position to put the recommendations into practice.

The guidance was developed on the basis of two main elements: a comprehensive literature review and a range of stakeholder interactions. This methodological approach is explorative, and so less formalised, in order to keep the necessary conceptual openness for investigating a nascent policy field such as integrated climate risk coordination at the interface between CCA and DRR.

This PLACARD guidance is structured in six chapters. The first introduces the topic while the second chapter presents the rationale behind the need for more coherent CCA and DRR communities, activities, and institutions. The third chapter provides an overview of the relevant CCA and DRR frameworks. The core of this guidance document is chapter 4, which focuses on practical recommendations, further strengthening CCA and DRR institutional coordination and capacity. Chapter 5 explores at the knowledge and action gaps that still exist. Finally, chapter 6 focuses on reflections and draws general conclusions targeted at both communities.

The aim of both CCA and DRR is to reduce people's exposure and vulnerability to climate risks through developing and implementing targeted activities. The range of actors at different governance levels, including civil society, private sector actors and citizens, should prioritise and invest in initiatives that have the potential to decrease people's vulnerability to climate risks, for example, through prevention, risk mitigation strategies and disaster risk reduction in the light of climate variability, and a changing climate on different levels. More concerted funding and greater investments in DRR and CCA activities are needed to reduce vulnerability to climate risks.



Executive Summary

“Our house is on fire”, climate activist Greta Thunberg declared to the participants of the World Economic Forum in Davos in January 2020. In 2019, our house was indeed on fire. Large-scale forest fires in Australia, the Amazon, and the Arctic showed how short-term actions of disaster risk reduction and relief need to be considered along with long-term measures of climate change adaptation. Climate-induced extreme weather events are currently increasing and intensifying, thereby leading to new forms of disaster risk. In order to sustainably extinguish this metaphorical fire, separated strategies are no longer enough. Responding to short term climate risks without considering the long-term climate trends, and vice-versa, is no longer an acceptable course of action, as it separates (knowledge and financial) resources that should belong together. However, integrated approaches to DRR and CCA can provide opportunities for building resilience. By collecting the hands-on experience from twenty-eight CCA and DRR experts across Europe, this guidance addresses the challenges and positive results from such integrated approaches in order to synthesise actionable policy advice for institutional actors across various governance levels.

We provide twenty recommendations in five areas: 1) safeguarding sound governance, 2) ensuring effective financing, 3) seizing opportunities for cooperation, 4) sharing new forms of communication, and 5) enhancing knowledge management.

Each recommendation (for details, see [Annex 7.2](#)) was developed with the aim to:

- Formulate a precise advice of what needs to happen.
- Introduce the relevance and limitations of the chosen approach.
- Showcase a possible way forward to apply such approach.
- Explain which institutions are addressed and how they can benefit.
- Provide an example of how the recommendation can work in practice.

Area 1: Safeguarding sound governance

Challenge: Separated decision-making processes and knowledge communities with different languages reduce the possibility of quickly joining resources in extreme events preparedness, when extreme events occur, and to plan for the long term when no emergency assistance is being deployed.

Recommendation: Implementation of a comprehensive Climate Risk Management (CRM) approach with broad stakeholder involvement at and across different risk governance levels.

New ways of including “local reasons for concern” into national policy-making are needed to implement target-oriented and ambitious adaptation and risk reduction solutions. Consequently, national governments should establish a national climate-risk council, to foster putting of CRM into action (see [4.1.1](#)).



Challenge: Separated user and stakeholder engagement processes and taxonomies applied by knowledge and policy communities creates difficulties in establishing proper research and practice communication channels, even if the target agents are common.

Recommendation: Engage stakeholders at different scales that have an interest in both the decision-making process and outcomes.

Robust decision-making that increases resilience to climate risks is embedded within social, economic and cultural landscapes. It is critical to engage all concerned actors in order to recognise the needs of all. Community resilience projects are good examples (see [4.1.2](#)).

Challenge: By focusing mainly on public policy and decision-making CCA and DRR communities often neglect private actors that can provide substantial contributions in case of disasters and planning for the long term.

Recommendation: Develop a stronger focus on self-safeguards or individual prevention and preparedness.

Successful societal implementation of adaptation to climate change and risk management requires substantial contributions by private actors. Here, public administrations lead in coordinating and paving the way. This means a need for new formats for cross-sectoral collaboration which require a strong mandate and considerable national support (see [4.1.3](#)).

Challenge: By failing to capture local knowledge in the preparedness and planning phases many CCA and DRR strategies miss out on valuable data, lessons and experiences that can enhance climate action.

Recommendation: Implement integrated, participatory designed strategies and plans at the municipal level that deal with climate-induced disasters.

This process relies on mobilising local knowledge and ownership, but also on sound climate data. The local scale requires an enabling environment at national level that explicitly addresses aspects of the authority of local governments to plan for and carry out essential integrated actions (see [4.1.4](#)).

Area 2: Ensuring effective financing

Challenge: New funding and insuring methods are needed to address climate risks and adaptation not previously covered by classical risk sharing schemes.

Recommendation: Create Sovereign Climate Insurance Funds with application of index-based insurance and Distributed Ledger Technology.

Yield-based approaches to the insurance of climate-related risks (especially in agriculture) have many drawbacks such as fraud detection and risk modelling. Index-based solutions are a better option and should be worked towards. Sovereign Climate Insurance Funds can cover climate-related risks and provide financial protection and support to affected regions and small farmers (see [4.2.1](#)).



Challenge: New risk transference methods are needed to address climate risks and adaptation not previously covered by classical market-based financial debt instruments.

Recommendation: Develop risk transfer and data collection via a European Risk Transfer Mechanism.

EU-institutions need to provide a funding framework, highlighting international priorities in aligning CCA and DRR funding. A Distributed-Ledger-Technology-based platform with the main aim of transferring risk from Sovereign Insurance Funds to the financial market, collecting, processing and storing climate-related data, is warranted. This includes new mechanisms of debt financing, such as climate insurance and risk transfer (see [4.2.2](#)).

Challenge: Current market and policy terminologies are not fit-for-purpose for upcoming transaction of financial assets associated with climate action.

Recommendation: Implement an EU Green Taxonomy with CCA and DRR components.

An EU taxonomy of green projects with a combination of CCA and DRR indicators and metrics can be useful to support national initiatives in mainstreaming protection against climate change and disasters and improving the effectiveness of climate finance. The incorporation of such indicators into the EU Green Bond Standard identifies climate-proof projects and green financial instruments (see [4.2.3](#)).

Challenge: Current forecasting methods focus on what the weather 'will be' rather than what the weather 'will cause' leaving room for improvements in early warning systems and preparedness mechanisms.

Recommendation: Pursue forecast-based financing to anticipate disasters and reduce human suffering and losses.

Although there are funds for long-term DRR as well as for emergency response, funds for anticipatory action are still lacking. The integration of physical parameters and anticipatory weather information into applied action to reduce disaster risk, offers an opportunity for impact-oriented, forecast-based financing (see [4.2.4](#)).

Challenge: Existing financial and debt financing mechanisms in the area of CCA and DRR are still not up-to-speed with climate funding needs at local-to-national scales.

Recommendation: Elaborate self-financing and crisis financing mechanisms with application of Distributed Ledger Technologies.

There is a disparity between DRR and CCA finance on different levels, especially regarding the improved management of climate-related risks and resilience of the financial system to non-financial threats. National Distributed-Ledger-Technology-based platforms for accumulation of savings and climate-related crisis financing can facilitate this process (see [4.2.5](#)).

Area 3: Seizing opportunities for cooperation

Challenge: Cross-country governance mechanisms for climate and disaster risk management are lacking or do not share common practices.

Recommendation: Develop a strong transnational and interregional collaboration between CCA and DRR with a joint focus on current and future risks.

Climate and disaster risks often become politically charged and rife with conflicts. Mainstreaming of CCA and DRR into existing or new transnational and interregional working groups on risks or geographic areas of mutual concern is a promising way to prevent such tensions from rising (see [4.3.1](#)).

Challenge: Effective communication and collaboration across CCA and DRR knowledge communities is hindered by separated taxonomies and networking mechanisms between groups of actors.

Recommendation: Use Social Network Analysis for stocktaking of stakeholders and to enhance interactions.

Often, particularly for cross-sectoral interaction formats, there is limited information on the reasons why actors have certain roles in their network or interact in certain ways, which can highlight obstacles to effective collaboration. Social Network Analysis helps to identify relevant stakeholders for such formats, learning about them, their network and its properties, and making use of this information to strengthen their interactions and encourage aligned resilience solutions (see [4.3.2](#)).

Challenge: Joint emergency and preparedness exercises that include both communities are lacking, which reduces learning opportunities.

Recommendation: Organise joint emergency exercises to strengthen collaboration on various levels.

There are many models to prepare action for climate-induced disaster risks, but the actual event may differ significantly from the modelled version. Joint emergency exercises help to explore climate risks, exchange knowledge and jointly prepare for weather anomalies. In addition, national governments need to test their early warning systems and joint disaster prevention models in reality, proving their effectiveness in cases of serious emergencies (see [4.3.3](#)).

Challenge: Transboundary climate and preparedness action is challenging due to different languages and cultural settings making it reactive rather than proactive.

Recommendation: Pursue proactive transboundary cooperation between CCA and DRR actors.

Most existing structures for collaboration vary significantly between national and sub-national governance systems. As a result, effective transboundary crisis cooperation must be driven by proactive rather than reactive collaboration. Traditional, cultural policies should be able to yield to flexible, international perspectives, to provide cooperative risk management for the border zone in a mutually sustainable manner (see [4.3.4](#)).

Area 4: Sharing new forms of communication

Challenge: Monitoring, Reporting and Evaluation (MRE) frameworks for CCA, DRR and sustainable development policies are disconnected and multiply the use of resources.

Recommendation: Foster a dialogue and learning on monitoring, reporting and evaluation.

A shared understanding of the current monitoring, reporting and evaluation (MRE) approaches, and indicators and criteria used in CCA, DRR and SDGs is a crucial starting point for collaboration. To achieve a shared understanding of MRE, a better coordination of the relevant actions and processes, a more effective use of resources, and a stronger collaboration between actors operating at different levels and in the different domains are required (see [4.4.1](#)).

Challenge: The use of storytelling, strategic narratives and art processes is residual across CCA and DRR communities and cross-community collaborative schemes are almost non-existing.

Recommendation: Develop new stories and strategic narratives for joint understanding and collaboration.

Some communication and collaboration barriers cannot be handled by “rational means” such as traditional science-based information and data. Stories and strategic narratives can be useful for national and local policymakers to overcome such barriers. Their success, however, depends heavily on the value orientation of the intended audience (see [4.4.2](#)).

Challenge: Educational and capacity building mechanisms suffer from community silo approaches that reduce learning over time, across and within organisations.

Recommendation: Mainstream integrated approaches through education.

Learning within an institution is critical if it is to achieve its operational goals. A responsive approach to educational needs that recognises the changing organisational landscape will ensure greater efficiency and maximise resources. Here, informal learning can be as beneficial as formal training in strengthening an institution's capacity, especially when new measures or policies need to be implemented (see [4.4.3](#)).

Area 5: Enhancing knowledge management

Challenge: Effective deployment of nature-based solutions (NbS) in adaptation and risk reduction strategies is still too complex because of the required level of cross-sectoral collaboration and multi-stakeholder coordination.

Recommendation: Foster ecosystem-based adaptation and risk reduction.

The consideration and use of nature-based solutions (NbS) in adaptation and risk reduction strategies should be strengthened through enhanced cooperation, dialogues and inter-sector practices and policies (see [4.5.1](#)).

Challenge: Information and knowledge management (IKM) processes across CCA and DRR communities are hindered by lack of clarity around language and the use of technical terminology.

Recommendation: Promote IKM standards and guidelines for sharing data, information and knowledge.

In CCA and DRR, the lack of clarity around language and the use of technical terminology is a particular barrier to collaboration, which is further inhibited by unclear translations. Information and Knowledge Management standards and guidelines that use a common language and support a cultural shift towards Linked Open Data (LoD) accelerate learning and collaboration, and make it easier for stakeholders to find, access, and use content (see [4.5.2](#)).

Challenge: CCA and DRR knowledge portals and platforms are not fulfilling their true potential regarding learning, practical implementation, monitoring and evaluation of climate preparedness and action.

Recommendation: Use knowledge platforms and portals to enhance learning and collaboration.

These online spaces should serve as connectors of people and knowledge, and forums for peer-to-peer learning and exchange across the two domains. This would require a cultural shift in how knowledge management is currently carried out (see [4.5.3](#)).

Challenge: Significant comprehension and communication gaps between CCA and DRR knowledge producers, providers, and users, as well as between science, policy, and practice persists hindering the effective use of information for practical decisions.

Recommendation: Develop knowledge-action networks to advance quality and usage of information.

Developing knowledge-action networks with multiple layers of producers and users from different sectors is an effective method of tailoring decision-relevant information to different decision environments and of allocating resources where they are most effective to bridge science and practice and integrate CCA and DRR strategies (see [4.5.4](#)).

In addition to these twenty recommendations, this guidance also reflects on the open questions and unresolved challenges by providing an overview of the prevailing knowledge and action gaps (see chapter 5) and reflections and conclusions (see chapter 6). This also includes the need for transformative approaches in CCA and DRR, which can address complex or 'systemic' challenges (like migration, health or urbanisation) that were not directly addressed in this report.

1. Introduction

Damage and losses caused by weather and climate related extremes, such as floods, droughts, storms and heatwaves have increased over the past decades in many regions around the globe and will likely further increase with the progression of climate change and socioeconomic development (IPCC, 2012; IPCC, 2014b; UNISDR, 2015a).

According to data on natural disasters in the member countries of the European Environment Agency (EEA) between 1980 and 2017, weather and climate-related extremes accounted for around 81 % of total losses caused by natural hazards, with yearly losses of around twelve billion Euro within the EEA member countries alone (CSI 042, CLIM 039, EEA). According to Forzieri, 2017, during the reference period (1981–2010), around 3000 Europeans lose their lives each year because of weather disasters. If no adaptation measures are taken, this number could rise substantially in the coming decades.

The objectives of the Sustainable Development Goals (SDGs), the 2015 Paris Agreement on climate change and the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030 explicitly address Disaster Risk Reduction (DRR), (UNISDR, 2015b) and Climate Change Adaptation (CCA) (IPCC, 2013). These multilateral agreements can only be achieved through a comprehensive and coherent approach. This approach needs to be able to promote

effective implementation of science and evidence-based policies and measures. For the first time, this international landscape of agreements provides a shared policy agenda to achieve resilience. This new approach must be consistent with the complexity of the different challenges while overcoming the limits of the traditional siloed approaches.

There are visible signals that climate change is changing the risk profile of Europe (EEA, 2017a). A prominent example is the forest fire in Sweden in the summer of 2018. In addition, changes in population structure, the aging population, urbanisation and density, as well as land-use in risk-prone areas, are increasing our vulnerability. Climate change is acting as a multiplier in these respects. Such changes in risk profiles need to be reflected accordingly in institutional arrangements, capacity and multi-agent coordination to provide us with the capabilities to address these risks. According to the summary of the OECD/PLACARD Conference on “Adapting to a changing climate in the management of wildfires” (OECD/PLACARD 2020), climate change can be expected to worsen wildfire and the exposure to wildfire risk is set to grow.

Building resilience in the face of weather- and climate-related risks is a goal shared by the CCA and DRR communities. A closer collaboration and policy coherence between these two areas, policy, research, and practice can lead to mutual benefits.

The PLACARD team and a diverse range of actors e.g. DGs, OECD, national and sub-national level in both CCA and DRR were involved in preparing this guidance document to further strengthen the coordination between and capacity of CCA and DRR institutions and stakeholders from academia, policy, administration, practitioners, business and non-governmental organisations.



The overarching aim is to provide guidance on how CCA and DRR related institutions (including practitioners) can practically increase their capacity for knowledge and information sharing, cooperation and overall strengthening of institutional linkages.

The core elements of the guidance are the recommendations in chapter four. They are designed to inspire CCA and DRR actors with methods and approaches to further increase cooperation between, and the capacity of, their respective institutions. The recommendations will also support national and European institutions.

Highlights in the CCA and DRR landscape during the PLACARD project, 2015–2019

- Creation of a Disaster Risk Management Knowledge Centre (DRMKC) with a focus on the connection between the two areas and community and EC services;
- Increased awareness of the importance of connecting the two areas as International, European and national levels;
- Evaluation of the EU Adaptation Strategy to Climate Change has considered the connection with DRR;
- EU Action Plan for Sendai has clear indications of connections with CCA-related policies and actors;
- National agencies have made, to a point, efforts to create communication channels between governmental agencies dealing with both areas;
- Increase of the number of workshop and large conferences that focus on the links and collaboration between the two communities (E.g. ECCA 2019, EFDRR 2019, DRMKC annual seminars);

How is PLACARD positioned in the CCA/DRR research landscape?

The policy and research landscape around the issues of CCA and DRR has been further developed. Especially from the perspective of the DRR research community, many international reports exist (UNDRR, 2019) and possible links between DRR and CCA have been discussed (Albris and Zuccaro, 2018). However, PLACARD offers a unique added value in this field due: firstly, when talking about institutional strengthening, PLACARD explicitly focuses on the potential and pitfalls in industrialised countries, rather than most other DRR reports and guiding documents which tend to consider this topic in developing countries (cf. UNDRR, 2019). Secondly, PLACARD offers concrete examples and measures, bringing together state-of-the-art knowledge and hands-on experience in implementation. This policy relevance strengthens the developed recommendations (see section 4). Thirdly, PLACARD greatly contributes to generating a CCA perspective on topics predominately perceived as DRR issues, such as the management of wildfires or investing in infrastructure, highlighting the costs, benefits and effectiveness of disaster risk reduction measures. Finally, but importantly, PLACARD is just one piece of a larger puzzle within a broader tentative learning process of dealing with global change: it highlights key issues that are perceived as relevant by the contributing experts, but can raise no claim to completeness.

1.1. Aim and target groups of the guidance

This report seeks to provide insights and inspiration by showcasing innovative activities that target coordination and capacity building between CCA and DRR. The guidance aims to foster coordination between institutions to strengthen interaction and collaboration. Core results presented in [chapter 4](#) of this guidance are a set of recommendations on how institutions in the fields of CCA and DRR can more effectively cooperate and effectively integrate policies and measures across the CCA and DRR space.

The guidance seeks to ignite initiatives and activities, which further strengthen the coordination between, and capacity of, CCA and DRR institutions. The target audience for this report is institutions responsible for planning and implementing CCA and DRR strategies and action plans. Stakeholders from many of the fields associated with CCA and DRR – academia, policy, administration, practitioners, business and non-governmental organisations – can initiate the recommended activities and networks. The report targets various administrative levels – international, European, national, sub-national and local levels – which can be in a position to put the recommendations into practice.

The aim is to create a more robust interface between CCA and DRR research communities, decision-makers and other stakeholders. Since the context is also very diverse across Europe, we provide recommendations and practical examples from different governance levels and decision-making contexts.

Key steps to contribute to strengthening institutional cooperation and capacity in this guidance context are:

- a. **Ensure coherence** – seize the opportunity to address disaster risk reduction, climate change adaptation in policies and practices
- b. **Invest in CCA and DRR** – Encourage society to invest resources in disaster risk reduction and climate change adaptation
- c. **Know your actors** – Getting an overview of your actors such as relevant stakeholders and networks
- d. **Increase collaboration** – Bringing actors together and combining each other's formats – being involved in each-other's activities
- e. **Foster exchange** – Encourage the various stakeholders to interact and exchange knowledge
- f. **Co-create new knowledge** – Produce “new collective knowledge” by capitalising on the diverse knowledge available
- g. **Good practice and “bad practice”** – also showcase what is not working

The guidance should be viewed as an effort to support strategic plans to integrate CCA and DRR, and a starting point for collecting good practice and does not provide a comprehensive list of recommendations. The aspects mentioned above have a strong cross-cutting character, meaning they appear in all 20 recommendations (see [Annex 7.2](#)). In order to provide a better overview, we clustered the recommendations according to their main field of action, namely:

- [4.1. Safeguarding sound governance](#),
- [4.2. Ensuring effective financing](#),
- [4.3. Seizing opportunities for cooperation](#),
- [4.4. Sharing new forms of communication](#), and
- [4.5. Enhancing knowledge management](#).

These areas of action to strengthen coherence are a result of the continuous development of the recommendations and as such heuristic. However, similar areas were also described by the OECD who identified “strong leadership and engagement of key government bodies, broad stakeholder participation and co-ordination, clear allocation of roles, responsibilities and resources, and monitoring, evaluation and continuous learning” (OECD 2020: 11) as cornerstones for discovering trade-offs, synergies, and to avoid redundancies while increasing coherence between CCA and DRR.

1.2. Methodological approach

The present guidance was developed on the basis of two key elements – a comprehensive literature review and various stakeholder interactions – that will be introduced in the following chapter. This methodological approach is explorative, and as a result less formalised, in order to keep the necessary conceptual openness for investigating a growing policy field such as integrated climate risk coordination at the interface between CCA and DRR.

The **literature review** analysed around 50 relevant topical papers, journal articles, project reports and existing guidance documents, which focus on institutional capacity building and coordination. This provided insights on how CCA & DRR institutions can increase capacity for knowledge and information sharing as well as cooperation. In particular, existing guidance documents, which are scarce and currently mostly available for the developing world, were screened for potential transferability to the European context. In this guidance, these findings are integrated, with the aim of supporting institutional strengthening, capacity building and their use at different scales in Europe and applying them to CCA and DRR.

Different **interactions with stakeholders** from CCA and DRR were at the very core of developing this report. Stakeholder, practitioner and expert engagement in workshops, conferences, working groups and other types of events pinpointed the areas where capacity for knowledge and information sharing can be further increased, and where cooperation and overall strengthening of institutional linkages can be particularly relevant. Those interactions were mainly organised through the PLACARD interchange network and project platform, with different formats according to the requirements of the stakeholders and the context. The full list of events is provided in [Annex 7.1](#).

Consequently, our methodological approach strongly relies on the **expert knowledge** of pioneers in the field. Expert knowledge can on the one hand facilitate access to state-of-the-art literature, to hands-on practitioners’ experience, and to poorly known innovative practice cases. On the other hand, it is necessarily biased towards the established assessments of experts, their research agendas and personal views. Our recommendations therefore bear the hallmarks of their respective experts, a fact which we aimed to counterbalance by addressing a broad bandwidth of international contributors, stakeholders and practitioners.

The development process of the recommendations (see [chapter 4](#)) was firstly based on the previously described literature review and stakeholder interactions, and secondly on priorities from policymakers as well as peer feedback in an iterative process. The template used for creating the recommendations is provided in [Annex 7.2](#).

Lastly, it is important to reflect that all recommendations are based on the knowledge currently available and as a result might have limitations in terms of experts' biases (see above) and unpredictable developments in this rapidly developing new policy field (see chapter [5. Knowledge gaps](#), and chapter [6. Reflections](#)). Furthermore, due to the highly diverse governance contexts throughout Europe, our recommendations must remain tentative, awaiting adaptation to their specific target context. No one-size-fits-all recommendations are to be expected.

1.3. Structure of the guidance

This PLACARD guidance is structured in six chapters. The current chapter focuses on the introduction to the topic and sets the scene, while the second chapter presents the rationale behind the need for further increasing cooperation and capacity of CCA and DRR communities, activities and institutions. The third chapter provides an overview of the relevant CCA and DRR frameworks. The core of this guidance document is chapter 4, which focuses on practical recommendations for further strengthening CCA and DRR institutional coordination and capacity. Chapter 5 looks at the knowledge and action gaps that still exist. Finally, chapter 6 focuses on reflections and draws general conclusions aimed at both communities.

2. Rationale – the need for increasing coordination and capacity

Europe's geographical interdependence, shared physical infrastructures, and close social and institutional integration requires close regional cooperation in disaster risk reduction and management, and climate change adaptation.

A recent Joint Research Centre study showed that **weather-related disasters could affect around two-thirds of the European population annually by the end of this century** under a scenario of climate and population change. This could result in a 50-fold increase in fatalities compared to today, if no measures are taken (Forzieri *et al.* 2017).

The Executive Director of the European Environment Agency, Hans Bruyninckx, noted at the launch event of the new European Environment Agency (EEA) report on Climate Change Adaptation and Disaster Risk Reduction in Europe (EEA, 2017a) that:

“ The extent of devastation in the wake of forest fires, floods, storm surges not only in Europe but also elsewhere has shown that the costs of not acting on climate change, as well as adaptation and prevention, are extremely high. DRR is crucial as it is ensuring effective action before, during and after a disaster.”

He further added that the results presented in this EEA report show that:

“ European countries have started preparing, but there is still much to gain from better coherence to improve resilience and reducing the risks. This should be the main goal for experts working in the adaptation and disaster risk reduction fields.”

These recent studies provide an overview on past and projected weather- and climate-related events and hazards in Europe. Parts of the main findings for a selected number of extreme events is summarised in Figure 1.

Adaptation measures that are intended to support efforts in dealing with the most severe impacts and risks of a changing climate may have transnational, regional, national and local requirements, making them prone to complexity in terms of both effective policy decisions as well as practical implementation (EC, 2017b).

Due to the above-mentioned reasons, integrating CCA and DRR may well constitute a requirement that, despite its implementation at local level, is also European in nature, and one that requires closer attention.

ARCTIC REGION

- Decrease in Arctic sea ice coverage
- Decrease in Greenland ice sheet
- Decrease in permafrost areas
- Risks to the livelihoods of indigenous peoples
- Potential increase in heavy precipitation events
- Sea level rise

COASTAL ZONES & REGIONAL SEAS

- Increase in sea surface temperatures
- Increase in storm surges & extreme sea-level (projected for northern & western Europe)
- Increasing number of marine dead zones
- Increasing risk of water-borne diseases
- Increase in heavy precipitation events

ATLANTIC REGION

- Increase in river flow
- Increase in heavy precipitation events
- Increasing risk of river & coastal flooding
- Increasing damage risk from winter storms
- Increase in multiple climatic hazards
- Large increase in heat extremes heat waves

BOREAL REGION

- Decrease in snow, lake & river ice cover
- Increase in heavy precipitation events
- Increase in precipitation & river flows
- Increasing potential for forest growth & increasing risk of forest pests
- Potential Increasing risk of forest fires
- Increasing damage risk from winter storms
- Increase in crop yields

MEDITERRANEAN REGION

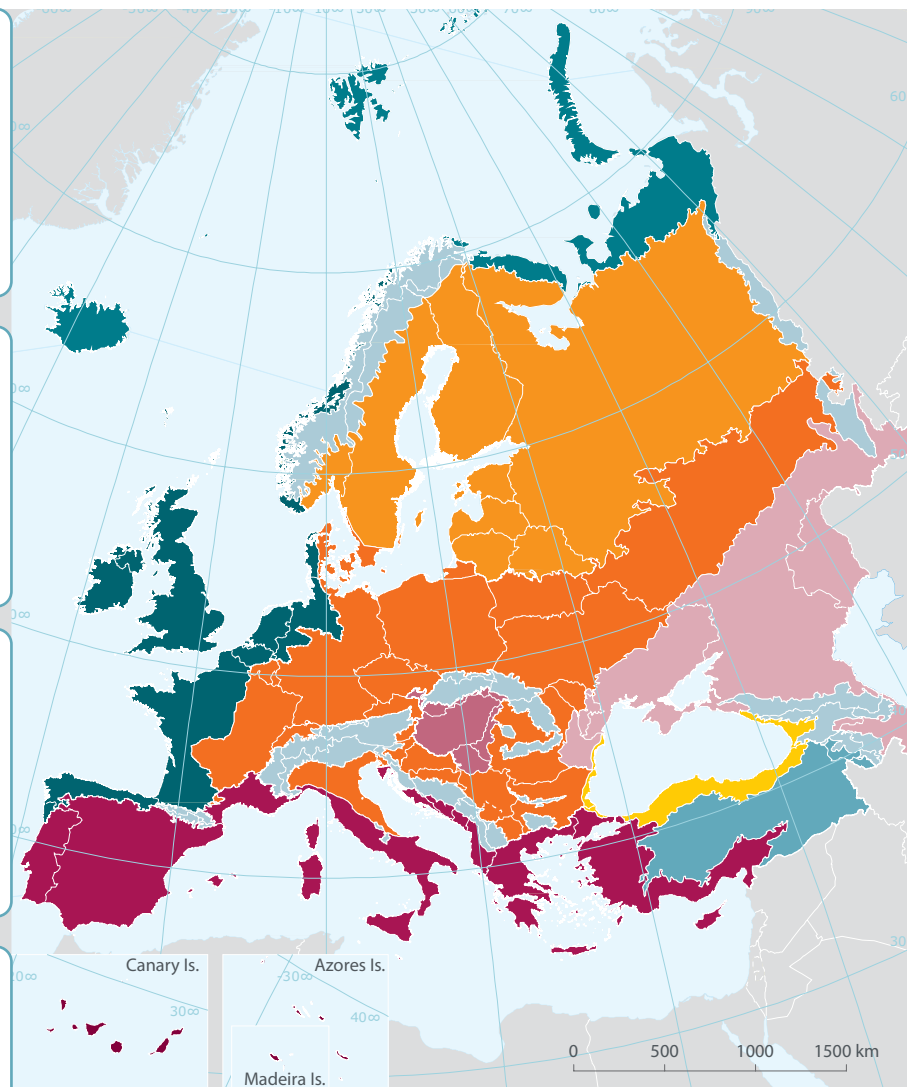
- Decrease in precipitation & river flow
- Increasing risk of droughts
- Increasing risk of biodiversity loss
- Increasing risk of forest fires
- Increased competition between different water users
- Increasing water demand for agriculture
- Decrease in crop yields
- Increasing risks for livestock production
- Increase in mortality from heat waves & heat extremes
- Expansion of habitats for southern disease vectors
- Increase in multiple climatic hazards
- Most economic sectors negatively affected
- Increase in heavy precipitation events

MOUNTAIN REGIONS

- Decrease in glacier extent & volume
- Upward shift of plant & animal species
- High risk of species extinctions
- Increasing risk of forest pests
- Potential Increasing risk of forest fires
- Increasing potential for forest growth & increasing risk of forest pests
- Increasing risk from rock falls & landslides
- Changes in hydropower potential
- Increase in heat extremes & heat waves

CONTINENTAL REGION

- Decrease in summer precipitation
- Increasing risk of droughts
- Increasing risk of river floods
- Increasing risk of forest fires
- Decrease in economic value of forests
- Increase in heavy precipitation events



BIOGEOGRAPHICAL REGIONS IN EUROPE, 2016

Alpine	Atlantic	Continental	Pannonian
Anatolian	Black Sea	Macaronesia	Steppic
Arctic	Boreal	Mediterranean	

1

2

3

4

5

2.1. Main challenges of integrating CCA and DRR institutions

CCA and DRR have been described as ‘two sides of the same coin’ or synonyms, especially for weather- and climate-related disaster risks, but also as ‘intersecting’ or, from a less constructive perspective, ‘subsets’ of each other (OECD, 2020: 11; Keweloh, 2015; Becker *et al.* 2013). Yet in terms of implementation, policy and programming, professional and conceptual aspects, boundaries remain in place in many governments, organisations and agencies (UNDRR, 2019: 166ff., 355ff., 389ff.). These contrasts raise legitimate questions about why two such similar risk management approaches are not always addressed jointly, and how to better influence the synergies between the two policy areas (UNDRR 2019: 361ff.; Mercer, 2010).

The historical development of these two policy areas has had an impact on how institutions are organised and how they communicate and collaborate today. They have been developed separately by communities with different backgrounds in terms of, for example:

- Actors and institutions in charge of CCA and DRR;
- Types of hazards/risks: weather- and climate risks versus all risks;
- Time horizons: adaptation deficit/future-oriented risks versus current risks;
- Level of implementation: low level of implementation versus lots of experience and practical implementation;
- Research methods: a relatively new area of research versus stepwise development over time and historical progress; and
- Political frameworks: Paris Agreement and Sendai Framework. Responsibilities for CCA and DRR often sit within different

European and national institutions, agencies, research groups and knowledge platforms.

Figure 2 shows some differences between CCA and DRR, which might act as collaboration barriers.

Climate change adaptation (CCA)	Disaster risk reduction (DRR)
Climate-related and climate change amplified risks	All risks
Focuses on longer-term risks	Deals with current and imminent risks
Implementation takes longer to put into practice	Implemented in stages
Relatively new field of expertise	Long experience of implementation

Figure 2: Some differences between CCA and DRR in terms of actors, institutions, hazard types, time-horizon, and level of implementation, research methods and political frameworks

The lack of integration, fragmented, and sometimes **contradicting interests and approaches** across CCA and DRR are widely cited in academic literature. This can result from issues related to capacity, with no clearly defined overarching authority and responsibility (Giordano *et al.* 2011), capacity constraints (UNDP, 2012), financial constraints limiting certain scales’ ability to take effective adaptation actions (Giordano *et al.* 2011), as well as limited knowledge (see Figure 4).

Figure 1 (previous page): Overview on past and projected weather and climate-related natural hazards in Europe, based on recent findings from EEA (Source: EEA, 2017b)

Despite the efforts to increase communication and collaboration across the fields in the last decade, significant fragmentation **within and across institutions** still persists, with noteworthy inefficiencies and incoherence across activities, communication and knowledge exchange (UNDRR, 2019: 368ff.; OECD, 2018: 30ff.; Dwirahmadi *et al.* 2013; Mercer, 2010; Venton, 2008). CCA and DRR are often affiliated with different ministries or authorities (UNDP, 2012; Amarantunga *et al.* 2017). Capability and lack of coherence within and across regulatory elements and legislation, but also norms and standards that are not effectively put into practice in low and middle-income countries, also create challenges in achieving resilience objectives in a coherent manner (BMZ, 2012) (see Figure 4).

In addition, strategic long-term planning approaches that are followed are often separated in global and regional frameworks for CCA and DRR (UNISDR, UNDP, 2012). The three global agreements as of 2015, namely the Paris Agreement, Sendai Framework for Disaster Risk Reduction (SFDRR) and the Agenda 2030/Sustainable Development Goals, in that regard and are seen as very supportive (OECD 2020). The **lack of strategic plans** to integrate CCA and DRR and the **existence of single-focused approaches** (for example, a narrow focus on disaster response leaving out precautionary or anticipatory responses) are also mentioned (OECD, 2018; Amarantunga *et al.* 2017). For example, this prominence of focus on the disaster itself rather than prevention and building back better was a major reason for the shift of focus within the Sendai Framework to the approach of primarily focusing on disaster preparedness and response, but also on building resilience. The aim of preventing the creation of new risk and reduction of existing levels of disaster risk is at the heart of this new framework (see section 3.2).

