AUSTRIA


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<td>Austrian Assessment Report 2014</td>
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<td>ADA</td>
<td>Austrian Development Agency</td>
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<td>APCIP</td>
<td>Austrian Programme for Critical Infrastructure Protection</td>
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<tr>
<td>ARGE ALP</td>
<td>Arbeitsgemeinschaft Alpenländer - Working Group of Alpine Countries</td>
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<td>ARISE</td>
<td>Adaptation and Decision Support via Risk Management through Local Burning Embers</td>
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<td>ASDR</td>
<td>Austrian Strategy for Disaster Risk Reduction</td>
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<tr>
<td>BBK</td>
<td>Deutsches Bundesamt für Bevölkerungsschutz und Katastrophenhilfe - Federal Office of Civil Protection and Disaster Assistance of Germany</td>
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<tr>
<td>BEAM</td>
<td>Basic European Asset Map</td>
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<tr>
<td>BKA</td>
<td>Bundeskanzleramt - Federal Chancellery of the Republic of Austria</td>
</tr>
<tr>
<td>BMBWF</td>
<td>Bundesministerium für Bildung, Wissenschaft und Forschung - Federal Ministry of Education, Science and Research</td>
</tr>
<tr>
<td>BMEiA</td>
<td>Bundesministerium für Europäische und internationale Angelegenheiten - Federal Ministry of European and International Affairs</td>
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<tr>
<td>BMF</td>
<td>Bundesministerium für Finanzen - Federal Ministry of Finance</td>
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<tr>
<td>BMI</td>
<td>Bundesministerium für Inneres - Federal Ministry of the Interior</td>
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<tr>
<td>BMK</td>
<td>Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie - Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology</td>
</tr>
<tr>
<td>BML</td>
<td>Bundesministerium für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft - Federal Ministry of Agriculture, Forestry, Regions and Water Management; formerly BMLRT until June 2022</td>
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<tr>
<td>BMLRT</td>
<td>Bundesministerium für Landwirtschaft, Regionen und Tourismus - Federal Ministry of Agriculture, Regions and Tourism; since June 2022 BML</td>
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<td>BMLV</td>
<td>Bundesministerium für Landesverteidigung - Federal Ministry of Defence</td>
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<tr>
<td>BMSGPK</td>
<td>Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz - Federal Ministry of Social Affairs, Health, Care and Consumer Protection</td>
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<tr>
<td>BOKU</td>
<td>Universität für Bodenkultur Wien - University of Natural Resources and Life Sciences</td>
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<tr>
<td>CCA</td>
<td>Climate Change Adaptation</td>
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<tr>
<td>CESARE</td>
<td>Collection, Standardization and Attribution of Robust Disaster Event Information</td>
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<td>CRM</td>
<td>Climate risk management</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>D-A-CH</td>
<td>Germany, Austria, and Switzerland</td>
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<td>DCNA</td>
<td>Disaster Competence Network Austria</td>
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<tr>
<td>DIN</td>
<td>Deutsches Institut für Normung - German Institute for Standardisation</td>
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<tr>
<td>DM</td>
<td>Disaster management</td>
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<tr>
<td>DRM</td>
<td>Disaster risk management</td>
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<td>DRR</td>
<td>Disaster risk reduction</td>
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<td>EUSALP</td>
<td>EU Strategy for Alpine Countries</td>
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<td>EUSDR</td>
<td>EU Strategy for the Danube Region</td>
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<tr>
<td>FFG</td>
<td>Österreichische Forschungsförderungsgesellschaft - Austrian Research Promotion Agency</td>
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<td>FGD</td>
<td>Focus group discussion</td>
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<tr>
<td>GBA</td>
<td>Geologische Bundesanstalt - Geological Survey of Austria</td>
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<td>GECKO</td>
<td>Gesamtstaatliche Covid-Krisenkoordination - National Crisis Coordination Office for COVID-19</td>
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<tr>
<td>GFDRR</td>
<td>Global Facility for Disaster Reduction and Recovery</td>
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<tr>
<td>HORA</td>
<td>Natural Hazard Overview &amp; Risk Assessment Austria</td>
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<tr>
<td>IIASA</td>
<td>International Institute for Applied Systems Analysis</td>
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<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<tr>
<td>KATWARN</td>
<td>Derived from “Katastrophe” (disaster) and “Warnung” (warning); name of an app that informs end-users if they are at risk, based on their location</td>
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<tr>
<td>KLAR!</td>
<td>Klimawandel-Anpassungsmodellregionen - Model Regions for Climate Change Adaptation</td>
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<tr>
<td>KLIEN</td>
<td>Klima- und Energiefonds - Climate and Energy Fund</td>
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<tr>
<td>KRITIS</td>
<td>Kritische Infrastrukturen - Critical Infrastructures</td>
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<tr>
<td>LGBTQ+</td>
<td>Lesbian, gay, bisexual, transgender, queer, plus other sexual and gender identities</td>
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<tr>
<td>MSS</td>
<td>MacroSeismic-Sensor Network</td>
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<tr>
<td>MTR</td>
<td>Mid-Term Review; this term refers to the Sendai Framework Mid-Term Review</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
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<tr>
<td>ÖBFV</td>
<td>Österreichischer Bundesfeuerwehrverband - Austrian Federal Firebrigade Association</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>ÖREK</td>
<td>Österreichisches Raumentwicklungskonzept - Austrian Spatial Development Concept</td>
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<td>ÖROK</td>
<td>Österreichische Raumordnungskonferenz - Austrian Spatial Planning Conference</td>
</tr>
<tr>
<td>OEZA</td>
<td>Österreichische Entwicklungszusammenarbeit - Austrian Development Cooperation</td>
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<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>PLFRA</td>
<td>Property-level flood risk adaptation measures</td>
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<td>RESPECT</td>
<td>Rollen und Verantwortlichkeiten im Klimarisikomanagement in Österreich - Responsibility and Risk: Operationalizing comprehensive climate risk layering in Austria</td>
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<tr>
<td>SKKM</td>
<td>Staatliches Krisen- und Katastrophenmanagement - National Emergency and Disaster Management</td>
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<td>UBA</td>
<td>Umweltbundesamt - Environment Agency Austria</td>
</tr>
<tr>
<td>UNDRR</td>
<td>United Nations Office for Disaster Risk Reduction</td>
</tr>
<tr>
<td>UR</td>
<td>Understanding Risk Conference</td>
</tr>
<tr>
<td>VVO</td>
<td>Verband der Versicherungsunternehmen Österreich - Association of Insurance Companies Austria</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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<tr>
<td>WLV</td>
<td>Wildbach- und Lawinenverbauung - Torrent and Avalanche Control</td>
</tr>
<tr>
<td>WMO</td>
<td>World Meteorological Organisation</td>
</tr>
<tr>
<td>ZaB</td>
<td>Zentrum am Berg</td>
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<tr>
<td>ZAMG</td>
<td>Zentralanstalt für Meteorologie und Geodynamik - National Institute for Meteorology and Geodynamics</td>
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1. Highlights and Introduction

1.1 Executive Summary / Highlights

Figure 1 displays the most mentioned topics within this report. The size of the terms indicates the respective importance due to its number of entries.

Retrospective View

- Compared to the number of extremes and hazards, the number of fatalities is very low in Austria.

- A fundamental basis of Austria’s DRR approach is the investment in protective measures and the pronounced voluntary structures of emergency services (with around 400,000 volunteers). The continuous implementation of the national emergency and disaster management (SKKM) structures and strategies are perceived, in general, as well functioning. Lately, a paradigm shift can be observed - strengthening resilience rather than just protecting people and putting more focus on risk governance than ‘just’ managing risks. [3.1. A]

- The awareness for and the assessment of vulnerability and integrated risk has been improved and a number of research results as well as assessments in the context of several directives (e.g. the EU flood directive) are available. However, systematic risk assessments are not yet available for different spatial levels and hazards. [3.2. B]

- The COVID-19 pandemic unveiled the interrelations between risk drivers and their cascading effects and challenged the existing risk governance and emergency managing systems. [3.2. B]
- An increase in collaboration taking marginalised groups into account has been perceived. However, to include vulnerable groups in all stages and on all levels of the disaster risk management process remains a challenge. [3.2. B]
- Tools that support local communities to participate in and guide their own risk assessments such as the ‘natural hazard and climate change check’ and the local KLAR! model regions for climate change adaptation have been successfully implemented. However, local communities are also facing challenges, especially to raise awareness and acceptance of prevention measures. Challenges remain in terms of facilitating communication and dealing with short lead times of warnings. [3.2. B]
- In general, risk governance and procedures have not changed significantly within Austria during the last 15 years. However, it can be observed that actors are increasingly collaborating and exchanging information. [3.2. C]
- Strategies for disaster risk reduction have been implemented on all levels: On the national level, measures include, for instance, conducting an expert-based national risk assessment according to EU requirements, the development of new laws for crises and climate change adaptation, as well as the implementation of COVID-19 regulations. On the federal states level, the introduction of new laws, subsidies and the adaptation of existing plans and strategies is taking place, e.g. regarding flooding and wildfires. [3.3. C]
- Austria invests around € 400M per year in natural hazard prevention (according to records of the Torrent and Avalanche Control (WLV), federal investments regarding structural measures have increased from € 89.5 million to € 103.4 million since 2015). In terms of climate change adaptation, increasing investments are expected regarding adaptive measures through to a shift in priorities within the federal budget, as damage costs are predicted to increase in the upcoming years. In terms of non-structural measures, the WLV completed the analysis and mapping of hazards in 2015 for all municipalities that are to be mapped. [3.4. D]
- Over the last years, preparedness, response, recovery, rehabilitation and reconstruction have improved according to most stakeholders: An increase in interconnectedness and collaboration is perceived between all kinds of stakeholders. Some opportunities that emerged include the increasing use and provision of open data, better integration of communication via social media and the improvement of early warning systems. However, data is not always available and the warning of people via cell broadcasting still poses a challenge. [3.5. E]
- On the local level, the exchange of experiences and information as well as training and workshops are highlighted. Moreover, the role of water boards for protective infrastructures is illustrated, as they set up funds to which each member contributes. On a national level, various stakeholders mention the work of the ASDR platform as a positive example, as well as workshops and training provided by the SKKM. Other successful initiatives and networks include the Disaster Competence Network Austria (DCNA) as a scientific disaster-focused network and the KIRAS Security Research Programme as a dedicated research and implementation funding scheme. [3.6. F]
- Currently, a national hazard event and loss/damage database (CESARE) is being established, which integrates harmonised data for selected hazards from different institutions. In the future, this database will support quantitative analysis within the national risk analysis as well as the Sendai Monitoring Programme. [3.7. G]
Contextual Shifts, New and Emerging Issues and Challenges

- The threat of multi-hazards, their cascading effects and systemic character, as well as the effective communication of related information are perceived as issues that have emerged since 2015. With the COVID-19 crises, the consequences of globalisation and interdependencies of our socio-economic system have become visible and the challenges and fear of shortages in supply chains are considered as a new emerging issue. Furthermore, the COVID-19 pandemic has challenged the role of politics in decision-making within the DRM cycle [4.1. A]. Accordingly, the increasing societal complexity has been identified as one of the emerging issues that causes a lot of concern amongst the stakeholders. Moreover, it is proposed to take the systemic nature of risks and cascading effects more into consideration in the future.

- In terms of climate change, the awareness amongst the consulted actors is very high for the impact it has on the implementation of the Sendai Framework and the reduction of disaster risk. The operationalisation of respective measures and unpredictable consequences are identified as challenges for the future [4.1. A]. Due to the complex interplay between different risk drivers, limits to climate change adaptation will become more relevant for Austria. [4.2. B]

- Linked to consequences of climate change, shifts in the ecosystem that lead to potential losses of ecosystem services should be considered more seriously.

Prospective Review and Recommendations

- In order to achieve the largest reduction in disaster risk and the largest increase in resilience, the consulted actors propose various options: Professionalising risk governance, embedding resilience within the legal framework (e.g. by implementing a climate resilience-check for investments/measures), and making risk management processes more inclusive and participative. Recommendations include to focus on further developing measures and action plans at the local level (e.g. practising scenarios and conducting assessments on which municipalities are especially at risk), improving risk assessments, enhancing early warning systems, providing training to strengthen the actors’ disaster resilience and competence, as well as more interpersonal aspects such as tailoring risk and crises communication to target groups, exchange experiences, and increasing capacities. [5.1. A]

- A central point in achieving progress in risk assessment, information and understanding is raising awareness and increasing access to information and knowledge. The consulted actors call for a strengthened interface between science and politics and for informed decision-making within DRR. For the purpose to strengthen the interface between science and politics the national ASDR platform is already well established and it is anticipated to actively support this exchange more intensively in the future. [5.2. B]

- Various adjustments in different areas are suggested by a variety of stakeholders consulted to benefit on opportunities and / or mitigate new and emerging threats, which include, the inclusion of vulnerable groups and to put already existing strategies into action, to propose a plan of implementation and to strengthen and continue an expert-based and -supported national crisis council. In addition, suggestions include resilience-checks for investments (see also above), to include risk assessments by law on the municipality level and to move from a partly-reactive to a proactive risk-provision. In general, all stakeholders highlight the importance of communication and transparency. To collaborate across all sectors, foster
participation and interconnectedness, and provide access to knowledge, information, and data helps to build trust and ownership. Further recommendations include empowering local authorities and local partnerships, establishing risk-informed spatial planning, further developing warning systems and overall strengthening networks and collaborations. [5.3. C]

- Suggestions regarding measures that public institutions can take to ensure risk is priced more accurately, both on a national and international level, mostly involve taking externalities into consideration. Therefore, suitable approaches should be developed and exchanged. Another suggestion is to predict potential fiscal risks and adapt the national disaster fund that is fed by deposits following these estimates. [5.4. D]
- In order to foster risk-informed sustainable development, it is proposed to trigger a paradigm shift in order to strengthen a broader ownership on risk related topics and provide citizens/local communities with adequate tools. One option could be to establish ‘risk partnerships’ to ensure more participation and acceptance for measures throughout the general public. Especially on a local level, most of the consulted stakeholders see a need for additional collaborations and partnerships. [5.5. E]

1.2 Introduction

This report constitutes the voluntary Austrian Mid-Term Review (MTR) of the Sendai Framework for Disaster Risk Reduction. It aims to assess the status quo of disaster risk reduction (DRR) and related developments since the implementation of the Sendai Framework in Austria, showcases highlights and identifies gaps, best-practices, challenges, and ideas for improvements. Moreover, this report supported the dialogue between various stakeholders as well as a process to strengthen disaster risk reduction.