Findings from the ESPREsSO project (Enhancing Synergies for disaster PRevention in the EurOpean Union) found that:

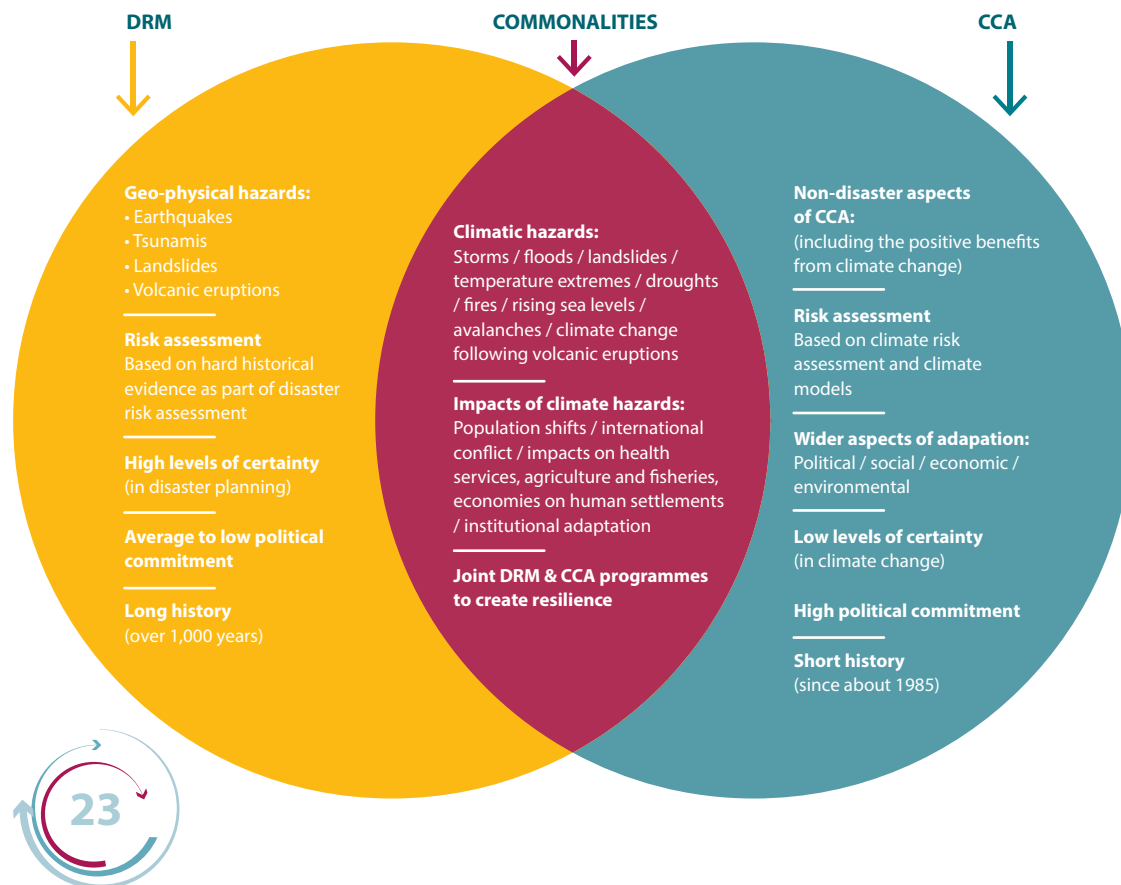
“ **Institutional barriers** are identified as a key challenge that hinders the process of successful integration of CCA into DRR. In most of the countries climate change-related policies and decisions are made by the ministries and organisations related to the environment, whereas disaster management and reduction decisions are made by ministries related to civil protection and infrastructure development. This **institutional structure disturbs the communication process**, which generates an information barrier among the institutions. Integration of CCA and DRR is not a legal mandate in most EU countries. Many have legal provisions for civil protection as a mandate of DRR. Therefore, countries have short-term plans for DRR or plans for disaster response and recovery, rather than a long-term strategic plan to reduce disaster risk by integrating CCA. [...] Given the comprehensive nature of the challenge of DRR and CCA, obviously other institutional actors play a role in the complex governance system” (Amaratunga *et al.* 2017).

Additional constraints include gaps in **communication and information sharing** between researchers, decision-makers and practitioners (UNISDR EUR, 2011), risk communication, the lack of communication between institutions and communities (Amarantunga *et al.* 2017), the **missing transparency and coordination** between different scales and sectors (Giordano *et al.* 2011) as well as **language barriers, lacking taxonomy for economic activities and financing** and different use of **terminology and definitions** of, for example, hazards and vulnerabilities (EC, 2018; EC, 2017a). The OECD acknowledges these constraints and summarizes that for overcoming them “certain enabling factors must be in place, including strong leadership and engagement of key government bodies, broad stakeholder participation and co-ordination, clear allocation of roles, responsibilities and resources, and monitoring, evaluation and continuous learning” (OECD 2020: 11).

As DRR and CCA involve a range of very diverse actors, different stakeholders define DRR and CCA concepts as per their scope of knowledge and objectives. This has created many diverse terminologies, such as the understanding of risk, impact, vulnerability and resilience.

About 60 % of the terms currently used in the CCA and DRR/DRM (Disaster Risk Management) communities overlap (see Figure 3). Although they are used in both fields, they can have quite different meanings (lack of common terminology), depending on the context and person involved, and might result in numerous misunderstandings.

Figure 3: Terms and meanings in CCA and DRR/DRM: commonalities and differences. Redrawn from Ian Davis.



Beyond lacking a shared understanding of key terminology, a major challenge is the competition for scarce resources to be implemented by different stakeholders for the same or similar objectives.

There are scarce resources and a lack of direct funding in an integrated manner, and also, in part, a lack of aligned interests and a deficit of common understanding of the objectives, aims and strategies of the DRR and CCA communities. The difficulty of quantifying the benefits of CCA and DRR (UNISDR, UNDP, 2012) are further known barriers which hinder effective cooperation and integration across these communities. These challenges prevail today (World Economic Forum, 2020).

2.2. Overlapping institutional realities

Diverse literature as well as policy documents highlight the need to better link and “join forces” between CCA and DRR. The OECD even speaks of “a clear mandate for increased coherence” (OECD 2020: 11) because both approaches guide progress towards a more sustainable future and therefore inevitably generate overlaps.

As highlighted by the EEA Report (2017a), “the impacts of weather- and climate-related hazards on the economy, human health and ecosystems are amplified by socio-economic changes and environmental changes (e.g. demographic development, land use change and climate change). Efforts to reduce disaster risk and at the same time adapt to a changing climate have become a global and European priority.”

In order to adapt to, for instance, climate-related risks or climate-induced disaster risk, the aim of any action is to manage vulnerability and risk, and so increase resilience.

One example is the system's ability to function no matter what stresses happen, maintain its critical functions in the face of crises, prepare for a crisis, and return or transform quickly to a (new) equilibrium that is consistent with sustainable development in the face of change.

Another common factor is the aim to reduce climate change-related losses through more widespread implementation of DRR measures linked with climate change adaptation. By better influencing synergies between CCA and DRR, any available and additional financial, human and natural resources can be used more efficiently. This will lead to increased effectiveness and sustainability of both adaptation and DRR approaches (ProAct Network, 2008). The more recent focus on transformative processes ('transformative adaptation' and 'transformative resilience') creates further synergies between adaptation planning, development strategies, population protection and disaster risk reduction (Amaratunga *et al.* 2017).

Figure 4 provides a tentative overview on the rationale for seizing opportunities for linking CCA and DRR (left hand box) and the current obstacles or challenges (right hand box), also reflecting upon the main challenges brought forward in section 2.1.

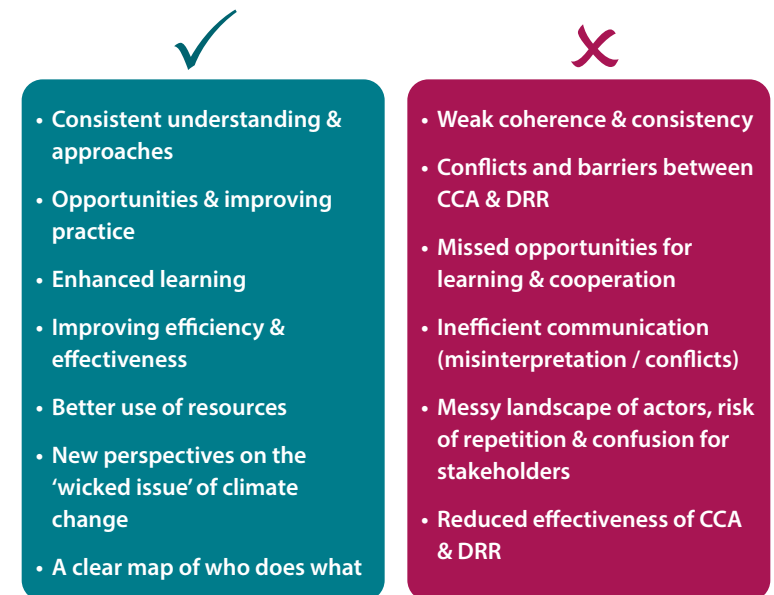
An important common overlap is that DRR and CCA are cross-cutting issues in terms of the risks and responses they address, each with multiple sectors and systems, and a broad spectrum of stakeholders that is necessary for successful cooperation and effective application. This can result in bringing together a large number of different types of stakeholders, and can make it difficult to find a common language and achieve a consistent understanding.

DRR and CCA share the objective of reducing the impact of natural hazards and climate change on people, ecosystems and

infrastructure. Because of the potential for synergies, considering their mandates, and complementary scope and activities, closer collaboration between the respective scientific, practice and policy communities can be expected to have significant benefits. Realising these synergies, however, can be challenging. For example, risks, vulnerabilities and solutions are framed differently in the different communities of practice, resulting in diverging policy, planning processes and practices in Europe.

A shared framing to realise the above-mentioned synergies should be based on the common goal of CCA and DRR, namely **reducing risk and vulnerability resulting from impacts of climate- and weather-related natural hazards**. This would include **measures and actions taken in CCA and DRR aimed at strengthening resilience** (Mitchell *et al.* 2010; Permanent Secretariat of SELA, 2010; BMZ, 2012).

Figure 4: Rationale for linking CCA and DRR



2.3. Implementation and management approaches

Role of institutions focusing on collaboration and capacity

Efforts in CCA and DRR are also strongly related to strengthening institutional coordination and capacity, which in turn strengthens society and increases resilience. Institutions work best when they fulfil their functions strategically, connect with key allies and partners, and expand to serve a broader public. Institutional strengthening in this guidance document is about increasing the capacity of institutions to perform their functions more efficiently in order to provide benefits to society (for example, resilience, prevention of impact etc.).

Critical to increasing institutional capacity and coordination is the availability of and access to financial resources; the cooperation within and across institutions, and coordination of stakeholders; networking capability (including recognising the value of informal institutional relationships that are more prominent at the local level); availability and quality of information used to inform actions; and the level of understanding within the institutions (or knowledge to which the institution has access).

In a broader definition, institutions cover a wide range of individuals, groups, communities, NGOs, associations and government bodies. Strong institutions not only serve their communities but also drive meaningful change at the local, regional, national, and even international level. This multi-level cooperation and governance needs good management and organisation. ([World Learning, Institutional Strengthening](#))

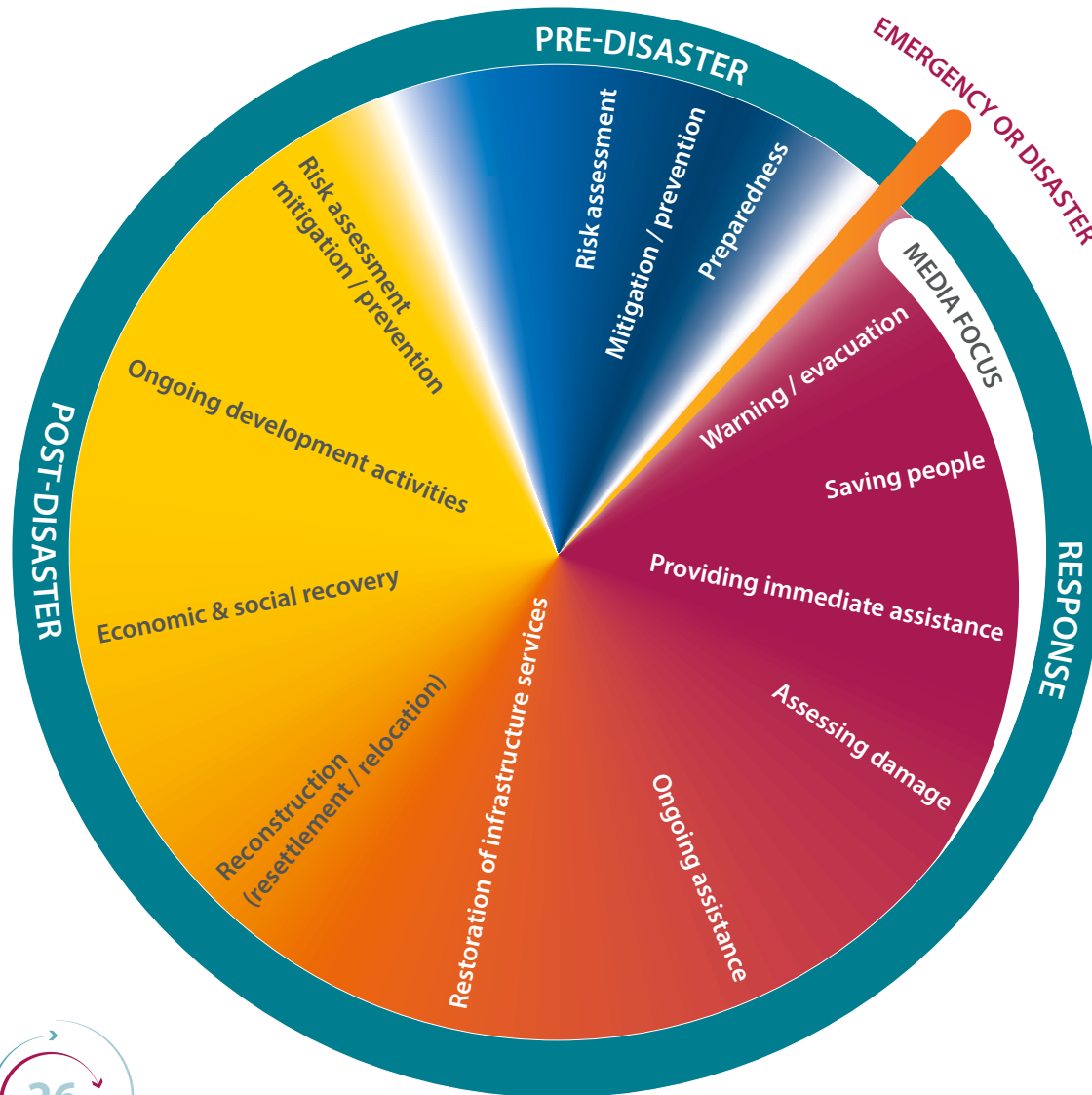
Important elements for institutions that actively deliver on CCA and DRR objectives are access to financial instruments, knowledge instruments, legislation and policy (legislative capacity and instruments), networking and partnership instruments (organisational capacity) and information and communication instruments.

Networking capabilities are also valuable, particularly when actors recognise the value of informal institutional relationships. Usually, these are more prominent at the local level. Further important elements are the availability and quality of data and information used to inform decisions regarding CCA and DRR measures. In addition, the level of understanding within the institution to use that information (or knowledge to which the institution has access) are fundamental aspects for both CCA and DRR action.

In the context of better influencing synergies between the fields of CCA and DRR, institutional strengthening may refer to:

- coordinating these instruments between CCA and DRR.
- avoiding duplication of efforts in terms of, for example, duplication of or conflicting investments.
- improving common understanding and increasing more efficient implementation of legislation and policy.
- improved seizing of opportunities for cooperation such as reducing weaknesses in networks, for example, through accountability measures.
- improving knowledge management by sharing and transferring knowledge and good practice examples e.g. conducting joint problem-solving exercises.

Figure 5: Disaster Risk Management Cycle, based on Barnier, M., 2006



Management approaches

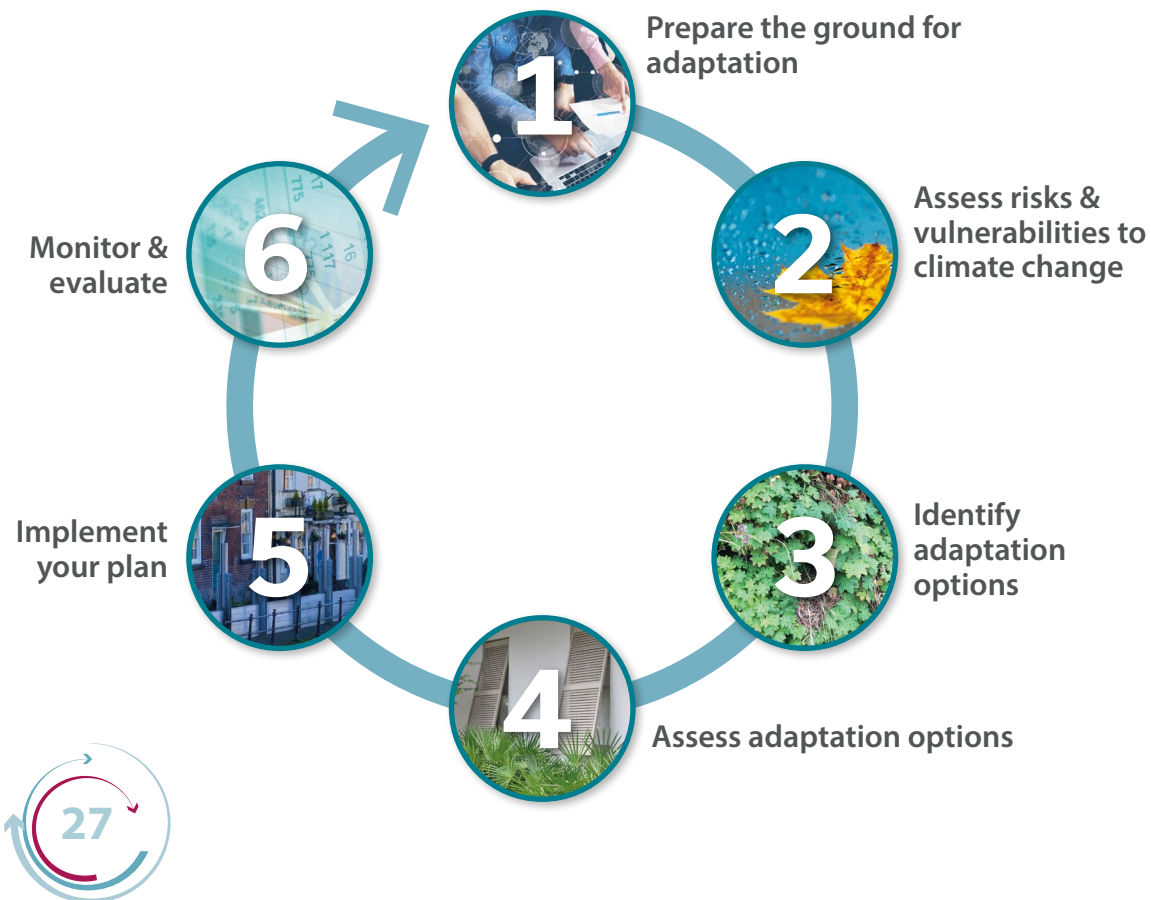
As stated earlier, an important common overlap is that DRR and CCA are both crosscutting issues. It is becoming more frequently recognised in the Paris Agreement and Sendai Framework, as well as the UN Agenda 2030 SDGs (UNCCS, 2017) that CCA, DRR and SDGs must be integral and integrated as a comprehensive approach of policies, programmes, plans, projects and implementation, to increase adaptation, resilience and sustainability.

Up to now, the policy relationship between DRR and CCA has been addressed mostly through the concept of mainstreaming (Climate Policy Info Hub) in CCA communities, and the consideration of the Sendai Framework, the Paris Agreement and the UN Agenda 2030 SDGs (and its implementation at the national and EU levels) in the DRR communities. These issues are in the early stages of being mainstreamed into European, national and sub-national policies, strategies, plans and other tools and techniques as well as slowly into sectoral practice. However, these approaches to mainstreaming also need to deal with the different aspects put forward by the SDGs (for example, SDGs 1, 2, 6, 11, 13 and 15) and consider the reduction of social inequality, increase ecosystem protection or support good governance. Therefore, effective or successful critical risk governance is a strategic investment in preserving economic competitiveness and sustainable growth, and in ensuring safer and better lives for the future (OECD, 2018). [UNISDR](#) defines Disaster Risk Governance as “the system of institutions, mechanisms, policy and legal frameworks and other arrangements to guide, coordinate and oversee disaster risk reduction and related areas of policy.”

It requires well-planned, knowledge and evidence-based, and comprehensive efforts across CCA and DRR/DRM. The following Figure 5 provides one version of the Disaster Risk Management Cycle and its different stages/phases.

To date, the CCA community and the DRR community use different concepts. The phases of prevention and recovery are more closely linked to all phases of the adaptation policy cycle (Figure 6), whereas preparedness and response are not necessarily as closely linked, other than they inform the earlier phases of the adaptation policy cycle.

Figure 6: Adaptation Policy Cycle, based on the [Climate-ADAPT Adaptation Support Tool](#).

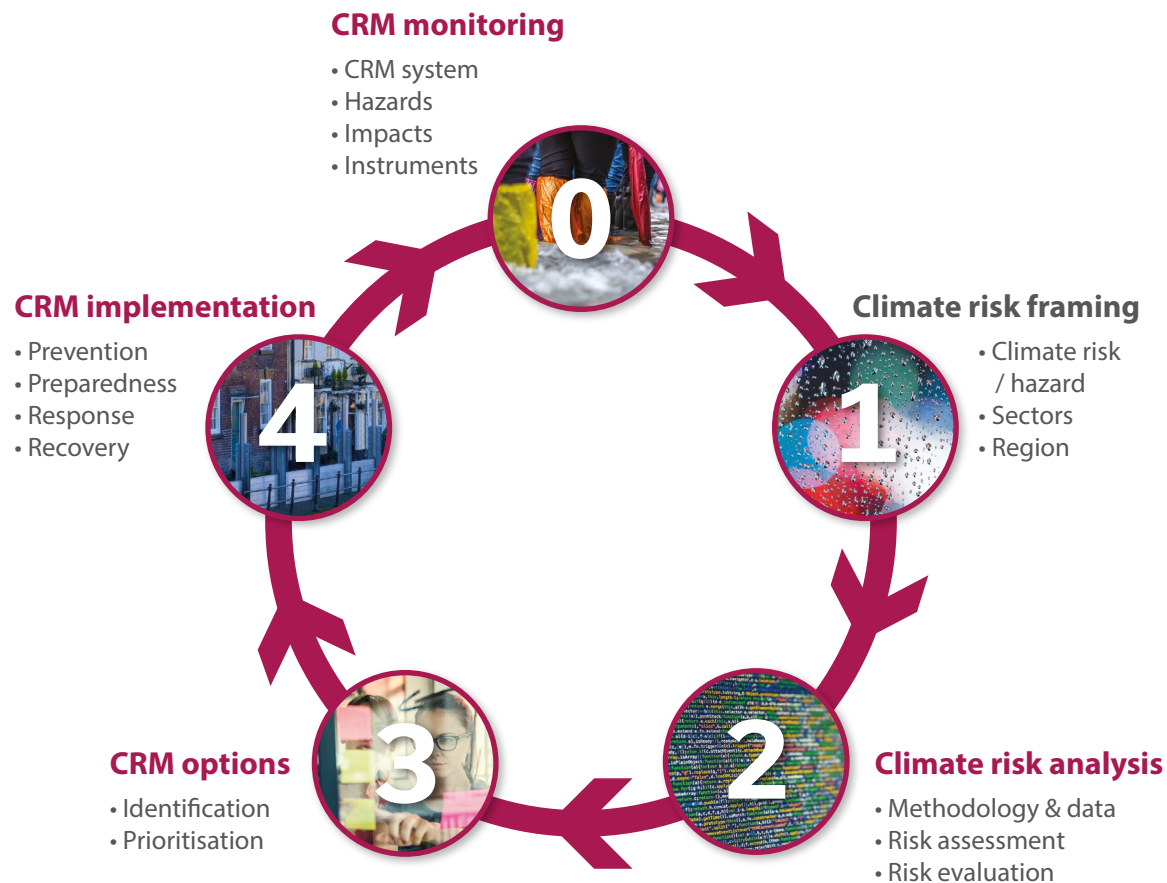


A promising approach to combining both concepts / cycles is that of Climate Risk Management (CRM). As stated by the co-chair of IPCC working group II, Chris Field:

“ Climate change is a threat multiplier that adds new dimensions and complexity to the development challenges we are already facing. Fundamentally, the challenge of managing climate change is a challenge of managing and reducing risk.”

These climate-related risks are already being tackled and overcome within the framework of natural DRR, as well as CCA. However, to manage these climate risks more effectively it is necessary to link natural Disaster Risk Management (DRM) and CCA to develop more comprehensive approaches (Jones *et al.* 2014). This also means that the focus of current CRM will be further advanced from a more reactive approach today (focusing on emergency response), to a preventive and forward-looking (proactive) approach, that includes foresight elements. Such a focus is in line with international disaster risk and climate policy frameworks, as well as the UN's SDGs. The Sendai Framework (UN 2015a) emphasises synergies between understanding risk, strengthening risk governance, investing in resilience and enhancing preparedness. The Paris Agreement (UN, 2015c) stresses the need for fostering comprehensive risk assessment and management in order to deal with climate-related risks, and Target 13.1 of the SDGs seeks to “strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries” (UN, 2015b).

Figure 7: Climate Risk Management Cycle (adapted, based on Leitner *et al.* 2019 and Schinko *et al.* 2017).



Proactive Climate Risk Management (CRM) is essential to effectively confront the challenges at the intersection of climate change adaptation and natural DRM. In addition, conceptual frameworks and practical applications of CRM have been developed (for example, Schinko *et al.* 2017) to foster comprehensive management of climate-related risks at the national level, and to support the implementation of adaptation measures as defined in national adaptation strategies and plans. To date, administrative and organisational arrangements, i.e. governance structures that are required for fostering CRM in practice, are still ill-defined.

The core steps are as follows:

1. Climate risk framing (Stock-take or baseline-study)
2. Climate risk analysis
3. CRM-options
4. CRM-implementation and
0. Monitoring.

On the one hand, monitoring should focus on methods and effectiveness of measures and achievement of target in the shorter term and on the other hand, be a learning process of monitoring and evaluation where CRM is embedded in a social-economic and ecological overall system. Figure 7 illustrates the CRM approach and the respective steps/phases.

3. Relevant CCA and DRR frameworks

This section highlights several of the relevant frameworks from the international to the national level. These are frameworks that contain key elements for both CCA and DRR communities and under which stronger institutions may emerge through enhanced connectivity and coherence.

3.1. International level

The Paris Agreement places adaptation and mitigation on equal footing. The global goal on adaptation (GGA) sets a clear link between adaptation, mitigation and sustainable development – “enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the global temperature goal” (UN, 2015c, Art.7, Abs.1). At the same time, the [Sendai Framework for Disaster Risk Reduction 2015–2030](#) (UN, 2015a) recognises climate change as an important driver for disaster risk and underlines the need to integrate DRR in CCA policies (EEA, 2017a), while the [2030 Sustainable Development Agenda](#) and the Sustainable Development Goals acknowledge the relevance of both CCA and DRR (EEA, 2017a).

These international agreements (Paris, Sendai and Agenda 2030) aim to strengthen coherence and reinforce development and climate action. This being acknowledged, the [Paris Agreement](#), [the Sendai Framework and Agenda 2030](#) depend on each other’s successful implementation – and they explicitly refer to each other, incentivising coherent implementation.

UN Sustainable Development Goals

During the Sustainable Development Summit 2015, the 2030 Agenda for Sustainable Development was adopted, containing 17 Sustainable Development Goals (SDG) and 169 targets (UN, 2015b). A direct link to climate change is set in Goal 13 “Take urgent action to combat climate change and its impacts” which highlights that implementation of the Paris Agreement is essential for the achievement of the SDG. Disaster risk reduction is touching different aspects and sectors of sustainable development. Some 25 specific targets are related to disaster risk reduction affecting 10 of the 17 SDG, firmly establishing the role of disaster risk reduction as a core development strategy. Over the coming years, with these essential (but not legally binding) goals applying to all countries, the aim is to mobilise efforts to end all forms of poverty, fight inequalities and tackle climate change.

Paris Agreement 2015

The Paris Agreement (PA) 2015 (UN, 2015c) sets out a global action plan with the aim of avoiding dangerous climate change impacts and keeping global warming well below 2°C compared to pre-industrial levels, and to pursue efforts to limit it to 1.5°C. In terms of adaptation, the Agreement sets to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, while contributing to sustainable development (UN, 2015c, Art.7; 1). It contains two specific DRR targets in the area of climate change adaptation (Art.7) and in the area of loss and damages (Art.8). In Article 7, the Parties to the PA recognise that adaptation is a global challenge with local, subnational, national, regional and international dimensions. Article 8 emphasises the importance of averting, minimising and managing loss and damage associated with the adverse effects of climate change, including weather extremes and slow onset events. The coordination of DRR and CCA funding is an overarching focus of the Warsaw International Mechanism and of Article 7 of the PA, including the issues of comprehensive risk assessment, risk insurance facilities and pooling of climate risks. Building resilience to climate variability and change provides common ground and progressively more coordinated concern for climate adaptation and disaster risk reduction. Hazard mapping, risk assessments and early warning systems are areas where integration of CCA and DRR is more advanced and recognised as a priority.

Sendai Framework for Disaster Risk Reduction

The Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) (UN, 2015a) was adopted in 2015 as a voluntary agreement, which recognises that the national level has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders.

A very important aspect of the Sendai Framework is the shift from a focus on disaster management to a focus on disaster risk management. This shift is a critical element that provides opportunities for integration with CCA and enhanced links with SDGs. SFDRR includes seven global targets and four priorities for action, covering improving the knowledge base, strengthening governance of and increasing the investment in risk reduction measures, to enhancing preparedness and response. Most priorities recognise climate change as an important driver for disasters and address the issue at various levels (i.e. better information, more and better methods and tools). Links to climate change adaptation are set at the level of implementation (Art.47(d)), recognising the need to incorporate DRR into adaptation policies.

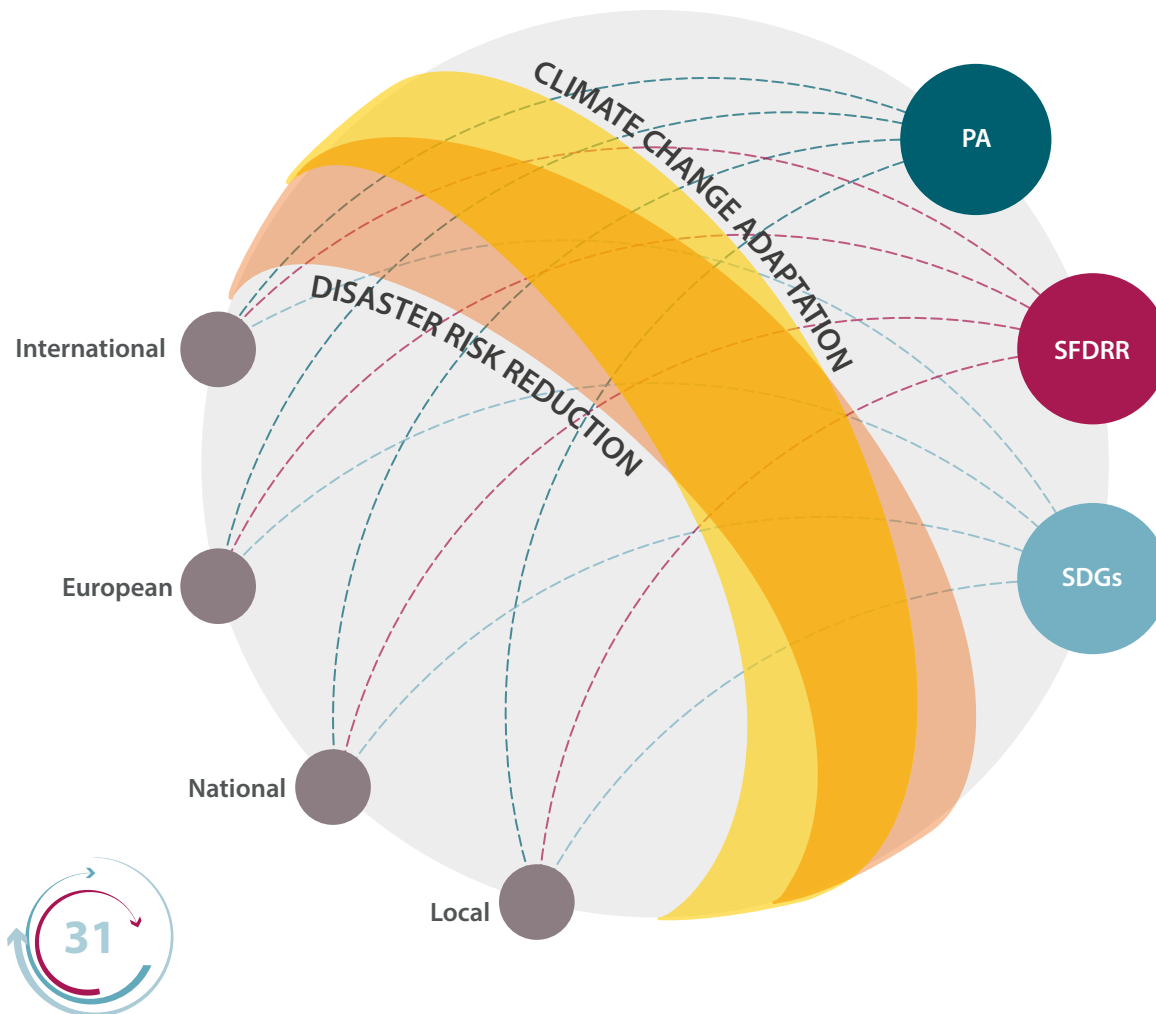
Recognition of linking SFDRR and PA

The SFDRR and PA recognise the importance of linking CCA to DRR, as well as the need to implement policies in synergy and full coordination across the parties. Together, these global policy frameworks have created a significant opportunity to build coherence across overlapping policy areas (Murray *et al.* 2016), the OECD even notes that their adoption “provides a clear mandate for increased coherence” (OECD 2020: 11). Connecting the PA and SFDRR requires enhanced collaboration in the implementation of these two global agreements across governance levels. The agreements express the need to bring DRR and CCA policies closer together based on the scientific evidence that disasters are, at least in part, related to or influenced by climate change. Simultaneously, these policy areas need to be mainstreamed into overall (economic) policy to ensure wider awareness and holistic approaches. Integrating CCA and DRR could also reduce the need for multiple reporting responsibilities via a coordinated reporting responsibility for the two global frameworks.



According to the outcomes and reflections of diverse PLACARD and other activities in CCA and DRR across European Member States, both global agreements SFDRR and PA should be closely connected and ensure coherence at the European, national and sub-national scales in order to succeed.

Figure 8: Interlinkages between SDGs, PA, and SFDRR on different levels



According to the OECD, this coherence should have three dimensions: strategic (aligned visions, goals, priorities), operational (aligned policy frameworks and institutional arrangements), and technical (strengthened capacities) coherence are elements of aligning SFDRR and PA for sustainable development (OECD 2020: 13).

What does the Paris Agreement mean for DRR?

Creating a culture and practice of resilience goes beyond reducing the consequences of foreseeable extreme and slow-onset events, but also builds resilience into systems to recover and adapt when adverse events occur. Climate change actions contribute to closing this 'resilience gap' by managing unavoidable changes and helping to avoid unmanageable ones. To prevent duplication and complication between PA and SFDRR, political and institutional coordination in various areas will be needed. If harmonisation is achieved, both frameworks can reinforce each other in their implementation. However, this will not [lead to effective action](#) if the amounts of money pledged are not increased.

What does the Sendai Framework for DRR mean for adaptation?

Coordination with SFDRR can lead to more effective policies through joining of forces, more efficient use of resources, and improved prevention and preparedness with regard to [climate-related risks](#).

The importance of linking SFDRR and PA has been recognised internationally and at first, progress was achieved. The UNISDR Global Assessment Report 2019 notes:

“ Decisions are in place to promote synergy and coherence in the implementation of the Paris Agreement and the Sendai Framework [...], practical coordination for international reporting is in the early stages, and Member States need to address very distinct reporting requirements and funding streams for CCA and DRR. [...] Positive evidence of synergy is already seen in Member States’ reports on NDCs under the Paris Agreement. More than 50 countries referenced DRR or DRM as part of their NDC” (UNDRR, 2019: p. 362).

Apart from these rather general statements, the UNISDR report also provides two examples that demonstrate how the integration of SFDRR and PA could look like. We integrated these models into our own thoughts in [Figure 8](#).

Figure 8 shows the integration of CCA and DRR under the wider framework of the SDGs. The key challenge remains to further clarify and define roles and responsibilities while encouraging partnerships and collaboration among a wider range of different actors on the national level, further building capacity, and working towards finding suitable forms and formats for implementation.

In an increasingly interconnected world, international cooperation is needed to address cross border and remote climate risks. UNFCCC and UNDRR play a critical role in coordinating global action on resilience building. Better understanding of risks posed by current and future climate variability and change informs short- and long-term policies. Disaster risk reduction efforts extended to take into account long-term evolution of climate-related risk reinforces the emphasis on preventive responses to risks.

3.2. EU-level

The European Union sets several activities in order to support the implementation of SFDRR and the Paris Agreement. We identified the following activities as being particularly useful.

EU Action Plan on the Sendai Framework

The EU supports the Sendai Framework for Disaster Risk Reduction (2015–2030). Many EU priorities for disaster risk management have been included in the new framework, including risk assessment, risk management, capability assessment, peer reviews, a strong knowledge base and the contribution of data and science. Disaster risk and resilience are also prominent in the 2030 Agenda for Sustainable Development, and DRR is closely linked to CCA in the Paris Agreement.