The following chapters will illustrate this dialogue and process as indicated: The first chapter introduces the Austrian disaster risk reduction context, including relevant risk governance structures, the Austrian Strategy for Disaster Risk Reduction and the highlights of the MTR. In the second chapter, we examine the methodology, including its limitations, which was applied to compile this report. The next three chapters aim to answer the guiding questions of the Sendai Framework: Chapter three depicts what has happened in terms of DRR in Austria during the last years since the implementation of the Sendai Framework, what progress was made, what challenges were encountered, and what opportunities arose. Chapter four examines context shifts, and new and emerging issues, while the fifth chapter formulates recommendations and suggestions needed to achieve the Sendai Framework’s targets.

Importantly, this report reflects the insights into the guiding questions, based on a literature review and the consultation of experts through focus-group discussions, online surveys as well as individual consultations. Therefore, the results presented are a common picture reflecting the consultations and do not claim any completeness, or necessarily represent the personal or institutional views of the authors and the Austrian government. The authors acted as facilitator and provided methodological guidance.
1.3 National Context

1.3.1 Risks and natural hazards in Austria

Due to its mountainous topography, only 38 % of Austria’s surface is suitable for permanent settlements with the population concentrated in the valleys and lowlands. Therefore, the damage potential concerning natural hazards is especially high in those places (Rudolf-Miklau, 2009). According to Rudolf-Miklau (2009) Austria is mostly affected by flooding, avalanches, storms, earthquakes and landslides in decreasing order according to human losses and damages. However, over the last few years, heat waves have become an additional mortality factor, leading to high numbers of fatalities, which in specific years in Austria have even exceeded the numbers of traffic deaths (https://www.ages.at/umwelt/klima/informationen-zu-hitze).

According to EU decision Nr. 1313/2013/EU1 Austria has to submit a National Risk Analysis every three years. The National Risk Analysis from 2018 compiled a total of 18 disaster risk scenarios, of which eleven were related to natural hazards and seven to man-made hazards (BMI, 2018a). The natural hazard scenarios correspond well with the hazards mentioned by Rudolf-Miklau (2009). However, the scenarios involving the hazards of pandemics and heat waves have been included. Among the man-made hazards are traffic accidents, power outages, nuclear accidents, terror- and cyber attacks and industrial accidents. Overall, this analysis assesses and ranks the relevant hazards according to their probability of occurrence and possible impacts. This analysis found the basis for any national preparedness and prevention strategies. Only scenarios of national importance are illustrated in the risk analysis. As such, scenarios that are within the responsibility and in the scope of the federal states are not included (BMI, 2018a).

1.3.2 Risk governance in Austria

Over the years, Austria has adopted an integral approach towards natural hazards management, where the government holds most of the responsibility (Rudolf-Miklau, 2009). The aim of integral risk management is to not only react in case of emergency, but to sustainably minimise damage on people and assets, including all relevant stakeholders, and at a reasonable cost (cf. BMLFUW, 2015; Glade et al., 2020; PLANAT, 2013). However, the government can choose which tasks to take on itself and which to leave to the population in general and to individual responsibility (keyword: self-provision), as there is no law concerning the “right to security”, as Rudolf-Miklau (2009) calls it. The distribution of competencies is influenced by Austria’s administrative system, which is a federal parliamentary republic, as well as a subsidiarity principle. Additionally, each measure or service is allocated to a specific stakeholder. That way, depending on the task, the responsibility falls to the federal government, the federal states or municipalities. In many cases, these competences overlap with various other competences of the different administrative levels. This splintering of competences amongst administrative stakeholders displays the cross-sectional characteristics of natural hazard management in Austria. However, there are also private stakeholders that engage in this field and provide services. Examples are emergency management organisations, insurance companies, associations, media, and the general population. In the end, one of the biggest challenges lies in bridging centralised control and local action (Rudolf-Miklau, 2009).
From a legal perspective, most emergency and disaster management matters fall into the remits of the federal states. Their disaster management laws are designed to identify whether an event is actually a disaster and to coordinate the official emergency coordination in the federal states, districts and municipalities. The national emergency and disaster management (orig. Staatliches Krisen- und Katastrophenschutzmanagement, SKKM) belongs to the Federal Ministry of the Interior (BMI) and supports and leads these coordination activities. It facilitates the exchange between international and national stakeholders to ensure an efficient emergency and disaster management (see fig. 2). The SKKM includes a coordination board that brings members of federal ministries, federal states, emergency response organisations and external experts together. The board coordinates both basic planning activities as well as the alignment of measures between the national and regional level in case of a large-scale hazard (BMI, n.a.).

On a local and regional level, emergency and disaster management has a long voluntary tradition: Organisations such as the local fire brigade, ambulances (such as the Austrian Red Cross and others) are traditionally dominated by voluntary members and few full-time members. Overall, over 400,000 volunteers are readily available in case of an emergency with experience and familiarity of local conditions (cf. Glade et al., 2020; Rudolf-Miklau, 2009).

1.4 Austrian Strategy for Disaster Risk Reduction

The Austrian Strategy for Disaster Risk Reduction (ASDR) platform was established in 2013 to serve as the national UNISDR/UNDRR platform. Following the adoption of the Sendai Framework for Disaster Risk Reduction in 2015 by the United Nations member states, the ASDR platform now strives to facilitate the implementation of the Sendai Framework in Austria (ASDR, 2022).
The aims of the ASDR platform are:

- the exchange of experiences and concepts
- the coordination of the strategies of the individual member institutions
- the establishment of synergies regarding the implementation of the members’ tasks
- joint developments in the fields of crisis intervention and prevention

Furthermore, the platform formulated a strategy to support the achievement of the Sendai targets. In addition, it also pursues nationally important objectives, such as the development of a national loss and damage database.

The ASDR platform is coordinated by the Zentralanstalt für Meteorologie und Geodynamik (ZAMG), the national meteorological and geophysical service of Austria, which serves as the focal point together with Ministry of Interior, Ministry of Agriculture, Forestry, Regions and Water Management and the Foreign Ministry.

The platform is constituted of representatives of several Austrian institutions which are related to natural hazards, emergency management and disaster risk reduction (for full list, see 7.1 in annex). These include eight ministries, the Federal Chancellery of the Republic of Austria (BKA), all nine federal governments, two insurances, three (environmental) research institutions, one development agency, four emergency and management associations, one research promotion agency, the Federal Statistical Office, two federal state emergency centres, two administrative associations for municipalities and cities, the board for traffic safety, and the Austrian representative of the World Meteorological Organisation (WMO).

The ASDR platform coordinates the process of the Sendai Midterm Review to evaluate the progress of the implementation of disaster risk reduction measures and the annual Sendai Monitor target assessments.
2. MTR-SF Methodology and Process

A steering committee was established amongst the members of the ASDR platform that facilitated the entire process and compiled and edited the report. The members of the steering committee are listed in Table 1.

Table 1: Steering committee members (alphabetically).

<table>
<thead>
<tr>
<th>Person</th>
<th>Organisation / Institution</th>
<th>Role in the report</th>
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<tbody>
<tr>
<td>Franz Breitwieser</td>
<td>Federal Ministry of European and International Affairs (BMeiA)</td>
<td>Process supervision, contribution to report, report approval</td>
</tr>
<tr>
<td>Siegfried Jachs</td>
<td>Federal Ministry of the Interior (BMI)</td>
<td>Process supervision, report approval</td>
</tr>
<tr>
<td>Stefan Kienberger</td>
<td>Zentraleanstalt für Meteorologie und Geodynamik - Austrian weather and geophysical service (ZAMG)</td>
<td>Development of assessment methodology, focus-group discussions, quality control</td>
</tr>
<tr>
<td>Stefan Kreuzer</td>
<td>Federal Government of Lower Austria</td>
<td>Process supervision, report approval</td>
</tr>
<tr>
<td>Laura Mainetti</td>
<td>Zentraleanstalt für Meteorologie und Geodynamik - Austrian weather and geophysical service (ZAMG)</td>
<td>Literature Review, Survey coordination, support of focus-group discussions, drafting of report</td>
</tr>
<tr>
<td>Andreas Pichler</td>
<td>Federal Ministry of Agriculture, Forestry, Regions and Water management (BML)</td>
<td>Process supervision, contribution to report, report approval</td>
</tr>
<tr>
<td>Andreas Schaffhauser</td>
<td>Zentraleanstalt für Meteorologie und Geodynamik - Austrian weather and geophysical service (ZAMG)</td>
<td>Coordination ASDR Platform, Process supervision, National Contact Point, report approval</td>
</tr>
<tr>
<td>Matthias Themessl</td>
<td>Zentraleanstalt für Meteorologie und Geodynamik - Austrian weather and geophysical service (ZAMG)</td>
<td>Development of assessment methodology, focus-group discussions, quality control</td>
</tr>
</tbody>
</table>

In its role as focal point of the ASDR platform, the ZAMG coordinated these activities, set up the methodological framework and supervised the data collection.

The report reflects the insights to the guiding questions based on a literature review and the consultation of experts through focus-group discussions, online surveys as well as individual consultations. Therefore, the results presented are a common picture reflecting the consultations and not necessarily claim the personal or institutional views of the authors team. The authors team acted as facilitator and provided methodological guidance.
2.1 Applied Methods and Approaches

To collect relevant data, a mixed-method approach was chosen (see workflow in Figure 3). Before we set out to answer the guiding questions of the MTR, we clustered them according to umbrella topics in the context of disaster risk management and prioritised them according to their relevance for Austria. This helped to focus on relevant aspects as well as reduce the amount and complexity of the questions.

In principle, we employed literature review, online surveys, direct consultations and interviews as well as focus group discussions in the course of the report preparation. For the priority topics and related guiding questions we conducted dedicated focus-group discussions. To complement the results from the focus-group discussions as well as to answer the remaining questions we used the above mentioned methods.

We started with a literature review to assess the scientific state of the art and identify topical issues in research dealing with disaster risk reduction. This landscaping provided a first overview of the topic, relevant actors and critical areas that needed further investigation.

Based on these findings, we decided to apply the following **mixed-method approach** (see also 7.2 in annex):

For the priority topics, we conducted **focus group discussions** (FGD) (see also 7.3 in annex). To that end, we allocated the questions to four thematic clusters:

1. emergency management
2. risk
3. future & emerging issues
4. local level needs

For the emergency management cluster and the risk cluster, we discussed the respective questions with the members of the ASDR platform. The FGDs were conducted online.

The questions of the future & emerging issues cluster were discussed in a meeting with key informants from an applied science background, as well as from an NGO that aims for the inclusion of vulnerable groups. This FGD was conducted in person.

To answer the questions of the local level cluster, we set up a stall at the natural hazards convention (www.naturgefahrenstagung.at) in Zell am See, Salzburg that was hosted by the ASDR in September 2022. This convention addresses local actors such as mayors and local politicians, KLAR! model regions for climate change adaptation (orig. Klimawandel-Anpassungsmodellregionen, https://klar-anpassungsregionen.at/, cf. Klima- und Energiefonds, 2022), emergency management actors such as the fire brigade, but also actors from nature parks and scientific networks. Flipcharts were set up at the stall, posing different questions to the local stakeholders who could add their perspectives. That way, we were able to talk to various stakeholders mostly from a local level and different geographical areas, and gain insights into their respective experiences, challenges and opportunities in dealing with disaster risk reduction on a local level.
Figure 3: Workflow and methods applied for the Austrian Sendai-MTR

Guiding questions for the Sendai MTR [UNDRR]

Clustering of questions focusing on...

CORE TOPICS

Emergency Mgmt.
Risk
Future & Emerging issues
Local level

...remaining questions

Focus Group Discussions

METHODS

Literature Review
Online Survey
Consultations

REPORT

Chapter Sections
Chapter Summaries (Blue Boxes)
Executive Summary/Highlights

Figure 3: Workflow and methods applied for the Austrian Sendai-MTR
Questions that were not covered by the clusters or went beyond their scope were assessed through online surveys. **Three different online surveys** were compiled – one for disaster management actors, one for scientific actors, and one for government and policy actors (see annex 7.4 and 7.5). Questions that were addressed in that way tended to require short, distinct answers that did not leave that much room for discussion compared to the FGDs.