The [EU Action Plan on the SFDRR](#), which covers a five-year period (valid to 2021), is the basis for a disaster-risk-informed approach to policymaking. Through an all-of-society engagement, the plan proposes concrete activities on risk knowledge, risk investments, disaster preparedness and resilience, thereby reinforcing the EU priorities of competitiveness, research and innovation, and supporting resilient sustainable development worldwide. The plan will strengthen the links between disaster risk management, climate change adaptation and biodiversity strategies. It will also facilitate capacity building of local and national authorities, and communities and other actors in managing disaster risk.

The outcomes of the [2017 European Forum for DRR](#), promoted by UNISDR, reflect the alignment between EU and UN positions towards the objective of strengthening DRR and CCA integration within a transboundary perspective.

EU Civil Protection Mechanism

Based on Article 196 of [the Lisbon Treaty](#), the EU has the role to support and complement the actions of Member States in the field of Civil Protection.

The European Commission (EC) adopted a communication on a community approach on the prevention of natural and man-made disasters on 23 February 2009,¹ setting out an overall disaster prevention framework and proposing measures to minimise the impacts of disasters. The communication advocated the development of EU and national policies supporting the disaster management cycle: prevention – preparedness – response – recovery (PPRR). This was followed by a staff working document on Risk Assessment and Mapping Guidelines for Disaster Management, on 21 December 2010.²

As one part of the European Civil Protection Mechanism,³ in particular Article 6, the participating 34 States (EU 28 Member States and the six non-EU countries (Iceland, Norway, Serbia, Montenegro, Former Yugoslav Republic of Macedonia, and Turkey) submitted summaries of National Risk Assessments (NRAs) by 22 December 2015, and agreed to do so every three years thereafter. The EC released a staff working document “Overview of Natural and Man-made Disaster Risks the European Union may face” on 23 May 2017 (EC, 2017a), which shows that contributions received were of varying levels of detail, and reflected a range of levels of progress and completeness in the production of NRAs. The disaster risk types “range from meteorological (flooding, extreme weather), climatological (forest fire, drought), geo-physical (earthquake,

landslide, volcano) and biological (pandemic, epizootic, animal and plant diseases) natural disaster risks, to non-malicious man-made disaster risks of technological origin (industrial accident, radiological accident, critical infrastructure disruption), and malicious man-made disaster risks and security threats (cybercrime, terrorism)”.

The overview working document focuses on the main disaster risks extracted from NRAs, namely: flooding; extreme weather; forest fire; earthquake; pandemic; epizootic; industrial accident; critical infrastructure disruption; nuclear and radiological accident; cybercrime and terrorism. As a result, climate- and weather-related risks are of critical relevance in most of the submitted national risk assessments.

Critical challenges that lie ahead include cross-border risks and cascading effects. The staff overview working document also highlights the need to consider long-term periods more often. This is especially the case for a changing risk landscape in the light of a changing climate, leading to the following suggestion:

“ By considering longer-term periods (e.g. 25-35 years), in particular for natural events, disaster risk assessments could enlarge their potential benefits by defining longer term purposes and widening the range of end-users. Longer-term periods could allow capturing of broad trends, emerging risks and the potential impacts of climate change on certain types of natural disasters, and therefore allow developing better risk informed policies and programmes in support of more resilient development.” (EC, 2017a: 12)

1 COM (2009) 82 final of 23.2.2009; The Communication on the Internal security strategy addressed the need for an integrated approach between security and other policies.

2 SEC (2010) 1626 final of 21.12.2010; Risk Assessment and Mapping Guidelines for Disaster Management.

3 Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism, OJ L 347, 20.12.2013, p. 924.

This forward-looking long-term view is also reflected in the PLACARD Foresight Report (Leitner *et al.* 2019). The current shortcomings identified focus on the area of prevention, because only through reducing the risk of disasters we can minimise their impacts and deal with them effectively. rescEU supports these efforts – more details below.

rescEU

In March 2019, the EU reinforced and strengthened all components of its disaster risk management by upgrading the EU Civil Protection Mechanism. The result was [rescEU](#) with the objective of improving both the protection of citizens from disasters and the management of emerging risks. rescEU entails a new European reserve of capacity (the ‘rescEU reserve’) which initially includes a fleet of firefighting aeroplanes and helicopters. However, rescEU’s scope goes beyond forest fires and it is expected to include responses to other threats such as medical emergencies or chemical, biological, radiological, and nuclear incidents.

The EU plays a crucial role in coordinating disaster response in Europe and beyond. Disasters have affected all regions of Europe in recent years, causing hundreds of casualties and billions of Euro in damage to infrastructure and to the environment. Flash floods, storms, forest fires, earthquakes, and man-made disasters tested countries’ response capabilities. In addition, security concerns have become more complex; climate change is expected to worsen the impact of disasters in the future.

When the scale of an emergency exceeds the capacity of a country to respond on its own, it can request assistance via the EU Civil Protection Mechanism. The legislation (Decision (EU) 2019/420 of the European Parliament and of the Council of 13 March 2019 amending Decision No 1313/2013/EU on a [Union Civil Protection Mechanism](#)) states that:

“ Disaster risk prevention and management imply the need to design and implement risk management measures that involve the coordination of a wide range of actors. It is important to take into account current climate variability and the projected trajectories of climate change when preparing risk assessments and risk management measures. The preparation of risk maps is a crucial aspect of reinforcement of prevention actions and response capacity. Actions to reduce the vulnerability of the population, economic activities, including critical infrastructure, animal welfare and wildlife, environmental and cultural resources such as biodiversity, forest ecosystem services and water resources, are of the utmost importance.”

This means that our understanding of climate variability and future climate projections need to be improved and integrated into disaster risk prevention and management in a more binding way.

EU Strategy on Adaptation to climate change, its evaluation and the European Green Deal

In April 2013, the European Commission adopted an EU strategy on adaptation to climate change (EUAS) (EC, 2013), which has been welcomed by the EU Member States. The strategy aims to make Europe more climate-resilient. By taking a coherent approach and providing for improved coordination, it is intended to enhance the preparedness and capacity at all governance levels to respond to the impacts of climate change.

An area of overlap is already provided in the EUAS, focusing on increasing climate-resilience. The December 2017 study to support the evaluation of the EUAS is accompanied by a summary of recommendations, including Recommendation 4 that focuses on linking DRR and adaptation:

“ The coherence between climate change adaptation (CCA) and disaster risk reduction (DRR) should be further enhanced across all levels of governance (global, European, national levels) via closer vertical and horizontal, cross-border and transnational coordination and collaboration” (EC, 2017b: 13).

In making this recommendation, the report specifically mentions that:

“ Both policy areas work towards similar overarching objectives. However, the review of the current state-of-play and stakeholder views revealed that, rather than trying to find stronger synergies, currently both policy areas are mainstreamed (in parallel) into key EU policies and strategies. Hence, there is still a need to foster further coherence between DRR and CCA policies, practices and knowledge” (EC, 2017b: 13).

The potential for greater coherence between disaster risk reduction and climate change adaptation policies, practices and knowledge was also identified by the EEA (EEA, 2017a). The findings of the Evaluation of the EU Adaptation Strategy (EC, 2018) state that: “A recurring policy area where coherence with adaptation was seen as essential is disaster risk reduction.” (EC, 2018: 6) In addition the Evaluation of the EU Strategy on adaptation to climate change states that “Half or more EU Member States are yet to ensure that: [...] Synergies with disaster risk reduction are progressed” (EC, 2018).

Thus there is a clear need for support and in this guidance, we outline possible pathways to realise this coherence in practice. This guidance supports countries in further increasing coordination and capacity to include climate change information in DRR decision-making.

The European Green Deal moreover foresees:

“ A new, more ambitious EU strategy on adaptation to climate change is needed and essential, as climate change will continue to create significant stress in Europe in spite of the mitigation efforts. Strengthening the efforts on climate-proofing, resilience building, prevention and preparedness is crucial” (EC, 2019: 5).

As a result, we envisage further alignment of CCA and DRR at the European Scale as well as support to its Member States and that the guidance can support that process.

3.3. Transnational level

Different natural hazards and climate-related risks occur across country borders, for the management of water resources for different purposes, such as flood risk management along a catchment, for example. Addressing these risks through effective DRR and CCA will require cross-border collaboration and action.

At the EU level, the [Macroregional strategy](#) addresses common challenges faced by a defined area with relation to EU Member States and third countries located in the same geographical area. One of the benefits is strengthened cooperation contributing to the achievement of economic, social and territorial cohesion.

Climate Change Adaptation and Disaster Risk Management are two, very closely linked areas that need to be addressed on the national, cross-border and transnational scale: the macro-regional strategies provide a space where these activities can take place and will be further increased in future. [Figure 9](#) provides an overview of the current four EU macro regional strategies.

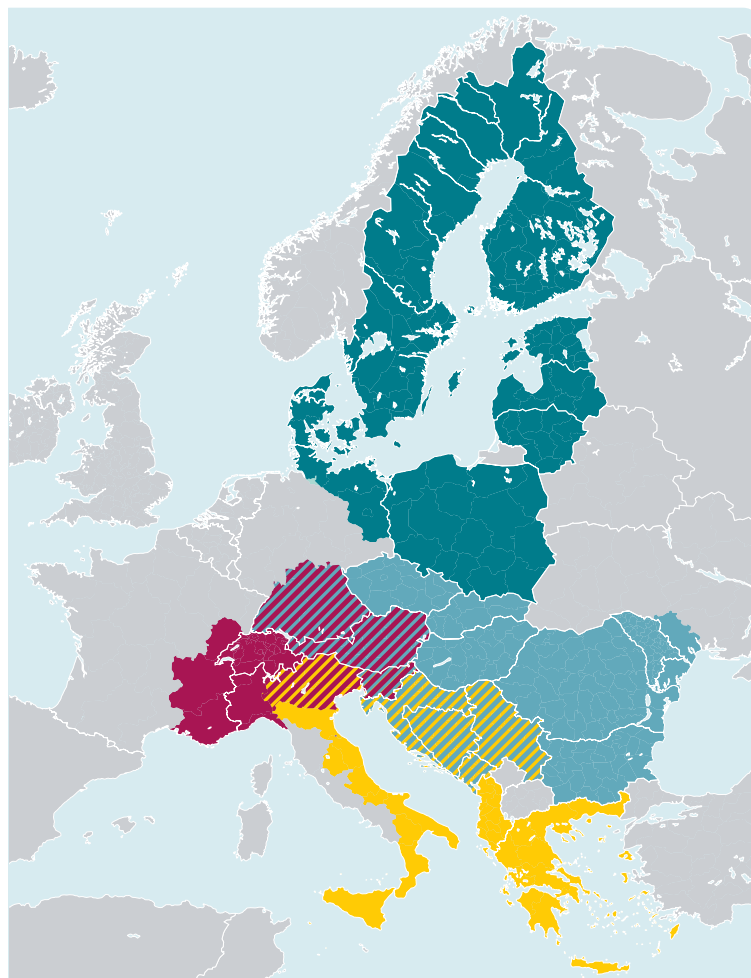


Figure 9: Current four EU macro-regional strategies

The EU macro-regional strategies are tackling climate change through: The EU Strategy for the [Alpine Region](#) (EUSALP) bundles CCA together with DRR in one of the nine actions. In both the EU Strategy for the [Adriatic and Ionian Region](#) (EUSAIR) and the EU Strategy for the [Baltic Sea Region](#) (EUSBSR), CCA is currently defined as a cross-cutting principle, relevant to all thematic pillars of both strategies. And in the EU Strategy for the [Danube Region](#) (EUSDR), CCA is addressed primarily as an environmental issue, particularly in the context of flood and water management.

3.4. National level

At the national level, adaptation strategies and action plans as well as National Risk Assessments and Disaster Risk Reduction Strategies in Europe provide frameworks and guidance for CCA and DRR actions.

An overview of adaptation policies – National Adaptation Strategies (NASs) and National Adaptation Plans (NAPs) – at the level of EEA member countries is provided in [Figure 10](#) and based on Information from [Climate-ADAPT](#). Here, the countries shown in blue have developed and adopted a NAS, while the countries in yellow have not. The data illustrates that climate adaptation policies have successfully been mainstreamed across the EU, which of course does not allow for drawing conclusions on the degree of implementation, which varies significantly between countries (Probst *et al.* 2019).

Figure 10: Overview of National Adaptation Strategies in EEA member countries.

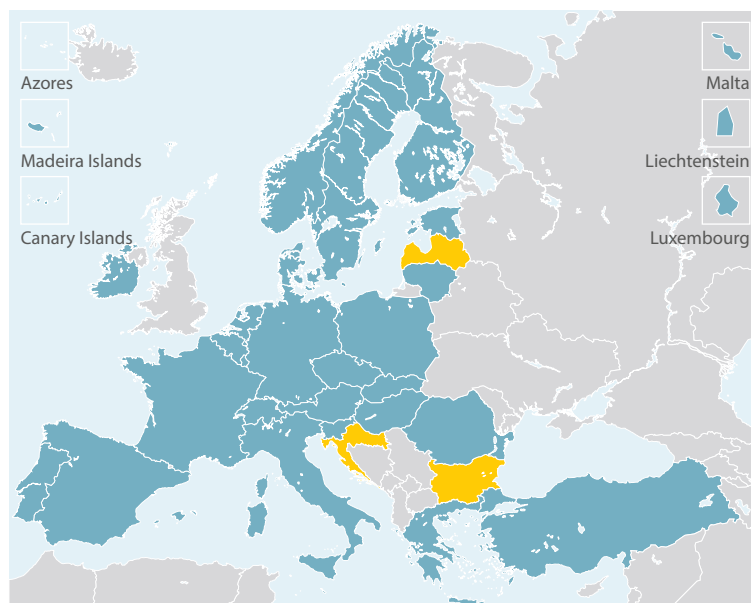


Figure 11: Overview of National Adaptation Plans in EEA member countries.

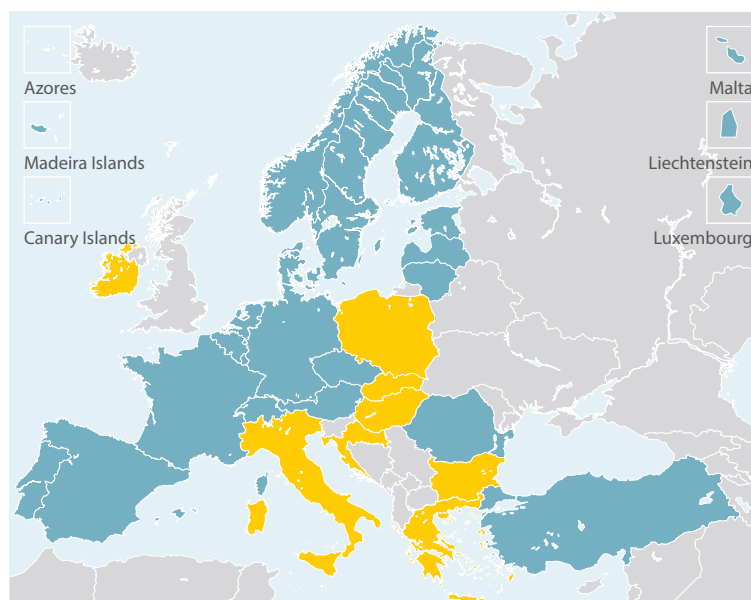


Figure 11, in contrast, shows how far NAPs are developed and adopted throughout Europe. Here, countries displayed in blue have adopted a NAP and countries in yellow have not done this so far. While this figure suggests that many Southern and Eastern European member states lag behind in implementing climate adaptation policies, this conclusion is premature because some NASs are developed in such a way that they strongly encourage implementation.

Unfortunately, the same progress overview like on NAS and NAP cannot be reported in the field of disaster risk reduction for disaster risk reduction strategies. An initial overview can be generated via the Sendai Framework country targets, [target E and Indicator E-1](#) (see [Figure 12](#)). This indicator is intended to show the progress of national development of DRR strategies worldwide; however the overview faces a significant lack of data. Data is available for only [four EEA member countries](#). This finding is symptomatic of a more general knowledge gap, as described in chapter 6 (i). A specific European overview of Disaster Risk Reduction strategies or National Risk Assessments might therefore be an opportunity, and be tackled by for example, the Disaster Risk Management Knowledge Centre (DRMKC).

However, it is important to highlight that nevertheless progress is being made. This applies, for example, to the development of National and Local Platforms for DRR, as well as National Focal Points (UNISDR, 2017: 10, 17, 21ff.), throughout European member states. On the national level, countries such as the Netherlands (ibid.: 35ff.) or Sweden (ibid.: 39ff.) show significant progress, as well as Italy (ibid.: 60ff.) at the local scale. National progress on DRR strategies is [highly diverse](#) and cannot be captured in a single image.

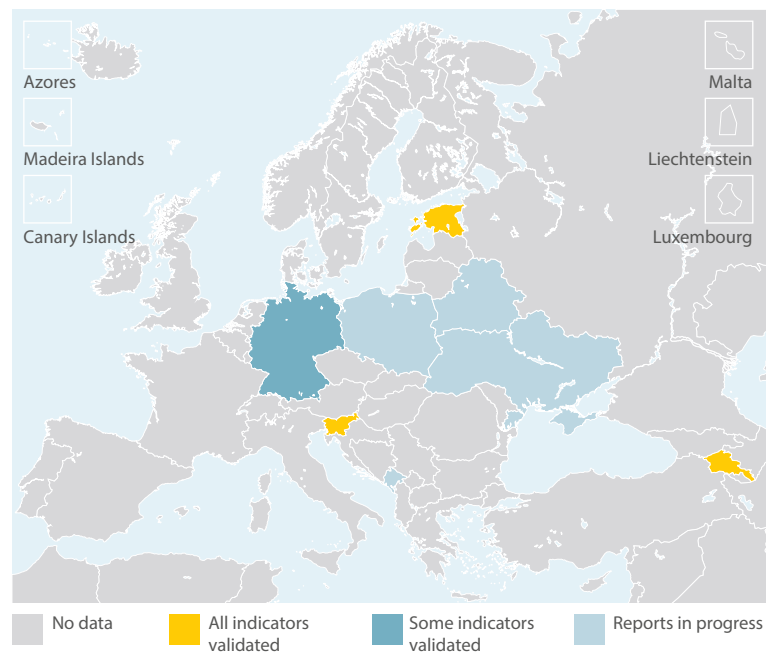


Figure 12: Sendai Framework country Target E – disaster risk reduction strategies.

4. Recommendations for strengthening CCA and DRR institutional collaboration and capacity

This chapter serves as the core of this guidance document and it provides a set of key stand-alone recommendations to foster institutional collaboration and strengthen institutional capacity. The recommendations have been developed along the key collaboration topics identified in the literature review, results from the PLACARD workshops, interviews and other type of interactions with researchers, decision-makers and stakeholders across CCA and DRR communities. The events and workshops that contributed to this list and the development of the recommendation comprising this guidance can be found in Annex List of events organised and attended by the PLACARD.

The goal of these recommendations is to inspire CCA and DRR actors for ways and approaches to further increase cooperation between and capacity of their respective institutions. Furthermore, they shall support national and European institutions responsible for the planning of CCA strategies and action plans and support mainstreaming DRR into CCA policies and vice versa. Finally, the recommendations are supposed to illustrate how institutions in the field of CCA and DRR can more effectively cooperate and/or effectively integrate relevant policies and measures across the CCA and DRR space.

The structure of this section is based on the goals of the report (see section 1.1) and the key steps of institutional strengthening (ibid.). The underlying logic is that recommendations are clustered according to their main field of relevance – [4.1. Safeguarding sound governance](#), [4.2. Ensuring effective financing](#), [4.3. Seizing opportunities for cooperation](#), [4.4. Sharing new forms of communication](#), and [4.5. Enhancing knowledge management](#). Each category is introduced briefly to avoid uncertainty; however, this system merely serves as a general heuristic, so for some recommendations also a different categorisation could be argued.

Each recommendation consists of (i) a title as well as names and institutions of its authors, (ii) a synopsis of what needs to happen, (iii) a short introduction into the specific terms, the relevance of the topic, its added value and limitations, (iv) a brief showcase of possible pathways how synergies can be used, (v) an explanation who is addressed, needed or benefits, and finally (vi) an example illustrating how the recommendation can look like in practice and how challenges were overcome in this case. Annex 7.2 provides the full template used to create the recommendations.

In the following, we briefly outline the structure and content of the whole chapter:

4.1 Safeguarding sound governance

4.1.1 Climate Risk Management (CRM) to facilitate climate-resilient decision-making at the intersection of DRR and CCA

The implementation of a comprehensive Climate Risk Management (CRM) approach with a broad stakeholder involvement at and across different risk governance levels will support streamlining of current and future CCA and DRR activities in policy and practice.

4.1.2 Relevance of stakeholder engagement into DRR and CCA decision-making processes at different scales

Robust decision-making that increases resilience to climate change impacts is not made in a vacuum, but rather is set within a diverse social, economic and cultural landscape. It is, therefore, critical to engage the actors that have an interest in both the decision-making process and outcomes in order that all needs are recognised.

4.1.3 Stronger focus on self-precaution or individual prevention and preparedness

Successful societal implementation of adaptation to climate change and risk management requires substantial contributions by private actors. Here, public administrations are in charge to coordinate and to pave the way. Therefore, they must find new formats for cross-sectoral collaboration.

4.1.4 The importance of integrated adaptation and disaster reduction strategies and plans at municipal level

Implement participatory designed strategy and plan at the municipal level that deal with climate-induced disasters.

4.2 Ensuring effective financing

4.2.1 Sovereign Climate Insurance Funds with application of Index-Based Insurance and DLT

Sovereign Climate Insurance Funds (pools) that cover climate-related risks and provides financial protection/support to the regions and small farmers.

4.2.2 Risk Transfer and data collection via European Risk Transfer Mechanism

DLT-based platform that aims to transfer risk from Sovereign Insurance Funds to the financial market; collect, process and store climate-related data.

4.2.3 EU Green Taxonomy and EU Green Bond Standard with CCA and DRR components

EU Taxonomy of green projects with combination of CCA and DRR indicators and metrics to improve effectiveness of climate finance.

4.2.4 Forecast-based financing to anticipate disasters and reduce human suffering and losses in a changing climate

Forecasting what the weather will do rather than how the weather will be allows timely action in advance of peak impacts.

4.2.5 Self-financing and crisis financing mechanisms with application of DLT

Elaboration of the national self-financing and crisis financing mechanisms with application of the DLT.



4.3 Seizing opportunities for cooperation

4.3.1 Risk governance as focused collaboration

Develop strong transnational and interregional collaboration between CCA and DRR with a joint focus on current and future risks.

4.3.2 Social Network Analysis: Stocktaking and Social Network Analysis as tools to enhance CCA & DRR interactions

Learn the actors in your CCA & DRR network its properties, and make use of this information to strengthen their interactions and encourage aligned resilience solutions.

4.3.3 Organise joint emergency exercises to strengthen collaboration on various levels between CCA and DRR actors

Organise joint emergency exercises to explore climate risks, exchange knowledge and jointly prepare for weather anomalies.

4.3.4 Proactive transboundary cooperation between CCA and DRR sectors

Effective transboundary crisis cooperation is driven by proactive rather than reactive collaboration between the CCA and DRR communities. Traditional, cultural policies should be able to concede to flexible, international perspectives, to provide cooperative risk management for the border zone in a mutually sustainable manner.

4.4 Sharing new forms of communication

4.4.1 Fostering dialogue and learning on monitoring, reporting and evaluation

In order to foster dialogue and learn from Monitoring, Reporting and Evaluation (MRE) of CCA, DRR and sustainable development policies and frameworks, a better coordination of the relevant actions and processes, a more effective use of resources and a stronger collaboration among actors operating in the different domains are needed.

4.4.2 Stories and strategic narratives for joint understanding and collaboration between CCA and DRR to foster preparedness and prevention

Develop new stories and strategic narratives for joint understanding, collaboration and improved resilience actions among CCA and DRR communities.

4.4.3 Mainstreaming approaches through education

Learning within an institution is critical if it is to achieve its operational goals. A responsive approach to educational needs that recognises the changing organisational landscape will ensure greater efficiency and maximise resources.

4.5 Enhancing knowledge management

4.5.1 Ecosystem-based Adaptation and risk reduction

The consideration and use of nature-based solution in adaptation and risk reduction strategies should be strengthened through enhanced cooperation, dialogues and inter-sector practices and policies.

4.5.2 Information and knowledge management to foster stronger CCA-DRR institutions

Promote a systematic process for sharing data, information and knowledge for CCA and DRR that accelerates learning and collaboration and makes it easier for stakeholders to find, access and use content that is legitimate and relevant to their needs.

4.5.3 Using knowledge platforms and portals to enhance learning and collaboration

Knowledge platforms and portals should play a leading role in promoting and supporting learning and collaboration within and between CCA and DRR communities. These online spaces should not serve as repositories of information, but act as connectors of people and knowledge, and as forums for peer-to-peer learning and exchange across the two domains.

4.5.4 From information to knowledge-action networks

Develop knowledge-action networks to advance quality and usage of CCA/DRR-related information.

4.1. Safeguarding sound governance

This chapter points out the necessity to put integrated CCA/ DRR policy into practice and showcases possible pathways to do so. Therefore, we contribute to overcoming the current implementation gap (see [5.1](#)) on various policy levels. Furthermore, we recommend strategies for integrated governance modes that were proven successful in our examples. However, in contrast to section [4.3](#) we focus not so much on the cooperation aspects of governance but on legislation, administrative processes and mandatory standards.

4.1.1 Climate Risk Management (CRM) to facilitate climate-resilient decision-making at the intersection of DRR and CCA

The implementation of a comprehensive Climate Risk Management (CRM) approach with a broad stakeholder involvement at and across different risk governance levels will support streamlining of current and future CCA and DRR activities in policy and practice.

Prepared by Thomas Schinko, IIASA and Markus Leitner, EAA

What and why

We suggest Climate Risk Management “CRM”, as a comprehensive risk governance (see section [2.3](#)) approach for decision-making at the intersection of climate change adaptation (CCA) and disaster risk reduction (DRR). Climate change has been identified as a threat multiplier that adds further complexity to the already existing development challenges caused by climate-related risks. Hence,

tackling climate change is fundamentally a challenge of managing and reducing climate-related risk. CRM aims at streamlining the intertwined decision-making contexts DRR and CCA in practice. It seeks to promote sustainable socioeconomic development by comprehensively tackling – reducing, preventing, alleviating – climate-related risks.

CRM supports decision-making in practice to better understand and address the complexities associated with managing climate-related risks across different geographical, hazard and governance level contexts. Operationalising a comprehensive CRM approach requires multiple methods and tools, ranging from quantitative risk assessment models to participatory stakeholder engagement tools. Embedded in iterative learning processes, the CRM approach overall and specific climate-risk management measures in particular can be assessed periodically in terms of efficiency, effectiveness and potential (positive & negative) impacts.

To illustrate the practical use value of CRM, we will present in the following first experiences from Austria, based on three specific case studies, namely Lienz in Austria. Lienz is located in an Alpine valley at the confluence of two rivers, with a size of 16 km² and a population of 11,868. For the city of Lienz, Austria, the IPCC concept of Global reasons for concern and its global burning embers were transferred to the local circumstances and context. The ARISE guidance document **Global problems – local risks** (Hama *et al.* 2016) was developed, based on a step-by-step, participatory approach led by experts in order to illustrate “local reasons for concern” in a clear form and to implement target-oriented and feasible adaptation measures. The local decision-makers in communities wanted to record the regional impacts of climate change as well as socio-economic changes in a structured way and counteract emerging risks at an early stage.

The PACINAS factsheet ‘Flood risk case study: Iterative Climate Risk Management’ (Schinko *et al.* 2017) showcases a detailed assessment of current and future flood risk in Austria, with a particular focus on the public sector’s contingent climate-related liabilities. It furthermore developed a comprehensive process-oriented CRM risk-governance concept for supporting decision-makers in tackling climate-related risks in Austria across scales, which is also applicable to other decision contexts. The RESPECT project working paper on “CRM in Austria” (Leitner *et al.* 2019) provided a comprehensive analysis of the decision and governance structures in the current Austrian CRM. While for both climate-related risks, flood and drought, first steps towards proactive climate risk management have been taken, a comprehensive CRM approach in Austria is still far from being realised. The report provides recommendations, such as the establishment of a national climate-risk council, to foster the operationalisation of CRM in Austria. Moreover, the RESPECT project developed and applied a role-play simulation to identify roles and responsibilities in local CRM decision contexts (Lintschnig *et al.* 2019). Only if the roles and responsibilities in implementing a comprehensive CRM are explicitly known, can it contribute to institutional strengthening in terms of coordination and capacity. The approach was tested in the Austrian city of Lienz and two regions, focusing on different climate-risks, namely floods and drought. The involved local stakeholders from policy, public administration and boundary organisations, as well as further involved stakeholders from the national and sub-national level, all expressed their view on the advantages of this approach and highlighted the potential for upscaling and duplication in other areas and decision contexts.

How

One element to foster the implementation of a comprehensive CRM that was put forward by Austrian stakeholders could be the

installation of climate-risk councils at different governance levels (sub-national, national and trans-national) that could be linked to each other via a system of delegates. The climate-risk councils would comprise representatives from all relevant policy and decision-making authorities, practitioners, civil society, research and the private sector, who are active in CCA and/or DRR, at each governance level. In addition, from a research perspective, multiple methods and tools, such as the RESPECT role-play (Lintschnig *et al.* 2019) or the “Co-creation of a desirable and resilient future in Lienz” (Mayer *et al.* 2019), are needed for operationalising/realising a comprehensive CRM in practice, comprising both quantitative risk-based modelling techniques and qualitative social science methods.

Who

CRM aims at including public actors (public administration on the sub-national, national and trans-national level) as well as private actors (citizens, companies, insurance providers, NGOs) who are in charge of, or who are contributing to, CCA and/or DRR. Both public and private efforts are considered crucial to manage current and future climate-related risks. In addition to the relevance of insurance, to date it has been public sector risk management that has played the most significant role in the application of proactive risk management approaches. The governments’ central position in DRR is due to its fundamental role in providing public goods and services and redistributing income. To identify relevant actors stakeholder mapping, including identifying concrete roles and responsibilities, can be a useful starting point (see e.g. CRM in Austria (Leitner *et al.* 2019) or [4.3.2 Social Network Analysis: Stocktaking and Social Network Analysis as tools to enhance CCA & DRR interactions.](#)

EXAMPLE:

Towards comprehensive Climate Risk Management – first practical experience in Austria

First steps towards comprehensive CRM have been taken in Austria. This process has been substantially guided by three closely linked research projects: [ARISE](#) set out to transfer the IPCC's burning embers concept (IPCC, 2014a) to the local level context, to the Austrian city Lienz. The "IPCC's Burning Embers – Reasons for Concern" concept illustrates the future global climate change-related risk development split into five categories (Risks to Unique and Threatened Systems; Risks from Extreme Weather Events; Distribution of Impacts; Global Aggregate Impacts and Risks from Large-Scale Singular Events) and their changes over time in a world with different increases in temperatures, depending on the mitigation of greenhouse gases. To date, this integrative concept has not been transferred to the local level for informing decisions where risks associated with climate change are mostly still understood and analysed in a sector- and hazard-specific and rarely scenario-based manner.

Based on the 'Local Reasons for Concern' visualisation and on risk assessment at the local level, entry points for DRR and CCA were identified in close collaboration with local stakeholders. At this stage, it needs to be acknowledged that the city of Lienz was, and is, a front-runner in disaster risk reduction and natural hazard management and was involved in such initiatives as the [UNISDR campaign](#), 'making cities resilient', but future climate change as well as socio-economic development was not yet on their radar. These entry points to link sound DRR with CCA and socio-economic development were based on qualitative expert interviews with local and regional actors, downscaled climate scenarios and socio-economic scenarios. Especially precipitation-related extreme events, temperature extremes

and drought, as well as worsening of civil-protection and losses in classical winter tourism are seen as challenges for the future and adaptation measures were developed in order to counteract these developments and increase resilience at the local level via joint efforts of CCA and DRR.

Building on this narrative and analytical assessment provided by ARISE, the RESPECT project fostered the collaborative stakeholder driven CRM approach, in particular by identifying and allocating concrete roles and responsibilities in CRM in Austria. At the national level, a scoping of the actor space, including relevant roles and responsibilities for private and public sectors, was conducted. At the local level, again for the city of Lienz, stakeholder mapping was undertaken as part of an innovative role-playing exercise, which focused on formulating an aligned understanding on how local risks, roles and possible actions should be shared between multiple societal actors. Role-play simulations have recently been suggested to streamline the world-views and actions of diverse stakeholders on various levels of governance (Rumore *et al.* 2016). By switching to the roles of other actors, players develop a reciprocal understanding and acceptance of the interests and resources of their co-players. Role-play simulations can provide new avenues for communities to adapt to climate risks by building capacity for collective responses (Rumore *et al.* 2016). The RESPECT role-play simulation (Lintschnig *et al.* 2019) was so far one of the most innovative attempts in Austria to involve public and private actors in joint climate resilience planning.

4.1.2 Relevance of stakeholder engagement into DRR and CCA decision-making processes at different scales

Decision-making that increases resilience to climate change impacts is not made in a vacuum, but rather, is set within a diverse social, economic and cultural landscape. It is, therefore, critical to engage the stakeholders that have an interest in both the decision-making process and outcomes in order that all needs are recognised.

Prepared by Peter Walton, UKCIP, University of Oxford

What and why

Constructive collaboration between all parties who have an interest in a project is by no means easy and can often be time consuming and frustrating but can yield benefits that working without them couldn't elicit. Projects developed in such a way are often more robust as they have the agreement of all parties and therefore less chance of being rejected, and have explored all options that might not necessarily have been considered by a single agency, nor considered at the outset of the project. Participatory stakeholder engagement can also inspire new ideas or highlight options that have not seemed suitable at the start. In addition, engaging with stakeholders can elicit local knowledge that can be critical in identifying areas of vulnerability and possible solutions to risk management, as well providing legitimacy to the research. That the DRR and CCA communities are so often closely aligned in their challenges and responses makes an integrated, participatory approach to stakeholder engagement even more effective. A single lens perspective to a hazard often results in narrow vision of what can and needs to be done, whereas, by bringing multiple stakeholders together from a range of sectors the problem and solutions can be viewed through multiple lenses. This may result

in a single, unified solution or it may identify multiple options, but it would have the advantage of potentially being more integrated, resource efficient, leading to a more robust response.

There is no one way to go about engaging with stakeholders, however, there are a number of basic principles that can be followed to ensure a greater level of success (Gardner *et al.* 2009). These include: spending time mapping the key actors; identifying what their needs for the project could be; how they could best work with the project; and what contribution from stakeholder engagement could be expected.

As mentioned, stakeholder engagement can be very time-consuming adding a layer of communication to the project that might not otherwise have been there. The initial process of recruiting stakeholders can take time, with the norm being a series of polite rejections before groups begin to sign up. Often individuals in organisations can leave or change jobs so losing their expertise or the contact in the organisation. Whilst these can't be mitigated against, perseverance will ensure successful stakeholder engagement bringing a richness of expertise and experience that otherwise would be lacking, particularly when attempting to bring both DRR and CCA goals together.

It should be noted that the term 'stakeholder' is used interchangeably with a range of other terms including user, customer, participant, and actor though it is important to realise that, though similar, the words can have different connotations when it comes to how you engage with them. If people involved with a project or process are considered as customers or users the suggestion is that they will be more passive recipients of the knowledge rather than co-creating it as a stakeholder would.

That is not to say that it is inappropriate to passively pass on information to stakeholders but rather, the whole process should employ a mix of different methods and mechanisms.

How

The Community Resilience to Extreme Weather [CREW] project engaged in an extensive process of stakeholder engagement with an interest in improving the resilience of local communities in SE London, UK to the impacts of extreme weather events. By viewing the 'problem' holistically, rather than a series of siloes, the project was able to develop a series of decision-making tools that helped citizens, communities, and small- and medium-sized enterprises (SMEs) address climate change adaptation and disaster risk reduction. It was recognised that CCA and DRR decision-making and planning operate at different levels and different scales and as such needed to be considered individually and collectively. Householders were able to better understand what future climate impacts they could potentially face and what they could do to adapt, whilst local government planners and first-responders are able to consider what strategies need to be implemented to reduce the likelihood of a disaster occurring following an extreme weather event. This level of stakeholder engagement requires a high degree of preparation, perseverance and time. An initial stakeholder mapping will identify the key actors, who will then be able to help identify other groups to engage. This can be effective when working at the household level where working with community groups can help provide access to often hard to reach groups, and typically those most vulnerable.