The questionnaire dealing with policy and governmental stakeholders included representatives of the Austrian Development Agency (ADA), the Federal Ministry of European and International Affairs (BMMeiA), the Federal Ministry of the Interior (BMI), the Federal Ministry of Finance (BMF), the Federal Ministry of Agriculture, Forestry, Regions and Water Management (BML), the Austrian Research Promotion Agency (FFG), the climate and energy fund (KLIEN), and the permanent representative of Austria at the WMO.

The return rates were as follows: In the case of the online survey for the disaster management actors, around 500 people were addressed and 16 filled in the online survey. The online survey for scientists, which was announced through a newsletter with 965 members, had a return rate of 6. And in terms of policy and governance actors, 6 out of 17 returned the online survey.

The questions that were neither covered by the FGDs nor by the surveys concerned investments in risk reduction and resilience (see 3.4). To that end, we directly contacted representatives of ADA, BMMeiA, BMI, BMF, BMK (Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology), BML, FFG, KLIEN (Klima- und Energiefonds, in English: climate and energy fund), the permanent representative of Austria at the WMO, and the current representative of the federal states. From these institutions/organisations, 7 out of 10 answered the questions. However, some questions could not be answered due to a perceived lack of competences or missing information. Moreover, in some cases the surveys and the literature review did not provide as much input as we hoped for. We tried to fill these information gaps with the help of selected key informants (mostly scientists) working in the area of s understanding and assessing risk at various scales and levels.

### 2.2 Limitations

Conducting two of the focus group discussions online conveniently allowed actors to participate, who would otherwise have had to travel a long distance. Moreover, in the face of the still ongoing COVID-19 pandemic, virtual meetings have the benefit of minimising health risk. That being said, we acknowledge that virtual meetings have their challenges too, such as technical issues, perceived distance or difficulties building trust (cf. Feitosa and Salas, 2021; Morrison-Smith and Ruiz, 2020). Another challenge concerns the translation of the guiding questions adequately into German to reach all relevant stakeholders. Especially when it comes to technical terms, the right translation makes all the difference. However, we had to adjust the questions in some cases, as not all groups that we consulted for the MTR are familiar with these technical terms, as in some cases they are rather practitioners and working hands-on.

Finally, the report does not claim any completeness, although we did make a significant effort to include as many relevant stakeholders as possible.
3. Retrospective View

This section of the Mid-Term Review summarises developments regarding DRR since the launch of the Sendai Framework in 2015. Therein we focus on the progress that has been made in reaching the goals of the Sendai Framework, improving the understanding and assessment of risk in general, developments in the area of disaster risk governance and management, investments in risk reduction and resilience, a change in disaster preparedness, response and ‘build back better’, and successful collaborations and partnerships. Figure 4 graphically illustrates the bandwidth as well as the importance of developments (by the size of the word) mentioned.

Figure 4: Most mentioned topics and expressions within the interviews, online surveys and focus group discussions in terms of a retrospective view for 2015 - 2022.

3.1 A. Progress towards the Outcome and Goal

Compared to the number of extremes and hazards, the number of fatalities is very low in Austria. In 2021, this indicator was 0.5 deaths per 100,000 inhabitants. Between 2010 and 2019 the number of fatalities has slightly decreased from 0.8 to 0.4 deaths per 100,000 inhabitants. Although there is no consistent Austrian time series available, the existing data indicates that economic damages have increased over the last two decades. This increase is due to more extreme events as well as the increased exposure of assets. A fundamental basis of Austria’s DRR approach is the investment in protective measures and the pronounced voluntary structures of emergency services (over 400,000 members of voluntary services). The investments in protective measures have proven their suitability and prevented even more dramatic impacts. However, protective infrastructures can only reduce disaster risk to a certain extent,
as residual risks remain, especially in the light of climate change. Necessary preparedness is still regarded as a given and a federal task and not really considered at the personal level. Lately, a **paradigm shift** can be observed - rather strengthening resilience than just protecting people and putting more focus on risk governance than “just” managing risks.

**Challenges** are related to climate change and its implications, as well as the expectations of individuals for the self-evidence of the protection against hazards and risks, as well as the emerging complexity of societal changes and related dynamics.

As stated by a member of the **core group**, there is a comprehensive legal framework for disaster risk reduction in place in Austria which governs this field on all administrative levels. Due to the distribution of powers under constitutional law no single authority is called upon to enforce all necessary measures alone. The constitution assigns responsibilities for legislation and implementation to all levels of government from municipalities to district administration, the nine federal states and the national government. Thus, subsidiarity is an inherent principle of disaster risk reduction. Therefore, there is no single act which would govern all aspects of the Sendai Framework. The legal framework for DRR spreads over a number of national laws and laws of the federal states. This makes it difficult to distinctly attribute actions regarding disaster risk reduction to the implementation of the Sendai Framework.

Regarding alpine-based natural hazards, **new challenges** have been recognised, mainly because of climate change and its implications, as the member of the **core group** elaborates: Austria recorded a mass of devastating storms - especially in the fall season, an increase of severe snow-related impacts, an increase of forest fires and an increase on biological calamities. Austria is working on the handle of these new phenomena, but there is no “barrier” detectable considering the Sendai Framework. Additionally, the ExtremA report (Glade et al., 2020) mentions the increasing expectations of people towards protective forests as a challenge: Not only shall they serve as a protective measure against natural hazards, but also as a carbon sink, for recreational purposes such as tourism and recovery, or as a source for ressources. This makes sustainable forestry more and more difficult.

Examining information from a **literary review**, in the period between 2010 and 2019 the number of deaths due to disasters shows a negative trend, decreasing from 0.8 deaths per 100 000 inhabitants in 2010 to 0.4 deaths in 2019 (Wegscheider-Pichler and de Cillia, 2020). In 2021, this value is at 0.5 deaths per 100 000 inhabitants, according to an inquiry made to Statistik Austria. Concerning economic damages no consistent database is yet available in Austria (Themessl et al., 2022). However, the existing databases from the provincial states as well as insurance numbers indicate a significant increase due to more extreme events but also more exposed and more vulnerable assets.

Overall, a **core group** member states that a permanent investment in disaster risk reduction – including structural and non-structural measures on all levels of policy, administration and society – will always reduce disaster risk and the impacts of natural- and man-made hazards. This is a fundamental basis in Austria in the framework of DRR. But, and this is essential, there is no 100 % protection against natural hazards possible – neither technical nor financial.
However, Austria is undergoing a **paradigm shift**: With the evidence of climate change, its multiple impacts on natural hazard management, and the changing behaviour of natural hazards, the limits of protection and the importance of considering residual risk have become evident and are fostering a shift in paradigm for coping with natural risks in Austria — a shift from protection to strengthening resilience and from risk management to risk governance.

### 3.2 B. Progress in Risk Assessment, Information and Understanding

The **awareness for and the assessment of vulnerability and integrated risk** has improved due to several EU and national directives, regulations and norms. Various (research) projects and risk assessments have contributed to an **improved understanding for the need for integrated risk approaches**. However, systematic risk assessments (e.g. including hazards, exposure and vulnerabilities) are not yet available at different scales and for the major hazards in Austria. **Tools** that support local communities to participate in and guide their own risk assessments such as the ‘**natural hazard and climate change check**’ and the local **KLAR! model regions for climate change adaptation are successfully implemented**. The mobile phone app for the volunteer group ‘Team Austria’, that allows households to assess their resilience towards risks is also considered as an important step at the individual level.

The COVID-19 pandemic demonstrated the **interrelations between risks and their cascading effects**. Overall, the understanding of interrelations between climate change and natural hazards has increased, which needs to be integrated in norms and regulations. One recent driver in advancing the **understanding of climate risks and their characteristics** - especially in the business sector - is the EU taxonomy regulation.

Progress has also been made regarding capacities to deal with risks: Collaborations between actors on a local/regional and international level are fostered and an increasing focus on **marginalised groups** has been perceived. However, to include vulnerable groups in all stages and on all levels of the disaster risk management process remains a challenge.

Austria features **well-established local networks between volunteers and key emergency management actors** such as the fire brigade, the Red Cross, or the Federal Armed Forces. Especially in rural areas, the emergency management relies heavily on volunteers. Nevertheless, the existing local knowledge could be more involved in planning processes and decision-making and risk governance.

Digital and Social media have become an essential tool for sharing information both within emergency services as well as towards the public. In order to improve the **communication flows** within these networks and between stakeholders, several local actors make use of **digital media**, such as Telegram or Whatsapp groups. However, local communities are also facing **challenges**, especially when it comes to raising awareness and acceptance for measures throughout communities. From a more technical perspective, challenges remain in terms of facilitating communication and dealing with short warning intervals.
3.2.1  Progress to better understand and assess disaster risk in all its dimensions

As one member of the core group outlines, the risk assessment process involves stakeholders from relevant ministries and regional authorities and includes inputs from other actors, depending on the risk. The risk assessment evaluates the hazard scenario’s frequency or likelihood of occurrence, as well as the potential impact that scenario might have. Austria defines five disaster impact levels based on current and historical data. Hazard zone mapping is translated into local and spatial planning and actions to protect existing infrastructure as well as to avoid risk.

Since 2015, progress has been made in several areas regarding understanding and assessing disaster risk according to the participants of the focus group discussion on risk:

In terms of vulnerability, two publications are mentioned in the FGD are the launch of the ISO 14091 on “Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment” (ISO, n.a.). This is described by some participants as an important step to standardise risk assessment and ways to adapt to climate change while not only focussing on hazards but also on vulnerability. The second publication regards a study issued by the Federal Ministry of Social Affairs, Health, Care and Protection on the social consequences of climate change (Seebauer et al., 2021). Among other things, this study focuses on the effects that climate change has on vulnerable groups and illustrates what measures can be taken to counteract these effects.

Within the topic of vulnerability, the inclusion of vulnerable groups such as people with disabilities was raised in the FGD too. Some progress is made in that field as people with disabilities are considered in several disaster management plans, such as in case of heat or flooding. An increase of collaborations is observed between mobile services and first responders to address and include these groups. The international NGO “Licht für die Welt” is mentioned as an example of an organisation that promotes the inclusion of disabled people into disaster management also in Austria.

Challenges in this field remain to adequately include vulnerable groups in all steps of emergency and disaster management as well as to develop concepts that are applicable not only in a local, but regional or national context.

Regarding the exposure of people in general, a mobile phone app of the Team Austria project (orig. Team Österreich) is mentioned that makes it possible for every household to assess its resilience towards risks (Österreichisches Rotes Kreuz, 2020). In terms of exposure of assets, the newly released Basic European Asset Map (BEAM) dataset is mentioned (cf. COPERNICUS Emergency Management Service - Mapping, 2022).

From a hazards perspective, one step that advances the understanding and assessment of their drivers is the EU taxonomy (EU Taxonomie Info, 2022). This guideline makes it necessary and legally binding for companies to assess if and how they contribute to increase risk. The knowledge regarding hazard characteristics was advanced concerning the potential threat that bark beetles pose to forests, forest fires and flooding (cf. Lintschnig et al., 2019). A research project at the University of Natural Resources and Life Sciences (BOKU) investigates climate-fit cultivation methods (cf. BOKU FIS, 2022). Also the “natural hazard and climate change check for municipalities“ (orig. Vorsorgecheck Naturgefahren im Klimawandel) is highlighted as an instrument to assess a municipalities exposure and vulnerability towards various hazards (UBA, 2022a).

Progress has also been made regarding capacities to deal with risks: The increase of collaborations, both within Austria and internationally is highlighted. Knowledge is successfully exchanged, training courses are held, and equipment is improved. Examples include the collaboration between the fire
brigade and the mountain rescue as well as the exchange with Portuguese stakeholders in the area of forest fires. Some learnings regarding improved methods are attributed to the pandemic. And last but not least, financial support in the form of the “forest fonds” (Waldfonds, n.a.) is mentioned as an example as well.

Interrelations are foremost highlighted in the context of climate change: The ISO 14091 on adaptation to climate change is mentioned again in this context. An increased integration of natural hazards and climate change is observed in several fields, for example also in terms of the next Austrian Assessment Report, that is currently being worked on. In this context, the “Vorsorgecheck Naturgefahren im Klimawandel” is drawn upon as an example again, as well as the RESPECT project (Responsibility and Risk: Operationalizing comprehensive climate risk layering in Austria) and the Pathways project (cf. Schinko and Hanger-Kopp, 2022). However, even if there is a broad consensus on the importance of integrating climate change into risk debates, one challenge is seen in the fact that norms often build on “old material” that is outdated and that the contributing factor of new hazards and risks is not adequately accounted for. The COVID-19 pandemic is raised again to serve also as an example of how cascading effects and interrelations between various hazards form multi-hazards and increase complexity.

Concrete measures have been taken in the area of

- Building codes: snow load, earthquake and nature-based solutions are increasingly factored into such building codes. For example, the project E-Protect conducts life cycle analyses of protective structures to assess their cumulative energy demand as well as their global warming potential (Rauch, 2018).
- Action plans on a community level put more focus on risk assessments, but not just by trying to take the monetary side into account, but also the non-monetary value of assets and people. The focus group voices a need for standardised procedures in this field though. Regarding emergency vehicles, there is a scheme in place in one federal state that assesses whether the acquisition of new vehicles is necessary by investigating the transport network.