Who

The project CREW aimed to address the needs of a range of stakeholders:

- Decision-makers for community resilience
- Property owners and householders, insurance companies and the building industry
- Small to medium sized business enterprises
- The research community.

These stakeholders benefited from:

- The development of a tool to map probabilistic future extreme weather events (flooding, heatwaves, subsidence, wind and lightning)
- The integration of social and physical research to understand the risk from extreme weather events at the community level
- Identification of the risks, vulnerabilities, barriers and drivers that affect the resilience of a local community to extreme weather events
- An assessment of the adaptive capacity of a local community to respond to the challenges of extreme weather events
- The development and testing of new strategic and operational models to support effective planning to cope with both current and future extreme weather events
- Provision of new insights into the inter-relationships between stakeholders in the local community (decision-makers, householders, businesses) for those with national responsibilities for coping with extreme weather events
- Inform communities of the risks and options for coping with extreme weather events
- Creation and evaluation of the benefits of an interactive, stakeholder-driven research programme.

EXAMPLE:

Working together, planning together: The CREW project

Learning from the CREW project has shown that engaging with a broad range of stakeholders at a range of scales can be extremely beneficial when it comes to finding solutions or support for CCA and DRR. Each group were able to contribute something unique to the development, testing and application processes. Often, a project of this scale needs a catalyst to start it off and then adequate funding to support the research and development. This catalyst could be the aftermath of a high impact event or, as in this case, the launch of the London Plan (Mayor of London, 2008), which states that the effects of climate change should be incorporated into the development of the 55,000 additional homes and 100,000 new jobs planned up to 2026. Whilst the plan states that climate change should be incorporated into new build it was also recognised that this was an opportunity to consider existing housing, infrastructure, service provision and planning.

For management purposes the project had 5 different elements to it that acted independently whilst maintaining an overall project goal of improving the capacity for resilience of local communities to the impacts of extreme weather events. Lessons from each sub-project were disseminated amongst the stakeholders to inform ongoing studies, with an annual general assembly employed to provide an opportunity for interaction between all the stakeholders and research teams. At the final general assembly stakeholders were asked to reflect on their experiences and levels of preparedness. They noted the importance of the inter-disciplinary approach to support planning and decision-making, as well as the benefit of looking at the problem of resilience to climate change through a number of perspectives. These included socially and organisationally; the different spatial scales; and the complexity of community

interconnectedness. Opportunities had been seen of how the outcomes could be integrated into existing practices, rather than either 'bolting on' new approaches, or having to start from scratch, helping further engage other organisations particularly at a senior level. Finally, participants highlighted who were the key actors in developing robust and integrated CCA/DRR strategies including: community-based organisations, built environment actors, and central government (Hallett 2013).

4.1.3 Stronger focus on self-precaution or individual prevention and preparedness

Successful societal implementation of adaptation to climate change and risk management requires substantial contributions by private actors. Here, public administrations can coordinate and pave the way. Therefore, they must find new formats for cross-sectoral collaboration.

Prepared by Daniel Buschmann and Markus Leitner (EAA)

What and why

'Individual climate risk precaution' attempts to be an umbrella-term for many similar expressions, like autonomous adaptation, private risk preparedness, self-protection, self-care, or risk prevention behaviour. The basic idea is to downscale climate risk precaution, traditionally a public responsibility at different administrative levels, to the local level and include the wide range of private actors. The underlying rationale is that firstly, local measures need to be highly sensitive to their specific local context and secondly, many private risk contributions or vulnerabilities are simply out of reach of public regulation.

With climate change intensifying the likelihood of extreme events, preparing for this development through individual precaution becomes increasingly important for any risk prevention strategy. This is on one hand due to the fact that state-investments are decreasing and maintenance costs of existing infrastructures increase. On the other hand, despite the highest expenditures for protective measures, catastrophes remain a residual risk. However, experience has shown that in many cases even small measures on the endangered objects (e.g. property protection measures) or by individual property holders can achieve a significant reduction in damage.⁴

Measures like awareness raising, public relations, information and communication are at the core of individual risk precaution. Their focus can be on 'grey' measures (e.g. improvements or insurance of buildings), on 'green' measures (e.g. drainage on private ground, decreased sealing), or on 'soft' measures, which are less costly and time-consuming (e.g. alarm plans, provisional and temporary protection, extreme weather insurances). In the following we will focus on soft measures, particularly on the local assessment of climate risks, which affects both, vertical governance between local up to national scale and horizontal governance between the CCA and DRR domains.

Learning from relevant experiences made in Austria can offer inspiration for possible pathways of public institutions in other European countries, because integrated CCA/DRR approaches will likely meet similar challenges and opportunities. However, since the Austrian governance context is not able to be used generally (i.e. the federal system and informal modes of policymaking play a strong role (Lexer and Buschmann, 2018: 40)), the recommendations must be adapted to the target context.

How

A possible way forward for Individual Climate Risk Precaution can be seen in semi-formal, institutionalised cooperation modes between sectors in the national and sub-national public administration. Here, key conditions for success are: (i) communicate the added value of collaboration for integrated CCA/DRR measures in a clear way, ideally with a precise goal and a concrete product (ii) transparently show efforts and costs, (iii) avoid negative statements and competition for topical leadership by showing the leeway for joint CCA and DRR action, (iv) offer a 'safe', i.e. informal, space for discussion on eye-level, (v) show proactive leadership, e.g. actively involve participants with a joint project whose concrete framework is prepared/supported by external experts, (vi) steer away from maladaptation and individual blockages with intensive briefings and debriefings of meetings, if necessary eye-to-eye, (vii) maintain a well-kept network with good personal relations and trust to all relevant key actors, (viii) do not shy away from committing resources (time, workforce, expertise, money) to the process, (ix) build solutions by capitalising on existing materials, approaches, achievements, examples, experiences, (x) avoid top-down approaches in implementation by considering and consulting early on with all relevant stakeholders and potential users (Lexer and Buschmann 2018: 44f.).

Who

The lead coordination of such a process should ideally be centralised on a higher administrative level and in a powerful and resourceful department. The benefit of this coordination is shared between all participating departments, but is also possible to share the costs and distribute the efforts in a consensual manner.

4 See [Naturgefahren im Bergraum](#) and [Schutz vor Naturgefahren: Eigenvorsorge, Absiedelung und Schutzwald](#).

Sub-national climate risk coordinators can offer critical support (i.e. knowledge transfer and translation, mediation, context specific expertise, etc.), especially in regard to implementation of measures. Moreover, an applied research project proved to be an excellent platform for developing integrated CCA/DRR solutions. The implementation phase obviously relies on local stakeholders like mayors, businesses, municipal utilities, land owners, and citizens (Lexer and Buschmann, 2018: 28f.). In Austria, volunteers have proven to play a key role for implementation of climate risk prevention measures, because (i) they enjoy a high degree of confidence when it comes to protecting against local hazards, (ii) they have a high risk perception, and (iii) they act as multipliers in risk communication (Balas *et al.* 2015). The last, but as we argue most important part of this chain are private actors, who are both the main beneficiaries and often overlooked individual players in risk precaution at the smallest scale, meaning on their own property.

EXAMPLE:

The LURK AG on 'self-responsible risk precaution'

In 2015, the Austrian Conference of State Environment Ministers (LURK) passed a resolution that paved the way for tackling cross-cutting measures of the Austrian Adaptation Strategy (NAS) by installing issue-specific horizontal and multilevel task forces. In 2017, the first of such inter-organisational working groups was formed: The so-called LURK AG is a temporal, informal, non-public and cross-sectoral cooperation format dedicated to the topic of 'self-responsible risk precaution'. It aligns administrative actors from the national level and state levels representing the two policy fields' climate change adaptation and natural hazard management. In an intense horizontal governance process, the LURK AG has produced a tool to assess both climate impacts and natural hazards in municipalities in an integrated way,

aiming to strengthen climate risk preparedness of municipal and private actors. The group has also developed an implementation concept and a governance model for the country-wide launch of the measure.

This shows the twofold approach of the LURK AG, aiming to have an effect (1) on enhancing the coherence between two public policy sector and (2) on the implementation of cross-sectoral measures at the local scale. The first point is relevant insofar as the LURK AG mandate explicitly relates to the implementation of cross-cutting measures of the NAS, and explicitly addresses the fields of work and interests of two different government sectors in an integrated approach – an unprecedented case in Austria. Furthermore, from the very beginning the process was organised collaboratively between two sectors, climate adaptation and natural hazard management. This case thus offers crucial insights into a highly innovative approach to cross-sector governance (Lexer/Buschmann 2018: 37ff.).

The second point, the climate risk assessment tool, called **Natural Hazards Check Climate Change**, aims to enter a new phase of adaptation policy counselling by providing voluntary sensitisation and counselling in the context of climate-driven natural hazards and extreme weather risks, including municipalities in their role as multipliers and contact points for private citizens and households. The tool assesses five fields: i) municipal climate risk profile, ii) land use, iii) construction, iv) behaviour, and v) risk precaution. This assessment is done by two external "check coordinators" together with up to 10 municipal decision-makers during a one-day on-site visit. Municipalities are then provided with an evaluation report displaying indicator profiles, traffic light scales and diagrams. Therefore, in addition to the tool itself, a training programme for local coordinators and municipal actors was set up and test training delivered in July 2019.



Learning from implementation and participation barriers in previous projects, the assessed data is not public and the further deriving of measures and its execution remains voluntary. This way, the collaboration and building of trust between the local (municipal) level and higher administrative levels increased (ibid.: 41).

4.1.4 The importance of integrated adaptation and disaster reduction strategies and plans at municipal level

Implement participatory designed strategy and plan at the municipal level that deal with climate-induced disasters.

Prepared by Ingrid Coninx, Wageningen University and Research

What and why

The impact of climate induced extreme weather events is felt at the local level. Therefore, we recommend developing strategies and plans at the local level that integrates climate change adaptation and disaster risk reduction. These strategies and plans should be developed in a participatory way, which means that it should involve stakeholders like public officers of different departments, representatives of citizens, businesses and other social groups. Community resilience will improve by considering emergency planning in climate adaptation actions and climate change data guides the identification of upcoming vulnerabilities. The main arguments to support local strategy and plan development are:

- The inclusion of local knowledge in the design of the plan
- The development of a plan that fits with local culture and social structures

- Enabling local ownership and therefore improving successful implementation

Local knowledge matters. Mainly local knowledge about past disasters and the location of severe impacts supports the effectiveness of strategies and plans. This knowledge is helpful to assess where measures have to be implemented as well as what kind of measures might be useful. Furthermore, local culture and social structures may differ among communities. Municipal plans acknowledge this variety and make sure that they fit within the local context. When plans are participatory prepared, tailored to the local situation, the community owns the plan, which contributes to more successful implementation (Cutter and Osman-Elasha, 2018). The benefit of developing plans that integrate climate change adaptation and disaster risk reduction is to support a coherent strategy and coherent measures towards flooding, heat waves, droughts etc. Resources can be combined to finance the plan implementation. The biggest limitation of the recommendations is the availability of data, and in particular climate data at the local scale. Downscaling climate projections to the unit of a town is sometimes difficult and even impossible, depending on the quality of the available data. In addition, not all municipalities have sufficient funds to get the required data.

How

Integrated climate adaptation and disaster risk reduction strategies and plans can be developed in several ways. PLACARD recommends a participatory approach to mobilise local knowledge and local ownership. At the core of the participatory approach is the local risk and impact assessment of climate induced extreme events like flooding, heat stress, wildfire, ... The risks are estimated, and potential impacts are assessed by combining climate data and disaster information that is coming from science with local

knowledge. Science will clarify when these extreme events are expected to increase in terms of frequency and intensity. Consequently, it will be discussed in a participatory manner what measures to take to deal with these risks and impacts, which is the basis of the strategy and plan. The participatory approach is helpful to organise social support of the various stakeholders, encourages the willingness to collaborate and to invest in the implementation of the measures. The discussed measures are further prioritised, responsibilities divided and required resources organised in order to contribute to successful implementation of the strategy and the plan.

Who

The recommendation to design and implement integrated strategies and plans is made for local politicians, local policy officers, emergency services and organisations. They are the key players who develop these local strategies and plans, engage the local community and make sure that required resources are organised. Local community will consequently benefit because the strategies and plans support their resilience to deal with climate related disasters. Nevertheless, national government can support the municipal level by a national adaptation strategy that can guide the local plans, by scientific data that can be easily applied by the municipal level and by providing resources like finance for project implementation, if needed.

EXAMPLE:

Climate based emergency planning in Antwerp, Belgium

In the scope of the European [Climate-fit.city project](#), the Emergency Planning Service of the city of Antwerp has started to use objective climate information in the planning and decision-making. Information included:

- changes in the frequency of extreme rain storms and pluvial floods;
- locations and characteristics of the flooded zones: inundation area, maximum inundation depth;
- socio-economic consequences of these pluvial floods (inundated houses, hospitals, schools, homes for the elderly);
- impacts on disaster emergency planning needs (fire brigade interventions: pumping, sand bags; ambulances; evacuations);
- impacts on traffic infrastructure including tunnels and metros, and obstructions for routes used by disaster emergency vehicles, planning for alternative traffic routes for disaster emergency vehicles, in relation to the location and extent of the flood (extreme rainfall and flood scenarios).

This data was used to upgrade the emergency plan into a climate-proof emergency plan. In September 2017, a first planning workshop was organised, involving representatives of the Antwerp's Emergency Management, the Federal Emergency Management, the Fire Brigade, the City of Antwerp Climate Adaptation Management and Water Management, the Local Police of Zone Antwerp, the Belgian Defence and the Federal Health Institute. Local knowledge like past inundated houses and obstructed roads was used in strategy and plan development. This information was combined with socio-economic data to assess the local vulnerabilities. In this workshop, it was discussed what climate information would have been relevant. In the demonstration workshop in December 2018, the maps that were developed by the EU project members was demonstrated via a map viewer to the many potential users like city officers, sewerage company, traffic centre, fire brigade.

The maps are currently used by this diverse group of users, which have made synergies with ongoing projects and initiatives. These projects are currently exchanged via the coordination platform “climate adaptation”. In other words, participatory looking at climate information has resulted in more synergy among projects and better exchange at the municipal level.

4.2. Ensuring effective financing

This chapter highlights examples that encourage the use of innovative financing instruments at various scales to enable the integrated CCA and DRR policies that were suggested in 4.1. This contributes to tackling the increasing funding gap between the amounts of CCA and DRR finance and current needs for implementation of integrated CCA and DRR policies. As a result, disparities between CCA and DRR funding are currently on the forefront of challenges for institutional strengthening.

4.2.1 Sovereign Climate Insurance Funds with application of Index-Based Insurance and Distributed Ledger Technology

Sovereign Climate Insurance Funds (pools) with application of IBI and DLT that cover climate-related risks and provides financial protection/support to the regions and small farmers.

Prepared by Oleksandr Sushchenko, Reimund Schwarze, UFZ

What and why

Climate change imposes unavoidable **loss and damage** (LnD) for both, local communities, economic sectors and national economies. **Climate finance** and **risk transfer mechanisms** can help bolster immediate action after disaster, speed up recovery and support access to critical services and rebuild critical infrastructure for people, communities and economies.

Making economic and financial systems resilient to climate change requires implementation of the **3D Nexus**: de-risking, digitalisation and decentralisation. Currently, we are on a pathway to global warming of 3.2 degrees Celsius that makes adaptation to climate change and reduction of the risks of disasters and extreme weather events extremely important, and requires appropriate measures as well as sufficient financial resources (UNEP, 2018).

The amount of data and financial resources needed to evaluate climate change risks is enormous. In order to arrange a quick, safe and efficient process of data collection, evaluation and decision-making it is crucial to build up DLT-based (Distributed Ledger Technology) insurance mechanisms on the national levels – **Sovereign insurance Fund** (SIF). Such a mechanism will allow integration of the CCA and DRR areas, where data about the outstanding climate-related risks (for example, at a local level) could be transferred into the **de-risking strategic documents** at the national level. A low penetration rate in the case of insurance against climate related risks (for example, only 40% in agriculture) suggests implementation of the DLT would offer protection even to small producers and decentralised storage of related data – **digitalisation** and **decentralisation** of the insurance mechanism. In addition, only 1% of climate-related losses in 2017 were protected with insurance services within the EU (CSI 042, CLIM 039, EEA).

A SIF is a state-owned fund that invests in real and/or financial assets (for example, insurance) which is based on tax or national revenue (for example, from foreign-exchange reserves held by the central bank). Sovereign Insurance (SI) is defined as a risk financing strategy for governments and may include reserve funds, insurance, catastrophe bonds (also known as CatBonds) or contingent debt (Ghesquire, 2007). SI could be considered as a model of climate insurance under the umbrella of the UNFCCC. Premium-subsidies or international solidarity funds financed by carbon taxes or auction proceeds from globally linked emission trading schemes are considered as other alternatives in this UNFCCC workstream.

Existing yield-based approaches to the insurance of climate-related risks (especially in agriculture) have a number of drawbacks including fraud detection and risk modelling. Index-based solutions (IBI) rely on the application of physical indicators (such as temperature or soil moisture level, etc.) that they use as a “trigger” for the compensation of losses. Compared to yield-based insurance, IBI has some positive features. Firstly, this approach is more objective due to the fact that indicators depend only on physical properties of the environment. In addition, compensation is limited to a fixed amount of money, based on past events and associated losses from previous periods. This approach can significantly reduce time for calculation of the losses and the time between the actual event and compensation payment. Another important advantage of IBI is the improved trust between insurance companies/funds and their clients. At the same time, IBI could simplify field loss assessment, reduce bureaucracy, increase transparency, making it less costly for small customers such as farmers (Gommes and Kayitakire, 2013).

Several important benefits are associated with implementation of DLT in conjunction with IBI (particularly for agriculture):

(i) improved real-time exposure assessment; (ii) enhanced accident and risk prediction. Those benefits contribute to improvements of **data processing** and facilitate understanding of the scenario-based assessments of a large set of changing parameters (in a real-time mode). DLT could significantly reduce the time needed for negotiations and quotations (by up to 90%). (Mesropyan, 2018).

How

Sovereign Climate Insurance Funds (CIF) with application of IBI and DLT with representatives from central and regional authorities could provide protection against climate-related risks through state guarantees and public financial resources, and contributions from the local level. In addition, such CIFs allow access to resources of the financial market by implementing innovative financial instruments (for example, derivatives).

The CIF should be able to issue sustainability, environmental impact, catastrophe, water and/or pandemic bonds (in addition to public funds). Application of the Catswaps could establish an opportunity to transfer climate-related risks to the financial market via facilities of the European Financial Stability Facility or European Investment Bank (see recommendation [4.2.2](#))

Who

Ministries of Finance, Ministries for Environmental Protection, UNFCCC, national authorities responsible for auctioning of the emission allowances, local/regional authorities. Climate-related risks could lead to escalation of the systemic risk for the entire financial system – response on the national and EU-level is needed. Such risks (like natural disasters or political risks) require systemic approach in protecting economic agents from them.

Background

According to existing estimates, minimum costs of climate adaptation measures range from 100 billion EUR in 2020 to 250 billion EUR in 2050 for the EU (UNEP, 2018). The economic losses in the EU due to floods are estimated at 20 billion EUR by 2020 and 46 billion EUR by 2050 (Rojas *et al.* 2013). The CIF could pool together different types of climate-related risks and reduce transaction costs, allow developing countries access to the market-based insurance instruments and protect them from possible fiscal shocks, should climate change affect local infrastructure and the ability of production facilities to added value creation.

In addition, flood protection measures need 1.7 billion EUR annually by 2020 and 3.4 billion EUR by 2050, with 46 billion EUR required to cover expected annual damage from flooding by 2050 (Feyen and Watkiss, 2011).

Recent scientific research shows that pooling insurance of agricultural risks is more effective than individual insurance (Villarroya and Agronoma, 2016).

CIFs could cover country-related risks to some extent (particularly in the case of developing countries) and attract climate finance. Those resources could be further transferred to the recipients according to their needs. Such instruments could provide protection and financial support to regions that can't directly collaborate with private financial institutions or the financial market, but are suffering the most from climate change and natural disasters.

From the point of view of insurance technology, there is a large number of applications of so-called index-based insurance as a

departure from the yield-based insurance. A shared feature of IBI is the use of an independent and objective indicator in order to overcome existing problems in agricultural insurance and offer farmers rapid compensation (Jarrod *et al.* 2018). Nevertheless, one technical side of the IBI approach in agriculture that remains largely unsolved is in the area of data collection and processing. Meanwhile, a widespread utilisation of Distributed Ledger Technology on the currency market demonstrated some positive features of this IT-solution, and possible ways to use it in other financial market sectors, particularly for insurance (Fisch, 2019; Hughes *et al.* 2019; Zachariadis *et al.* 2019).

Other issues of the Suva dialogue include risk assessment, LnD assessment, and the interaction with risk management. The current state of the debate indicates that climate insurance may be just one element of a risk-layered approach towards LnD.⁵

EXAMPLE:

Successful stories

All over the world we found examples of sovereign catastrophe risk pools: The Caribbean Catastrophe Risk Insurance Facility (CCRIF) and the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), Mexico's Disaster Fund, Turkish Catastrophe Insurance Pool and other. In all cases role of the government is crucial to meet the demand for catastrophe risk insurance.

For example, CCRIF acts as a risk aggregator to pool country risks into one (portfolio) – reduction in premium costs of 40–50 per cent.



⁵ Background: [Seventh meeting of the Executive Committee of the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts](#).

Donors are important source of the financial basis of the CCRIF and if the risks are too high, they could be transferred to the financial market. For the parametric insurance products specific premiums will be attached – from 200 000 USD to 4 million USD for coverage ranging from 10 million USD to 50 million USD.

A platform for index-based insurance with application of DLT launched in 2019 by TheLab – Blockchain Climate Risk Crop Insurance (short, BCRSI). This platform offers not only protection for African small farmers against climate-related risks, but also allows collection of the necessary raw data to improve effectiveness of the tool.

4.2.2 Risk Transfer and data collection via European Risk Transfer Mechanism

Distributed Ledger Technology-based platform with the aim of transferring risk from Sovereign Climate Insurance Funds to the financial market; collect, process and store climate-related data.

Prepared by Oleksandr Sushchenko, Reimund Schwarze, UFZ

What and why

The sovereign debt crisis in 2010–2013 in some EU countries (Portugal, Ireland, Italy, Greece and Spain) proved the effectiveness of the risk transfer mechanism to the financial market (European Financial Stability Mechanism – EFSM). According to the Pisani-Ferry's trilemma, a lack of unified public debt policy within the EU (particularly with the existing monetary union) led to the spread of financial turmoil throughout the member states. The difference in cost of capital within the EU attracted speculative capital and

provoked a deeper debt crisis as the lenders tended to raise the interest rates while knowing that European Central Bank could back up repayments as the lender of last resort.

All economic sectors are negatively affected by climate change, particularly extreme weather events and natural disasters. In this respect, special attention should be paid to the agricultural sector, which has direct and indirect impacts on our daily life (for example, food security). There is an ongoing and deep-rooted conversation on a possible **third pillar of the Common Agricultural Policy** (CAP) – the existing CAP is unable to provide protection against climate-related risks. In addition, the effectiveness of subsidies for the agricultural sector within the CAP raises many questions. The main disadvantages of the existing CAP are: increased transaction costs and losses; opportunities for fraud; limited initiatives to optimise the use of inputs; most of the subsidies are received by a limited number of very large farms (Slajs & Doucha, 2014; Stonkute, 2013; Grant, 2010). As a result, there is a need to support national initiatives in providing protection against climate change (see recommendation 4.2.3) by establishing a risk transfer mechanism at the EU level – transferring risks to the financial market.

Possible losses resulting from climate change pose significant systemic risk not only to agricultural policy, but also to the entire economy, cities, households and businesses. The difference in the costs of capital could contribute to **systemic risk** for the entire European financial system if innovative financial debt instruments are applied (for example, synthetic derivatives). Since climate change could contribute to the systemic risk, it requires an adequate response at the EU-level to protect the entire European financial and economic system against climate-related risks.

In this respect, a special mechanism is needed in order to issue debt instruments (such as catastrophe bonds – catbond), derivatives (such as catswaps) and transfer climate-related risks from CIFs to the financial market and preventing possible financial turmoil in the European financial system (see recommendation [4.2.1](#)).

Since financial market instruments have **very high transaction costs** (collection, processing and evaluation of the related information on both sides) for small investors and issuers of such instruments (such as catastrophe bonds), it is very important to establish a DLT-based risk transfer mechanism (connected via smart contracts existing separated platforms for CIFs) on the EU-level (**European Risk Transfer Mechanism**, ERTM). Such a mechanism could deliver solutions for immediate transfer of the money from the financial market to provide compensation of the losses and damage via CIFs without any delay. In addition, such a mechanism could also facilitate collection and evaluation of the information about damage and losses, improving management of climate-related risks on the EU-level.

EFSF or the European Investment Bank (EIB) could be considered as the managers of the DLT-based ERTM and issue catbonds or catswaps to transfer climate risks from Sovereign Insurance Funds to the financial market. EFSF already exists in the European Union – it was established in 2010 with the aim of providing financial assistance to those EU Member States with severe debt conditions (avoiding collapse of the European Financial System). This body can issue debt instruments and swaps, which could serve as an effective instrument for transferring risks from Sovereign Insurance Funds to the financial market. Such an approach could equalise the costs of capital in case of issuing catbonds as the creditworthiness of the EU is much higher than for some Member States.

How

A DLT-platform at the EU-level for national and sub-national authorities or institutions in order to transfer climate-related risks to the financial market, and collect and process related data. Such data could contribute to the reduction of transaction costs and improve management of climate-related risks on the EU-level.

Who

The following institutions and organisations at the EU-level should be involved in the project: Ministries of Finance, Ministries of Environmental Protection, European Financial Stability Facility, European Investment Bank.

Background

Risk transfer is especially important for developing countries, where the public sector is unable to cover the climate change-related economic losses. As a result, different methods of risk transfer are being used in order to meet the needs of the real sector. In other words, we are talking about pre-disaster financing arrangements that shift economic risk from one party to another (IPCC, 2012).

Methods of risk transfer are: catastrophe bonds, catastrophe SWAPs or other similar financial arrangements.

Alongside traditional indemnity-based insurance, which gives an opportunity for one party to get guaranteed compensation for the losses and damage from another party, the modern financial market offers a wide range of new instruments. For instance, catbonds and catswaps were designed to shift risks from insurers to investors via high-yield debt instruments.

Importantly, if the insurance company suffers from the losses of a predefined catastrophe, the obligation of repayment could be forgiven.

The data are important to make an informed decision – effective coordination between authorities on the EU and national levels is crucial in this case. In this regard, existing DLT-platforms allow us not only to collect and store information, but also to effectively transfer risks to the financial market. An additional advantage of the DLT-based platform could be an opportunity to share risks within supply chains (Deloitte, 2017).

Such a mechanism could give real-time access to the data, transfer risks and provide financial support in the right amount and place. It would also support development of the CCA strategies and actions as well as regional and local DDR measures. In addition, the effects of adaptation and risk reduction-related measures could be assessed and evaluated properly based on actual and proven data.

In addition, DLT-based allocation via catastrophic, water or pandemic bonds could be facilitated and driven not only by institutional investors, but by also small buyers of the “stakes” – spreading the opportunities of risk transfer and increasing the amount of financial resources, which could cover the possible losses of climate-related damages (HSBC, 2019).

The process of climate finance accumulation and repayment could be shorter than usual, because of the algorithms and where verification and certification is already determined, allowing immediate acceptance by all parties without any delays (KAS, 2018). Examples of the The Caribbean Catastrophe Risk Insurance Facility (CCRIF) and the Blockchain-based platform TheLab – are the most appropriate to be used within the ERTM (see recommendation [4.2.1](#)).

EXAMPLE:

Successful stories

The International Financial Corporation (IFC) offers the Global Index Insurance Facility (GIIF) as an opportunity to facilitate access to financial resources for SMEs by providing catastrophe risk transfer solutions and IBI in developing countries. IFC issues catbonds to accumulate financial resources and the risks are being transferred via cat swaps to the national authorities in developing countries.

Effective DLT-application – Allianz Risk Transfer (ART), was jointly developed and introduced in 2016 by Allianz and Nephila to facilitate risk transfer via cat swaps. Smart contract technology facilitates and accelerates the triggering process of catastrophe swaps and bonds.

4.2.3 EU Green Taxonomy and EU Green Bond Standard with CCA and DRR components

EU Taxonomy for green projects with combination of CCA and DRR indicators and metrics in order to improve effectiveness of climate finance.

Prepared by Oleksandr Sushchenko and Reimund Schwarze, UFZ

What and why

According to existing estimates provided by the World Economic Forum (WEF), by 2030 globally more than 100 trillion of USD should be invested in climate-related infrastructure projects in order to limit global warming by 2 degrees Celsius. On the financial market, there is no unified understanding of green assets – this leads to a rise in information asymmetry and high transaction costs. The lack of standards in this area limits green investment flow. At the same time, in the financial market there are different debt instruments, which can help to mobilise climate and environmental finance. Among those instruments, green and sustainable development bonds are playing the most important role.

The main advantage is that international financial institutions have developed their own standards to identify underlying assets and the use of proceeds. At the same time, there is now unified standard for classification of green assets – debt markets can deliver only a limited portion of the financial resources for sustainable development projects. In other words, the international financial community is still trying to deliver common rules on how to identify green or sustainable investments and avoid so-called “green washing” – creating clear rules to unlock green or sustainable financial flows.

Nowadays, we can find different types of standards and principles for green, sustainable or social bonds all over the world and in some individual countries. A small number of influential initiatives, created by financial institutions, national authorities and international organisations (such as the Climate Bonds Initiative) are trying to foster implementation and utilisation of the green or sustainable financial instruments – facilitating creation of a taxonomy for such instruments and projects, supporting different legislative steps which are taken by the national authorities.

In 2018, the EU Commission adopted an Action Plan for establishing a Sustainable Financial System in the EU. The aim of this Action Plan is not only to facilitate mobilisation of financial resources for climate-related projects, but also to improve resilience of the European finance system to non-financial risks. With this as an overall goal, the EU Commission stated the following aims: reorientation of capital flows towards sustainable investments; enhancing management of environmental and social risks; fostering transparency of economic and financial activities.

As a result, in 2019 the European Commission prepared three reports on disclosure of non-financial information, green benchmarking, and taxonomy. The report on taxonomy of climate-related projects clarifies the process of separating mitigation and adaptation projects from the entire scope of available investment opportunities. Taking into account existing limits for pension funds and insurance companies on the EU market, there is a need for the unified taxonomy of climate-related projects in order to increase effectiveness of the investment-decision process by reducing transaction costs associated with collection and processing non-financial information.

In 2019, the incoming president of the European Commission announced a European Green Deal with the aim of establishing a circular economy, and providing financial support for related projects. In this respect, green financial instruments should play a critical role in mobilising financial resources. At the same time, the lack of a clear legal definition of “green” leads to phenomena such as “green washing” on the financial market. As a result, clear guidance for identification of green projects and assets is essential. In addition, there is a need to incorporate CCA and DRR aspects when identifying green and resilient projects.

How

Incorporation of CCA and DRR indicators and metrics into the EU Green Bond Standard and the EU Green Taxonomy for identification of green projects and green financial instruments.

Who

European Commission and High Level Expert Group on Sustainable Finance.

Background

According to the Global Risk Report 2020 (World Economic Forum), climate change and its consequences (for example, increasing number and intensity of extreme weather events) belong to the risks with the strongest impacts on economic relations. Since the problem was first understood (1988) and recognised not only by the United Nations (1992), but also attracted the attention of the corporate sector (starting as early as 1998, with a remarkable increase in annual publications from 2008 onwards), it’s important to have complete information about the causes and effects of this process. On the one hand, we need to know the extent to which this

problem could affect our daily lives and, on the other hand, it could be helpful to understand possible improvements and evaluate the outcome in economic, environmental, social and governance dimensions. In addition, the existing information gap between companies and society led to deepening of the “principal-agent” problem (company-society, company-financial market, company-government, etc.).

Since climate change imposes certain costs on society, creating negative externalities, it’s necessary to establish a framework for climate finance mobilisation. Collection, processing and analysis of climate-related information is a prerequisite to ensure high level of transparency on the market – reducing transaction costs associated with climate finance mobilisation.

According to scientific findings, we can distinguish three categories of transaction costs: information and search costs (availability and price of required goods), bargaining costs, and policing and enforcement costs.

In general, the following types of transaction costs are associated with mobilising climate finance: application for free allocation, allowances trading, and examining abatement costs.

The major part of the costs is ‘hidden’: time for senior management and other staff to discuss report contents, developing and implementing data gathering systems, etc.

For this reason, multinational development banks are the pioneers in issuing innovative green or climate finance instruments. As a result, in 2007 the European Investment Bank (EIB) introduced the first green debt instrument in the form of climate awareness bonds (green bonds) in order to finance climate-related projects in renewable energy production and energy efficiency improvements.



In addition, in 2019 the European Bank for Reconstruction and Development (EBRD) issued the first resilience bond with the aim of supporting climate resilient infrastructure (for example, water and energy); climate-resilient business and commercial operations; climate-resilient agriculture and ecological systems.

EXAMPLE:

Successful stories

Alongside the legal process of framing selection and investments in climate-related projects, there are several attempts at a self-regulation approach aimed at identifying green projects. For instance, International Capital Market Association (ICMA) has already developed its own principles for identifying green, sustainable projects, and projects with a social impact.

The Climate Bonds Initiative (CBI) launched the Climate Resilience Principles in 2018, guidance for identification of CCA and DRR projects, where indicators and metrics from two distinct, but very similar areas have been combined.

4.2.4 Forecast-based financing to anticipate disasters and reduce human suffering and losses in a changing climate

We need to move forward towards impact-based forecasting, meaning to forecast what the weather will do rather than how the weather will be. The ability to take timely action in advance of peak impacts holds considerable promise in Europe, particularly for hazards such as floods and droughts. Therefore, DRR and CCA communities should apply forecast-based financing (FbF) to protect local population and infrastructure against climate risks.

Prepared by Margot Curl, Catalina Jaime and Carina Bachofen, RCCC

What and why

Forecast-based financing is an example of targeted disaster risk financing, automatically applied in emergency situations which leave no time to develop substantial measures on the national or subnational level. It provides assistance for the most vulnerable, for example small farmers, in order to protect lives and livelihoods before a potential disaster. The objective is to allow actors to make the best use of forecast lead times and risk analysis (depending on the hazard), to avoid making hasty decisions (for example, by having an automatic trigger system), to enable plans to be made with sufficient consultation of stakeholders, and ultimately, to reduce the impacts of extreme weather events (IFRC 2020). The forecasts can have seasonal dimension (droughts) but also cover time scales of 3 to 15 days (floods), depending on the type of hazard. Funds are allocated automatically when a specific threshold is reached. This gives an opportunity to provide immediate financial support, in some cases only days after the onset of a disaster (GRC 2019).

Climate projections play an important role in the FbF planning process. During the setup of the forecast system, a profound risk analysis looks into historical weather events and disasters, and also into potential future changes that could influence a change in risk factors. Disaster events induced by hazards including heatwaves, droughts and floods, are expected to increase in frequency and severity as a result of climate change and other risk factors.

The ability to develop further and make use of advance warnings and scale up meaningful interventions offers an opportunity to reduce the risks of disaster events and adapt to a changing climate. Governmental and non-governmental actors at international, national and sub-national levels could provide support and guidance to populations at risk before the shock and negative impacts have materialised, reducing the overall burden of the disaster event. In addition, they can expand the response options made available to actors via advanced planning and consultative processes across different Government sectors, Disaster Managers and other key institutions with a role to act early before disaster happens. In doing so, institutions within the DRR and CCA fields could be strengthened, better coordinated, and more able to successfully reduce risks to extreme weather events (Wilkinson *et al.* 2018).

By strengthening the relationships between forecasting services and DRR and CCA institutions, it would be possible to truly co-develop meaningful impact-based Forecasting services, that integrate weather and climate information with understanding of risk across different timescales, including the consideration of future climate prediction is current Early Warning and Early Action strategies.

Although considerable scientific advances in our ability to forecast extreme weather events have occurred in recent decades, there is

still a gap in the capability to make full use of the advance warning systems provided by present day forecasting capacity. One of the key problems with existing advance warning systems is that they are mostly hazard oriented and lack a comprehensive monitoring of other risk factors that are dynamic as well. This is why the move towards impact based forecasting is so relevant, as it includes both. Although a few countries in Europe have advance in impact based forecasting, there is still work to do to develop a service that can be used better for early action.

Uncertainty inherent in forecasts, lack of robust risk analysis process and connection with risk information management systems, a lack of anticipatory financing that can be triggered automatically based on forecast, and limited contingency planning, among other challenges, may all contribute to a sub-optimal implementation of advance warning systems across the world, including Europe. A major barrier to making use of advance warnings for weather related disasters is the timely initiation and implementation of early actions during the lead time of a forecast – which can be months (the El Niño seasonal forecast), days (a flood forecast such as the [Global Flood Awareness System](#) GloFAS) or hours (a daily temperature forecast to predict a heatwave). Also a deterministic forecast, based on river level observation, could be given in hours, particularly for flash floods.

How

Forecast-based financing seeks to anticipate extreme weather events in order to implement actions prior to the event or before impacts are experienced. Therefore, the focus is more on mitigation, and of course also on improve preparedness and emergency response. FbF was developed in the humanitarian sector for use in low resource settings, to enable the automatic release of anticipatory humanitarian funds.

A great deal was learned from European activities (for example, UK, France and the Netherlands) such as the UK heatwave plan and its impact-based forecasting. However, the ability to take timely action in advance of peak impacts holds considerable promise in Europe, particularly for hazards such as floods and droughts, and at international, national and sub-national levels. For example, as part of CCA/DRR strengthening investment, National Hydro-Meteorological Services could be supported to produce this new type of impact-based forecasting services. Such is happening in the Philippines, where the Green Climate Fund is funding PAGASA (national meteorological service) to develop impact-based financing services in cooperation with the national DRR agency, this in turn could have a crucial impact in the capacity of the Philippines Red Cross to activate its Forecast-based Financing system.

Who

For forecast-based financing (FbF) to be successful, a multi-stakeholder approach is essential. This begins with a feasibility analysis that involves the National Hydro-Meteorological Service (NHMS), DRR and CCA agencies, the affected local communities themselves, humanitarian and development actors, and the scientific community, who will take active part in the FbF set up and advocacy process.

Background

An overview of the efforts to reduce extreme event impacts using the FbF approach made so far has been produced as an ODI paper entitled [Forecasting Hazards, Averting Disasters: implementing forecast-based early action at scale](#).

The procedures of the FbF programme are outlined thoroughly in the [FbF manual](#) hosted by the German Red Cross and co-developed by the Climate Centre.

Additional information on the FbF approach and the various ongoing programmes can be found on the website of the [Red Cross Red Crescent Climate Centre](#) and the [International Federation of Red Cross Red Crescent Societies](#).

There are mechanisms for the long-term DRR and funds for response, but not funds for anticipatory action at scale. However there is progress: the International Federation of the Red Cross Red Crescent Societies with support from the German Government launched in 2018 its first fund for forecast-based action, [FbA by the DREF](#). FAO also launched a similar fund in 2017 as well as the Start Network of NGOs (FAO, 2017). Explorations on the use of existing Disaster Risk Financing tools is also part of the process to identify sustainable funding alternatives, this [Impact before Instruments report](#) provides more insights. However, there is no institutional funding mechanism at governmental level to implement early action (apart from small cases of ad hoc decisions to use disaster relief funds given certain forecast, some provinces in Philippines give some good examples of that).

EXAMPLE:

FbF in the humanitarian sector

Depending on the hazard, its magnitude, potential disaster impacts and the effectiveness of anticipatory actions implemented, using a FbF approach has the potential to reduce disaster risks and the overall burden of the disaster, or the burden on specific vulnerable groups of the population, reduce costs borne by governments at multiple levels as well as household level, and open up additional options for intervention – most notably actions that make sense in the window of opportunity between a forecast and a potential disaster, and not as part of longer term risk reduction measures or in response to disaster impacts. An example of the latter in the European context would be in-person visits; phone calls or other social messaging that targets individuals (and care advisors) most vulnerable to extreme heat (for example, awareness-raising campaigns with health-related messages such as: drink water, protect your skin, keep children away from the sun, and even in some cases ensure people at risk can have access to cool places to alleviate the heat stress from their houses etc.).

As the approach was developed within the humanitarian sector for use in low resource settings, the examples to draw upon must be re-contextualised to be suitable for European. For example, programmes in multiple countries including Peru and Uganda have initiated action to reduce the risk of cholera and diarrheal disease – the risk of which is heightened during and following floods. Other programmes focus on protecting livestock-based livelihoods from livestock mortality caused by extreme cold and snow by providing herder families in Mongolia with unconditional cash transfers, and fodder distribution to sustain the herds they rely on for subsistence.

The first steps to integrate the FbF concept into social protection programmes in various countries throughout Africa has begun (see the [Shock Responsive Social Protection study](#)), taking into account that the needs of households receiving social protection support will often be heightened by extreme weather events and as such, support for these populations need to scale in anticipation of heightened times of stress in order to allow them to maintain a minimal standard of living and avoid engaging in negative coping strategies. (see IDS Bulletin Vol. 48 No. 4 July 2017: [Courting Catastrophe: Humanitarian Policy and Practice in a Changing Climate](#)).

Taking inspiration from these examples of low-resource settings, there are a number of lessons relevant to the European context. In each of these examples, the forecast-based trigger that initiates the action, choice of actions, how this action would reduce risk, how actions are to be implemented and by which institutional actors, are pre-agreed by all involved parties. In doing so, decisions are automatic once an extreme event is forecasted above a specified threshold of probability and with certain likelihood of disaster impacts.

The establishment of a suitable disaster risk financing mechanism that releases funding based on forecast information and understanding of risks is a central feature of any FbF initiative. Typically, each step of the activation is outlined within an early action protocol. The development of an early action protocol well in advance of when it might be needed provides a unique opportunity to:

- review the skill of available forecast,
- conduct an in-depth risk analysis process,
- analyse existing early warning systems information,

- identify sub-sets of the population most at risk of specific impacts,
- explore different thresholds for triggering actions,
- develop a tool to show an impact-based forecasting intervention map to guide decision-makers about when and where actions should be taken,
- develop a robust theory of change concerning how specific actions are meant to produce specific results,
- engage in thorough consultation with at-risk populations and institutions,
- prepare procedures for the disbursement of funds to conventional actors or lower levels of governments, and
- fully address the unique risks associated with acting based on a forecast, which necessarily includes some risk of false alarms.

The processes have been refined over time based on considerable institutional learning on implementing FbF programmes. They remain relevant to other settings, including the protection of non-subsistence-oriented livelihoods from droughts, support of energy-poor households during extreme temperature events, and flood protection of infrastructure which are all of central importance in European settings.

4.2.5 Self-financing and crisis financing mechanisms with application of Distributed Ledger Technologies (DLT)

Development of national self-financing and crisis financing mechanisms with application of DLT.

Prepared by Oleksandr Sushchenko and Reimund Schwarze (UFZ)

What and why

Taking into account existing NDCs, our current pathway of global warming is over 3 degree Celsius by 2100. Hence, CCA and DRR are at the core of current efforts at international and national levels. We also urgently need to bridge the gap between two distinct, but very close to climate change communities: CCA and DRR. In this case, finance could play an important role in bringing together two sides of the same coin.

Provision of financial resources is a common requirement within both the Paris Agreement and Sendai Framework on Disaster Risk Reduction. In fact, finance could contribute to improvements in climate risk management (see recommendation [4.1.1](#)) – another common topic for CCA and DRR communities.

In addition, both communities aim to promote economic, social and cultural investments in order to improve resilience to climate change (UNISDR, 2015a).

Climate-related investments in critical infrastructure (transport and energy sectors) should also encompass co-benefits in economic and social dimensions. This requires improvements in existing methodologies of cost-benefit analysis in order to monetise intangible assets achieved because of the improved resilience.

In addition, the integration of DRR (for example, structural improvements) and CCA (for example, social, economic and environmental quality) could bring more favourable returns on investments – improving efficiency of the funding mechanisms.

Nowadays, we face a gap between our current investments and the need for DRR and CCA finance. According to the data provided by UNEP, at the international level only 20 billion USD for adaptation needs are being mobilised on an annual basis (CPI, 2018). At the same time, our current needs in adaptation finance account for 140–300 billion USD (UNEP, 2016). More importantly, there is a lack of DRR and CCA investments both at the international and EU-level (UNISDR, 2015a). In this regard, effective combination of both DRR and CCA components, fiscal and market-based financial instruments is crucial on the way to improved risk management and overall resilience to climate-related extreme weather events and natural disasters.

Disaster financing comprises a variety of instruments designed to achieve different outcomes. A strategy based on a diverse set of complementary financial instruments and institutions is more capable of managing and responding to a variety of environmental and man-made risks. Insurance offers individual protection against the risk of damage caused by various natural hazards. However, it must be embedded in government action to regulate and complement the products. For example, comprehensive agricultural multi-risk management systems have to be supported by common market programmes.

Existing financial mechanisms in the area of CCA and DRR can be divided into five broad groups: savings or self-financing; debt financing; contingent and crisis financing; climate insurance; risk transfer (reinsurance).

Alongside self-financing or savings opportunities, there are other mechanisms of debt financing, climate insurance and risk transfer. Such mechanisms could contribute to the process of bridging the gap in DRR and CCA finance on different levels, improve management of climate-related risks and resilience of the financial system to non-financial threats.

How

National DLT-based platforms for accumulation of savings and climate-related crisis financing.

Who

Ministries of Finance, Ministries of Environmental Protection, International Organisations.

Background

Different international agreements aim to limiting global heating by implementing measures of a single common goal: combatting climate change. So, as part of the Sendai Framework on Disaster Risk Reduction there is an ongoing process of strengthening early warning systems.

At the same time, the Paris Agreement aims to reduce the risks of extreme weather events by implementing Nationally Determined Contributions (NDCs). Actually, DRR could be considered a common theme for the above-mentioned areas and an important prerequisite to achieve the SDGs.

Forecast-based financing (FbF – see recommendation [4.2.4](#)) is a very useful tool to connect CCA actions with DRR measures, and should be incorporated into the relevant strategies in both areas.

In case of SFDRR, implementation of the FbF could contribute to the following Sendai goals: a, b, c, f and g. It aligns with the four priority actions due to the necessary analysis of risks, coordination of responsible actors, and introduction of the new innovative financial instruments (German Red Cross, 2017).

Some negative features of the FbF directly or indirectly relate to the problem of data collection and processing, and reduces the effectiveness of such mechanisms. The positive features of the newest IT-solutions improve existing mechanisms in CCA and DRR. Nowadays, the opportunities of Distributed Ledger Technology (DLT) could contribute to the improvement of FbF tools through reducing time and costs for transactions; limiting corruption; and improving accountability of the actions (Zwitter *et al.* 2018).

Some existing humanitarian projects that utilise the DLT demonstrate better ability to track financial aid by providing recipients with IDs. All this leads to a lower level of corruption and an improvement in effectiveness. Application of smart contracts could facilitate the SOP in both time needed to enact this procedure and speed of protocol implementation. Taking into account existing plans to replace non-food items with money transfer, the benefits of smart contracts could facilitate fast and reliable transfer of financial resources to the end-consumer (IFRC, 2018). In addition, it would very easy to track the usage of money and what kind of products have the highest demand in different situations (e.g. shift from goods to the money transfer, since people do know better what kind of goods they need. Moreover, money transfer is quicker in comparison to supply of the goods).

An [OECD-PLACARD workshop](#) in September 2019 put forward this need. Even though the focus was on “Investing in infrastructure: costs, benefits and effectiveness of disaster risk reduction measures”, it became apparent that the climate signal needs to be reflected in DRR investments and cost-benefit analysis must better reflect the benefits of multi-purpose resilient infrastructures.

EXAMPLE:

Successful stories

Modern IT-solutions allowed us to use different variations of the so-called index-based mechanisms in all the above-mentioned areas. For example, Distributed Ledger Technologies (DLT) help to develop and maintain such innovations as a Drought-index Savings mechanism. The most important feature of this solution is that even small farmers could balance their savings between bad and good years (COIN22 in Kenya) (FAO, 2019).

Since early 2015, the German Red Cross has worked jointly with the respective National Red Cross and Red Crescent Societies implementing FbF pilot projects in Uganda, Togo, Peru, Bangladesh and Mozambique (Red Cross, 2017).

4.3. Seizing opportunities for cooperation

This chapter focuses on the importance of bringing actors together, joining each other's formats, and being involved in each other's activities. In contrast to section 4.1, this chapter focuses more on establishing the required background arrangements, supportive networks and beneficial framework conditions for implementation. The overarching goals are:

- To ensure coherence by addressing both DRR and CCA in policy and practices;
- To reduce weaknesses in networks, for example, through accountability measures or avoiding duplication of efforts; and
- To recognise the actors, that is, to gain an overview of the relevant stakeholders and networks.

As the increase of coherence between CCA and DRR is still a crucial gap for institutional strengthening (see 5.3), this chapter contributes to exploring possible pathways for overcoming this.

4.3.1 Risk governance as focused collaboration

Develop strong transnational and interregional collaboration between CCA and DRR with a joint focus on current and future risks.

Prepared by Markus Leitner and Daniel Buschmann (EAA)

What and why

Governance, often used synonymously with steering or regulation, refers to the way government, civil actor, institution and the private sector interactions are organised to fulfil their respective tasks (Steurer, 2013). It describes the administrative and organisational structures by which authority is exercised and decisions are taken and implemented. Governance includes both formal requirements – such as legislation, administrative processes and mandatory standards – as well as informal structures, communication procedures, and the way space and resources of a particular group, entity or institution are managed and interact.

This recommendation focuses on the informal aspects, and defines governance as the process of facilitating stable, sustainable and effective cooperation within and among institutions.

The term risk governance is used when stakeholders at a local, regional, national or transnational level collaborate in risk-related decision-making (United Nations, 2015; Catholic Relief Services, 2011), i.e. the identification, assessment, management and communication of risks (IRGC 2018). Climate risks – for example, flooding, heatwaves, forest fires, coastal storm surges or degradation of ecosystems – can be addressed in terms of prevention or preparedness. However, in a globalised world these risks are increasingly systemic, meaning they transcend national borders and cross administrative boundaries (Sellke and Renn, 2018). This is a challenge, but also an opportunity. Integrated risk governance at the intersection between CCA and DRR can tackle complex challenges, contributing to achieving resilience and foresight (IRGC, 2018: 47).

The CCA and DRR communities, particularly those institutions dealing with climate risks across different scales, can benefit strongly from effective collaboration through integrated risk governance. It delivers risk and resilience management, enables long-lasting cooperation within and between institutions, and supports the coordination of activities. This is particularly important for CCA and DRR, which are not organised as sectors in themselves, but must be implemented through the policies of other sectors. As a result, CCA and DRR need to cooperate with diverse sectors to implement actions (UNISDR, 2010). It is a specific strength of informal, cooperation-oriented governance formats that contribute to awareness-raising, agenda-setting and knowledge brokerage across public and private institutions, and from different spatial scales and sectors (Prutsch *et al.* 2011; Menzel & Pütz, 2013).

Building on a partnership approach at eye-level, climate risks become less politically charged and less conflict-riddled. Hence compromises can be found which often ‘trickle down’ into participating institutions (Lexer *et al.* 2018).

Obviously, any recommendation that addresses such a wide variety of actors, whose precise composition varies with the scale of the problem, must be tentative and needs to be adapted to the respective institutional context. Our goal is to demonstrate a possible way forward rather than a fixed solution.

How

One option to strengthen collaboration is mainstreaming CCA and DRR and its integration into existing transnational and interregional working groups, or possibly setting up a working group which focuses on a risk or geographic area of mutual concern, such as a mountain range or a river catchment area. Possible formats stretch from informal talks, ad-hoc interactions, information exchange, and voluntary agreements to networking and case-based meetings. The working group (or a sub-group of a broader transnational or interregional body) should focus on the interface of DRR and CCA in the context of hazard management in a changing risk landscape. This integrated focus can enhance risk management at the transnational or interregional level in that context, and furthermore lead to new forms of cross-sectoral CCA and DRR collaboration among different institutional actors.

Who

Involve interregional, (trans-) national and sub-national institutions who are in charge of CCA, DRR, disaster risk management (focusing on climate risks), and natural hazard management in countries affected by risk or in the spatial focus of the working group. In

the light of absent formal governance at a transnational level, the challenge is to address national and sub-national actors with the authority to implement measures. Relevant actors may represent national ministries and institutions, sub-national or regional governments, providers of early warning services, national and sub-national or regional coordinators, relevant agencies and the private sector. To identify relevant actors, stakeholder mapping can be a useful starting point. Most importantly, informal governance formats can strengthen the position of participating actors, making them ‘change-makers’ within their own institutions and providing them with the authority to develop integrated strategies.

EXAMPLE:

EUSALP Action Group 8 on natural hazards protection and climate change management

The Alpine region is extremely vulnerable to climate-related risks. Retreating glaciers cause risks to the quantity, quality and seasonal distribution of water, and increase the chances of glacial lake outbursts.

Moreover, changing precipitation patterns increase the risk of landslides, and warmer temperatures together with thawing ice and soil cause rock falls. Since the Alpine region depends strongly on climate-sensitive sectors such as tourism, these changes further increase its economic vulnerability.

To address these challenges, the EU set up the [European Union Strategy for the Alpine Region](#) (EUSALP) as one of several European Macroregional strategies. It aims to improve governance and collaboration between the alpine countries. The EUSALP is a political working body, led by the General Assembly of the ministries of partaking countries and regions: Austria, France, Germany, Italy, Slovenia, Liechtenstein and Switzerland.



National coordinators (Executive Board) are responsible for central coordination, and nine action groups focused on various topics form the implementation body of the strategy. Members of the working groups are representatives of national and regional authorities with decision-making capacity. Each action group holds two to four meetings a year. NGOs and other expert institutions hold an observer role. The Board of Action Group Leaders ensures the horizontal thematic coordination and exchange with the Executive Board. The EUSALP closely cooperates with the Alpine Convention (AC) and the Alpine Space Programme (ASP).

Climate change adaptation and disaster risk management are bundled together within [Action Group 8](#) (AG8), which aims “to improve risk management and to better manage climate change, including major natural risks prevention”. This task comprises four steps, (i) stocktaking of stakeholders, interests, and governance structures, (ii) enhancing, validating, and leveraging existing cooperation structures, (iii) identifying good practice, (iv) developing and implementing local, regional and transnational pilots and projects on EU, national, regional and private levels.

By 2019, the EUSALP AG8 had taken stock and compared adaptation governance systems in Alpine countries, explored linkages, and shared pathways to bring together the governance mechanisms of both CCA and DRR policy areas and set up the online portal [Climate Adaptation Platform for the Alps](#) (CAPA) to facilitate knowledge exchange between the CCA and DRR communities. In addition, it gathered best practice in risk governance and published a risk governance policy brief.

According to the experiences of AG8, an important success factor for transnational groups is the use of pre-existing structures and traditions of transnational cooperation in the region. It is

useful to link with existing transnational entities, working bodies, respective actors and their expertise. However, setting up an effective working group covering two policy fields can be a challenge, given the large number of different actors. The group has to bridge the gap between being inclusive and keeping to a workable size.

Another success factor in implementing the work programme of AG8 is alignment of the activities with ongoing projects to avoid overlaps and to utilise synergies, as well as inclusion of important regional players in designing, developing and implementing activities. An increasing challenge is access to funding, as in several transnational programmes, CCA has been downgraded from a funding priority to just one of many mainstreaming issues.

4.3.2 Social Network Analysis: Stocktaking and Social Network Analysis as tools to enhance CCA & DRR interactions

Identify the actors in your CCA & DRR network, the network properties, and make use of this information to strengthen their interactions and encourage aligned resilience solutions.

Prepared by Gabriela Michalek, UFZ, Eleni Karali, CMCC

What and why

Further to the need for robust legal and institutional frameworks, effective communication and collaboration have proved to be critical for the successful adaptation to climate change impacts (Aldrich *et al.* 2016; Joseph *et al.* 2016), as well as for the successful preparedness, response and recovery from climate-related hazards and catastrophes (Aldrich and Meyer, 2014). A good understanding of the roles, competences and running projects of the involved actors, and their respective interrelationships may inform the design and support the implementation of transformative responses required for coping with the changing type, severity and frequency of climate change impacts as well as for the effective management of climate risks. Such information has the potential to shed light on possible complementarities and trade-offs that may encourage, or endanger information and knowledge exchange (Seballos and Harris, 2012), and coordination of relevant actors and their actions, and ultimately the achievement of long-term climate resilience.

In addition to understanding actor interactions within the boundaries of the CCA and DRR communities, exploring and reinforcing the interactions between them benefits both communities, as it may support the establishment of collaborations. Such horizontal cooperation has often proved challenging to achieve in practice. Nevertheless, it can help to eliminate many work inefficiencies and create important synergies (Birkmann and von Teichman, 2010) with an overall goal of achieving an integrated and coordinated response to the current and projected climate change impacts.

Stocktaking can provide a comprehensive overview of the actors' active in a network, including their tasks and competencies. The analysis of the actor interactions is typically performed by means of the Social Network Analysis (SNA); a powerful quantitative method used to investigate the structure and functions of a network. SNA focuses on the characteristics of the connections among actors rather than on characteristics of the actors themselves (Wetherell *et al.* 1994). It can express statistically and graphically patterns of interactions (i.e. connections) even in complex systems (i.e. networks) (Corlew *et al.* 2015), identify which actors are better connected in them and through which type of interaction (Wasserman and Faust, 1994).

Despite the advantages of the method, a fundamental weakness of the SNA is that it may provide limited information on the reasons why actors have certain roles in their network or interact in certain ways. Social survey methods, such as in-depth interviews may be used complementarily for such a purpose, providing useful, contextual information. Furthermore, one should keep in mind that SNA results are static and reflect only a snapshot in time, whereas CCA & DRR networks are actually dynamic.

A regular repetition of such exercises (McCann *et al.* 2016; Krupa *et al.* 2018), including the stocktaking can enhance the understanding of the way that networks evolve over time. This, of course, comes with all the effort and time required to update the database of actors (stocktaking) and repeat the SNA exercise (i.e. select relevant actors from the database, contact them, evaluate and analyse data, calculate metrics), a not insignificant task.

How

The following steps are necessary to implement the recommendation:

- a. Stocktaking provides a clear overview of the actors and activities embedded in the CCA and DRR landscape (who is who, what overlaps or opportunities for synergy can be observed?). Taking into account the rapidly changing environment (e.g., new institutions are established, others stop operating or change location/core competencies etc.) stocktaking should be performed frequently (or in certain time intervals on a regular basis),⁶ preferably accompanied by the visual mapping of the landscape. Depending on the purpose and users' interests, the stocktaking and SNA exercises can be performed on a local, sub-national, national, transnational or international level. Because of substantial time and effort involved, we recommend public institutions/ projects financed from public resources to carry out such exercises and make the results broadly available, so that numerous interested actors can make use of the information.

- b. Analysis of the CCA and DRR network interrelationships – SNA: collected information on actors' interactions and calculated SNA metrics provide useful insights into the interrelationships within CCA and DRR network. These can rarely be recognised at the first glance (e.g. who communicates/ collaborates with whom, who are the most powerful actors in the network, capable of performing strategic tasks? Who is best suited to connect two communities/ disseminate important information?)
- c. Implementation of the network knowledge in practice, e.g. use the obtained information while an institution re-thinking its mission/vision, designing its work schedule and/or future activities to encourage cross-disciplinary dialogue and collaboration.

Who

Many different groups can effectively use the information about the actors active in the CCA and DRR network (at a chosen scale) and network properties. This can include representatives from:

- national and sub-national (i.e., regional, local) government bodies;
- non-governmental organisations;
- academic / research institutes;
- private sector;
- networks (e.g. partnerships, forums);
- portals (e.g. climate data portal, digital information system);

⁶ Based on PLACARD experience gained during the stocktaking exercise at the European and national level, we recommend to update the databank at least every 6 months. Depending on the investigated network and the scale of analysis, the recommended frequency may differ, e.g. in a smaller but volatile environment it may be recommendable to take stock of actors even every 2–3 months.

- platforms (e.g. virtual networks to exchange information, digital portals which also include human expertise or are institutionalised with specific working groups);
- media (e.g. online news, newspaper, radio);
- funding agencies (e.g. donors like development banks) and
- representatives of International / EU organisations.

Learning the actors in the network (who is out there and what kind of task do they perform? How can they support my work?) and unravelling the complexity of their relationships (who talks/ works with whom? Which actor from my domain is best suited to reach out to the other community (CCA or DRR)? Which actor can most effectively disseminate information within/across both communities?), may enhance collaboration and communication within, but also across the two CCA and DRR communities. This can then lead to a more efficient use of resources, enhanced knowledge-base and ultimately aligned resilience solutions across different governance levels.

EXAMPLE:

Stakeholder Mapping – the case of PLACARD activity

Within the PLACARD project, a stocktaking and mapping exercise of CCA & DRR actors operating on the European and national (selected examples) level was performed.

The first part of this exercise (stocktaking) provided an overview of the relevant Stakeholder and boundary organisations, knowledge Platforms, policy and research Initiatives, existing Networks/ partnerships and End user needs (SPINE), their activities and relationships within the CCA and DRR landscape in the European context. Altogether 322 stakeholders at

international, transnational and national levels (295 key stakeholders), as well as their activities (27 key activities) were identified and stored in the MS Access Database (as of November 2017).

Analysis of the data revealed several insights into the European CCA and DRR landscape with regard to the distribution of actors working in the separate CCA and DRR domains or both (with a slight skew towards DRR), the geographical scope of their work (majority of national-level actors), the field of work within each community (dominated by Climate Services and Environmental Protection in CCA and Civil Protection and Humanitarian Aid in DRR), as well as to the differences in institutional types (CCA centred around platforms, networks and research institutions, DRR actors were mainly connected to government bodies).

The SPINE database also served as an input to the second part of this exercise. This included two rounds of Social Network Analysis (SNA) that aimed at improving the understanding of the interactions among selected national and European actors. Specifically, the SNA aimed to explore the role of the selected actors in their networks and the way that they connect to each other. Actor interactions were investigated in terms of their intensity (i.e. if actors are aware of the other actors present in the network but do not interact with them, if they communicate or collaborate with them, and how strong their interactions are), and their type (i.e., whether each interaction is related to the field of CCA, DRR, or both).

The first SNA exercise investigated the interactions between 35 CCA and DRR actors operating at the European and international level.

The second analysis explored the two-way interactions between national level actors in four European countries: Germany, Italy, Switzerland and the United Kingdom, as well as the one-way interactions between national level actors and a small group of international actors whose role was identified as important based on the output of the first SNA.

The output of the first SNA showed that Climate-ADAPT is the most suitable actor to communicate directly (bi-directional) with the other actors of the network (highest score of degree of centrality) and to contact the most powerful actors in the network (highest score of eigenvector centrality).

Most importantly, Climate-ADAPT significantly outperformed all other actors in terms of the ability to connect CCA and DRR communities (highest score of betweenness centrality, see Figure 13). With regard to the type of interaction, collaboration between investigated stakeholders was most often related to both CCA and DRR, while communication in many cases tackled one of the two areas.

The second SNA confirmed that governmental actors have a central role in national CCA / DRR networks. Further, in many cases the same actors occupied the top places in the ranking of more than one of the calculated SNA metrics, which highlights the role of key actors in the network. Businesses and private actors were found to be particularly active in connecting other network members (high score of out-degree centrality) and their importance is predicted to further increase in the near future.

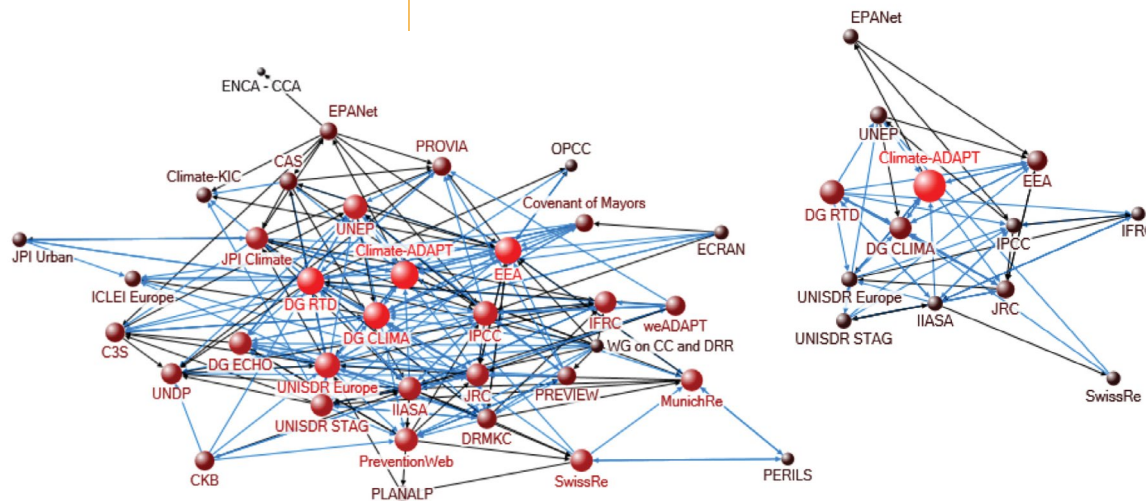


Figure 13: SNA based on intensive communication and collaboration, presenting betweenness centrality. Node size and colour are determined by the node's betweenness centrality value. Strong communication is represented with black and strong collaboration with blue edges. Top right: actors with the highest betweenness centrality values. (First SNA)

4.3.3 Joint emergency exercises to strengthen collaboration on various levels between CCA and DRR actors

Organise joint emergency exercises to explore climate risks, exchange knowledge and jointly prepare for weather anomalies.

Prepared by Ingrid Coninx, Wageningen University and Research

What and why

An emergency is a state in which normal procedures are suspended and extra-ordinary measures are taken in order to avert a disaster (WHO, 2002). As a result, emergencies require strong collaboration between key players that have the capacity to avert a disaster.

Emergency exercises are preparatory activities that involve these key players to anticipating extreme weather events or other weather anomalies and so avoid them becoming a disaster. There are, generally speaking, two types of emergency exercises: discussion-based exercises like seminars, workshops, table-top exercises and games; and operations-based exercises like drills, functional exercises and full-scale exercises.

Climate change is expected to increase the frequency and intensity of extreme weather events like heat waves, water scarcity, drought, wildfires and flooding, etc., which can have a heavy impact on society, environment and the economy when not being dealt with appropriately. This means that due to climate change, emergency situations are likely to occur more often (frequency) and partly have greater impact (magnitude). Given that these extreme weather events can result in a cascade of impacts on energy, transport and health infrastructure, joint emergency exercises can significantly help to foster collaboration to prevent and prepare for potential disasters. The word 'joint' refers to bringing together key players from different policy and practice departments and/or from different countries. By organising emergency exercises on potential hazards and disasters, key players can discuss relevant actions to take in advance, during and after such an event. They can jointly prepare what to do in such an event and explore the optimal way to collaborate and to communicate to avert the disaster.

The benefit of joint emergency exercises is to develop a common understanding on how to deal with a potential (climate) hazards and disaster and to train people on how to act during such an event. This is useful for countries and cross-border risks, since these risks require aligned emergency procedures. Furthermore, these exercises enable sharing knowledge among key players and highlight vulnerabilities and gaps in their preparation with regard to their equipment, resources and capacity. However, the

limitation of joint emergency exercises is that the actual event may differ significantly from the exercised situation, meaning that improvisation will have to take place to a certain extent.

The benefit of organising the emergency exercise involving both staff from climate adaptation (like adaptation policymakers at national, provincial or local level) and disaster risk reduction (like emergency organisations) is that the risks and potential measures will be evaluated with both the best knowledge and capacity available from both communities. The knowledge of CCA and DRR people complements each other very well. Climate adaptation staff are acquainted to consider risks on the longer term, including the climate projections. They often perceive the risks from an integrated perspective. This knowledge is useful to include no-regret measures in the emergency operation. Disaster risk reduction staff bring to the table knowledge on how to prepare people when the disaster is expected to take place which is very useful to minimise the disaster risk.

Disaster risk reduction staff consider disasters on a shorter term and are experienced in how to minimise impacts before, during and after a disaster is actually taking place. Merging the knowledge and measures from both communities is helpful and may result in new solutions and joint emergency measures to deal with the risks.

How

One example of a joint emergency exercise is a joint (climate) risk analysis to get a good understanding of the cascade of impacts due to climate change related extreme events. During analysis, important players from the various departments and sectors explored questions such as: What are the consequences of the event and the indirect impacts? Do we have sufficient knowledge of these impacts? What are the potential cascading effects?;



Who will have to bear the costs of these impacts? This joint (climate) risk analysis reveals the current operational procedures as well as the gaps in current collaborative networks. The discussion also contributes to mutual respect and understanding on how to strengthen collaboration and cooperation.

Who

Public officers in CCA or DRR can take the initiative by involving public officers, practitioners from emergency services and organisations in the fields of climate change adaptation, disaster risk reduction, public safety, health, transport and energy. These exercises are useful for operational staff and related decision-makers as these people are aware of what is going on in the field and can improve processes by taking specific required decisions.

EXAMPLE:

Table top role-playing exercise for joint risk analysis

The Benelux countries (Belgium, the Netherlands and Luxembourg) have organised a Table Top Role-Playing Exercise together with representatives from the health, transport and energy sectors of each of the three countries. The Table Top included 3 + 1 discussion topics: transport, energy and health + 1 cross-over risk management workshop to discuss the cascading effects of these three sectors. The delegation was limited to 4 or 5 people per country, to ensure the quality of the discussion. Apart from the delegation, there were also observers that could observe the Table Top discussions and contributed at the end of the discussion by identifying missing issues.

At the start of the Table Top Exercise two potential future scenarios about extreme weather events, that are expected to take place after 2050, were prepared. These scenarios are:

- Scenario 1: long, warm and dry summers which includes low water levels in rivers, low ground water level, sudden storms that results in urban flooding, dry periods and high concentrations of ozone as well as high risk for wildfire in rural and urban areas.
- Scenario 2: extreme wet winters which includes sea level rise, flooding along big rivers, strong winds and risk for dike failure and evacuation of people.

These two future scenarios were used to explore potential consequences with regard to health, energy and infrastructure as well as the cascading impacts concerning these three sectors.

The exercise clarified that these future scenarios can have diverging effects on the sectors and that the sectors are differently organised in each of the countries. The lesson learned from this Table Top exercise is that there are still many opportunities within the sector to prevent impacts. Preventive measures are currently missing to some extent in the national strategies and plans. Another lessons learned is that the cross-border collaboration differs among the sectors. In some sectors, cross-border collaboration is still in an early-stage, affecting the effectiveness of the risk reduction strategy. The Table Top exercise has definitely contributed to acknowledging the differences among the national sectors and has resulted in some cases in a spin-off of national discussions within the sector. This analysis was useful to jointly discuss what was needed to improve collaboration and mutual communication.

4.3.4 Proactive transboundary cooperation between CCA and DRR sectors.

Effective transboundary crisis cooperation is driven by proactive rather than reactive collaboration between the CCA and DRR communities. Traditional, cultural policies should be able to concede to flexible, international perspectives, to provide cooperative risk management for the border zone in a mutually sustainable manner.

Prepared by Laura Booth (ETH Zurich, Switzerland).

What and why

A transboundary threat is one that is characterised by its consequences covering areas that cross national boundaries. Such a crisis can escalate along both geographical and functional dimensions, which, when combined, defines the catastrophic potential (e.g. Boin and Rhinard, 2008). Proactive transboundary crisis management is relationship-building and strengthening communication during normal times, in order to build strong foundations before crises necessitate action by one or multiple states. Both CCA and DRR communities have a valuable engagement role to play in easing cooperation between states, especially when they can demonstrate aligning to a common threat, risk or purpose, such as climate change related risks (Abad, *et al.* 2018). Decision-making frameworks which build on trusted cooperation provides more organic and flexible governance structures in times of crisis and improve objectivity in encouraging institutional cooperation within the “intermediary” space a border region often creates (Brethaut, 2015).

Apart from different languages and cultures either side of a border, the major institutional challenge is the different country approaches to disaster management. These barriers were explored during the EU-funded [ESPRESSO Project](#) (2016–2018) in a series of international Think Tanks. To change long-held practices requires a significant level of ‘buy-in’ from bordering nations, offering clear mutual incentives, such as avoiding duplication of activities, or saving costs by pooling resources. One example is transnational governance of European river basins, such as the International Commission for the Protection of the [Danube River](#) (ICPDR, 2018) and the International Commission for the Protection of the [Rhein River](#) acting as international platforms which can align both CCA and DRR perspectives in adapting their strategies to managing and preparing for increasing climate-related risks, e.g. flooding.