The FGD participants observe the systemic character of risks within the context of the pandemic, as interrelations between various systems become visible. Moreover, the decision of the government to pass the federal disaster security law is raised as an example (BMI, 2021).

Similarly, some scientists that were consulted via an online survey perceive an increase of people’s awareness towards (multi-)hazards, crises and risks. This is traced back to specific events such as the large number of deaths and high amount of damages due to the flash flood in 2021, as well as to an increase of media exposure and the COVID-19 pandemic in general. The interrelationships between various sectors and areas have increased through the interconnection of socio-technical systems, globalisation, digitalisation, economisation etc. This also helps to increase the awareness towards risks. Yet, some scientists argue that this interconnection can increase complexity and risk itself: To be aware of one’s own vulnerability and exposure to risks can feel threatening and increase fears, which in turn can inhibit the sensible handling of risks and the development of effective and meaningful coping strategies.

Contrary to the increase of awareness towards risk, vulnerability and exposure in general, the consulted scientists note that people tend to see the provision of infrastructure, prevention and mitigation measures as a given and as a task of the government, something the state is responsible for, and less as a topic that concerns also their self-provision.
Compiling the information from the online survey, the FGD, and the input of the core group with a **literary review**, the following two tables comprise policy-relevant information and tools as well as research projects and findings that help to advance the understanding and assessment of disaster risk in all its dimensions (for full list of tools and projects, see annex 7.6).

### Policy-relevant information and tools

| **HORA** | Natural Hazard Overview & Risk Assessment, Austria  
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<tbody>
<tr>
<td><strong>CESARE</strong></td>
<td>CollEction, Standardization and Attribution of Robust disaster Event information</td>
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<tr>
<td><strong>Natural hazard and climate change check for municipalities</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SKKM</strong></td>
<td>National Crisis and Disaster Protection Management (orig. Staatliches)</td>
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**HORA** is an internet platform that visualises data of various natural hazards and their occurrence in Austria within a map (BML, 2022a). In 2002, HORA started out as a platform providing information about flood risk, thus answering a call after a flood event in 2002 for raising awareness for risk, the limits of protective measures and the interaction between the public sector, the insurance sector and private actors. That way, the platform enables people to assess the hazard of flooding in a specific area as well as allowing for an optimisation and prioritisation of protective measures for municipalities, federal states and the state (BMLFUW, Sektion VII/5, 2011). Today, citizens can additionally inform themselves about various other hazards such as storms, earthquakes, landslides, hail, snow load and current weather warnings concerning their home by entering their address in the search (BML, 2022a). The input parameters for the underlying models are maintained and updated (BMLFUW, Sektion I, 2021).

The **CESARE** project developed a database compiling existing multi-hazard national event-based loss and damage data from various administrative units and federal agencies. A process was formulated to standardise this data regarding their spatial and temporal resolution, level of detail, hazard types, the time period covered, the focus of documentation (processes, events, damages), and vocabulary. The result is a demonstrator that enables “event identification, loss accounting and disaster forensics according to international standards” (Themesl et al., 2022, p. 1). So far, the demonstrator focuses on the three hazard types of floods, storms and mass movements between 2005 and 2018 in the two Austrian federal states of Styria and Lower Austria. It can support disaster risk management activities of relevant actors such as the compilation of reports like the Sendai Monitor reporting. The aim is to expand the reach of the database and demonstrator to include both more federal states and more hazard types such as avalanches, forest fires, and earthquakes. Integrating insurance data as well as loss and damage data on federal assets into the CESARE database would help to improve the reliability for assessments.

The **natural hazard and climate change check for municipalities** supports the self-assessment of municipalities regarding their exposition and vulnerability to natural hazards and climate risks. The goal is to sensibilise municipal decision-makers for locally relevant natural hazards and climate risks and to strengthen, raise awareness for risk and existing capacities: “This method identifies existing potentials and preparedness of the municipality, as well as possible needs for action for the four pillars of precaution (spatial, constructive, behavioural, and risk based). This way, the community is better prepared for natural hazards and the challenge of adverse climate change effects.” (UBA, 2022a). The precautionary check follows a guideline of several steps, from assessing the current situation to a prioritisation of relevant hazards and finally a look into the future. It is executed by two auditors together with local decision-makers working in the context of natural hazards and climate risks. The three thematic areas cover hydrological natural hazards, gravitational natural hazards and climate-related natural hazards (UBA, 2022b).

The **SKKM** was launched in 1986 as a reaction to the nuclear accident in Chernobyl. Since 2003, it is integrated into the Federal Ministry of the Interior and was reorganised merging several coordination bodies into a single coordination committee in 2004. This committee comprises federal ministries, federal states, rescue and emergency organisations and some media organisations. The principal task of the SKKM is “to ensure a quick coordination between the federal authorities and the provinces […] in the case of complex crisis and disasters” (BMI, n.a.). The SKKM Strategy 2020 (SKKM, 2009) serves as a policy guideline, defining its goals and setting priorities. It covers the entire emergency management cycle, ranging from actions of prevention and preparedness to response and rehabilitation. The SKKM promotes self-help on a local level combined with subsidiary intervention of higher administrative levels and the federal states. The federal government only engages in situations of supra-regional disasters/emergencies/events. In a guideline released in 2018,
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<th>Title</th>
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<tr>
<td>Krisen- und Katastrophenmanagement</td>
<td>The SKKM describes an international paradigm shift away from a sole disaster management and towards a disaster risk management approach, thus referring to the Sendai Framework (BMI, 2018b). They now promote an approach that anticipates risks and reaches beyond reactive measures. Based on different scenarios that depend on the respective risks in a region or community, a limit as to what risk can be tolerated and what not is set. Finally, it is illustrated which measures can be taken to minimise the non-tolerable risks. The role of risk communication is highlighted as an essential part in disaster risk management.</td>
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<tr>
<td>National Risk Analysis</td>
<td>The National Risk Analysis compiles various disaster scenarios of national importance that are within the scope of the responsibility of the federal government. The National Risk Analysis of 2018 compiled a total of 18 disaster risk scenarios of which eleven were related to natural hazards and seven to man-made hazards. The man-made hazards include traffic accidents, power outage, nuclear accidents, terror- and cyber attacks and industrial accidents (BMI, 2018a). The National Risk Analysis is carried out every three years.</td>
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<tr>
<td>ASDR convention on natural hazards</td>
<td>One ongoing activity of the ASDR platform is hosting conventions on the topic of risk and natural hazards. In 2016, the Understanding Risk (UR) conference, which is a format of the World Bank, was held in Vienna (UR, 2016). A second UR conference was held in Vienna in 2019 on the topic of heavy rain (UR, 2019). Due to the outbreak of the Covid-19 pandemic in 2020, these kind of activities were paused. In 2021, the ASDR platform established their own format: an annual convention on natural hazards (ZAMG, 2022a). Its debut took place in Öblarn, Styria under the motto “natural hazards at our door: flood risk, avalanches and landslides”. In 2022, the convention took place for the second time, this time in Zell am See, Salzburg with the motto “Between Living Space and Disaster Protection: Understand – Network – Prepare”. The aim of this convention format is to bring local and regional stakeholder together, educate them on potential natural hazards and how to deal with them.</td>
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<tr>
<td>AAR14 Austrian Assessment Report 2014</td>
<td>The AAR14 deals with the assessment of changes in climate and the implications that has on extreme weather events and natural hazards (Kromp-Kolb et al., 2014). The publishing date has to be taken into consideration though.</td>
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<tr>
<td>ExtremA Report</td>
<td>The ExtremA report (Glade et al., 2020) elaborates on the understanding of vulnerability and distinguishes between physical, institutional, economic and social vulnerability. Moreover, it conducts an assessment regarding the economic loss arising from disaster events in an attempt to understand the correlations between exposition, vulnerability and hazard.</td>
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**Research projects and findings**

<table>
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<th>Title</th>
<th>Description</th>
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<tr>
<td>CESARE</td>
<td>See also above.</td>
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<tr>
<td>ARISE Adaptation and Decision Support via Risk Management through Local Burning Embers</td>
<td>The ARISE project (Adaptation and Decision Support via Risk Management through Local Burning Embers) aims to address global problems and local risks on a local level. First, the vulnerability of a local community or region is assessed. Based on that, measures and actions are derived to improve adaptation and increase resilience. According to the ARISE guideline (Projektteam ARISE, 2016), these actions serve as local answers to the IPCC’s project „global burning embers“. It is designed to help local and regional decision-makers to identify future risks and derive adaptive measures that can then be implemented. At the same time, it is possible to identify opportunities and minimise risk not only in disaster prevention, but also in the tourism sector, economy, and agriculture. That way, the resilience and adaptive capacity of local communities can be fostered. That way, the ARISE project addresses local decision makers as target group and aims to provide them with the necessary tools to tackle local burning embers. Lienz is the first town worldwide to identify local burning embers and derive adequate adaptation measures. ARISE uses a step by step approach, first defining the general conditions, followed by local climate and socioeconomic development scenarios, defining local burning embers,</td>
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</table>
developing adaptation measures and evaluating their implementation (Projektteam ARISE, 2016).

The RESPECT (Responsibility and Risk: Operationalizing comprehensive climate risk layering in Austria among multiple actors) project is the product of a collaboration between the Environment Agency Austria, the International Institute for Applied Systems Analysis (IIASA), the department Z_GIS of the University of Salzburg, the Wegener Center of the University of Graz, the University of Innsbruck, and the Spatial Services GmbH. The aim is to integrate natural hazard management that focuses on events caused by natural climate variability with climate adaptation measures that deal mostly with increasing risks resulting from climate change. Together, these measures form a holistic approach, a so-called climate risk management approach, which the project aims to operationalise (Lintschnig et al., 2019). The authors argue that it is often the ill-defined roles and responsibilities that hinder effective climate risk management. A guideline by Lintschnig et al. (2019) explains how to conduct a role play simulation game for public and private actors in order to collectively develop a strategy and measures as well as defining responsibilities to address flood risk and droughts. Actors from one area of expertise play a character from a different area of action in order to improve awareness and understanding amongst the actors. Furthermore, Lintschnig et al. recommend implementing the RESPECT concept together with the ARISE approach, as they argue that it is important to know the concrete local burning embers in order to enable forward-looking and climate-sensitive action. This participative process helps to uncover gaps in the climate risk management of local communities and regions and increases the readiness to act.

ZaB (orig. Zentrum am Berg, English: Mountain Centre)

Implementatio
n of property-
level flood risk
adaptation (PLFRA) measures

The Zentrum am Berg is a research centre located at the Styrian Erzberg and coordinated by the Montanuniversität Leoben. It focuses on constructing and operating underground facilities and also deals with the topic of safety, providing a tunnel safety training as well as an escape and rescue training (ZaB, n.a.).

Attems et al. (2019) investigate how PLFRA (property-level flood risk adaptation) measures can help to increase the preparedness of households. They draw on examples that are already implemented in Austria, such as sandbags, building on elevations or flood proof windows.

The status of climate risk management in Austria

A methodological framework to operationalize climate risk management

According to Leitner et al. (2020), the latest revision of the national flood risk management starts to implement climate risk management (CRM) aspects into disaster risk management (DRM).

Schinko et al. (2017, p. 1078) state that “the Austrian CRM approach is currently characterized by a single-loop learning process, which is reacting to the new normal and focusing on improving the efficiency of current practices without questioning underlying mental models”.

3.2.2 Local knowledge and participation of stakeholders

In terms of risk governance, a member of the core group states that the relevant stakeholders could be more involved in planning processes and decision-making or hardly contribute to protective services. In most Alpine countries, institutional risk management is ruled by the state. Risk governance is a concept of systematic risk-based decision-making that involves civil society in the process of risk assessment and coping with risk. The key foundations are based on the principles of communication, participation/cooperation, and balancing of risk-related societal conflicts. Risk governance is applied if a large number of actors/stakeholders are involved in a risk-related decision-making process, and cooperation and compromises are essential. Risk governance fosters cooperation for the creation of
better solutions in risk management within regional and local networks, where state-driven risk management and legal instruments fail. Risk governance is an appropriate tool to compensate and balance risks, as in most cases different actors share the advantages and disadvantages of protective measures. The following are successful examples of good practice for the application of risk governance in Austria:

- Continuous public discourse on protection needs (risk dialogue)
- Negotiating acceptable risk and dealing with residual risk
- Acquisition and securitization of areas with protective function
- Public consultation in the planning and endorsement of hazard maps
- Water cooperative (legal instrument): collaborative financing and maintenance of protection infrastructure
- The strong role of voluntary services (fire brigades and rescue operations) in emergency management

**Austria considers public interest in natural hazard protection.** Natural hazard management is part of the state’s responsibilities for “public safety” and “public precautions for existence.” The state has a responsibility, but there is no legal “right (title) for protection” in Austria. This means the protection measures can be implemented, but there is no right to receive them from the state. The protection measures are public goods in Austria. Beneficiaries may not be excluded from consumption, and the availability for an individual is not reduced by the use of others. Protection can be used free of charge. Public funds are applied, if the measures lie beyond the sphere of influence or capability of the individual. If individuals are not able to protect themselves, they can apply for public funds. Austria supports risk information sharing and awareness. High coverage is provided by hazard and risk maps, which are on public display and easily accessible, with online information and support. Public participation in the development of hazard and risk maps as well as protections measures are a living standard.