Climate change has in recent years opened up discussions that were once held behind closed doors for a select group of disaster risk stakeholders, to a much broader network, within a wider-community approach, to sit at the table for disaster planning and decision-making. This trend will continue to expand the debate with ‘whole of society’, de-centralised approaches, championed in countries like Switzerland (Booth *et al.* 2017). It is in the DNA of Switzerland to go for cooperation rather than coordination. 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 (i.e. Cantonal decision-making) 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 if structure comes first, and is upheld, then the system can more easily adapt to crises (in Lauterbach *et al.* 2018).

The possible limitation to this approach is of course, that if the structure is not adequately developed or evolved cooperatively in the first instance, then its ability to develop future adaptation will be hindered.

The structure also depends heavily on the governance system of the state – although this might work well in some parts of Switzerland, this may not be the same in other countries where political stability may fluctuate. It is also not the case that in all parts of the same country, structures evolve equally, so there may be disparity within a nation, with differing approaches used along its different border regions, often determined by historical trans-border relationships.

How

Cross-border crisis response teams help promote accountability. Often supported (or led) from a voluntary stance, perhaps centred on managing a common natural resource, like an international river or lake, they can be highly successful in bringing new CCA and DRR actors to the table. They create an atmosphere of transparency, which in time builds trust between not just the different nations represented, but the disciplines of science and policy. Where stakeholders (or staff) come and go, institutional links remain, which is key groundwork for facilitating action to take place during crises.

The Oberrheinkonferenz (ORK) and the three countries Switzerland, Germany and France, encourage cross-border communication and joint practice drills for handling crises across the three countries. Drill scenarios however, need to be chosen in a way that all three nations are concerned for their own territory, not merely coming to the aid of a neighbour offering free resources. Secondly, the scenario needs to pose enough challenges that the countries 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. It is therefore a carefully selected engagement tool to encourage home-grown collaboration.

Who

This action involves cross-border actors predominantly at the local, yet international, level of governance. NGOs may assist local authorities, but it would require support from the state level to allow cross-border interaction to build in any meaningful way.

This could largely be precipitated using good practice examples, to show the value of such initiatives. The cross-border actors however are the ones who stand to benefit- they are fully aware of this and so the incentives are obvious for them to build transboundary cooperation, in order to make their roles easier during times of crisis, when time or resources may be in short supply. This incentive needs to be communicated upwards, as it is not always fully appreciated at state level (nor are the complexities or costs involved in doing so). Naturally, the biggest benefit will be to the border zone population itself, who often have to circumnavigate legislative hurdles during crises that could easily be overcome with flexible transboundary cooperation, e.g. driving long distances to hospitals where their health insurance policies are recognised even if there is a better suited facility over a nearby border (e.g. MOT, 2015; Booth *et al.* 2019).

EXAMPLE:

Institutionalising Transboundary Coordination and Cooperation in Mitigating Disaster Risk, Basel-Stadt Kantonale Krisenorganisation (KKO)

Basel-Stadt is a city and canton in northern Switzerland, covering 37 km², sharing borders with France and Germany. The river Rhine flows 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. Around 100'000 workers come to Basel-Stadt on weekdays, adding 50% to its resident population.

Basel-Stadt's 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 bigger 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 different fields of the cantonal administration. Only three people work full-time on 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.

Given the geographic setting of Basel-Stadt, crises facing authorities 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 suffice in achieving this so far, 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.

Basel-Stadt has chosen a militia system, which is beneficial in times of actual emergency as it unites experts of various fields with the most current 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 seven cantonal départements differ in their understanding of hierarchy, operational management and responsibility. This poses a challenge as well as an opportunity to an organisation trying to unite its various members and expertise. Diversity needs to be seen as key to achieve sustainable results.

A disadvantage of the militia system is that the necessary preparation measures and educational activities require a considerable amount of time away from the actual day-to-day job. Ultimately, a strong political will as well as a strong consensus on citizenship duties are required to maintain such a structure.

To date, cooperation is established, but it needs continuous work for it to stay in place and in order to remain updated. Personal commitment is essential- for stakeholders to cross the border, to join exercises in other countries proactively and get to know the system and governance structures in everyday life. Regular visits and lectures in neighbouring trans-boundary communities and partner organisations are also to be enhanced.

Wider challenges, such as tackling climate change adaptation, can then be met more sustainably by stepping-up adaptation and mitigation, using these established structures as a template for engagement.

Basel-Stadt's 3K motto "In Krisen Köpfe kennen" (knowing the heads or persons to contact in crisis situations) can only be achieved through common activities before such crises arise. To this end, they encourage different experts to become engaged in working groups of the Oberrheinkonferenz, for the KKO- mainly the working group "aid in catastrophes" with sub-groups: "Trinat", "exercises", "communications" and "enhance security and avert hazard on the river Rhine". 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.

4.4. Sharing new forms of communication

This chapter pinpoints the importance of increased institutional exchange to encourage the various stakeholders to interact and exchange knowledge. Though communication is an essential part of cooperation and precondition to successful collaboration (see [4.3](#)), we separated this specific aspect due to its more abstract and general character. Moreover, we introduced the focus on creating a basis for common understanding to highlight the relevance for institutional actors in the CCA/DRR nexus, because developing a 'shared language' or standardised methods and indicators are repeatedly described as a vital challenges to integrated CCA and DRR approaches (see section [5.4](#)).

4.4.1 Fostering dialogue and learning on monitoring, reporting and evaluation

In order to foster such dialogue and learning on CCA, DRR and sustainable development policies and frameworks, a better coordination of the relevant actions and processes, a more effective use of resources and a stronger collaboration among actors operating in the different domains are needed.

Prepared by Markus Leitner, EAA and Eleni Karali, CMCC

What and why

Monitoring, Reporting and Evaluation (MRE) of CCA and DRR are quite new fields. They are becoming more and more relevant at national, sub-national and city levels (for example, countries are constantly progressing towards the more 'mature' phases of the adaptation policy cycle).

MRE processes are strongly supported by the Paris Agreement and the Sendai Framework for Disaster Risk Reduction (SFDRR), and monitoring and reporting are of high relevance in Agenda 2030 and its Sustainable Developments Goals.

When referring to MRE, we mean the need to ensure that CCA and DRR initiatives, programmes, plans and actions are effective and efficient in the long-term. Diverse national and sub-national actors are interested in the questions: are we doing things right and are we doing the right things?

Monitoring refers to tracking the performance of activities undertaken to increase adaptation and reduce climate-related risks. In addition, changes in impacts due to the changing climate or socioeconomic development can be monitored.

Evaluation can be seen as determining whether planned outputs and outcomes from certain adaptation or risk reduction strategies, plans, programmes or actions have been achieved.

Reporting refers to recording the state of knowledge about monitoring and evaluation of adaptation and risk reduction efforts. This can be based on international agreements, such as the Paris Agreement, and international reporting requirements, based on, for example, National Communication of parties towards the UNFCCC, the regular reporting for the implementation of the Sendai Framework for DRR, or the 2030 Agenda (Sustainable Development Goals). Whereas the Sendai Framework has a monitoring process ([UNDRR](#)), including targets and indicators (UNDRR), and the 2030 Agenda ([UNSTATS](#)) is agreed and slowly being reported, there are no agreed indicators for CCA. This is due to the issue that CCA is customised for the needs of parties or countries and their specific contexts, and refers to the adaptation goals of the specific systems.

In response to reporting requirements from European and global level agreements, the continuous progress made in national level adaptation processes, and the resulting need to better understand if policies and actions are achieving their intended goals, interest in MRE activities has increased significantly in recent years (Mäkinen K. *et al.* 2018).

The number of countries adopting CCA, DRR and SDG policies to address the challenges of climate change and reduce climate related risks and hazards has grown constantly. As a result, countries' interest in developing processes and frameworks to track policy implementation progress they make in a systematic way (for example, see recommendation [4.5.2](#)) and assess their impacts has been steadily growing, too. Although important progress has been achieved lately, experience in this area is still considered limited and as a result certain barriers surface, such as the challenges with

addressing uncertainty and long timeframes, establishing suitable baselines and measurable targets and objectives, as well as data and resource constraints (EEA, 2015a).

MRE plays a crucial role in supporting iterative adaptation processes and increased resilience, and as more countries move to implementing national adaptation strategies and plans, there is an increasing demand for sharing lessons learnt on how progress can be measured in a meaningful way. Collaboration for MRE in the light of climate-related risks might be time- and resource-consuming at the very beginning and it will take time to generate trust and relationships between the actors from diverse institutions. Nevertheless, it will pay off in the longer term due to synergies in reporting requirements, bundling of information and having an overview of actors, responsibilities, mandates, information and knowledge.

How

Establishing a good understanding of the current MRE approaches and indicators and criteria used that support the domains of CCA, DRR and SDG, and communicating this information to actors involved in relevant activities is a starting point. As a next step, it is useful to:

- i) Develop an explicit description of the monitoring and / or evaluation processes and reporting requirements described in the different policies or frameworks (who does what and when? – knowing the other actors) and analyse the relevant policy documents;

ii) Investigate the relevance of processes, requirements and tools (for example, M&E indicators) for all relevant CCA, DRR and SDG agreements and frameworks (which overlaps or opportunities for synergy are evident) and keep in mind the iterative nature of adaptation indicator development, as well as screening for developed products (for example, reports, databases or guidelines) describing potential synergies or complementarities.

For ensuring robust MRE, the involvement of diverse actors with different roles such as data holders and providers, data processors, data interpreters, decision-makers, private sector, NGOs and others, is an important element. Only through multi stakeholder engagement and a coordinated approach and effort, can robust MRE be achievable. As a result, the dialogues and learning from MRE contributes to strengthening of institutional coordination and is related to increasing our capacity, aiming to find the right answers to the questions above.

Finally, there is the need to iii) communicate the identified information to actors involved in these processes (and others that have an interest in this topic). After steps i) and ii), actors should be encouraged to learn from other actors within their country – engage with practitioners, policymakers, private sector and scientists working in this field – but also from experiences of other countries through, for example, knowledge sharing events. Learning across governance scales (for example, conference sessions) is also important and through spaces for exchange which are targeted to all CCA, DRR and SDG communities to share knowledge and communicate emerging insights in a timely manner.

MRE needs to be connected at different levels of implementation of CCA and DRR policies and actions (international, European, national, sub-national, local) – as a result the objectives of MRE and

the relevance of different indicators vary across different levels of governance.

Who

Policymakers and practitioners who are involved in the development, coordination and implementation of MRE processes of CCA, DRR and Agenda 2030 (SDG), and other relevant policies / agreements / frameworks at national, sub-national and EU level. In addition, the involvement of researchers and scientists with a background and working experience in the field of MRE and related indicators is essential. Actors holding different relevant data and information such as national statistics or [EuroStat](#)

EXAMPLE:

The role of indicators in CCA, DRR and SDG for monitoring, reporting and evaluation

A technical report on “Indicators for adaptation to climate change at national level – Lessons from emerging practice in Europe” (Mäkinen K. *et al.* 2018) by the European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA) and the European Environment Agency (EEA) offered an overview on the main reporting processes included EU and global level frameworks (for example, the Sendai Framework on Disaster Risk Reduction (SFDRR) 2015–2030, the Agenda 2030 – Sustainable Development Goals (SDG), the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, the Greenhouse Gas Monitoring Mechanism Regulation, the non-binding reporting processes resulting from the EU Adaptation Strategy and its Evaluation).

SFDRR and SDG also consider adaptation as crucial, and as a result important synergies could arise at the national level where these frameworks need to be implemented. The potential synergies and complementarities among them were explored and led to the following findings.

For an effective use of resources, the three frameworks should ideally be implemented in an integrated manner, ensuring that action taken under any of the frameworks complements the objectives of the others (UNISDR, 2015a). The EU Member States individually implement the required data collection and reporting for each of these three global agreements. In addition, the European Commission contributes to the process towards implementation of these global commitments at EU level, and helps to ensure connectivity and coherence between these frameworks within the EU.

Mäkinen K. *et al.* 2018 showcases in Tables 3–6, pages 23–24 the indicators relevant to adaptation included in the SDG and/or in SFDRR. In addition, Vallejo (OECD, 2017) suggests exploring potential sources included other international reports with partly overlapping aims, such as those produced in relation to the SDG and the SFDRR 2015–2030. As a result, synergies should be seized on by parties.

There are still fundamental challenges that limit the development and full functioning of national adaptation indicators. These challenges include, for instance, the improvement of indicators' sensitivity to systemic changes in vulnerability and adaptive capacity, a better recognition of the implementation risks of CCA measures, and identification of dynamic interdependencies within and across different systems. Enhancing the use and influence of adaptation indicators also remains a challenge (Mäkinen K. *et al.* 2018; OECD, 2017).

Furthermore, recent progress has been made in the development and implementation of indicators used for monitoring and evaluation of CCA at national level looking at four European cases: Austria, Finland, Germany, England and Scotland. The working paper is complemented by a database, which includes metadata for national level adaptation indicators from the four countries mentioned above. Information in the report and the database could serve as material for reflection and inspiration for actors that operate in countries with an MRE system in place or under development. Also, it offers a starting point for fostering learning on MRE among the CCA, DRR and SDGs' communities (Mäkinen K. *et al.* 2018).

4.4.2 Stories and strategic narratives for joint understanding and collaboration between CCA and DRR to foster preparedness and prevention

Develop new stories and strategic narratives for joint understanding, collaboration and improved resilience actions among CCA and DRR communities.

Prepared by Ingrid Coninx, Wageningen University and Research, Gabriela Michalek, UFZ and Julia Bentz, FCIências.ID

What and why

Every climate and disaster event is experienced differently. Based on people's past experiences, their knowledge, values and worldviews, they have different ideas and perceptions about how to deal with extreme events.

The diversity of ideas and perceptions may hamper communication and can result in conflict, frustration and even inertia because actors fail to develop a joint plan on how to prepare, prevent and recover from extreme events.

Stories can help to deal with the diversity of voices and perceptions. Stories are a spoken or written account of connected events that can move people's emotions and imagination and therefore may influence people's behavior (Shipley, 1984; Soanes and Stevenson, 2004). When a story is constructed with a specific purpose in mind, such as, for example, fostering preparedness action, we call it a strategic narrative. Joint development of new stories together with CCA and DRR community members such as policymakers, citizens, academics and businesses, create the opportunity to weave a common thread of understanding of shared values, and induce joint action. Stories are therefore mainly helpful when people have different ideas and perceptions. It is a way to overcome the differences and unite people to take collaborative action.

This, in turn, is likely to result in aligned and more effective resilience solutions for the future.

The added value of stories is their potential to overcome communication and collaboration barriers that cannot be handled by "rational means" such as traditional science-based information and data. Often the information about future climate-related impacts and recommended solutions is available, and the necessary resources can be obtained, but nothing or little is actually done with the information. Well-constructed strategic narratives can help to overcome that deadlock by creating a momentum for joint action. Stories are easy to understand and can be "customised" to appeal to different kinds of people from various sectors or social groups. As a result, they can help to connect and encourage collaboration when people find common ground in these stories. The power of stories

is that they are not only a way to communicate and understand reality, they can also deeply touch or move people, and as a result inspire collective and transformational action.

The limitation of stories and strategic narratives is that their success depends heavily on the value orientations of the people or target groups that hear the story. Values are often hidden and difficult to change in the short-term. When the story values are not in line with the audience value orientations, the impact on behavioral change will be hindered or limited.

How

Stories can be used to (1) inform people, to (2) trigger action and/or to (3) foster collaboration. Successful stories that deeply affect behaviour in the scope of climate change and disaster risk management are designed by considering certain sociological and psychological mechanisms as well as respective linguistic constructs.

For instance, to encourage action, the story has to leave a sense of feeling empowered. PLACARD has developed a recipe book that builds on those mechanisms and provides a set of recommendations on how to construct stories and strategic narratives. This so called "recipe book" can be used to enhance people's capacity to develop stories and strategic narratives to encourage joint (CCA and DRR) action. Joint actions can be engendered when stories are developed in line with people's values, that are told in easy to understand and familiar wording, that empower the people and that follow a logical structure. In particular, it can be used individually or can serve as the basis for a training programme or a joint story development.

For example, place-based story development focuses on citizens, emergency planners, politicians and other relevant people jointly exploring a local map and sharing experiences, folk tales and history, along with their views on the causes and consequences of climate change and disasters, and discussing a way to deal with these issues. This way, they frame and build a joint story about the place and the preparedness plan.

Who

Stories and strategic narratives are mainly useful for national and local policy officers when engaging other stakeholders in the policymaking process to combat climate-related risks such as heat, flood and drought. Stories and strategic narratives can also be useful for actors aiming to foster preparedness to improve resilience, such as local emergency planners, city mayors, and local politicians. Academics and consultants can make use of stories too in order to share new findings with politicians and citizens in an understandable way. Last, but not least, stories and narratives can be used by NGOs and citizens (representatives) who wish to draw attention to the problem of climate-related extremes and mobilise concrete actions, for example, in their own local communities.

EXAMPLE:

Art to create stories for change

The importance of telling stories on climate change and climate-related disasters is increasingly recognised by practitioners. However, in organisational setting, facts and data still dominate the dialogue. We present here an example on the use of art to craft engaging stories.

Artists have the power to inspire and engage people with an issue in a creative way. Growing numbers of artists are working

on climate change with the aim of inspiring and engaging people with the issue and provoking community action. Art can be a promising way to engage young people who are commonly left out of public decisions around climate change ([Friday For Future protests](#)). By empowering young people, they are able to challenge assumptions which were taken for granted and induce transformative thinking and respective actions. In the scope of the [Art for Adaptation project](#), 48 students at the António Arroio Art High School in Lisbon engaged in a 30-day experiment to create new climate narratives and solutions through art and transformative learning. They could freely choose a sustainable behavior (for example, eating less meat, using public transport) and were asked to adopt it for 30 days. During this time, the students explored what it meant to change and discussed in groups the obstacles and social norms as well as the structures and values that were both facilitating or hampering individual and collective change. At the end of the 30-day experiment, the students developed an art project based on their experience. The following narratives were presented:

- It is urgent to act to stop climate change/ prevent disastrous consequences.
- “We should be informed about climate change consequences earlier”. This narrative illustrates disappointment.
- “Don’t tell us that everything will be alright! It’s not true”. This narrative illustrates anger.
- “We can influence people around us and they will influence more people. Like this we can create a movement for climate action.” This is the narrative of empowerment.

The artworks were presented at in two exhibitions: Festival de Telheiras, 9–19 May 2018, Lisbon and ECCA 2019 conference, 28–30 May 2019, Lisbon.

4.4.3 Mainstreaming approaches through education

Learning within an institution is critical if it is to achieve its operational goals. A responsive approach to educational needs that recognises the changing organisational landscape will ensure greater efficiency and maximise resources.

Prepared by Peter Walton (UKCIP, University of Oxford)

What and why

Francis Bacon is quoted as saying “knowledge is power”, and if we are to consider ways to integrate the necessary understanding for capacity building between CCA and DRR then we need to reflect on the role that ‘education’ can play. Education manifests itself in a number of ways, including formal and informal, whilst learning can be considered as either deep or shallow.

Organisations should be aware that there is no one approach that they should consider when developing learning opportunities to strengthen their operations, but rather to reflect on the overall aims of the organisations, the needs of the staff, and the resources available to them.

The DRR and CCA communities have benefitted from studies reflecting on suitable educational approaches, though these have largely focused on organisations operating in the global south, however, the concepts ideas and perspectives are still applicable, in a European context (e.g. Twigg, 2015; Barquet *et al.* 2016). As with stakeholder engagement discussed earlier, combining learning opportunities that addresses both communities allows each to better understand where the synergies exist and how they can be applied to their own contexts. A well-constructed learning opportunity enables each sector to test new ideas, processes and

understanding from their own perspective but also being able to apply knowledge from a broader context.

Because of the large corpus of material on institutional learning, it is difficult to define the main concepts in simple terms. However, working definitions taken from Chen and Byer (2012) and Twigg (2015) for the purposes of this report can be seen as:

- Formal and informal learning describes the extent to which the learning takes place in a structured environment. For example, formal learning can be seen as taking place in a classroom, lecture theatre or online learning platform. Whilst informal learning can occur in the classroom, it is usually distinguished as taking place outside of a structured educational setting, for example, talking to a friend, a personal experience, or listening to a radio broadcast. When considering the learning process, it is important to develop deep understanding of the issue rather than shallow. Deep understanding allows individuals not only to retain the knowledge, but creates the ability to synthesise it with other knowledge, and apply it to new situations and contexts.
- Informal knowledge management is important, as institutional ‘memory’ is often poor, short-lived, and siloed within individual departments. Measures need to be adopted to formally record ‘knowledge’ developed that can then be disseminated efficiently to all staff, allowing them to add to it, so building comprehensive learning. For organisations operating in a defined space the dissemination is easier than those that operate across a number of sites, including in the field. This latter group needs to consider innovative ways to facilitate communication, utilising technology where appropriate. This could include emails, newsletters, mailing lists and intranets. Technology is a valuable tool for creating and maintaining communities of practice within a sector [either DRR/CCA] or for facilitating communities across sectors.

- Formal training opportunities within an organisation strengthen their internal knowledge capacity, building on their own identified needs and gaps in understanding. This, in turn, allows them to inform their own training materials. However, formal training does not have to be restricted within an organisation but can be developed across sectors engaging individuals from different institutions. Bringing together communities of practice to formally share knowledge, ideas, and approaches to CCA and DRR helps organisations to view problems from a different perspective, as well as challenging their own preconceived ideas about how to conduct resilience-building.

Whilst the idea of developing an integrated training strategy either within an organisation or across institutions is simple in principle there are a number of challenges that need to be understood and overcome. The use of language in a European situation is always going to be a possible limitation, but also in the way that different sectors use concepts and ideas such as 'risk' and 'uncertainty'. There is a challenge in carrying out the initial training needs assessment where an organisation may not be aware of the learning opportunities to be gained from engaging with either the DRR or the CCA sector. A training assessment by an external agency can begin to identify some of these areas but with a broad geographic spread this process can be slow.

How

As identified, informal learning can be as beneficial as formal training in strengthening an institution's capacity within CCA and DRR. This can be especially important where new measures need to be adopted, policy implemented or new a cohort of staff introduced. For example, blending online technology and face-to-face meetings allowed a group of local authorities in the south of England to develop a community of practice (CoP) between four

district councils and a city council to consider how to address, and implement, a new set of guidelines for CCA that had implications for DRR as well.

Who

Regional councils in the UK are responsible for local development and implementation of local planning regulations, as well as working with larger agencies on appropriate strategies on nationally identified targets. Whilst this case study focuses on a local authority, it is a suitable approach for other institutions in a similar position – any organisation that is faced with a new challenge, with limited experience and resources, but needing to develop a common approach. The example below highlights various benefits for national and local authorities.

EXAMPLE

Helping hands, minds and resources: Communities of practice to support local decision-makers.

Local Authorities in England were tasked by the British Government to report on how they were building resilience to impacts of climate change. This was the first time they had been expected to consider the potential risk of climate change impacts, and as such did not know how they could go about doing it. The UK Government issued guidelines, but they were of a technical nature that made them difficult to implement. The UK Climate Impacts Programme (UKCIP) initiated a series of formal training courses to support the assessment and report writing process. However, what UKCIP was unable to provide was the ongoing support required, given the unique context each local authority operates in.

UKCIP was able to provide initial support in helping to create a community of practice (CoP) between four district councils and a city council. Each of the councils had the same responsibility to report on their plans to build resilience to climate change, but each had a unique set of geographical, social and economic scenarios to consider. The need for the coming together of these councils was highlighted when the area experienced severe summer flooding that had significant consequences in the region. These included flooding of several town centres and a bridge being washed away isolating a train station for commuters. Therefore, considering both climate change adaptation and disaster risk reduction was important. Only the member from the city council had experience of climate change, but not in the context of the expected report, and all of them had other responsibilities limiting the amount of time that they could commit to the process.

A simple website was created to provide a shared space that could be used for a range of support purposes:

- as a document repository
 - » background documentation
 - » copies of their own reports
 - » useful resources (e.g. web links, case studies, scientific data, impact studies)
- discussion forum
- space to co-create documents.

The group were already meeting on a regular basis and decided to add the CoP to the agenda as a standing item. In between the face-to-face meetings, they could use the website as a means to share knowledge, experience, results, ask questions and chat synchronously if they needed to.

Once the districts had created their reports, the CoP was effectively redundant, and so was no longer used. It is important to consider the shelf life of a community such as this, so that it does not build resentment amongst its members from individuals not contributing, or dropping out. Without a shared purpose or goal, the community wouldn't serve any benefit, thus leading to members leaving or just not using it. The simple website ensured that technology did not act as a barrier to engagement, but rather facilitated engagement between people separated by distance not by motivation.

Given a limited set of resources, time and expertise the CoP, and the way it was conducted, proved crucial in the success of the development of the planning and subsequent reports on building their districts resilience to climate change.

4.5. Enhancing knowledge management

As much as successful implementation (4.1) depends on effective financing (4.2) and supportive background arrangements (4.3), they in turn depend on a shared basis of understanding (4.4) which relies on proper tools for knowledge management. This chapter showcases good practice and examples for producing a “new collective knowledge” by capitalising on the diverse knowledge available, for example, by sharing and transferring knowledge, tools, and good practice instances.

4.5.1 Ecosystem-based Adaptation and risk reduction

The consideration and use of nature-based solutions in adaptation and risk reduction strategies should be strengthened through enhanced cooperation, dialogues and inter-sector practices and policies.

Prepared by Guillaume Rohat, Karin Allenbach and Hy Dao (University of Geneva)

What and why

Nature-based solutions (NbS) are defined as “actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits” (Cohen-Shacham, 2016).

NbS could serve as an effective umbrella framework embracing a number of different ecosystem-based approaches, including other issue-specific solutions such as Ecosystem-based approaches to disaster risk reduction (Eco-DRR) and Ecosystem-based Adaptation (EbA) etc. (Cohen-Shacham *et al.* 2019).

EbA is the “sustainable management, conservation and restoration of ecosystems, as part of an overall climate change adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities” (CBD, 2009). EbA harnesses biodiversity and ecosystem services to reduce vulnerability and build resilience to climate change, including extremes.

Eco-DRR is “the sustainable management, conservation and restoration of ecosystems to provide services that reduce disaster risk by mitigating hazards and by increasing livelihood resilience” (PEDRR, 2010).

The sustainable management of natural ecosystems is increasingly perceived as an important and efficient approach to addressing societal challenges, including climate change, food and water security, natural disasters, human health, and economic and social development (Cohen-Shacham *et al.* 2016).

The advantages of using ecosystems to increase resilience are numerous. For example, natural ecosystems act as buffer zones in case of river flooding (Haase, 2015) or sea level rise (Yepsen *et al.* 2016), stabilise the soil, protect against erosion (Narayan *et al.* 2016; Gedan *et al.* 2011), and protect against snow avalanches (Moos *et al.* 2018), etc. (EEA, 2015b).

In addition, preservation and restoration of ecosystems have a number of associated co-benefits, such as carbon fixation, water filtration, contributing to leisure and mental well-being.

Acknowledging the benefit of an ecosystem-based approach, the international community has been widely engaged in its development and committed to financing research, cooperation, and knowledge-sharing in this field.

NbS are a complex issue that requires cross-sectoral collaboration and multi-stakeholder coordination in a wide range of landscapes. Capacity building and institutional strengthening are particularly important in effective design and implementation of NbS, and in taking into account the broad spatial scales (GIZ, 2019).

In order to develop a common language and framework to ensure the quality and credibility of NbS, and to unify ecosystem-based approaches, the International Union for Conservation of Nature (IUCN) is developing a global standard for NbS that will be launched in June 2020 at the IUCN World Conservation Congress.

The standard is developed around eight principles as a result of continuous updates, based on science and practice, and internal and public consultation processes (see: [A global standard for Nature-based Solutions](#)).

Although NbS provide a wide range of benefits for human well-being and biodiversity, the value of ecosystems and their ability to reduce the negative impacts of climate risks are uncertain, highly diverse and context-specific. When planning NbS, the impact of climate change on the provision of associated ecosystem services must also be considered (Calliari *et al.* 2019, Nelson *et al.* 2013.) Monitoring and adaptive management are necessary to guarantee the sustainable effectiveness of the solution in the long-term (Cohen-Shacham *et al.* 2019, Nesshöver *et al.* 2017, Raymond *et al.* 2017a).

When evaluated as a whole, beyond monetary values, NbS is often presented as a cost-effective solution compared to conventional engineering options. However, measuring financial and economic costs and benefits is extremely challenging (Reid *et al.* 2019; Cornell 2011; Fraser, 2014; Spash, 2011).

For effective and transparent implementation, to increase credibility, and trigger investments, associated trade-offs and potential harm should also be considered. The effectiveness of the solutions should be evaluated in a comprehensive manner, taking into account the uncertainty of future climate and socio-economic projections, and integrating an adaptive management framework (Calliari *et al.* 2019).

Incentives or financial instruments (such as payment for ecosystem-services) may be needed to overcome short-term losses before reaching longer-term benefits, or to compensate affected actors and/or strengthen community support (Reid *et al.* 2019; Cohen-Shacham *et al.* 2019).

How

EbA and Eco-DRR have many similarities and are perceived as effective instruments to bridge DRR and CCA communities by promoting the collaborative implementation of different conventions (Convention on Biological Diversity (CBD), UN Convention to Combat Desertification (UNCCD), and the UN Framework Convention on Climate Change (UNFCCC). (CBD, 2018)

In addition, sustainable management of ecosystems has been widely embedded in global policy agreements (Sendai Framework on Disaster Risk Reduction, Sustainable Development Goals, and Paris agreement on Climate Change (UNFCCC). As a result, ecosystem-based approaches should be integrated into national-level strategies that implement these global policy frameworks.

A successful collaboration between several institutions is the Partnership for Disaster Risk Reduction PEDRR (www.pedrr.org). This is a community of practice around Ecosystems for Adaptation and Disaster Risk Reduction, which brings together 24 international members, including IUCN, UN Environment, and the World Business Council for Sustainable Development and the Swiss NGO DRR Platform.



Who

At the country-scale, both authorities in charge of environmental regulation, landscape planning, and the economy should be involved in assessing adaptation and risk reduction options, and the potential for an ecosystem-based solution. At the European level, the main actors that could implement long-term and global strategies based on the use of natural ecosystems are the United Nations Office for Disaster Risk Reduction (UNDRR), the International Union for Conservation of Nature (IUCN), United Nations Educational, Scientific and Cultural Organization (UNESCO), The European Directorate Generals (DGs) of International Cooperation (DG DEVCO), Environment (DG ENV), Climate Action (DG CLIMA), European Civil and Humanitarian Aid Operations (DG ECHO), and other international organisations for protection of specific ecosystems, such as Wetlands International.

It is also important to mention that the main success factors for implementation of ecosystems-based adaptation and risk reduction are the engagement of local stakeholders through interactive participative approaches (Reid *et al.* 2019), cooperation across them, the alignment of activities across agencies and institutions, and the involvement of the private sector through the demonstration of private and multiple (co)benefits.

EXAMPLE:

Collaborative approach to combat coastal flooding using NbS in South-East England (Medmerry)

The coast of South East England is affected by sea level rise, leading to the loss of important natural habitats such as wetlands and intertidal habitats. Coastal flooding has long impacted the coast of Medmerry, exposing the coastal cities of Selsey and Pagham to a serious risk of flood. Previous coastal defences,

a 3 km shingle bank, was costly, unsustainable and offered insufficient protection. To develop the region sustainably, the UK Environment Agency (EA) proposes to implement coastal realignment by building new defences inland (water banks) and restoring coastal ecosystems and their functions.

At first, the EA strategy was not well received by the local community, but early involvement and close collaboration between wide a range of stakeholders have contributed to the success of the project. This example also illustrates the positive collaboration between government, public and private sectors, leading to the implementation of NbS at a large scale.

This successful case study brings an increased awareness of NbS and illustrates their effectiveness and co-benefits such as an increase in biodiversity (creation of a bird sanctuary), cultural richness (discovery of an important Bronze Age settlement) and tourism growth.

Monitoring and post-project results demonstrated the flood protection is successful. Although the winter of 2013–2014 was one of the stormiest and wettest for the UK for 50 years, no damage was sustained. In comparison, a similar scale storm in 2008 caused substantial financial damage.

Further information and sources:

- Oppla: [Medmerry, West Sussex coastal flooding](#)
- UK Government policy paper: [Medmerry coastal flood defence scheme](#)
- Case study 3, IUCN report: Cohen-Shacham, E., Walters, G., Janzen, C. and Maginnis, S., 2016. [Nature-based Solutions to address global societal challenges](#). Gland, Switzerland: IUCN. ISBN: 978-2-8317-1812-5

4.5.2 Information and knowledge management to foster stronger CCA-DRR institutions

Promote a systematic process for sharing data, information and knowledge for CCA and DRR that accelerates learning and collaboration, and makes it easier for stakeholders to find, access and use content that is legitimate and relevant to their needs. This can also promote better monitoring, reporting and evaluation processes.

Prepared by Sukaina Bharwani and Julia Barrott (SEI) and Rob Lokers (WER)

What and why

Information and knowledge management (IKM) refers to the systematic process of collating and sharing data, information and knowledge so that it can be easily found, accessed and used (Barrott and Bharwani, 2018a). This process is essential for ensuring that relevant knowledge generated by different actors can be found by those who could benefit from it or who need to apply it. However, this requires a cultural shift in the current IKM mindset regarding how knowledge is shared and how learning takes place.

In a nutshell, good IKM optimises the value and utility of the intellectual resources produced by an organisation or community of practice. These resources are not limited to data and publications. A variety of different types of information and knowledge (collectively referred to here as 'content') may be useful for different actors. These can include traditional products such as environmental and socio-economic data, project and research reports, and legislation and legal documents, but also organisational and actor-oriented data (location, topical areas, expertise, sectors, role, mission etc).

In the context of reducing climate and disaster risk, good knowledge management facilitates:

- a. the evolution of good practice and avoidance of repeated mistakes through supporting the sharing of lessons learned and experiences from research and the whole adaptation and disaster risk reduction cycle;
- b. better informed practice through enhanced access to data and information needed for decision-making;
- c. reduced redundancy, duplication and enhanced opportunities for collaboration through easy discovery of who is working on what, and where;
- d. increased capacity and common understanding and language through enabling easier knowledge transfer between actors and peers; and
- e. peer-to-peer networking and communication, leading to stronger, better connected networks.

An increasing number of governments, organisations, projects etc. are working to reduce climate and disaster risk. Good IKM presents an opportunity to increase the visibility, impact and, as a result, the legacy of the work being undertaken. The adoption of good IKM practice across these actors presents significant opportunities to increase the efficiency, in terms of both financial and human resources, with which objectives to reduce climate and disaster risk are reached. Overall, good IKM practice can better enable these actors to work together in a complementary and mutually supportive manner to expedite the achievement of the goals of the Paris Agreement, Sendai Framework and SDGs.

In CCA and DRR the lack of clarity around language and the use of technical terminology is a particular barrier to collaboration (Barrott and Bharwani, 2018b). Internationally this is further inhibited by complications arising from translation into different languages. The use of a shared and well-described terminology is essential for connecting relevant knowledge, promoting awareness and understanding of the meaning ascribed to particular terms, and thus for supporting communication and connection between these fields. In addition, international efforts to record the state of knowledge about monitoring and evaluation of climate mitigation, adaptation and risk reduction efforts at the national level (see recommendation [4.4.1](#)) would significantly benefit from better IKM processes. Harmonising the use of language remains a challenge due to the diverse and heavily nuanced and ever-evolving definitions. Addressing disparities in the use of terms directly risks losing these nuances, many of which are valuable to ongoing debate. Such a top-down approach also risks marginalising certain actors. Building and legitimately translating a shared terminology that acknowledges and connects the varied terms and definitions used today is a significant undertaking, and one that requires support from an equally varied array of actors.

How

Develop and promote a transformation in IKM standards (a common terminology) and guidelines that supports a cultural shift towards the use of Linked Open Data (LOD), so that online content can be better connected across portals and platforms (see recommendation [4.5.3](#)) and subjected to more sophisticated searches (Bauer and Kaltenböck, 2012, Bauer and Kaltenböck, 2016) to accelerate learning and ultimately more climate-resilient action.