As some of the **consulted scientists** describe it, local and traditional knowledge are hardly integrated into decision-making processes and risk assessments. One calls this the so-called “flooding dementia”, as knowledge is soon forgotten after a community has recovered from an event again. This tendency to forget becomes apparent especially when it comes to handling supposedly new risks – one stakeholder draws on the expression of reinventing the wheel. Another actor argues that there are few big players that are not interested in competition. Even though information is provided by public authorities, one scientist states that the information is hardly claimed by the general public, as many find it challenging to know where to get the right information for which situation.

However, also two positive examples are mentioned: As one scientist lines out, the public can participate and is encouraged to do so when it comes to finalising the hazard mappings of a region (cf. RIS, 1975) and compiling the flood-risk-management plan (BMLRT, 2020). Moreover, according to one scientist, in some cases local knowledge and communities are well included and represented in research projects, e.g. by the Disaster Competence Network Austria (DCNA), an academic networking platform that compiles expertise on security and disaster research (DCNA, 2022).

Many participants of the **focus group discussion with local actors** mention the well-established local networks between volunteers and key emergency management actors such as the
fire brigade, the Red Cross, or the Federal Armed Forces. Especially in rural areas, the emergency management relies heavily on volunteers. In some cases, as one local fire brigade commander explains, there are even too many volunteers, which makes coordinating activities harder. Knowing who is who and who is responsible for what and whom to turn to in case of emergency is key in order to be able to react quickly. Therefore, the better connected the stakeholders are, the more efficient the communication and the response.

To improve communication flows, one mayor highlights the opportunities that digital media offers. His municipality uses a Telegram group both for decision makers and the general public to inform about emergencies and potentially dangerous situations. A local fire brigade commander shares a similar approach, referring to a WhatsApp group that connects emergency and disaster management actors. Every time a relevant message pops up, they share it in the group. That gives them the opportunity to quickly assess the gravity of a situation. In case it is of high urgency, they meet on-site and together work on the adequate response. Furthermore, one stakeholder highlights the need for communication between experts and local stakeholders.

One tool that helps local communities to participate and guide risk assessment is the natural hazard and climate change check by the UBA (2022a). Another concept that is mentioned is the one of the KLAR! regions which are model regions for climate change adaptation (cf. Klima- und Energiefonds, 2022). As these regions constitute a network that spans across Austria, it comes with a certain multiplier-effect.

In terms of challenges, one mayor mentions how being exposed to and affected by a disaster event can one the one hand help to foster understanding and acceptance among the general public, but also how that effect can fade after a phase of recovery. Therefore, the challenge is not only to raise awareness, but to keep awareness, as one actor outlines. There is a need to shape the transfer of knowledge sustainably and regularly. Moreover, one mayor describes the challenge to raise awareness for the necessity of taking actions personally too and not solely depend on measures and actions of the public administration. From a more technical perspective, the challenges remain to facilitate communication and to deal with short warning times.

3.3 C. Progress in Risk Governance and Management

Risk management structures in general have not changed significantly in Austria during the last 15 years. Relevant structures are established and legally mandated. However, it can be observed that actors between different levels and sectors are increasingly collaborating and exchanging information. There is a pronounced interest on a national level in combining efforts and measures to address both DRR and climate change adaptation (CCA). On a local level, measures include the implementation of hazard and risk assessments, training, and the increased implementation of disaster prevention plans. In some cases, disaster scenarios have been identified to serve as a preparation for worst case scenarios. On the regional and national level, laws and norms are established to regulate disaster prevention.

Strategies for disaster risk reduction have been implemented on all levels: On the national level, measures include conducting an expert-based national risk assessment according to EU requirements, the development of new laws for crises
and climate adaptation, workshops and trainings conducted by the SKKM, as well as the implementation of COVID-19 regulations. However, coping with the COVID-19 pandemic also drew attention away from other pressing issues such as climate change.

On the federal states level, the introduction of new laws, subsidies and the adaptation of existing plans and strategies is taking place, e.g. regarding flooding and wildfires. A forest fire in the Rax area/Lower Austria in autumn 2021 demonstrated the importance of having functioning strategies and plans in place. Linking climate change and natural hazards as well as improved technical equipment and methodologies help to propel DRR on that level. Yet, even though there are strategies in place on the local level, the creation of functional emergency plans that account for responsibilities and provide procedures in case of emergency has to be completed nationwide and should also include climate change aspects.

On the local level, diverging interests between local spatial planning and DRR still remain one major challenge. Moreover, approaches that have been in place for a long time are often no longer up to date and would need revision, which leads to conflicts between ‘new’ and ‘old’ actors. To establish a suitable format of exchange between local actors and actors on other levels, it would be necessary to increase the acceptance of measures by the local population.

Overall, disaster risk as such has not practically become a ‘due diligence’ requirement by law yet. In terms of shared responsibility, this assessment report did not come to a final consensus whether this principle is in action or not. Measures that do support the integrated management of disaster risk reduction include the establishment of unions and more responsibility on the governmental level (as suggested by the scientists), as well as the provision of workshops and training on a local and regional level (suggested by disaster management actors).

3.3.1 Aligning national and local public policy, legislation, planning and organisation to the Sendai Framework

Most of the disaster management actors that were consulted via online survey agree that not many changes have occurred since 2015 in order to align local and national public policy, legislation, planning and organisation with the Sendai Framework period. However, changes that have been observed mostly concern communication between actors of different levels and emergency management actors and information exchange. One course is offered by the SKKM dealing with risk management on the national, regional and local level (BMI, n.a.). On a local level, measures include conducting risk analyses, training, and implementing disaster prevention plans. Especially when it comes to preparing for a blackout, the general public is strongly involved. On a regional and national level, some laws are put into action to regulate disaster prevention, and several guidelines are intended to turn into norms. In some cases, various catastrophe scenarios are conducted to enhance preparedness for an actual case of emergency. Research activities are strengthened, especially in the area of disaster prevention and mitigation.

When asked which actors were mostly involved in the mentioned activities, particularly in terms of inclusive and diverse decision-making, it seems that men represent the largest share, followed by
women and adolescents (mentioned half as much as men). People with disabilities were only mentioned twice, and the category “else” was only ticked once (see also 7.5.1 in the annex).

3.3.2 Establishment of local, regional and national disaster risk reduction strategies and plans

One member of the core group elaborates on the current situation in Austria: Natural risk management and disaster management are tasks of the federal state, laid down in the Austrian Constitution and distributed among territorial entities (compare Table 2). A wide range of legal regulations (Water Act, Forest Act, spatial development acts, building acts, road and railroad acts) and institutions have been founded in the last decades to support governmental tasks in risk and catastrophe management. In Austria, competencies in hazard/risk and disaster management are based on special acts/laws and distributed hierarchically among the federal state, federal states, and municipalities according to the Austrian Constitution, as shown in Figure 2. In general, disaster management—that is, management of most natural and human-made disasters—is handled within the competence and responsibility of the federal states.

The federal government has various competencies that are managed at the national level and mandated by the national legislation, applicable nationwide. The competencies of the federation include federal police, federal army, public health (for epidemics, pandemics, and radiation protection), flood risk management, torrent and avalanche control, and traffic systems (railways, aviation, and shipping). The federal states also retain competencies and have responsibilities under the law relating to disaster risk management, including fire services, emergency medical and first aid services, disaster management (natural and man-made disasters), and land use planning.

Table 2: Competences in natural hazard and risk management in Austria

<table>
<thead>
<tr>
<th>Competence in legislation</th>
<th>Competence in execution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal government</strong></td>
<td><strong>Federal state</strong></td>
</tr>
<tr>
<td>Torrent and avalanche control</td>
<td>Torrent and avalanche control</td>
</tr>
<tr>
<td>Flood control</td>
<td>Flood control</td>
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<tr>
<td>Hydraulic engineering and funding</td>
<td>Supralocal disaster management</td>
</tr>
<tr>
<td><strong>Community with own domain</strong></td>
<td></td>
</tr>
<tr>
<td>Land use planning, building</td>
<td>Local disaster management</td>
</tr>
<tr>
<td>Local disaster management</td>
<td>Avalanche commissions</td>
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</tbody>
</table>

From the prevention perspective, all three levels of government are involved in shared tasks in the management and reduction of natural hazards. In principle, this is similar to the management of human-made or technical hazards. In the area of prevention, the basic responsibility is at the national government level. For example, the Federal Ministry of Agriculture, Forestry, Regions, and Water Management (BML) governs flood risk management and the control of avalanches and torrents. At the same time, there are other ministries responsible for traffic systems, railways, aviation, and shipping. Prevention is managed and governed by the federal government with local governments and in cooperation with the regional and local administrative units.
The three levels of government share responsibilities. The 2,100 municipalities are responsible for local land use planning and local building codes, for instance. These are important tools for the reduction of natural hazards. The law is adopted at the federal state level for land use planning, however land use plans are established at the municipality level. These land use plans, hazard and risk maps and plans, which are established by the Ministry of Agriculture, are implemented and established as a legal order for the use of land for new buildings or industries.

The three levels of government cooperate. The national government steers and has a strategic management function. The operational management of protective measures is executed at the federal state and local levels. For example, the EU Floods Directive is implemented by the BML as well as in cooperation with the federal states and local structures.

The local governments are encouraged to contribute to risk reduction and play a role in the prevention framework. One instrument is the land planning and building codes. Each structural measure that is built in Austria to protect against floods and other natural hazards always has to be initiated at the local municipal level. The higher levels of government, namely the federal states and the federal government, contribute and support local municipalities financially and with the elaboration of risk and hazard maps to help them protect their local properties and the local environment. The local level has to take the initiative and start prevention projects.

Regarding response and preparedness for response, the districts play a more prominent role. The nine federal states are divided into districts and usually take the lead in a response operation. The municipalities also have important responsibilities for setting up fire brigades and emergency medical services. The mayors are the local disaster managers either on their behalf or on behalf of the district authority, which may delegate tasks to them. In bigger emergencies, the federal states take the lead. The federal government normally does not play a critical role in natural and man-made disasters but focuses on coordination and support of local levels. However, in other areas, such as health, the situation is the reverse—the national government is in the lead and the federal states act on behalf of the national government.

The ministries are the risk owners. In this regard, the tasks of the federal ministries vary within their competencies. The following federal ministries are involved:

- Federal Ministry of the Interior (BMI): Disaster and crisis management coordination and international disaster relief
- Federal Ministry of Social Affairs, Health, Care, and Consumer Protection (BMSGPK): Management of health risks and epidemics
- Federal Ministry of Agriculture, Forestry, Regions and Watermanagement (BML): Floods, torrents, and avalanche protection and management
- Federal Ministry of Climate Action, Environment, Energy, Innovation and Technology (BMK): Nuclear emergency planning, traffic system (railways, aviation, shipping), electric energy, and gas controls
- Federal Ministry of Finance (BMF): Disaster fund

A decentralised system allows Austria to stimulate and activate resources, including the resources of CP, non-governmental organisations (NGOs), and volunteers, leaving more freedom and less governance for these resources. In addition, the implementation of the strategy is monitored through the national DRR platform, although there is no strict regime or clear mandatory targets for actors involved—rather each actor must act on its responsibility. This risk governance system can be very
effective. In general, considering Austria’s exposure to ensure that damages arising from disaster events are lower than those experienced in past disaster events. For example, there are almost no human losses from disasters. Despite the growing potential of risks, exacerbated by climate change, the measures that Austria has taken have effectively controlled the damages from year to year.

**Austria has given adequate political, legal, and institutional priority to DRR.** Austria has a variety of strategies related to DRR, such as the National Security Strategy, which identifies resilience against natural and other hazards as a priority. The Climate Change Adaptation Strategy and other strategies suggest measures to further improve protection against natural hazards and response capacities. The Austrian National Strategy for Disaster and Crisis Management has been in force since 2009. In Austria, tourism is one of the important economic sectors, and it is important for Austria to ensure the safety of guests and the local population through the prevention-oriented DRR approach. Climate change and the adaptation to it, in close connection with DRR, will be one of the major challenges for the next decades. Austria adopted the National Climate Change Adaptation Strategy and has included objectives related to risk mitigation and better response to (mainly) disasters.

Still, there are various developments taking place at different policy levels in Austria that contribute to the realisation of the outcome, goal and targets of the Sendai Framework, as the participants of the focus group discussion on emergency management outline:

In 2018, the first national risk assessment has been initiated. The SKKM Strategy 2020 of the National Emergency and Disaster Management is mentioned by the participants as a prominent development of the last years, introducing and defining tools and strategies to meet future challenges (SKKM, 2009). The conduction of workshops on emergency management is planned. In general, there is a pronounced interest on a national level in combining efforts and measures to address both DRR and climate change adaptation (CCA). An example is the compilation of knowledge and information on both topics to draw up a report which shall be published in October 2022. Moreover, both a crisis-law and a law on climate protection are in progress, where potential intersections and cross-connections are looked into. Furthermore, a COVID-19 framework was developed to record the state-of-the-art and thus serve as a national strategic action-plan in pandemic management (BSGPK, 2022). In a way, the pandemic has both highlighted the necessity of strategies and frameworks to address crises, but it has also shifted the focus away from other equally pressing disaster risks and hazards, as some participants note. Last but not least, a WHO requirement with a focus on persons with special needs was adopted into national legislation dealing with DRR.