These standards should include:

- the adoption and criteria for the use of a shared CCA-DRR terminology for describing content (for example, using keyword tagging),
- the provision of term definitions and other metadata (for example, synonyms) to promote understanding of their meaning(s), and
- the adoption of an appropriate tool to tag content in a way that enables relevant content across different websites, portals and platforms to be inter-connected and comply with LOD standards.⁷

Use sustainable IKM infrastructure that assures the longevity, discovery and accessibility of knowledge, to maximise its utility and legacy:

- maximise the use of well-connected sustainable databases that: adopt a Linked Open Data approach (including a standardised vocabulary); are designed for the long-term; are informed by user needs; and, are kept up-to-date,
- adopt a practice of assigning unique and persistent identifiers (e.g. URI's, DOI's) for online sharing and reference,
- avoid the development of new websites that ultimately contribute to a growing mosaic of defunct online spaces; where customised online spaces are needed, create microsites that are built on and thus connected to the knowledge bases of existing websites (see weADAPT microsites, for example).

⁷ The [Climate Tagger](#) is one such tool that is currently being optimised for CCA and DRR through the PLACARD project, and which will be further optimised to support automatic keyword tagging of content.

Insist on high content accessibility for diverse, multidisciplinary audiences by:

- ensuring content is open access,
- championing knowledge brokers who employ LOD guidelines, and
- requiring actors to refer to common vocabularies of the terms they are using in their publications and then to state or provide alternative definitions, if needed.

Who

In order to succeed with implementing this recommendation, broad involvement of many different stakeholders is needed, including: the academic and practitioner communities and associated organisations and institutes; the public sector, including regional and national Government offices and ministries; private sector entities working in the climate risk space; programmes and projects producing and sharing relevant knowledge and information/data; donors and funders of CCA and DRR relevant work; and relevant operating knowledge and information portals and platforms.

In particular, this is of critical relevance for departments and actors responsible for the communication of knowledge and information products, including managers of websites and working groups developing reports with glossaries or working on terminology. This links to the multilingual, and perhaps even the cultural aspects related to the development and use of ontologies and LOD.

At the European level, these are actors such as the UNISDR Open-Ended Working Group on Terminology, the Disaster Risk Knowledge Management Centre (DRMKC) and Climate-ADAPT, but also all kinds of adaptation and risk reduction portals on the national and sub-national level.

At the international level, actors such as the European Commission Directorates, the United Nations, the IPCC Working Groups and global portals such as [PreventionWeb](#) and [weADAPT](#) have to be involved.

These recommendations complement and build on initiatives that are already underway, including the [FAIR Principles](#) and development of the [European Open Science Cloud](#) (EOSC) .

EXAMPLE

Specialised thesauri and keyword tagging for content discovery and Linked Data

The [International System for Agricultural Science and Technology](#) (AGRIS) is a multilingual bibliographic database that connects users directly to a rich collection of research and worldwide technical information on food and agriculture. AGRIS facilitates access to publications, journal articles, monographs, book chapters, and grey literature – including unpublished science and technical reports, theses, dissertations and conference papers in the area of agriculture and related sciences. Most of the AGRIS records are indexed by AGROVOC (the FAO multilingual Thesaurus). AGROVOC is widely used in specialised libraries as well as digital libraries and repositories to index content and for the purpose of text mining. It is also used as a specialised tagging resource for knowledge and content organisation by FAO and other third-party stakeholders.

The [PLACARD Connectivity Hub](#) (Bharwani *et al.* 2019) uses keyword tagging technology to pull and interlink content from multiple European and global CCA and DRR platforms.

This content includes case studies, publications, related topics, authors and organisations, allowing users to find relevant evidence, expertise, tools and methods, good practice insights and peers. By making content from multiple online platforms available in one space, the Connectivity Hub can be used to search many platforms from a single-entry point. This helps to reduce incidences of redundancy, replication or siloed working that may arise from a lack of awareness of parallel and complementary work and enhance collaboration through increasing the visibility of climate change adaptation and disaster risk reduction actors and their activities.

In weADAPT, a global knowledge-sharing platform for CCA and related issues, keyword tags, using the Climate Tagger, are used to search and filter content, so that users can find the content that is most relevant to their needs. New content in both weADAPT and the Connectivity Hub are being used (in tandem with other international efforts) to refine and develop new taxonomies for climate change adaptation and disaster risk reduction in the Climate Tagger.

In addition, to contribute to this cultural shift in how IKM is currently carried out, weADAPT has developed a microsites service that enables individually branded websites to be built on top of the same IKM technology used by the main platform. This allows microsite developers to utilise keyword tagging and integrate their content within the existing knowledge base, thereby enhancing discoverability, and reducing replication and redundancy.

4.5.3 Using knowledge platforms and portals to enhance learning and collaboration

Knowledge platforms and portals should play a leading role in promoting and supporting learning and collaboration within and between CCA and DRR communities. These online spaces should not serve as repositories of information, but act as connectors of people and knowledge, and as forums for peer-to-peer learning, dialogue and exchange across the two domains.

Prepared by Sukaina Bharwani and Julia Barrott (SEI)

What and why

Knowledge, technologies, methods and approaches within CCA and DRR are growing and evolving quickly. There are also expanding areas of overlap between CCA and DRR as decision-makers, scientists and practitioners look for more comprehensive, integrated solutions. At the same time, additional actors such as businesses and those from other sectors such as health are increasingly looking to address climate change and its impacts. Consequently, the need for learning and collaboration across an array of actors with varied capacity and networks – from community leaders to government officers to business strategists to scientists and researchers – is increasing.

Knowledge portals and platforms are websites that focus on curating, collating and sharing data, information and knowledge so that it can be more readily used by target stakeholders. They have the potential to enhance collaboration and learning, and to build on relevant good practice across the two domains.

These websites include data portals such as the [Copernicus Climate Change Service](#); local and national governmental websites such as [Climate Ireland](#); regional websites such as the [Pyrenees Observatory](#) and [Climate-ADAPT](#); international organisational websites such as the United Nations [Nairobi Work Programme's Adaptation Knowledge Portal](#); and global knowledge platforms such as [PANORAMA Solutions](#), [weADAPT](#) and [PreventionWeb](#) to name a few.

Knowledge portals and platforms have an opportunity to actively support learning and collaboration by better connecting related content, increasing discoverability, relevance and accessibility (Barrott and Bharwani, 2018a; EEA, 2015c).

For learning, this requires: (1) going beyond sharing research outputs towards promoting a culture of deeper reflection and analysis, encouraging more detailed and honest exchange on challenges and failures and the resulting learning (Young *et al.* 2017); and (2) specifically curating, collating and packaging content to make it more accessible and comprehensible to non-experts, to support capacity development. For collaboration, this involves enabling peer-to-peer connections through providing (1) accessible information on who is working on what and where (see also recommendation [4.5.2](#)); and (2) the means by which actors can connect with one another. This connectivity is especially important for decision-makers wanting to connect with peers in similar contexts and/or find specific expertise e.g. the PLACARD Connectivity Hub (Bharwani *et al.* 2019).

The extent to which platforms and portals can and should adopt these changes depends on their readership and remit. User needs must be the principle factor dictating the design and services on offer. A good understanding of users and their needs is essential

for identifying ways in which learning and collaboration can be supported by the platform or portal. User profiles and spaces for dialogue can be useful for enabling peer-to-peer connectivity but will not be appropriate for all platforms.

Where they are used, platform or portal managers must be mindful of making registration and sign-ins as simple as possible, for example, through “single sign-on” integration with users’ existing social media accounts and networking sites such as LinkedIn. Importantly, promoting increased interaction and reflection (for learning) requires additional time and effort by both platform or portal managers and contributing actors, and needs to be provided for. However, this can be done in innovative ways, for example, considering “in-kind” contributions. Providing more time and resources requires a deeper understanding by senior managers within organisations in both domains of the value of knowledge platforms to enhance learning and collaboration. Fundamentally, this requires a transformation in how knowledge management is currently undertaken (see recommendation [4.5.2](#)).

How

Platform managers:

- Ensure shared content is correctly attributed to the actors and organisations who undertook the work through including up-to-date contact information, or a contact pathway (for example, via LinkedIn) for at least the lead author.
- Use maps to quickly show users what relevant CCA and DRR work (case studies, projects, solutions) is being undertaken, and where; if user or organisational profiles are available (with the appropriate permissions), these should also be linked to a map.⁸

⁸ Where people are located and where they undertake projects can vary significantly, so it is useful for user profiles to contain up-to-date metadata on both.

- Undertake regular (annual or biannual) analysis of active and target users and their needs, and use this information to inform the design and content of the platform or portal.
- Tailor how content is organised and described to meet the needs of users: include a summary in simple terminology; frame the information in a way that is familiar to the potential audience; and, present information and knowledge in engaging ways, for example, using interaction, visualisations, pictures, infographics etc.
- Create spaces for honest reflection on and discussion of approaches and results.

Funders:

- Stipulate that research and project outputs must be shared on specific, relevant regional or global platforms or portals.
- Promote a culture of learning through encouraging and sharing honest and reflective analysis of project approaches and results (both failures and successes, Young *et al.* 2017), so that future efforts can benefit from past experiences.

Who

This recommendation is mainly aimed at platform and portal developers and managers, who act as brokers of a rich array of data, information and knowledge, and those funding platforms and portals, who provide the resources for these brokering activities. Platform and portal developers and managers have influence over what is communicated and how, and are thus in a position to enable deeper learning, networking and dialogue.

However, there is also significant onus on individual actors, project coordinators and funders to utilise these platforms and portals to instigate and maintain a culture of learning, which is then reflected in the way the knowledge is curated and shared (for example, highlighting “Lessons learned”). This step requires reflection and input from those who have undertaken the work in question and so cannot simply be left to those running the platform or portal.

Achieving a culture of reflection and learning requires that individual actors, project coordinators and funders (1) perceive this as a valuable undertaking; and (2) dedicate or stipulate appropriate resources specifically for this activity. Fear of potential reprisal or negative feedback has inhibited the sharing of lessons learned during projects to date, particularly with respect to enabling new opportunities for future funding. To address this, funders and donors need to explicitly recognise and reward honest reflection and learning from projects.

EXAMPLE

Using maps and user profiles to support collaboration

[weADAPT](#) and [Climate-ADAPT](#) use geographical interfaces to show who is working on what, and where.

Supporting non-experts

[Climate Ireland](#) provides introductory materials on climate change and climate change adaptation to support non-experts engaging in these fields.

Promoting learning through systematised knowledge sharing

PANORAMA Solutions provides: structured data focused around specific regions, challenges, themes and ecosystems to help users find relevant information; summaries to help users quickly appraise content; and user profiles to support peer to peer engagement.

weADAPT uses keyword tagging to link related content and provides syntheses focusing on lessons learned. These syntheses make use of specified text fields in article templates that promote the sharing of lessons learned, descriptions or barriers and enabling factors etc.

Supporting peer-to-peer communication

weADAPT enables users to comment directly on content, providing opportunity for discussion and further knowledge sharing, and to host discussions in a series of topic-specific discussion forums. weADAPT also promotes collaboration and networking by linking content to user profiles, allowing users to contact others whose work is relevant to them. As well as providing the ability for users to connect with each other if they find a user's content or expertise of value, these profiles showcase all of a specific user's content, thereby highlighting their expertise to would-be collaborators.

Importantly, such features need to respect restrictions on the use of personal data, for example, informing users at the point of registration that data will be used in various ways such as for the development of new interaction tools, the exact format of which cannot always be foreseen.

Network Climate Change Adaptation Knowledge Platforms Community of Practice

At a more global scale, the [Stepping Up Knowledge Exchange Between Climate Adaptation Knowledge Platforms](#) (KE4CAP) project is running a series of facilitated KE events in 2020 that will bring together platform and portal professionals in Europe with major partners in Japan, Australia, Canada, Mexico, South Africa, India and Argentina, as well as the international platform community more broadly. The KE4CAP project aims to provide a forum for platform developers and operators to come together to compare and learn from their approaches, to share knowledge and good practices, and to work together to address common and emerging challenges. The overall aims are to stimulate KE, to advance cooperation and learning, and to inspire the evolution of national and regional adaptation platforms in terms of scope, governance, content coverage, functionality and management.

4.5.4 From information to knowledge-action networks

Develop knowledge-action networks to advance quality and usage of CCA/DRR-related information.

Prepared by Juergen Weichselgartner (Hochschule für Wirtschaft und Recht Berlin, Germany) and Emilie Brévière (Swedish Meteorological and Hydrological Institute, Norrköping, Sweden)

What and why

A coherent sustainable development policy that is based on DRR, i.e., analysis and reduction of the causal factors of disasters, and CCA, i.e., adjustment to actual or expected climate and its effects, requires knowledge for informed decision-making and coordinated action (IPCC, 2014a; UNDRR, 2019). In both domains, there is an increasing recognition of gaps between knowledge producers, providers, and users, as well as between science, policy, and practice (Weichselgartner and Pigeon, 2015; Hewitt *et al.* 2017, Bruno Soares *et al.* 2018; Weichselgartner and Arheimer, 2019).

This recommendation focuses on two critical points that need to be addressed: adjustment in the modes of production and use of CCA and DRR-relevant information, and evaluation of the effectiveness of this information in decision-making. Achieving the first goal requires agreed forms of conceptualisation, operationalisation, and evaluation; achieving the second goal requires mapping and monitoring information use in decision-making processes to trace the impacts of applied information and its success in CCA and DRR. Both goals call for transformative changes in knowledge infrastructure and producer-user interfaces.

Given the findings of a recent examination of the historic impact of climate-related disasters on ancient societies (Peregrine 2018), these shifts are by no means trivial: societies that allow greater political participation in decision-making and with more community coordination and governance organisations appear to benefit from greater resilience to climate-related catastrophes.

An initial suggestion is to distinguish different forms of knowledge and qualitative levels of comprehension, since that provides a sound basis from which researchers can better communicate with policy-makers and practitioners, and vice versa (Weichselgartner

and Arheimer 2019). A precise use of terms prevents incorrect labelling of the process of ‘providing information’ with the term ‘knowledge’, as is frequently done in both the literature and practice. It also clarifies that an increase of information does not inevitably result in an increase of knowledge. Indeed, the advancement of information technology progressively produces facts and data, but much of the information remains unorganised, closed, or untapped, and as a result is not turned into applicable knowledge. A second suggestion is to combine understanding from multiple sources and provide mechanisms for linking solutions proposed by research with the articulated needs and problems of practitioners: this reduces the discrepancies between activities of different actors, and result in more timely and context-appropriate solutions (Weichselgartner and Kasperson 2010).

Since few countries operate centralised coordination mechanisms between CCA and DRR, let alone transdisciplinary, integrated, multi-sectoral assessment, planning and decision-making structures (UNDRR 2019: ix), it is timely to establish adequate forms of cross-sectoral collaboration between different institutional actors. Developing knowledge-action networks with multiple layers of producers and users from different sectors is an effective method of tailoring decision-relevant information to different decision environments, and of allocating resources where they are most effective in order to bridge science and practice, and integrate CCA and DRR strategies. Such interactive approaches, however, can entail high costs for participants, particularly in terms of financial, human, and time resources (Lemos *et al.* 2019). In addition, integrating different knowledge systems across spatial-temporal scales requires concerted action in capacity and skills development (Weichselgartner and Pigeon 2015).

How:

Developing the capability for contextual understanding and decision-making is a far more effective way of dealing with uncertainty and complexity than the present reliance on extrinsic frames of reference and categorical technical expertise, which is siloed into disciplines (UNDRR, 2019:58f.). We know from scientific studies that applicability, comprehensiveness, timing, and accessibility of scientific research have an influence on decision-makers, and that relevance, credibility, and legitimacy are critical attributes for effectively informing policy and decision processes (Weichselgartner and Arheimer, 2019). Recent findings also indicate that more meaningful decisions can be taken in an arena where different actors provide knowledge of specific domains and that the emergence of new knowledge can be sustained by combining scientific and policy expertise (Olazabal *et al.* 2018). Consequently, a locally embedded and socially contingent production of actionable knowledge is required, involving scientific know-how, place-based wisdom of practitioners, and indigenous sensitivities. Areas of shared responsibility and networks of actors, i.e., knowledge-action networks (or systems), are a useful way to better understand and overcome many challenges described (Muñoz-Erickson and Cutts 2016).

Interactive knowledge- and decision-making bodies at local levels require more effort and resources to create an agreed collaborative work space and incentivise the production and use of knowledge, but have significant benefits with regard to institutional stability, learning mechanisms, and identification of decision needs and critical decision points.

Who

CCA/DRR-relevant data, information, and knowledge are produced and provided by universities and research centres, public and private bodies, civil society, governments and non-governmental organisations alike. Knowledge-action networks include not only a diversity of actors and their learning practices involved in knowledge production, transfer, and use, but also the values, beliefs, and visions underlying their knowledge, as well as the modes of framing, contesting, and applying knowledge in policy and practice. In addition to institutional and legislative arrangements, boundary work is a critical factor in linking knowledge and action. So-called boundary organisations operate at the interface between science and policy to create and sustain mutually beneficial connections between producers, providers, and users with lines of responsibility and accountability to each. By integrating differing cognitive communities, knowledge systems, and societal sectors, they excel at providing space and mechanisms to support CCA/DRR-relevant information in particular contexts, hence brokering knowledge to decision-making. With their established links to different societal sectors, they also have the ability to both bridge and to protect the boundary between knowledge-making and decision-making. The place-based context-sensitive solutions that emerge from collaborative knowledge-action networks lend themselves to self-organising around actions that are co-created, with local ownership of information and solutions.

EXAMPLE

National and regional practices in integrated approaches to CCA and DRR

The recently published Global Assessment Report on Disaster Risk Reduction (UNDRR, 2019:368ff.) explores national and regional practices in integrated approaches to CCA and DRR.



The selected country experiences – ranging from legislation and information to national adaptation plans – illustrate important challenges and synergies found in practice. For instance, a study in Vanuatu identified a well-developed DRR operational governance structure comprising many government levels and non-governmental actors working together to implement top-down and bottom-up DRR strategies that consider CCA elements. The selection, however, also illustrates that there is no blueprint, neither for integrating CCA and DRR efforts, nor for developing knowledge-action systems. As a result, pointing to critical barriers and bridges may be more useful than providing the best practice example.

On the basis of scientific findings, the following recommendations on the design of effective knowledge-action networks for integrative CCA and DRR are proposed:

- Start building non-hierarchical knowledge-action networks at the local scale, where context-appropriate measures can be implemented in a timely manner.
- Create dense social networks that provide bidirectional links across spatial scales and societal sectors to enhance soundness and value of knowledge.
- Pay attention to the differing perception, motivation, preferences, and requirements of actors to reduce discrepancies and avoid misinterpretations.
- Include diverse actors and combine multiple knowledge sources and forms to enhance legitimacy and credibility of knowledge.
- Emphasise a context-driven and decision-oriented knowledge production mode to enhance relevance and usability of knowledge.

- Design polycentric, interactive, and multipartite processes in a sustainable dialogue between knowledge- and decision-making to obtain a more consensual view of what is both feasible and desirable.
- Establish space and mechanisms for social learning and experimentation to enable new practices that may be needed under changed contexts.
- Enhance links to other networks with related objectives to create and use synergies and diminish redundancies.
- Provide multidisciplinary education and cross-sectoral training in CCA and DRR-relevant science and policy.

Designing such contexts has major implications for science, policy, and practice. Co-designing and co-producing knowledge requires not only precious resources – temporal, spatial, and financial – it also increases complexity and transaction costs. Likewise, enabling well-informed governance is not just a matter of managing the interfaces between knowledge and governance, but also a matter of capacity building in order to bring about reflexive governance arrangements (van der Molen, 2018). These aspects need to be considered and it may be that intensive efforts of cross-sectoral interaction should be reserved for complex information and contexts in which there may be no substitute for in-person interaction. Nevertheless, there are alternative avenues to enhance usability of information and to aid interaction (Lemos *et al.* 2019).

5. Knowledge and action gaps

According to the OECD the different approaches and mechanisms in CCA and DRR “inevitably result in overlaps and gaps” (OECD 2020: 11). After having explored the overlaps in chapter 4, this chapter provides information about critical knowledge and action gaps on the current subjects, but also on additional CCA and DRR science and practice issues.

The knowledge and action gaps in this chapter are clustered into the same five sections as chapter 4, according to their main field of relevance, plus a sixth section on complex gaps:

- **5.1** safeguarding sound governance,
- **5.2** ensuring effective financing,
- **5.3** seizing opportunities for cooperation,
- **5.4** sharing new forms of communication,
- **5.5** enhancing knowledge management,
- **5.6** relevant challenges not covered in the guidance.

We have added the dimension of governance level on which the majority of target institutions are addressed: European, national or sub-national, and local level. Of course, most knowledge and action gaps need to be tackled on more than one governance level, however, since our report aims to provide basic orientation in an emerging policy field and to guide stronger and more efficient institutional action, we highlight on which level the main responsibility can be identified. The table below gives a brief overview over knowledge and action gaps according to the level of governance that is most relevant for tackling them. Chapter 6 will reflect upon the relevance of these gaps.

European level	(Sub-) National level	Local level
5.1 Safeguarding sound governance		
<ul style="list-style-type: none"> • Systemic & transnational CCA/DRR coherence • Further align strategies developed in the post-2015 framework of international agreements¹ 	<ul style="list-style-type: none"> • Institutional coherence between CCA/DRR sectors • Make international frameworks matter for the local level • Integration of DRR/CCA into legal frameworks² • National risk governance systems are often still underdeveloped³ • Political support and leadership by a recognised co-ordination entity⁴ • Clear roles and responsibilities between institutions who co-ordinate, and those who implement and fund⁵ • Regulation of the financial sector⁶ • Legal framework must be improved⁷ 	<ul style="list-style-type: none"> • Gaps in technical knowledge, capacity or skills⁸ • Proactive action is not taken due to uncertainty over future climate prognoses and lack of locally significant data⁹ • Investment strategies for resilience should consider the multiple benefits influencing the daily lives of communities¹⁰
European level	(Sub-) National level	Local level
5.2 Ensuring effective financing		
<ul style="list-style-type: none"> • Overcome institutional, technical, financial capacity challenges in front-line agencies¹¹ • Build a common understanding of risk, which is precondition for coherent planning, budgeting¹² • European Risk Transfer Mechanism to avoid escalation of the climate-driven systemic risk • Incorporation of the CCA and DRR aspects into the EU Green Bond Standard and the EU Green Taxonomy 	<ul style="list-style-type: none"> • Finance the re-establishment of local data that was lost during privatisation of utilities • Funding gap between the plans and implementation • Overcome disparities between cca and drr funding and increase coordination of joint funding • Systematic integration of climate/disaster risk assessments into national financial and fiscal planning • Sovereign climate insurance funds with application of the IBI to aggregate risks from small and medium economic agents • Crisis financing (a.k.a. forecast-based financing) facilities with application of the DLT 	
European level	(Sub-) National level	Local level
5.3 Seizing opportunities for cooperation		
	<ul style="list-style-type: none"> • Provide local authorities with the capacity and capability to exert their CCA/DRR responsibilities • Explicit roles and responsibilities in implementing a comprehensive Climate Risk Management (CRM) 	<ul style="list-style-type: none"> • Address and involve private actors into risk precaution

European level	(Sub-) National level	Local level
5.4 Sharing new forms of communication		
<ul style="list-style-type: none"> • Development of shared language/ understanding • Provide a comprehensive European overview about DRR strategies or National Risk Assessments¹³ 	<ul style="list-style-type: none"> • Involvement of different (non-) expert stakeholders • Public authorities using different communication channels (incl. social media) to reach stakeholders (incl. local communities) • Information generated often does not inform subsequent policy-making processes¹⁴ 	<ul style="list-style-type: none"> • Utilisation of the local knowledge base • Using culturally adjusted strategic narratives to overcome inertia and mobilise action
European level	(Sub-) National level	Local level
5.5 Enhancing knowledge management		
<ul style="list-style-type: none"> • Ensure “data availability, quality, accessibility, application” for national governments¹⁵ • Overcome lack of a common methodology and different standards for data collection, analyses, assessments¹⁶ • Development of shared terminology • Further develop indicators and methodologies for monitoring and evaluation¹⁷ 	<ul style="list-style-type: none"> • Assess climate-related risks to health, livelihoods, food security, water supply, human security and economic growth • Provide climate change data and information at local levels¹⁸ • Need for (i) advanced simulations, (ii) interdisciplinary research, (iii) enhanced data management, (iv) co-creation of knowledge, (v) communication & dissemination platforms, (vi) interdisciplinary training in higher education programmes¹⁹ • Gap in exposure and vulnerability data²⁰ 	
European level	(Sub-) National level	Local level
5.6 Relevant challenges not covered in the guidance		
<ul style="list-style-type: none"> • Coherence between post-2015 agreements • Implement joint CCA/DRR schemes²¹ → formulations are yet too generic to lead to concrete action²¹ • Systemic and transnational coherence between CCA (international, long-term, non-binding) and DRR (sub-/national, short-term, binding)²³ • Understand health and socioeconomic effects due to increasing average temperatures • Understand potentially systemic consequences of non-linear climate change²⁴ • Understand limits to adaptation and adaptive capacity • Avoiding maladaptation and lock-in effects • Assessing the success of adaptation actions • Up-scaling of successful adaptation measures • Assessment of a complex multi-risk landscape²⁵ & understanding how impacts, strategies, tools interrelate²⁶ 	<ul style="list-style-type: none"> • Systemic enhancement of funding landscape²⁷ • Contemplate risk from a multi-hazard (e.g. environmental, technological, biological) perspective²⁸ intersectional issues (health, urbanisation) require systemic approaches • Avoid artificial institutional divisions & pursue all-vulnerabilities approaches²⁹ • Participation of society as a whole, thereby enabling the proper definition of responsibilities/rights across stakeholders/institutions 	<ul style="list-style-type: none"> • Managing systemic risks in urban areas³⁰ • Enhance build-back-better strategies • Develop trans-boundary crisis management³¹ • Develop systemic approaches, adopting integrated risk governance adapted to the local context³² • Systemic transitions through overarching adaptation options in rural and urban areas³³

Table footnotes

6. Thereby providing concrete indicators addressing the institutional, systemic, and transnational CCA/DRR coherence (see [4.3.4](#))
7. Useful tools are: 1) Law and Climate Change Toolkit, 2) Checklist on Law and Disaster Risk Reduction. UNISDR 2019: 370
8. UNDRR, 2019: 333
9. Ministries and agencies with a presence at the local level are well placed to lead these efforts (OECD 2020: 11).
10. Stricter enforcement of common policy instruments, such as land-use management and building codes, can contribute to joint CCA and DRR outcomes (OECD 2020: 11).
11. UNDRR, 2019: 42
12. “Decision-makers, scientists, technicians, and operational bodies need to be safeguarded from the legal and economic consequences of their actions under emergency conditions.” Albris/Zuccaro, 2018
13. Capacity constraints – human and financial – can exacerbate barriers to implementation, particularly at the local level where most implementation occurs. Lack of coherence and coordination at higher levels of government can also lead to conflicting or duplicative demands local level (OECD 2020: 11) Albris/Zuccaro, 2018: 11
14. For example, healthcare, heritage and culture protection, energy services. Zuccaro *et al.* 2018: 21
15. UNDRR, 2019: 369
16. UNDRR, 2019: 372
17. See chapter 6: Data availability, quality, accessibility, application.
18. OECD 2020: 12
19. UNDRR, 2019: 275
20. i.e. hazard, exposure, vulnerability, impact on communities and built/natural environment. Zuccaro *et al.* 2018: 17
21. Albris/Zuccaro, 2018 :13
22. Albris/Zuccaro, 2018: 11
23. Zuccaro *et al.* 2018: 17
24. To overcome this challenge, incentives must be in place to encourage owners of data to make it accessible [...] climate data should also be complemented with information on other ecological, economic and social factors that drive exposure and vulnerability (OECD 2020: 14)
25. Albris/Zuccaro, 2018: 12, UNDRR, 2019: 334
26. UNISDR, 2019: 379
27. “There is a gap between the international, often non-binding agreements for CCA and the national, regional and local often binding legislation for DRR,” Albris/Zuccaro, 2018: 8, and a gap between short-term nature of DRR which often neglects long-term aspects of CCA. Albris/Zuccaro, 2018: 13
28. UNISDR 2019: 359
29. “Non-climate-related natural and manmade hazards and risks (especially geophysical and biological, technological and environmental), as well as cascading and systemic risks, including possible amplifying effects of climate change.” UNISDR 2019: 382

30. "The gap between global, regional and local risks, risk perception, and risk prevention and mitigation strategies, and to evaluate the potential impacts of financial market regulations and possible innovative financial tools with regard to their impact on food security and the environment." UNISDR 2019: 42
31. Enhance i) funding knowledge, (ii) funding implementation, (iii) funding multi-risk resilience, (iv) funding country-specific priorities, (v) funding international priorities, (vi) funding resilience awareness. Zuccaro *et al.* 2018: 21
32. "Policymakers need to contemplate disaster risk from a multi-hazard perspective that includes a range of man-made and mixed hazards (e.g. environmental, technological and biological hazards and risks)." UNDRR, 2019: 363
33. National states should not overemphasise the differences between CCA and DRR, often results of a rather artificial institutional division, and instead pursuing an all-vulnerabilities or all-resilience approach that paves the way for integrated policy options at the intersection between PA, Sendai, Agenda 2030 and SDGs. UNISDR 2019: 364
34. UNISDR, 2019: 422
35. Zuccaro *et al.* 2018: 23
36. "Multidimensional nature of interrelating risks in urban areas require systemic approaches, that seek to understand the nature of interacting systems and adopt integrated risk governance adapted to the local context." UNISDR 2019: 422
37. UNISDR 2019: 369

6. Reflections and conclusions

Despite the notable progress made (see chapters [2](#), [3](#) and [4](#)), knowledge and action gaps on how to enhance and strengthen CCA and DRR institutional coordination still persist (see chapter [5](#)). This is not a shortcoming but rather a necessary result from the different approaches and mechanisms in both fields (OECD 2020: 11).

It is expected that some of these gaps may be tackled via research (for example Horizon Europe, EU macro regional strategies, JPIs or national funding agencies) and that additional efforts via institutional innovation may lead to further joint practices. However, the success of future actions is contingent on several factors that have been explored in this report.

Tangible policy advices regarding institutional innovation are difficult to produce given the complexities associated with local, sub-national, national, trans-regional, European, and international decision-making processes and geopolitical constraints. Current examples associated with the COVID-19 pandemic show how diverse individual responses can look like and how, even when dealing with complex and pervasive events, cooperation is not always easily attained.

While carrying out this guidance, the authors came across several relevant questions that deserve reflection. How can institutions strengthen their CCA-DRR cooperation in these five areas? How does enhanced cooperation look like in practice? Who should take the lead and what are the necessary resources? Are there limits to cooperation or areas where a separated approach may yield more results?

In order to reflect on the lessons learnt from the examples previously analysed, this chapter is divided into the same five areas of recommendations targeted in chapter 4, supplemented by a section on transformative CCA-DRR:

1. Safeguarding sound governance,
2. Ensuring effective financing,
3. Seizing opportunities for cooperation,
4. Sharing new forms of communication,
5. Enhancing knowledge management, and
6. Transformative approaches in CCA and DRR.

For each of these sections this chapter describes the following four points:

- i. **“This report highlights”** shows the prevailing knowledge and action gaps, and limitations that were identified in the course of developing the PLACARD recommendations,
- ii. **“Additional gaps”** summarises issues that appeared in the literature review (see [1.2](#)) but could not be addressed in the scope of this report,
- iii. **“This is relevant because”** points out why exactly the mentioned gaps are relevant for policymakers, and finally
- iv. **“To succeed”** shows the way forward, meaning first essential steps to tackle these unresolved challenges. The way forward is a result of both, the pooling of experts’ judgements during the course of the PLACARD project, and of the literature review that had a slightly more general scope. It is meant to enable the implementation of the selected recommendations under the circumstances of prevailing knowledge gaps. As far as possible the way forward identifies the need for action at specific governance levels, i.e. for local, national, European institutions or research.

Given all the recommendations (see [chapter 4](#)), this chapter provides discussion and reflection about the knowledge developed during this work as well as on the identified challenges and limits to cooperation and integration of CCA and DRR research and practice. Several challenges were not covered in this report, but are relevant to CCA and DRR in a changing climate. One of the most prominent issues in recent years is migration, but also trends such as urbanisation and demographic change, general impacts on health, or Na-Tech events (where a natural disaster leads to release of hazardous materials) are not addressed here.

This chapter therefore concludes with discussing the need for transformative approaches in CCA and DRR, which can address some of these complex or ‘systemic’ challenges.

6.1 Safeguarding sound governance

The challenge of integrating CCA and DRR relies heavily on the initiative of governing institutions across all scales and is:

“Successful when coordination at regional, national and local levels is assured by a strong lead institution with a robust coordination mandate. As DRR and CCA are issues that affect many sectors, isolated action is rarely successful, and real coherence can take place only if silos are broken at the level where implementation occurs.” (UNDRR, 2019: 382)

Below we summarise some of the essential tasks for action according to their respective governance level: local, national, or European. However, we explicitly acknowledge that multilevel governance approaches will likely be the best course of action.

(i) Local climate and disaster risk governance

Efforts to deal with climate change, health and human well-being rely on thriving communities; population-wise, most communities today live in urban areas. Although positive expectations exist, these communities often need assistance from higher-ranking governance frameworks to improve their resilience. In particular, the management of systemic risks (see i-iii below) challenges local institutions: the “multidimensional nature of interrelating risks in urban areas require systemic approaches, that seek to understand the nature of interacting systems and adopt integrated risk governance adapted to the local context” (UNDRR, 2019: 420).

Addressing this issue causes specific needs for action at the local level.

This report highlights that local knowledge matters (see [4.1.4](#)). But at the same time, the availability of local data, in particular climate data, is greatly limited. Downscaling climate projections to the size of a single town is difficult. It depends on the quality of available data and is further constrained by increasing uncertainties in the process of downscaling. In addition, not all municipalities have enough funds to access the required data, and many different forms of locked-in processes can occur at local scale. This can be caused, for example, by lacking awareness of the local actors who are often key-experts and responsible for the implementation, by political motives, by a fear that taking proactive measures could result in economic losses (for example, in the tourism sector), or simply when a process started but follow-up measures are not taken.

Additional gaps are (i) lacking capacity, technical knowledge, and resources of local government staff to implement measures adequately (Lexer *et al.* 2020), (ii) knowledge about how the specifics of local governance (for example, allocation of responsibilities) affect comprehensive institutional strengthening in particular, (iii) prevailing lacks of communication and coordination between government levels.

This is relevant because local governments still face highly specific challenges to translate and integrate international frameworks (i.e. SFDRR, PA) into their particular contexts (UNDRR, 2019: 62, 316ff., 330). Local authorities often lack the expertise and capabilities for this task (Albris/Zuccaro 2018: 10). Not reflecting on these specific local needs can result in national level decisions having no impact at the local level (ibid.: 9).

To succeed, this report recommends developing participatory strategies and plans at the local level that fully integrate CCA with DRR (see [4.1.4](#)). This process relies on mobilising local knowledge and ownership, but also on sound local climate data. As a result, the local scale needs access to an enabling environment at the national level that explicitly grants local government the authority to plan for, and carry out essential integrated action. This requires a review of the enabling legislation (local, subnational, or national) and the institutional frameworks, which often encourage working in silos rather than cross-sectoral, and top-down rather than taking up local inputs (UNDRR, 2019: 419). As a consequence, we recommend the use of Climate Risk Management (see [4.1.1](#)) along with stronger actor engagement (see [4.1.2](#)) and public-private coordination efforts (see [4.1.3](#)).

(ii) National climate and disaster risk governance

Integrating CCA and DRR policies at the national level is a new endeavour for most countries, as evidence from country practices suggests (UNDRR, 2019: 419). However, given the yet insufficiently understood scope of threats posed by climate change, it is imperative that all countries pay adequate attention to reducing climate risks in a comprehensive manner. We identify the following needs for action:

This report highlights that national governance contexts are highly diverse in terms of federal systems, informal modes of policymaking, and more (see [4.1.3](#)). Therefore, a national specification and adoption of our recommendations are required. Systems to include “local reasons for concern” in national policymaking are justified to implement target-oriented and feasible adaptation measures (see [4.1.1](#)).

Additional gaps are (i) clear roles and responsibilities for comprehensive CCA and DRR governance, partly because national prioritisation is lacking (Jernberg 2019: 12), (ii) national disaster risk governance systems are still often underdeveloped, particularly with regard to risk prevention (including targets, indicators, monitoring, and follow-up mechanisms) and regulation of the financial sector (iii) implementation or impact of SENDAI-aligned strategies at a national level is lacking, and (iv) the systemic gap between the international, often non-binding agreements for CCA and the national, regional and local, usually binding legislation for DRR.