In Austria, the role of the federal states is of high importance when it comes to handling and promoting DRR. The introduction of new laws and the adaptation of existing plans and strategies demonstrates the topicality of DRR on the federal state level. One example is the adaptation of the “special disaster protection plan for flooding” which has been altered to include financial support measures for heavy rain and slope water. A law regarding the forest fund offers financial support in terms of preparedness against wildfires. The handling of a wildfire in October / November 2021 demonstrated the importance and success of existing collaborations and emergency plans in place. It also initiated an exchange with international experts on wildfire to share knowledge and experiences. Similarly, several adaptations were implemented across organisational structures, addressing the gaps detected in the aftermath of the COVID-19 pandemic. Several participants highlight an increase in awareness for risk exposure and resilience across sectors. In one federal state, a separate staff unit is established to link natural hazards and climate change. However, it is not only policies, but also technological innovation that propels DRR further on the agenda of federal states: The use of new
tools and materials such as drones and thermal imaging cameras opens up new possibilities for the exploration and aftercare of disaster events. On the local level, a more varied picture evolves. Communities and municipalities that already had to deal with hazards and disaster events in the past are better prepared for future disaster risks. A key challenge on the local level is the lack of tangible practical approaches and guidelines. The participants call for the development of an emergency plan on a local level that also accounts for responsibilities and serves to standardise procedures in case of emergency. This would also be beneficial for situations where there are no national or federal guidelines in place yet and municipalities are on their own. Other challenges include conflicts between spatial planning and DRR, as in planning natural hazards are often treated as a “problem”. Therefore, the participants highlight the need for conveying the importance of addressing disaster risk and natural hazards, as it has an impact on all sectors and areas of life. Approaches that have been in place for a long time and would need revision, are often held onto “because it has always been done that way”. This conflict arises mostly between long-established and young actors that are new to the field. Interestingly, discourse about DRR has been rekindled by debates regarding the possibility of a blackout and how that could be handled. The participants conclude that the provision of a suitable format of exchange between local actors and actors on other levels would be necessary to increase the acceptance for DRR measures on the local level.

Overall, some participants attest a shift towards a more risk-oriented approach in the Austrian policy landscape.

The online survey of the consulted scientist confirms the findings of the focus group discussion: On all geographical and administrative levels strategies for disaster risk reduction have been implemented. However, the scientists do only attest these strategies a little bit of success, nothing too big. In many cases, there exist collaborations with or an integration into other strategies, such as the Agenda 21 or the Paris Climate Agreement.

### 3.3.3 Disaster risk as ‘due diligence’

When asking both scientific and disaster management actors via an online survey about how various aspects of disaster risk have become a ‘due diligence’ requirement by law, the following picture emerges: Most scientists state that understanding disaster risks, their root causes and their incorporation in public and private decision making and investment have rather not become a legal requirement. Some differ and see a slightly positive tendency for these areas to become a ‘due diligence’ requirement. Only one person states that in all these areas, disaster risk in fact is already a ‘due diligence’ requirement.

In case of the disaster management stakeholders, the tendency that disaster risk has rather not become a ‘due diligence’ requirement by law is more pronounced. Only few see it as partly implemented. One person states that disaster risk has not become a ‘due diligence’ requirement in any of the categories of understanding disaster risks, their root causes and their incorporation in public and private decision making and investment. Only in the case of understanding disaster risks and their root causes, two stakeholders see it as definitely a ‘due diligence’ requirement.


3.3.4 Guiding Principle of shared responsibility

In terms of applying the Guiding Principle of shared responsibility between central Governments and local authorities, sectors and stakeholders, the consulted scientists unanimously agree that it has rather not been applied so far. They suggest that measures put in place that foster integrated management of disaster risk across institutions and sectors are the establishment of unions and more responsibilities on the national level. Some scientist criticises that responsibilities are rather passed on between the relevant stakeholders.

From the point of view of the consulted disaster management actors, the answers differ a bit more: Most stakeholders state that the principle of shared responsibility rather tends to be or not to be implemented. There is only one person each who is sure that it either definitely is or is not implemented. Measures in place that foster the integrated management of disaster risk are workshops and training that allow people to prepare for disaster events. In that context, the communication between actors of different administrative and geographical levels is highlighted. Especially the actions of the SKKM such as sectoral workshops and the SKKM “Mangelradar” – an early warning system detecting a shortfall in supplies – are mentioned as best practice examples. As mentioned by one stakeholder, measures are often initiated on a local level. According to another stakeholder, the topic of self-provision is receiving increased attention.

3.4 D. Investment in Risk Reduction and Resilience

Austria invests around 400M € per year in natural hazard prevention. According to records of the Torrent and Avalanche Control (WLV), respective public investments regarding structural measures have increased from € 89.5 million to € 103.4 million since 2015. The largest share of these investments goes to construction. In terms of climate change adaptation, increasing investments are expected regarding adaptive measures through to a shift in priorities within the federal budget, as damage costs are predicted to increase in the coming years. In terms of non-structural measures, the WLV completed the analysis and mapping of hazards in 2015 for all municipalities that are to be mapped according to the § 11 of the Forest Act. Since then, they have been revising 60 hazard maps every year to keep them up to date. Moreover, the federal expenditure for climate change adaptation measures is based on the recommended actions of the Austrian Strategy for Adaptation to Climate Change of 2012 and is currently under review to be updated. The costs for the implementation of these recommended actions should be covered by setting priorities and reallocating them within the available budget of the federal government. In 2014, the respective expenditures amounted to € 488 million. When taking the expenditures from the Austrian disaster fund into consideration too, the expenditures for adaptive measures and damages account for € 886 million, which reflects 1.2 per cent of the total federal budget. On the national level, around € 11 million have gone towards research concerning emergency and disaster management between 2006 and 2020 within the KIRAS program. The current annual damage costs of € 2 billion are expected to rise up to € 6 - 12 billion by the middle of the century. Moreover, the forest fund has been implemented as a new financing tool to support risk-based financing for forestry.
In terms of the federal budget, a shift in priorities is taking place to allocate more budget to adaptive measures to reduce potential damage costs in the future. On the federal states’ level, selected examples include the fire brigade equipment decree or the establishment of a special service for fighting field and forest fires (both in Lower Austria). Typically, rather than receiving financial resources via international cooperations, Austria is providing other countries with financial support. For example, the BMF is part of the World Bank’s Global Facility for Disaster Reduction and Recovery which aims to support developing countries in better understanding and reducing their vulnerability to disasters and climate protection. However, in the case of the storm disasters of 2018 and 2019, Austria received some financial resources via the EU solidarity fund.

Various stakeholders were asked via individual questions and tasks to quantify the public investments into structural and non-structural measures since 2015, indicate to what extent public and private investments are increasingly risk informed, and whether financial resources have been provided to Austria for DRR measures. However, only few felt they had the competence and information to answer this question.

Currently, there is a price put to risk usually by assessing the probability of an impact times the damage it will cause. When looking at single projects, cost-benefit-analyses are conducted to assess whether to invest in protective measures (e.g. regarding natural hazards) or not. By asking selected stakeholder individual questions, a picture emerges of the extent to which public investments in resilience have increased since 2015, how investments are increasingly risk-informed and about the provision of financial resources via international cooperation.

3.4.1 Public investments in resilience

According to the records of the Torrent and Avalanche Control (WLV), public investments in structural measures across the country have increased from € 89.5 million in 2015 to € 103.4 million in 2021 (BMLRT, 2021). Most expenses are dedicated to protective infrastructure. Taking a look at the investments at the level of federal states, Salzburg, Styria, and Carinthia show the highest increase in investments into structural measures (see Figure 5).
In municipalities surveyed, the amount of adaptation costs rises from 200.65 million Euros in the year 2012 to 886 million Euros in the year 2014.

Figure 5: Public investments in structural measures by federal states. Based on data of the BMLRT (2021), status as of May 2022. Own visualisation.

In terms of non-structural measures, the WLV has completed the compilation hazard maps since 2015 for all municipalities that are to be mapped according to the § 11 of the Forest Act (RIS, 1975). The planned expenditures are financed completely by the federal government. They are only listed internally and not intended to be published, so no estimation about an increase of investments can be derived. Currently, about 60 revisions of hazard maps are approved by the BMLRT per year.

In the context of climate change adaptation and within the research project PACINAS (Public Adaptation to Climate Change, cf. Bednar-Friedl, n.a.), federal expenditure relevant to adaptation was surveyed, based on the recommended actions of the Austrian Strategy for Adaptation to Climate Change of 2012 (BMK, n.a.). Following a resolution of the council of ministers of 2012 and 2017, the costs for the implementation of these recommended actions should be covered by setting priorities and reallocating them within the available budget of the federal government. The top-down analysis of the federal budget estimates annual expenditure relevant to adaptation with € 2.1 billion. The amount that is estimated to go explicitly to adaptive measures amounts to € 488 million. However, this amount only includes expenses of the federal government. So, expenses of the federal states, municipalities and of the private sector are not yet included. The aforementioned expenditure for adaptive measures accounts for 8 % of the examined budget items (three budget subdivisions) and for 0.65 % of the total federal budget in 2014.

When adding the annual expenditure of the Austrian disaster fund (BMF, n.a.) (of which some expenses are already included in the top-down approach), the expenditure for adaptation and damage rises to € 886 million, so 1.2 % of the total federal budget. Based on expert interviews, an alternative bottom-up approach estimates the current expenditure of the Austrian Strategy for Adaptation to Climate Change – with regard to the areas relevant to the federal government – at € 358 million per year.


3.4.2 Risk-informed investments

Examples of how public and private investments are increasingly risk-informed include measures and projects on various geographical and administrative levels:

Within the EU programme Horizon 2020: Between 2014 and 2020, about € 2.16 billion have gone to the area of disaster resilience. In this category, the topics of climate change mitigation/climate protection and earth observation are not included. Within the context of the EU programme Horizon Europe, about € 27 million have gone to the area of disaster resilience in 2021. For 2022, the amount is expected to rise to € 46 million, and € 5 million are planned to go to the thematic cluster of nature based solutions to protect local infrastructures (based on data of the FFG’s funding database).

On a national level, within the KIRAS project around € 11 million have gone to research and development in the area of emergency and disaster management between 2006 and 2020 (based on data of the FFG’s funding database). Another example is the Austrian Strategy for Adaptation to Climate Change (BMK, n.a.), in which various courses of action are recommended for several areas. These measures are to be implemented by shifting priorities within the federal budget. This shift of priorities is argued by referring to the current and potential damage costs that are likely to arise in the future: Damage caused by weather and climate change already causes costs with an average of at least € 2 billion per year in Austria. An average annual damage of at least € 3 billion to 6 billion is expected by 2030. By the middle of the century, the values will increase to at least around 6 billion to € 12 billion annually (Steininger et al., 2020). Moreover, the forest fund has been established as a new financing tool of the Federal Ministry for Agriculture, Forestry, Regions and Water Management to establish risk-based funding for forestry, especially regarding forest fires. Based on a risk map for forest fires, funding is allocated to forest areas. In total, the forest fund amounts to € 350 million (Waldfonds, n.a.).

When looking at the federal state level, one example for how public investments are increasingly risk-informed includes a decree on fire brigade equipment of Lower Austria: Implemented in 2011 and with the latest adaptation in 2022, this law regulates that every municipality has to calculate what kind of equipment is needed depending on the risk they are exposed to (Federal State of Lower Austria, 2011). Moreover, a special service for fighting field and forest fires was implemented in Lower Austria in 2020. It was initiated by the federal fire brigade association and is financed via the catastrophe fund and the forest fund. Therefore, vehicles specifically designed for forest fires, fire extinguishing equipment, and turnout gear are acquired (NÖ Landesfeuerwehrverband, n.a.; Werth, 2022).

3.4.3 International cooperation and provision of financial resources

Rather than receiving financial resources, Austria is mostly providing them to other countries: Austria is a shareholder in International Financial Institutions (IFI) such as the World Bank Group, regional development banks and thematic funds. The BMF represents the Austrian interests and objectives in the IFIs and sets four thematic priorities in the programmatic cooperation:

- sustainable energy and climate protection,
- water and sanitation,
- private and financial sector development and
- urban development.
As part of this priority setting, the BMF also made financial contributions to reduce the risk of disasters in developing countries. The BMF has been a member of the World Bank’s Global Facility for Disaster Reduction and Recovery (GFDRR) since 2012, which aims to support developing countries in better understanding and reducing their vulnerability to disasters and climate protection. GFDRR thus contributes directly to the implementation of the Sendai Framework, the Paris Agreement and the Sustainable Development Goals of the United Nations. GFDRR sees Austria as a central donor to support activities, especially in the regions of Europe/Central Asia and Africa, as well as in the area of resilient urban development (City Resilience Program) and hydrometeorology/early warning systems. In addition, the BMF financed several junior positions in the area of natural catastrophe risks at the World Bank. Furthermore, the BMF supported the co-financing and implementation of a climate and disaster tool at country and regional level at the Asian Development Bank. However, as one consulted stakeholder outlines, there has been some support from the EU solidarity fund towards Austria, especially for the storm disasters in 2018 and 2019.

3.5 E. Progress in Disaster Preparedness, Response and ‘Build Back Better’

Over the last years, preparedness, response, recovery, rehabilitation and reconstruction have improved: An increase in interconnectedness and collaboration is perceived between all kinds of stakeholders. These networking activities between public authorities on various levels as well as awareness-raising activities have helped to increase preparedness as actors collaborate and assist each other more efficiently in case of emergency. These collaborations, in turn, help to improve the response to disaster events. Some opportunities in terms of preparedness and response include the increasing usage and provision of open data, communication via social media and the improvement of early warning systems. However, data is not always available and the transmission of data as well as warning people via cell broadcasting still pose a challenge.

In some areas, new regulations have been put in place to set incentives for private actors to invest in DRR and thus strengthen preparedness. On the other hand, large investments have already been made in the past in terms of protective measures. Many stakeholders perceive a context shift in Austria’s DRR landscape in terms of an increased participation of the general public. People tend to be more proactive, which might be attributed both to the media and that those actually affected are increasingly involved in the process. However, collaborating with an increasing number of actors can also bring challenges. Other challenges mentioned by the consulted stakeholders mostly involve a lack of experience with large disaster events. Moreover, the increase in complexity as well as the availability of resources could complicate measures in the future.

Over the last years, progress was made in several areas of disaster risk management as discussed by the participants of the focus group discussion on emergency management:
The *increase in interconnectedness*, collaboration, cooperation, and communication between public and private stakeholders and the general public is mentioned as one of the key developments. Intensified networking activities between public authorities, both on national and a local level, as well as with the SKKM improved strategic processes and the preparedness in an actual case of emergency. Having in mind Sendai’s aim to strengthen participation processes and the engagement of the general public into disaster risk debates, the participants mention a distinct shift in Austria’s DRR landscape. Many describe a perceivable *increase in participation of the general public* and its motivation to act. More and more people are proactive in accessing information about their exposure to disaster risks and use the existing services available. Additionally, there is a growing number of associations that focus on the topic of disaster risk.

This improvement is on the one hand attested to successful awareness raising efforts, which the ASDR members partly attribute to the media. On the other hand, they argue that those actually affected are increasingly involved in planning processes and reactive measures. However, there are also challenges coming with the larger number of actors involved. Political attitudes are often woven into/inherent to social structures such as associations and clubs. The development of them is rather a legal vacuum. Therefore, such actors might act on underlying political agendas, which is not always declared openly.

All in all, the intensification of interaction between a growing number of actors helped to improve the *preparedness* through awareness raising and establishing collaborations. These collaborations in turn help to improve the *response* to disaster risk emergencies:

Opportunities arise in terms of **open data and the reachability of people via mobile phone**: People can be informed about events much faster and easier than before, and their location data can be used to assess the exposure of communities. However, the availability of data is not always given, neither is the provision of real-time data and its transmission. Cell broadcasting - albeit seen as a great opportunity to warn people in time - is not yet implemented in Austria.

Other improvements mentioned by the participants include the development of **new regulations** that serve as incentives for the private business sector to invest in and take on DRR measures. **Large investments** in protective measures to a certain degree are due to the topographically limited availability of permanent settlement areas and the consequent necessity to protect existing settlement areas as well as possible. However, to take measures that are not only in line either with DRR or with climate adaptation measures, but with both and also with other demands as well.

In terms of **‘build back better’**, participants refer to their experiences of the last two years during the COVID-19 pandemic. Moreover, they mention an exchange on an international level with actors from Rheinland-Pfalz, which was severely affected in the summer of 2021 by heavy rain.

However, this is also the area where the participants locate **most challenges**: So far, Austria has hardly been affected by large disaster events. Therefore, there is little experience in how to handle these. Moreover, they perceive an increase of complexity regarding risk and impact. This, in turn, affects the activities of insurance companies. Additionally, the availability of resources for the recovery phase might turn out to be an issue in the future, seeing as for example the war in Ukraine has an impact on the availability of several building materials.

The feedback of the **scientists that were consulted via the online survey** paints a similar picture: In terms of preventing disaster, most see a definitive improvement compared to the situation in 2015. One scientist sees a slight decline though and one chose was indecisive or rather found none of the other options to be correct. Regarding preparedness for response, all consulted actors agreed
that there has been an improvement, some observing a slight improvement, while most agree on a
definite improvement. In terms of recovery and rehabilitation from disaster events, one person each
perceives a slight decline or a slight improvement. However, most of the consulted scientists agree on
a definite improvement of these areas since 2015. When asked about the development in the area of
reconstruction, the feedback is most varied. Two scientists see a definite improvement since 2015,
while one scientist each either perceives a slight decline, a slight improvement, or found none of the
options to be correct.

The findings of a literary review identify policy-relevant information and tools as well as research
projects and findings that contribute to an improvement in preparedness for response, as well as for
recovery, rehabilitation and reconstruction. Combined with the input of the focus group discussion
and the online survey, they can be compiled into the following boxes.

**Policy-relevant information and tools**

| **ASDRR** | The Austrian Society for Disaster Risk Reduction (ASDRR) explicitly promotes
developing resilience and accelerating recovery in order to “build back better”. Their
vision is to support countries of the global south to do that by sharing Austrian Know-
How with them through workshops, courses and an annual summer school (ASDRR, 2020). |
| **Team Austria** | The “Team Austria” is a project initiated by the Austrian Red Cross: Since 2007,
volunteers can register in a database, already before emergencies or crises. In case of
an event, these volunteers can be called upon to support emergency forces (Österreichisches Rotes Kreuz, 2020). |
| **ÖREK** | Another important tool in order to take the spatial dimensions of risk into account is
the ÖREK, the Austrian Spatial Development Concept (orig. Österreichisches
Raumentwicklungskonzept). It is a set of guidelines that are developed, implemented
and followed by all members of the ÖROK, the Austrian Spatial Planning Conference
(orig. Österreichische Raumordnungskonferenz) (ÖROK, n.a.). In the ÖROK 2030, the
spatial development until 2030 is planned. One special focus is the adaptation to
climate change and to improve protection against natural hazards through preventive
spatial development, for example by maintaining free spaces as such or infrastructural
corridors in a climate resilient way (ÖROK, 2021). |
| **ExtremA 2019** | In terms of cases of overload, Schneiderbauer et al. (2020) observe a shift towards
considering whole catchment areas instead of single river segments. Moreover,
ecosystem services are taken into consideration in order to gain additional safety and
reduce costs for structural measures. Additionally, due to increasing frequency and
intensity of extreme events, protection targets are reconsidered and adapted to this
shift. The approach to evaluate protective measures economically is slowly emerging,
but not applied regularly to this day.

“Forests play a major role in protection against floods, landslides, rockfall and
avalanches”, as Kleemayr et al. (2020, p. 624) state. In 2014, a comprehensive modeling
of protection forests in Austria was carried out which can serve as a basis to integrate
forest in general into protective measures. Moreover, Kleemayr et al. advocate for an
active approach in maintaining protection forests and making them climate-fit.
Research projects and findings

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
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<tbody>
<tr>
<td>ARISE</td>
<td>By identifying so-called local burning embers and deriving adequate adaptation measures, the ARISE project helps to increase the preparedness of communities for locally relevant risks (Projektkteam ARISE, 2016). So far, this process has only been conducted in one municipality. However, the outcome seems very promising.</td>
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<tr>
<td>RESPECT</td>
<td>Identifying roles and responsibilities in climate risk management is crucial in order to prepare for risks and foster recovery, rehabilitation and reconstruction after disaster has struck. The RESPECT project contributes to that by offering a role play that lets relevant stakeholders immerse themselves in risk scenarios and helps them to define roles, allocate responsibilities and derive a package of measures to tackle climate risks (Lintschnig et al., 2019).</td>
</tr>
<tr>
<td>Trends in torrential flooding in the Austrian Alp</td>
<td>Schlögl et al. (2021, p. 1) argue that due to the efficiency and the effectiveness of technical mitigation structures, there has been no increase in the magnitude, frequency and seasonality of damage-inducing torrential flooding: “While the indices of triggering precipitation and the number of exposed buildings increased steadily, frequency, magnitude and seasonality of damage-inducing torrential flooding did not show clear trends. This contradiction was attributed to a compensatory effect of the increasing number of technical mitigation structures.” This signifies an increase in preparedness, as the coping mechanisms in place intercepted the increase in risk.</td>
</tr>
<tr>
<td>KIRAS</td>
<td>The KIRAS program for safety research, a collaboration between the BMLRT and the FFG, supports national research programmes focussing on improving safety. These measures range from the APCIP project (BMI, n.a.) or systematic risk management and resilience planning for the security of food supplies to an emergency planning and decision-making system in case of an accident related to hazardous substances (KIRAS Sicherheitsforschung, 2022).</td>
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3.6 F. Collaboration, Partnership and Cooperation

Successful partnerships and initiatives can be found on different scales and administrative levels in Austria:

On a local level, the exchange of experiences and information as well as training and workshops are highlighted. The natural hazard and climate change check for municipalities is mentioned as a best practice example by several actors. Moreover, the role of water boards for protective measures is illustrated, as they set up funds to which each member – individual, municipality, company – contributes. These funds are then used to develop and maintain mitigation and/or prevention measures. Another example is a citizen science approach to map earthquakes, the MacroSeismic-Sensor Network. The importance of NGOs and civil society actors as intermediaries between local communities and governmental stakeholders is highlighted.

On the regional level, the implementation of heat protection plans is illustrated by drawing on two examples from Lower Austria and Vienna. The concept of the KLAR! regions as model regions for climate change adaptation - which cover 79 regions with 651 municipalities involved - is highlighted by several actors. Other
partnerships and collaborations evolve around measures and activities taken by various federal states. On a national level, various stakeholders mention the work of the ASDR platform as a positive example, as well as workshops and training provided by the SKKK. Moreover, the SKKK is currently still working on implementing cell broadcasting. To inform people and dedicated users that are at risk based on their location can be done via the KATWARN app. Regarding the activities of the ASDR platform, the establishment of a loss and damage database (CESARE) is highlighted. The ZAMG hosts various hazard advice and information services that provide information to the general public and key stakeholders. Other successful projects and networks include the Disaster Competence Network Austria (DCNA) and the KIRAS Security Research Program by the FFG.

Concerning the international level, examples mentioned include cooperations between the ADA and the UN Environmental Programme, as well as various projects at an EU level. There are also transboundary collaborations in place between Austria and Bavaria, Germany. The work of both the ASDR platform and the DCNA are highlighted in terms of partnerships that extend across national mechanisms and institutions. However, challenges arise in terms of including all relevant stakeholders, especially when it comes to vulnerable groups. Moreover, many tasks are taken on by civil society actors and volunteers, even though they are technically within the limits of governmental actors.

3.6.1 Partnerships and initiatives most successful in reducing disaster risk

According to the experience of various core group members, successful partnerships and initiatives in Austria can be found on all geographical levels, from local up to regional, national, and international:

On a local level, the Natural hazard and climate change check for municipalities is highlighted as a best practice example that encourages local stakeholders to take action to reduce disaster risk (cf. UBA, 2022a). An example for bottom-up disaster risk prevention initiatives are water boards: Water boards are statutory corporations under Austrian law (Water Act of 1959) and can be composed of any number and combination of individuals, municipalities or companies. Each member contributes financially to a common fund, which is intended for use in the development and maintenance of mitigation or prevention measures. The readiness to financially contribute to infrastructure investment can be considerable. For example, in the case of the Saalbach (a river in the Federal State of Salzburg) water board, which is relatively large with 600 members, individual contributions can be as high as € 50,000 annually. The level of contribution is determined by a point system derived from the exposure of a member’s property or dwelling. The initial determination of membership fees is automatically transferred to new property owners.

Water boards may decide to take responsibility for co-financing sometimes costly protective infrastructure, instead of leaving this to local authorities. There are several advantages for taking such an initiative. Water boards can, for example, expedite the request for a protective infrastructure, which serves the interests of those directly impacted by potential hazardous events. Water boards,
just like municipalities, can initiate and request the construction of protective infrastructure, and thereby oblige its members to finance the suggested measures. In the case of Austria, investment proposals by water boards receive a faster treatment of their request and a higher central co-financing rate than requests submitted by local governments. The difference can be as high as 15% and should thereby reward individual willingness to contribute to financing protective infrastructure.

As water boards become the formal owners of the protective infrastructure they build, they are responsible for maintaining it. This has led to significantly better results in the status of protective infrastructure over time, compared to infrastructure for which maintenance is the responsibility of other groups, such as municipalities, that have faced resourcing challenges.

Considering the longer-term maintenance requirements of protective infrastructure investment, municipalities may encourage investment by water boards.

In terms of partnerships and initiatives on a regional level, the establishment of heat protection plans through the health department of the Federal State of Lower Austria together with the ZAMG, emergency medical services, hospitals and nursing homes is highlighted. Other examples are the KLARI model regions (cf. Klima- und Energiefonds, 2022), the conduction of simulations to practice catastrophe scenarios (Lohninger, 2018). The MacroSeismic-Sensor Network (MSS) uses citizen science to map earthquakes and inform the public whether a commotion occurred due to an earthquake or not (MSS, 2022). And the Federal State of Lower Austria’s Energy and Environmental Agency (eNu, 2022) as well as the climate and the Climate and Energy Programme (Amt der Niederösterreichischen Landesregierung, 2021) both deal with climate change.

On a national level, the role of the SKKM is highlighted once more, both in regard to the provision of workshops and trainings and the implementation of a cell broadcast system (not yet in place). The BMI launched the KATWARN App that informs people if they are at risk based on their location (BMI, n.a.) and established a new operations control and communication system (APA, 2021). The work of the ASDR platform – especially regarding the compilation of the CESARE loss and damage database (Themessl et al., 2022) – is mentioned as well as a new warning platform of the ZAMG that takes the impact of events into consideration (ZAMG, 2022b). Coming from a typically scientific direction, there is the DCNA, an academic networking platform (DCNA, 2022), the KIRAS Security Research program of the FFG (2022), as well as a master programme on risk prevention and disaster management at the University of Vienna that was launched in 2015 (Universität Wien, n.a.).