This is relevant because such gaps pose a serious constraint to comprehensive CCA and DRR governance (UNDRR, 2019, p. 331f.), particularly with regard to the requirements imposed by the multi-level government context (Albris/Zuccaro 2018: 8). At the same time, the way forward is hampered by a lack of good national governance examples to learn from (ibid.: 12).

To succeed, well-defined structures of proactive national CRM are critical to increase institutional capacity and coordination (Albris/Zuccaro 2018: 16). Consequently, national governments can establish a national climate-risk council, to foster putting CRM into practice (see 4.1.1). Such national coordination platforms need to have a strong mandate and considerable national support (see 4.1.3). In addition, national-level authorities need to systematically support local authorities on integrated CCA and DRR planning (see 4.1.4). National governments need to tailor UN frameworks to the specific national contexts. New partnerships are needed that bring together knowledge and skills from different stakeholders and create links with the private or industry sectors (UNDRR 2019: 316, 421).

The legal framework must be improved, for example, decision-makers, scientists, technicians, and operational bodies need to be safeguarded from the legal and economic consequences of their actions under emergency conditions (Albris/Zuccaro 2018: 20). EU-institutions need to support this ambitious endeavour by improving the coherence between all post-2015 frameworks. Research can assist this challenge by co-developing and co-evaluating how multi-level governance frameworks can shift from a single (siloed) risk focus to embracing a multi-risk approach when working with technical and political authorities.

(iii) European climate and disaster risk governance

Providing a stimulating environment for overcoming national-level challenges is at the core of European climate and disaster risk governance, for national and local governance can only be successful if properly embedded in a broader framework, provided by leading institutions with a strong coordination mandate (UNDRR, 2019: 382). Therefore a new, more ambitious EU strategy on adaptation to climate change is essential. Strengthening the European efforts on climate-proofing, resilience building, prevention and preparedness is needed for the work on climate adaptation continue to influence public and private investments, including on NbS (COM/2019/640/final: 5).

Finally, it must be recognised that all aforementioned tasks for comprehensive CCA and DRR governance must also proactively discuss their limits: “although disaster and climate risk have significant overlap, there are also substantial aspects in which they do not coincide, and this is an important challenge for integrated risk governance” (UNDRR, 2019: 381). Defining the potential for integrated approaches critically relies on acknowledging which tasks cannot be tackled in such way.

6.2 Ensuring effective financing

Financing is one of most crucial issues to enable increased coherence between CCA and DRR, as even strong governance mechanisms and accessible risk information may become useless if climate risk is not translated into a budgetary process. However, not only the amount but, more importantly, also financing strategies need to be revised: “Instead of perpetuating institutional competition for separate resource streams, financial instruments need to be made available that operate at the nexus between DRR and CCA and provide comprehensive financial resources. Financing mechanisms still need to be adjusted to this paradigm.” (UNDRR, 2019: 382).

This report highlights that yield-based approaches to the insurance of climate-related risks (especially in agriculture) have many drawbacks such as the difficulty to detect fraud or risk modelling. As a result, index-based solutions should be pursued (see [4.2.1](#)). In addition, support for national initiatives in providing protection against climate change is needed (see [4.2.3](#)) by establishing a risk transfer mechanism at the EU level. There are funds for long-term DRR as well as for immediate response, but these are often insufficient for anticipatory action (see [4.2.4](#)). Likewise, there is a gap in DRR and CCA finance on different levels, particularly regarding the improved management of climate-related risks and resilience of the financial system to non-financial threats (see [4.2.5](#)). Hence, new mechanisms of debt financing, such as climate insurance and risk transfer are warranted now ([4.2.2](#)).

Additional gaps are (i) the overall DRR and CCA budgets are insufficient, (ii) an increasing funding gap between plans and implementation (UNDRR, 2019: 352), (iii) a lack of coordinated funding for joint CCA and DRR activities (Albris/Zuccaro 2018: 11f.), and (iv) more specific funding gaps, including: (a) funding

knowledge, (b) funding implementation, (c) funding multi-risk resilience, (d) funding country-specific priorities, (e) funding international priorities, and (f) funding resilience awareness (Zuccaro *et al.* 2018: 21f.).

This is relevant because insufficient or inappropriate funding hampers efforts to strengthen joint CCA and DRR governance or advance at an adequate pace to counter the increasing challenge. More specifically, the way in which funding is organised can create discrepancies between CCA and DRR (Albris/Zuccaro 2018: 19f.) or the scope of funding may be limited by the interests of the donor organisation (i.e. CCA or DRR, not both).

To succeed, local governments need to identify specific local funding needs, gaps and priorities, and communicate them to the respective governments and administration, respectively to financial institutions or private investors. They need to support national authorities in the investment decisions at the local level. National governments should assess country-specific CCA and DRR funding needs, gaps and priorities, allocate appropriate budgets, and ensure funding coherence. They must improve guidance, access to stable funding, and information for integrated CCA and DRR approaches at the local level. National Distributed Ledger Technology based platforms for accumulation of savings and climate-related crisis financing can enable this process (see [4.2.5](#)). EU-institutions need to provide a funding framework (funds as such and criteria for funding decisions) that highlights international priorities in aligning CCA and DRR funding. Here, sovereign Climate Insurance Funds (see [4.2.1](#)) and European Risk Transfer mechanisms (see [4.2.2](#)) are recommended as useful tools.



Additional recommendations include the incorporation of CCA and DRR indicators and metrics into the EU Green Bond Standard and the EU Green Taxonomy for identification of green projects and green financial instruments (see [4.2.3](#)), as well as forecast-based financing in order to implement anticipatory actions (see [4.2.4](#)).

The European Green Deal states that “Work on climate adaptation should continue to influence public and private investments, including on nature-based solutions. It will be important to ensure that across the EU, investors, insurers, businesses, cities and citizens are able to access data and to develop instruments to integrate climate change into their risk management practices.” (EC 2019: 5) In addition, “climate and environmental risks will be managed and integrated into the financial system. This means better integrating such risks into the EU prudential framework and assessing the suitability of the existing capital requirements for green assets” (ibid.: 17). This is necessary to ensure that CCA and DRR are better reflected in decision-making processes and their related financial flows. A sufficient strategy would explicitly mention the goal of resilience (DRR) alongside climate change adaptation (CCA) and ensure that all European financial instruments are subject to a robust screening process to attain the resilience of investments to future disasters and climate risk (UNDRR, 2019a, Michalek *et al.* 2020).

6.3 Seizing opportunities for cooperation

Establishing background arrangements, supportive networks and beneficial framework conditions for implementation are critical to the strengthening of coherence between CCA and DRR. This highlights the importance of bringing actors together, connecting each other’s formats, and being involved in each other’s activities. To achieve this, several important gaps need to be taken into account.

This report highlights that climate risks can become politically charged and conflict-riddled (see [4.3.1](#)), while at the same time there is limited information about the reasons behind actors having certain roles in their network or interacting in certain ways (see [4.3.2](#)). While there are many models to learn from, the actual event may differ significantly, so improvisation will be necessary, to a certain extent (see [4.3.3](#)). In addition, many existing collaborative structures may not be adequately developed, so their ability to develop sufficient responses will be hindered (see [4.3.4](#)). These structures also depend heavily on the governance system of the respective national states.

Additional gaps are (i) stronger coherence between the Paris Agreement and SFDRR (i.e. policy indicators and implementation, see UNDRR, 2019: 30f.), more specifically (a) institutional coherence between sectors, (b) systemic coherence between abstract CCA and concrete DRR ideas, and (c) transnational coherence between national- and local levels (Albris/Zuccaro, 2018: 8), (ii) addressing and involving private actors in risk precaution (UNDRR, 2019: 58, 62), (iii) a comprehensive strategy for reaching the public with the proper messages (Zuccaro *et al.* 2018: 23), and (iv) understanding how behaviour and choice transfers to individual and collective accountability for risk creation, or reduction.

This is relevant because coherence is essential to any attempt at institutional strengthening of CCA and DRR (Jernberg 2019: 12f.). Many CCA and DRR policies are still not effectively in place in many countries and relatively few concrete measures exist on the ground, so there is a clear need for more international cooperation on climate risk prevention and preparedness (ibid.: 13). The quality of national-level planning and coordination activities in DRR and CCA is crucial for the coherence of the entire prevention and preparedness system (ibid.: 14).

In addition, the public is often unaware of their own vulnerabilities, meaning they do not actively support CCA or DRR action (Albris/Zuccaro 2018: 13), a factor which is partly aggravated by scepticism about the veracity of online information and news (Zuccaro *et al.* 2018: 23).

To succeed, national governments should engage public authorities through social media to overcome public scepticism around official information, to raise awareness, and to increase individual risk preparedness. In addition, they need to develop a coherent public relations strategy. National governments need to address the issues of institutional and systemic coherence between CCA and DRR throughout their respective levels of governance. National climate risk coordination platforms are a positive example, and Social Network Analysis is a promising tool to identify relevant stakeholders for such formats (see [4.3.2](#)). Furthermore, a way forward can be the mainstreaming of CCA and DRR, and its integration into existing transnational and interregional working groups, or setting up such a working group with focus on a risk or geographic area of mutual concern (see [4.3.1](#)). National governments also need to test their early warning systems and joint disaster prevention models in order to assess their effectiveness in cases of serious emergencies (see [4.3.3](#)). Decision-makers need to be shown the consequences of their inaction. EU-institutions need to further align strategies developed in the post-2015 framework of international agreements, thereby providing concrete indicators addressing the institutional, systemic, and transnational CCA/DRR coherence (see [4.3.4](#)).

6.4 Sharing new forms of communication

Improved communication encourages the various stakeholders to interact and exchange knowledge. Creating a basis for common understanding is critical, as developing a 'shared language' or standardised methods or indicators are repeatedly described as a vital challenge to integrated CCA and DRR approaches.

This report highlights that generating a common understanding is resource-consuming at the very beginning and it will take time to generate trust and relationships between actors from diverse institutions (see [4.4.1](#)). Stories and strategic narratives can facilitate this process but their success depends heavily on the audience value orientations. Values are often hidden and difficult to change in the short-term (see [4.4.2](#)). As a result, no one-size-fits-all solution can be expected (see [4.4.3](#)).

Additional gaps are (i) a shared language and understanding between actors involved in CCA and DRR, both among experts and non-experts, (ii) a disappearing local knowledge base, particularly in rural municipalities, sometimes aggravated by the privatisation of utilities and critical infrastructure.

This is relevant because these gaps have created many diverse terminologies for both DRR and CCA, and varying views on how integration should be pursued (Albris/Zuccaro 2018: 8f.). Municipalities in particular face a knowledge drain through rural outmigration and demographic change, so local risk prevention knowledge, based on centuries of weather experience, which often manifests in traditional, simple but highly effective measures, might get lost. In addition, when utilities are privatised, official, public reports are replaced by confidential consultants reports and knowledge of municipalities can then be lost. Massive investment is needed to re-establish such data (ibid.: 10f.).

To succeed, a shared understanding of the current monitoring, reporting and evaluation (MRE) approaches, and indicators and criteria used in CCA, DRR and SDG is an important starting point. MRE needs to be connected at different levels of CCA and DRR policy and action implementation (international, European, national, sub-national, local), thereby the objectives of MRE and the relevance of different indicators vary across different levels of governance (see [4.4.1](#)). Strategic narratives can be useful for national and local policymakers to overcome communication and collaboration barriers that cannot be just handled by “rational means” such as traditional science-based information and data (see [4.4.2](#)). For mainstreaming integrated CCA and DRR approaches, informal learning can be as beneficial as formal training in strengthening an institution’s capacity, particularly when new measures or policies need to be implemented (see [4.4.3](#)). To prepare future generations of policy makers, researchers and practitioners for the necessary interdisciplinary approaches to climate risks, universities and other institutions for higher education may respond by offering additional interdisciplinary programmes. Currently, most universities still only offer programmes with a focus on either CCA or DRR. Collaboration between universities and organisations such as UN agencies, the Red Cross/ Red Crescent movement, NGOs and national authorities should be stimulated to ensure the graduates meet the evolving requirements regarding knowledge and skills.

Data availability, quality, accessibility, application

A specific challenge for improved communication is the lack of a sound data basis. Because this aspect is highlighted repeatedly throughout current reports and entails many consequences for action, we address it separately in this subsection.

This report highlights that data gaps may hinder effective financing (see [4.2.1](#), [4.2.2](#), [4.2.4](#)) and cooperation (see [4.3.2](#)), especially on the local scale (see [4.1.4](#)).

Additional gaps are (i) a lack of available high-quality and high-resolution digital data for simulations (UNISDR GAR 2019: 95 f.), (ii) a lack of climate change data at local levels (Albris/Zuccaro 2018: 11), (iii) development of a central and accessible knowledge management platform and risk assessment system for CCA and DRR with a balanced combination of scientific and local knowledge, good practices, natural and social scientific data, and risk information, (iv) risk assessments are often based on material hazards only, excluding social and psychological forms of vulnerability, (v) a lack of a common methodology and shared standards for data collection, analyses and assessments; particularly in (a) advanced simulations, (b) interdisciplinary research, (c) enhanced data management, (d) co-creation of knowledge, (d) communication & dissemination platforms (Zuccaro *et al.* 2018: 17), (vi) a lack of indicators methodologies for monitoring and evaluation (Albris/Zuccaro 2018: 13).

This is relevant because gaps in data and knowledge limit governments’ ability to act and effectively communicate with the public on reducing risk (UNISDR GAR 2019: 16) and may create uncertainty for decision-makers and key actors throughout all sectors and levels of governance. Solely hazard-based assessments are not adequate to address the challenges outlined earlier (Albris/Zuccaro 2018: 12) but since climate change cannot be assessed in a linear or predictable manner, future climate risk assessments need to take a significant leap forward (Jernberg 2019: 12). However, the outcome of these assessments will only be as good as the quality of input data, and the lack of methodological standards represents a weakness in the whole CCA/DRR governance process, not least because CCA and DRR are not at the forefront of the political agenda.

To succeed, national governments need to support their respective reporting institutions with a data recording framework that not only matches UN reporting standards but also prevents time-consuming and difficult assessment procedures. This encompasses the clear definition of terms, such as 'disaster'. The models, methodologies and data used for conducting the National Risk Assessments must be improved and strengthened. EU-institutions need to make resources available (potentially through the SDG architecture) to national governments seeking to redress data and capacity gaps. A comprehensive European overview about DRR strategies or National Risk Assessments is not yet available, therefore it should be tackled by, for example, the Disaster Risk Management Knowledge Centre (DRMKC). Research should continue collaboration under the Global Flood Partnership in order to effectively close data gaps and identify further research needs.

6.5 Enhancing knowledge management

Proper tools for knowledge management can produce a "new collective knowledge" by capitalising on the diverse knowledge available, for example by sharing and transferring knowledge, tools, and good practice examples. For example, sustainable management of natural ecosystems as well as their restoration and preservation are increasingly perceived as effective tools in addressing societal challenges including climate change, increasing resilience to natural disasters, food and water security, health, and economic and social development (Cohen-Shacham *et al.* 2016). However, several gaps remain and need to be addressed.

This report highlights that good Information and Knowledge Management (IKM) optimises the value and utility of the intellectual resources produced by an organisation or community of research or practice. Good IKM processes connect relevant knowledge, promote awareness and a shared understanding of the meaning ascribed to particular terms, and can link different communities and knowledge domains. Transformational IKM that is using taxonomies more extensively, working towards shared ontologies, Linked Open Data and knowledge graphs could, for example, support the tracking of progress on climate change action (for example, see [4.4.1](#)). Nature-based Solutions (NbS) bring many associated co-benefits for human well-being and biodiversity, but they remain a complex issue with many uncertainties since they are highly diverse and context-specific (see [4.5.1](#)). In CCA and DRR, the lack of clarity around language and the use of technical terminology is a particular barrier to collaboration. Internationally this is further inhibited by complications arising from translation into different languages. This remains a challenge due to the diverse and heavily nuanced definitions used for terms, particularly those that benefit from buy-in from society such as 'resilience'. Addressing disparities in the use of terms directly risks losing these nuances, many of which are valuable to ongoing debate (see [4.5.2](#)). Knowledge platforms could facilitate these challenges, but would require a cultural shift in how knowledge management is currently carried out (see [4.5.3](#)). Such approaches, however, can entail high costs for participants, particularly in terms of financial, human, and time resources, and integrating different knowledge systems across spatial-temporal scales requires concerted action for capacity and skills development (see [4.5.4](#)).

Additional gaps are (i) knowledge as to whether efforts in awareness raising, such as knowledge sharing and information campaigns, have actually had any impact on behaviour, (ii) an understanding to which degree targeted information is useful to help specific vulnerable groups (Jernberg 2019: 12), (iii) knowledge about how thorough or inclusive national risk assessments are (Tuhkanen *et al.* 2019: 36), (iv) international tools for knowledge management often need to deal with information that is only available in local languages.

This is relevant because the effective use of tools for knowledge management critically relies on being able to guarantee standards in the assessment of knowledge, monitoring impacts and assessing the needs of the target audience.

To succeed, international level actors such as the European Commission Directorates, the United Nations, the IPCC Working Groups and global portals such as PreventionWeb and weADAPT have to be involved. On a European level, actors such as the UNDRR Open-Ended Working Group on Terminology, the Disaster Risk Knowledge Management Centre (DRMKC) and Climate-ADAPT, and adaptation and risk reduction portals on the national and sub-national level need to play a leading role. These should bring on board donors and funders, the academic and practitioner communities and associated organisations and institutes; the public sector, including regional and national Government offices and ministries; private sector entities; programmes and projects producing and sharing relevant knowledge and information/ data. When realising measures, monitoring and adaptive management are required from the implementation stage onwards (Cohen-Shacham *et al.* 2019, Nesshöver *et al.* 2017, Raymond *et al.* 2017a). Experience shows that cross-sectoral collaboration, capacity building, institutional strengthening, incentive or financial instruments are needed for a successful acceptance

and implementation of Nature-based Solutions (NbS) at large scale (see [4.5.1](#)). To monitor and assess the effectiveness of NbS, integrated methods that simultaneously evaluate benefits and costs across its multi-directional effects (economic, socio-cultural and environment) and across several geographic and temporal scales is required (Calliari *et al.* 2019, Raymond *et al.* 2017a, Raymond *et al.* 2017b). The dynamic nature of ecosystems should be considered under future climate and socio-economic conditions (Calliari *et al.* 2019). In addition, development and promotion of a transformation in Information and Knowledge Management standards and guidelines are recommended. These can use a common language and support a cultural shift towards Linked Open Data (LOD), so that online content can be subjected to more sophisticated searches (Bauer and Kaltenböck, 2012, Bauer and Kaltenböck, 2016) and accelerate learning (see [4.5.2](#)). Knowledge portals and platforms have an opportunity to actively support such learning and collaboration (Barrott and Bharwani 2018a, see [4.5.3](#)). The use of a shared and well-described terminology is essential for connecting relevant knowledge, promoting awareness and understanding of the meaning ascribed to particular terms, and for supporting communication and connection between these fields. Building and legitimately translating a shared terminology that acknowledges and connects the varied terms and definitions used today is a significant undertaking, and one that requires support from an equally varied array of actors. Developing knowledge-action networks with multiple layers of producers and users from different sectors is an effective method of tailoring decision-relevant information to different decision environments, and of allocating resources where they are most effective to bridge science and practice and integrate CCA and DRR strategies (see [4.5.4](#)).

6.6 Transformative approaches in CCA and DRR

This chapter refers to the multidimensional nature of interrelating climate and disaster risks, which require “systemic approaches, that seek to understand the nature of interacting systems and adopt integrated risk governance” (UNDRR, 2019: 420). Addressing these complex issues is important because some aspects of integrated CCA and DRR governance require complex actions and fundamental considerations, for example to include “non-climate-related natural and manmade hazards and risks (especially geophysical and biological, technological and environmental), as well as cascading and systemic risks, including possible amplifying effects of climate change” (UNDRR, 2019: 382). In addition to the increased level of complexity, developing responses to both natural and anthropogenic disasters has changed the array of involved networks and actors significantly (Zuccaro *et al.* 2018: 23). Below we outline which consequences arise from this context and how they could be addressed.

This report did not cover recommendations or knowledge gaps regarding transformative CCA or DRR.

Additional gaps are (i) a ‘transformative’ approach to integrated CCA and DRR governance is due, comprising a systemic, anticipatory, socially inclusive long-term perspective; for example complex ‘whole-community approaches’, that issue risk preparedness at the intersection between social and ecological vulnerabilities, (ii) research into the multiple benefits of resilience policies is due, for example, how it influences the daily lives of communities in terms of healthcare, heritage and culture protection, energy services etc. (Zuccaro *et al.* 2018: 21f.), (iii) expanding the knowledge on systemic transitions through several overarching adaptation options in rural and urban areas (UNDRR, 2019: 367), (iv) build-back-better strategies are needed that call for introduction of

different design values (for example, human health, cultural heritage, security and safety, climate agencies, etc.) to develop and explore new and innovative solutions, (v) transboundary crisis management is needed, for example, involving emergency response system cooperation beyond the governmental level, (vi) the dynamic, multidimensional nature of interrelating risks in urban areas requires systemic approaches, that adopt integrated risk governance that is adapted to the local context (UNDRR, 2019: 420).

This is relevant because short-term political cycles focus attention on short-term action. This mismatches with the need for thinking long-term for building-back-better, prevention, protection and adaptation (Albris/Zuccaro 2018: 13). More specifically, systemic approaches help avoid ineffective and inefficient action, communication and cooperation. Decisions at the local level are often delayed in a ‘wait and see’ approach and proactive action is not taken (*ibid.*: 11).

To succeed, research should develop a central and accessible knowledge management platform and risk assessment system for CCA and DRR, with a balanced combination of scientific and local knowledge, good practices, natural and social scientific data, and risk information. National governments need to redesign funding schemes and mechanisms to support coherent CCA and DRR solutions, and encourage cooperation and coordination for efficient use of financial resources (UNDRR, 2019, p. 364). In addition, they need to develop a proactive approach that includes different stakeholders, in line with their skills and resources (including for example, multi-stakeholder platforms, technical tables, think tanks etc.), and provide means for active engagement with authorities for the implementation of national and local strategies, and plans for DRR and CCA (Zuccaro *et al.* 2018: 19).

EU institutions need to consider that holistic and integrated strategies are critical to better integrating the Sendai Framework, the 2030 Agenda, the Paris Agreement and the New Urban Agenda (Jernberg 2019: 14). Hence CCA, DRR and SDG must be integral and integrated components, as a comprehensive approach to adaptation and resilience.

It is important to note that there are already moves to confront the complex nature of climate risks. For example, the CCA community has begun to focus on the existing adaptation deficit and the move towards enabling and empowering concrete action – beyond mere problem definitions – and acknowledges that learning from implementation is helpful. The development of comprehensive CCA and DRR policies can be seen as a continuum of change, where first steps have been taken and the soil is fertile for further, more profound action. It is in this light that we position our recommendations, as briefly summarised below.

Overall, this study concludes that CCA-DRR institutional strengthening goes beyond the creation or re-formulation of institutions, but it is rather a long-term learning process that requires extensive levels of exchange on practices and experiences. The recommendations put forward in this report require a degree of policy commitment that may be difficult to attain in the short term, but that should be encouraged and facilitated in Europe through targeted research, innovation and capacity-building training actions.

List of acronyms

Acronym	Full spelling		
CAP	Common Agricultural Policy	DLT	Distributed Ledger Technologies
CBI	Climate Bond Initiative	EBRD	European Bank for Reconstruction and Development
CCA	Climate Change Adaptation	EC	European Commission
CCRIF	Caribbean Catastrophe Risk Insurance Facility	Eco-DRR	Ecosystem-based approaches to disaster risk reduction
CIF	Climate Insurance Funds	EbA	Ecosystem-based Adaptation
CoP	Community of Practice	EEA	European Environment Agency
CRM	Climate Risk Management	EIB	European Investment Bank
DG	Directorate General	EFSF	European Financial Stability Facility
DG CLIMA	Climate Action	EFSM	European Financial Stability Mechanism
DG ECHO	European Civil Protection and Humanitarian Aid Operation	ERTM	European Risk Transfer Mechanism
DG JRC	Joint Research Centre	ESPRESSO	Enhancing Synergies for disaster PRevention in the EurOpean Union
DG R&I	Research and Innovation	ETC/CCA	European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation
DRMKC	Disaster Risk Management Knowledge Centre	EU	European Union
DRR / DRM	Disaster Risk Reduction / Disaster Risk Management		

EUCPM	EU Civil Protection Mechanism	OECD	Organisation for Economic Co-operation and Development
EUSAIR	EU Strategy for the Adriatic and Ionian Region	PA	Paris Agreement
EUSALP	EU Strategy for the Alpine Region	PLACARD	PLAtform for Climate Adaptation and Risk reDuction
EUSBSR	EU Strategy for the Baltic Sea Region	PPRR	Prevention – Preparedness – Response – Recovery
EUSDR	EU Strategy for the Danube Region	SDGs	Sustainable Development Goals
FbF	Forecast-based Financing	SFDRR	Sendai Framework for Disaster Risk Reduction
GAR	Global Assessment Report	SI	Sovereign Insurance
GGA	Global Goal on Adaptation	SIF	Sovereign Insurance Fund
H2020	Horizon 2020	SMEs	Small- and Medium-sized Enterprises
ICMA	International Capital Market Association	SNA	Social Network Analysis
IUCN	International Union for Conservation of Nature	UN	United Nations
IKM	Information and Knowledge Management	UNCCS	United Nations Climate Change Secretariat
IPCC	Intergovernmental Panel on Climate Change	UNDP	United Nations Development Program
LOD	Linked Open Data	UNEP	United Nations Environment Programme
LnD	Loss and Damage	UNFCCC	United Nations Framework Convention on Climate Change
MRE	Monitoring, Reporting, Evaluation	UNISDR/UNDRR	United Nations international Strategy for Disaster Reduction/United Nations Office for Disaster Risk Reduction
NAP	National Adaptation Plan	WEF	World Economic Forum
NAS	National Adaptation Strategy		
NbS	Nature-based Solutions		
NDCs	Nationally Determined Contributions		
NHMS	National Hydro-Meteorological Service		
NRA	National Risk Assessment		



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Glossary

CaTBonds: are risk-linked securities that transfer a specified set of risks from a sponsor to investors. They were created and first used in the mid-1990s in the aftermath of Hurricane Andrew and the Northridge earthquake.

Catswap: financial instrument that serves as an alternative to the classic insurance where the insurer pays a third party to assume the financial risk of a defined major natural disaster in exchange of a payment or series of payments (Medium).

Climate Change Adaptation (CCA): This report uses the IPCC WGII definition “The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects” (IPCC, 2013).

Climate Risk Management (CRM): A combination of increasing vulnerability and risk of weather-related hazards are expected to result in more extreme events and disasters. Climate risks have significant effects and thus CRM includes all measures to reduce the impacts from climate risks, and associated climate change.

Disaster Risk Reduction (DRR): This report used the UNISDR definition “the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events” (UNISDR, 2009). This concept differs from Disaster Risk Management (DRM) insofar as the “policy objective of anticipating and reducing risk is called [...] [DRR, while DRM] can be thought of as the implementation of DRR, since it describes the actions that aim to achieve the objective of reducing risk” (Preventionweb after UNISDR, 2015).

Mainstreaming: refers to the integration of climate change adaptation into related government policies in several sectors. [Mainstreaming](#) [...] could in addition to adaptation also cover mitigation [...]. Mainstreaming means that adaptation to climate change will be directly brought in when sustainable development planning is undertaken, and in the development of sector policies. Adaptation would then not be 'added' through dedicated policy instruments. Mainstreaming can also involve setting up institutional or organisational structures, or designing and implementing projects in a way that they 'automatically' take adaptation into account. The assumption of mainstreaming is that a project or policy has a goal – related to for example mobility, population well-being or health care – and that the sustainability and impact of the initiative can be increased by taking into account potential climate change impacts."

Linked Open Data (LOD): a vision of globally accessible and linked data on the internet. This provides an open environment where data can be created, connected and consumed on an internet scale. The assumption is that data has more value if it can be connected to other data. Data, in this context, is any structured web-based information.

7. Annex

7.1. A shortlist of events organised and attended by the PLACARD project team

Table 1: List of events relevant for the development of this Milestone report				
Event	Date	Location	PLACARD Partners involvement	Main goal of the event
ECCA 2015 Session: What do have climate change action and disaster risk management in common? Explore it!	12–14 May 2015	Copenhagen, Denmark	EAA (Organiser of session), FFCUL, UOXF, UFZ, RCCC	Presentation of PLACARD and exchange with stakeholders from JRC and UNISDR. Relevant output and knowledge gained from the project know4drr for PLACARD were assessed
Conference: Our common future under climate change Session: CCA and DRR: international and urban approaches	7–10 June 2015	Paris, France	EAA (Organiser of session), FFCUL, RCCC, UFZ	Explore experiences at different governance scales on how CCA and DRR are implemented as well as how they are mainstreamed or mismatched
PLACARD Connecting CCA – DRR workshop	19–20 April 2016	Brussels, Belgium	UOXF (Organiser Partner), FFCUL, SEIO, RCCC, UFZ, ALTERRA	Consultation with policymakers and networks from across Europe to consider how to better integrate CCA DRR in both policy and practice and what could be the role of PLACARD

Event	Date	Location	PLACARD Partners involvement	Main goal of the event
Adaptation Futures. Two sessions: How to integrate Climate Change Adaptation and Disaster Risk Reduction policy and practice at different governance scales	10–13 May 2016	Rotterdam, The Netherlands	FFCUL and UNIGE (organisers of session 1); FFCUL and EAA (organisers of session 2)	Focus on the processes to enable collaboration between CCA and DRR at different government levels
Understanding Risk Conference. Side event: Learning across communities of practice: risk assessment for disaster risk reduction and climate risk management Technical Session: Climate extremes and economic derail	16–20 May 2016	Venice, Italy	CMCC (organiser of the side event and technical session), EAA, UFZ	Collaboration with the project ENHANCE and JRC covering the topics including environmental risk, economic risk and impact analysis, risk management and institutional challenges
Session on Climate Change Adaptation on the DRMKC 2nd Annual Scientific Seminar	9–10 March 2017	Rome	FCID (co-organisation of the session with DG CLIMA)	Discuss the relevance of CCA for DRR. Opportunity to increase awareness within DRMKC network
Stakeholder Workshop on the Strategy on adaptation to climate change	5 April 2017	Brussels	FCID, EAA	Participation in the discussion and on the evaluation process
Sessions at ECCA 2017: Guidance for EU and national bodies in identifying options for innovative solutions to increase resilience Integration of climate change adaptation (CCA) and disaster risk reduction (DRR) at the European and national level, 4	6–9 July 2017	Glasgow	ALTERRA (session 2), FCID (session 1 in collaboration with H2020 projects RESIN, EU-CIRCLE, RESCCUE and BRIGAD), 2) EAA (session 3 in collaboration with EEA)	Opportunity to explore a few relevant issues in a major conference
PLACARD Workshop: Joining forces	24 October 2017	Brussels	EAA (main organiser), FCID, RCCC, SEIO, WERN	To support and boost CCA and DRR institutional strengthening efforts
CCA and DRR 1st ESPRESSO Think Tank Meeting	12 October 2017	Berlin	FCID, UFZ, EAA	Participation in the discussions

Event	Date	Location	PLACARD Partners involvement	Main goal of the event
2nd Stakeholder Workshop for the EU Adaptation Strategy	23 January 2018	Brussels	EAA	Participation in the discussion and on the evaluation process
Working group 6 on Climate Change Adaptation	24 January 2018	Brussels	EAA	Break-out group work was carried during a meeting of the Working group 6 on adaptation under the Climate Change Committee, with representatives from EU Member States focusing on the interface between CCA and DRR
6th European Civil Protection Forum. Session: Bridging climate change adaptation and disaster risk reduction to scale up prevention	5–6 March 2018	Brussels	EAA (co-organisation of the sessions with DG CLIMA), FCID	Discuss the relevance and increase the awareness of CCA for DRR in a major forum in Civil Protection
Expert workshops on National Climate Change Impacts and Vulnerability Assessments and the EIONET workshop 2018	5–7 June 2018	Copenhagen	EAA contributing	Contributions from the European Environment Agency (EEA) and EEA Member countries supported the guidance development
ECCA 2019 Session: Supporting and further strengthening institutional coordination between and capacity of CCA and DRR communities – Recommendations and ways forward	29 May 2019	Lisbon	EAA	To showcase and test draft recommendations arising from the PLACARD guidance document – testing of four recommendation with target audience
European Urban Resilience Forum	25 May, 2019	Bonn	UFZ	Participation in the discussion
10th Global Forum on Urban Resilience	26–28 May, 2019	Bonn	UFZ	Participation in the discussion
18th Joint Seminar of the European Association of Law and Economics and the Geneva Association	13–14 June, 2019	Milan	UFZ	Participation in the discussion

Event	Date	Location	PLACARD Partners involvement	Main goal of the event
OECD-PLACARD workshop. Investing in infrastructure: costs, benefits and effectiveness of disaster risk reduction measures 2019	18–19 September 2019	Paris	EAA contributing	Contributions from PLACARD and OECD Member countries supported the guidance development
Partnership of European Environmental Research (PEER): Multi-Hazard/Multi-Risk-Workshop	14–16 October, 2019	Copenhagen	UFZ	Participation in the discussion (specially coherence with sustainable finance)
Roundtable organised by DG ECHO and UNDRR. Finance for disaster risk reduction – Boosting public-private sector cooperation	24 October, 2019	Brussels	UFZ	Participation in the discussion
Innovations by nature	15–16 November, 2019	Kyiv	UFZ	Participation in the discussion (specially coherence with sustainable finance)
PLACARD 1st Legacy Dialogue	28 May, 2019	Lisbon	SEI (organiser), FC.ID, SEIO, UOXF, EAA, UFZ, CMCC	Focus on scoping possibilities with team members, stocktaking important activities or milestones, and strategising with key stakeholders, projects and programmes
OECD–PLACARD Conference: Adapting to a changing climate in the management of wildfires	16–17 January, 2020	Paris	FC.ID, EAA	This conference provided an opportunity for participants to discuss current science and policy gaps that need to be addressed to accelerate actions for resilience against wildfires. It also provided an opportunity for participants to share good practices and different country experiences

7.2. Template for recommendations

The structure of each recommendation is designed following a common framework:

i. Title

- Short title + Prepared by author(s) and institution(s).

ii. Recommendation (max. 40 words)

- Formulated as an advice (imperative).
- Answering as precise as possible: What needs to happen in order to strengthen CCA/DRR institutional coordination and capacity?

iii. What and why (max. 500 words)

- Define how you understand your terms used by using references.
→ **Key question:** What is/ how do you understand “scientific term”?
- Explain how/why this topic is relevant to institutional strengthening in the CCA/DRR context, ideally by referring to the goals of the report.
→ **Key question:** Why/how is this relevant?
- Explain the added value for your target group. You may add an example that proves the need for your recommendation.
→ **Key question:** Which institutions can potentially use this recommendation and how?
- Discuss limitations of your recommendation, e.g. needs to be adapted to the specific context; may not work in federal systems; resource intensive; not a solution for the local level; scientifically/ politically contested; trade-offs with a certain measure.

iv. How (max. 200 words)

- Showcase a possible/inspiring/innovative pathway and how it further increases cooperation between and capacity of respective institutions.
- Show how CCA/DRR interact more effectively in this case.
- Explain what support is/would be necessary, which synergies are used; show also the success factors of this approach.

v. Who (max. 200 words)

- Explain which actors/institutions are addressed for implementation and what is their responsibility
→ **Key question:** Which key actors at which level, which organisations/institutions are best suited to put the recommendation into practice, to initiate or take part in the process/working group/etc.?
- Show who benefits (relevant target group) in which way.

vi. Example/good practice (max. 500 words)

- Title + Introduce an inspiring example that shows how your recommendation can work in practice, highlighting the benefits for your target group (what were the goals, how were they reached, who did what, how did the situation improve – use ‘poor practises’ according to your own estimation of usefulness).
- Showcasing that/how current barriers/challenges can be overcome.
→ **Key question:** Why is it a good example?
- Provide resources, like links to further information, sources, and material.



Bonding CCA and DRR: recommendations for strengthening institutional coordination and capacities

Markus Leitner, Daniel Buschmann, Tiago Capela Lourenço, Ingrid Coninx and Anna Schmidt

Work Package 4 – institutional strengthening

Task 4.2 – Elaborate guidelines to strengthen CCA and DRR institutional coordination and capacity (Deliverable 4.2)

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