Other best practice examples include partnerships and initiatives on an international level: The CLIMAPROOF project was conducted together with the United Nations Environmental Programme in the West Balkan and that was financed by the ADA and that aims to foster climate proofing regarding investments in the industrial sector and technical capacities (ADA, 2022). Moreover, there is also the ADA partnership with Austrian enterprises e.g. for slope protection against hydro-geological risk in Nepal together with Trumer Schutzbauten Ges.m.b.H. (ADA, 2018) or for improved risk management for small-holder farmers in Moldova together with Pessl Instruments GmbH (ADA, 2016). Other international collaborations at an EU level which are increasingly applied in Austria include support systems derived from Copernicus, such as the European Flood Awareness System (Copernicus Emergency Management Service, n.a. a), the European Forest Fire Information System (Copernicus Emergency Management Service, n.a. b), and the European Severe Storms Laboratory (ESSL, n.a.). Moreover, the Basic European Asset Map is seen as an opportunity for Austria to assess real and potential damages caused by natural hazards (COPERNICUS Emergency Management Service - Mapping, 2022).
The **scientists that were consulted** named a few best practice examples for successful partnerships and initiatives: On the **local level**, they mention the general public, associations, companies and local politics. In terms of **regional** partnerships and initiatives, the establishment of the water boards is mentioned.

One scientist and key informant stated that collaboration with NGOs and civil society groups that represent vulnerable and marginalised groups, such as the Red Cross, the Diakonia, and the Lebenshilfe (an association promoting the interests of people with intellectual disabilities and learning difficulties) is a very successful concept. One project she highlights is the CAVE project dealing with community engagement and vulnerabilities in epidemic response (KIRAS Sicherheitsforschung, 2022). According to her, these actors are well suited for the role of an intermediary between vulnerable groups and the policy level, also helping to translate the “technical language” into the local context.

However, it is exactly this communication that poses a challenge: While the scientist argues that the communication between the intermediary organisations and the target groups works very well, she states that there is little support and proactivity from the governmental side. Moreover, she argues that the complexity of vulnerability is often neglected as vulnerability increases exponentially and that some relevant groups are still not included. Furthermore, the pandemic made it difficult to find volunteers. Yet in general, civil society engagement has increased. One example that the scientist mentions is the migration in Europe in 2015. According to her, civil society and volunteers engaged in manifold ways, while the state and government acted rather reluctant. In that way, she sees a negative trend in terms of governmental support.

The return of the **online survey with the disaster management stakeholders** was higher: On a **local level**, best practice examples that were mentioned concern the fostering of knowledge and awareness, e.g. by providing emergency training for municipalities. One mentions the role of personal contacts, while another actor perceives the handling of the pandemic and the digital disaster protection plan as successful. Personal contact and a casual exchange of information are mentioned by one stakeholder each, as are the natural hazard and climate change check for municipalities and a project to prepare a municipality for a blackout.

Similarly, successful partnerships and initiatives that are mentioned for the **regional level** include work related to the pandemic, disaster protection plans, preparation for blackouts, and the exchange of information, e.g. via the annual natural hazards convention of the ASDR. Moreover, the concept of KLARI regions (cf. Klima- und Energiefonds, 2022) is mentioned, as is the avalanche warning service and the emergency services regular’s. One actor highlights the AG Klimawandelanpassung (engl. working group on climate change adaptation) of the Federal State of Salzburg as an example.

An example highlighted by one disaster management actor is the action plan concerning coping with heatwaves, which the health service of the City of Vienna contributed to. Info sheets were published with guidelines for the general public on how to deal with heat (Stadt Wien, n.a.). To prevent heat-associated health damages, especially for vulnerable groups, medical, nursing or childcare facilities, the heat warning service was established in 2010 by the City of Vienna’s health service. Since then, the ZAMG has been sending warnings about predicted heat waves to these facilities on behalf of the state health department, so that they can take preventive measures in good time and activate their own emergency plans. This information is also made available to the public.

One stakeholder states that in some cases some regions do not seem so keen on partnerships and collaborations.
On a national level, one successful initiative that is mentioned by several actors is the SKKM, the national crisis and catastrophe management. Also the work of the ASDR platform is mentioned by some stakeholders as being successful in connecting various stakeholders on different levels. The development of a protection forest map is another example noted, as are the partnerships that developed during the time of the pandemic. One suggests adapting the 3-K-concept - knowing stakeholders in times of crises - as illustrated by the German Federal Academy for Security Policy (cf. BAKS, 2013). As a more general success factor that is mentioned are activities that help raise awareness. On the other hand, two stakeholders agree that there are hardly partnerships and initiatives on this level, at least not systematically incorporated in sovereign structures.

There are also some transboundary activities that are highlighted by the disaster management stakeholders, especially between Austria and Germany: A collaboration with the Bavarian alpine rescue service via the Federal Ministry for the Interior is mentioned, the ARGE ALP (Working Group of Alpine Countries, cf. ARGE ALP, 2019) and the EU-Regio Salzburg – Berchtesgadener Land – Traunstein (cf. EUREGIO, n.a.), as well as an exchange with the Federal Office of Civil Protection and Disaster Assistance of Germany (cf. BBK, n.a. b). However, there are also international partnerships mentioned between the EZA countries (cf. ADA, n.a.). Furthermore, an exchange between avalanche warning services is mentioned, as well as university education.

Some initiatives and partnerships that are mentioned in the category of “other” are a letter of intent that concerns the establishment of a mountain rescue service in Albania. Moreover, partnerships with the European Commission are highlighted, such as the Directorate-General Joint Research Centre or the Directorate-General for European Civil Protection and Humanitarian Aid Operations. Other international partnerships mentioned are UNDRR and with the World Bank.

The literature review provides some additional input:

### policy-relevant information and tools

| Agenda 2030 | DRR and the prevention of disaster risk are part of the Agenda 2030’s targets: One sub-target of target 13 aims to improve the resilience and adaptive capacities of municipalities, especially in the context of climate-related (natural) hazards. Climate protection measures shall be incorporated into national strategies, politics and planning (cf. Wegscheider-Pichler and de Cillia, 2020). |
| ASDR convention on natural hazards | The annual convention on natural hazards, hosted by the ASDR platform, and addressing regional and local stakeholders, is held for the second time in 2022 in this format. Before that, two conventions were held, one in 2014 and one in 2019 with the title “Understanding Risk”. However, these two conventions were rather addressing an expert crowd (UR, 2019). The ASDR platform now rather aims at building awareness and improving preparedness of stakeholder bottom-up by bringing together various actors from the areas of emergency and disaster management of a region. At the heart of the convention is the exchange of experiences of local actors. That way, networking is facilitated and fostered, and preparedness increased (ZAMG, 2022a). |

### 3.6.2 Cooperation & Collaboration across National Mechanisms and Institutions

One project on disaster risk reduction that works across national mechanisms and institutions and that is mentioned both in the online survey of the scientists and the disaster management actors is the ASDR platform. The platform serves as the national focal point for the implementation of the Sendai Framework. However, one stakeholder states that the impact of the ASDR’s work is not yet perceptible, and that many politicians are not aware of the existence of the Sendai Framework.
Another example is the establishment of the DCNA. While the ASDR platform engages mostly with actors of emergency and disaster management, ministries and the government (local, regional and national), the DCNA is a scientific network that conducts research in the field of disaster management (cf. DCNA, 2022). Moreover, according to a disaster management actor, some individual initiatives in the area of emergency management have developed since 2015, as well as the Austrian society for snow and avalanches (orig. Österreichische Gesellschaft für Schnee und Lawinen, cf. ÖGSL, 2022). On a national level, the Federal Ministry of the Exterior has incorporated the goal of disaster mitigation and risk reduction across all their cooperations and collaborations. Two stakeholders argue that no such cooperation and collaborations have evolved since the adoption of the Sendai Framework.

Some additional examples were identified through a literature review.

<table>
<thead>
<tr>
<th>Policy-relevant information and tools</th>
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<tr>
<td><strong>ADA</strong></td>
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<tr>
<td><strong>Cooperation between BMF and World Bank Group and EUSALP Action Group 8</strong></td>
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<td><strong>EUSDR</strong></td>
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<td><strong>EUSDR</strong></td>
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3.7 G. Progress in achieving the Targets of the Sendai Framework

Progress is made in achieving some of the targets of the Sendai Framework: In terms of target 6 and 7 – increasing international cooperation to development countries (6) and increasing the availability and access to multi-hazard early warning systems & disaster risk information and assessments (7) – stakeholders observe a positive trend in reaching these targets. However, in terms of coming closer to achieving targets 1 to 4 – reducing mortality (1), number of affected people (2), economic loss (3), and damage to critical infrastructure & the disruption of basic services (4) – both scientists and disaster management actors observe a negative trend with an increase in loss and damage numbers but at the same time also increased efforts to deal with the respective problems. Concerning mortality numbers, Austria is already at a very low level with respect to the number of natural hazards occurring.
Currently and based on the initiative of the ASDR platform, the national event and loss/damage database CESARE is being established, which integrates harmonised information for selected hazards from different institutions. At the moment, this covers only selected hazards for two provinces and has been established as a demonstrator. However, it is currently being rolled out to other provinces and hazards.

Challenges that the consulted stakeholders have encountered over the last years include difficulties in implementing functional early warning systems which are also accepted by the general public. Moreover, factors such as an increased building density, ground sealing, lack of data and evidence, short lead times in case of extreme events and establishing good collaborations are mentioned too.

3.7.1 Striving to meet the Sendai Framework Targets

When asked about which progress has been made regarding the seven global targets of the Sendai Framework, the scientists and disaster management actors evaluated the status quo as follows (figures in annex):

In terms of achieving Target 1: Reduce mortality, there is no distinct tendency amongst the consulted scientist, as some perceive it to have increased while others observe a decrease. The disaster management actors rather see a decrease in mortality. However, in both groups the choice which received the most answers was “I don’t know / nothing applicable”. Following these answers, there is a slight progress happening in terms of target 1. However, there is not necessarily a causality regarding the implementation of the Sendai Framework that can be determined, meaning that the developments introduced in this section cannot definitely be attributed to the implementation of the Sendai Framework. This applies to all of the following targets.

Regarding Target 2: Reduce number of affected people, the opinions show the same tendency: Three out of five scientists observe a definite increase, while two hold off from making a distinction. Most disaster management actors agree on a slight increase in number of affected people, while far less see a slight to definite decrease. However, also in this group four out of thirteen state that none of the statements matches their observations. As far as target 2 is concerned, there is no real progress observable, rather a slight deterioration.

In the case of Target 3: Reduce direct disaster economic loss, the emerging picture seems rather consistent: Both disaster management actors and scientists observe an increase respectively a slight increase in economic loss. In comparison, only few find none of the answer choices suitable. In conclusion, there is no real progress noticeable in reducing economic loss.

Similarly, most scientists and disaster management actors agree that there is a slight to definite increase regarding damage to critical infrastructure and the disruption of basic services, which constitute Target 4. Only few observe a slight decrease or do not find the given choices applicable. Thus, no real progress can be determined.

In terms of Target 5: Increase the number of countries with national & local DRR strategies, no assessment can be made for other countries than Austria. To read about what the situation looks like in Austria in this regard, please go to chapter 3.3.2 Establishment of local, regional and national disaster risk reduction strategies and plans.
When taking a look at **Target 6: enhance international cooperation to developing countries**, scientists distinctly observe a slight to definite increase. Most of the disaster management stakeholders perceive a slight to distinct increase. However, two observe a slight to distinct decrease. Some find none of the answer choices suitable. All in all, the chart shows a positive trend in achieving target 6.

Also with regard to **Target 7: Increase the availability of and access to multi-hazard early warning systems & disaster risk information and assessments**, scientists again observe a slight to distinct increase. Similarly, most disaster management actors also state they perceive a slight to distinct increase. Only a few note a slight decrease. While some stakeholders do not find the answer options applicable, overall a positive trend can be derived regarding achieving target 7.

In order to quantitatively monitor the progress in achieving the Sendai Targets the ASDR plattform initiates the establishment of a national event and loss/damage database. Although Austria is a data rich country concerning hazard and risk information, legal frameworks as well as historical developments resulted in a decentralised data landscape concerning hazard and risk related data. With the CESARE (Collection, Standardization and Attribution of Robust Disaster Event Information) project the feasibility of a central national repository integrating and harmonising relevant data could be demonstrated. Within the next few years the CESARE system should be extended to entire Austria and to more hazard types and also foresees to integrate further information sources. More information can be found at www.cesare.at or in Themessl et al. (2022).

### 3.7.2 Challenges

Various challenges are identified by the **disaster management actors**, that have occurred over the last years since the implementation of the Sendai Framework: Implementing a warning system that works and really manages to reach all persons that are currently located in an endangered area (e.g. via cell broadcasting), without having a specific app installed or a certain network provider. Another important factor is the acceptance of the general public, both of using an app such as KATWARN or being contacted via cell broadcasting. Also, some stakeholders feel it is hard to meet the expectations of the public, which they feel are sometimes quite high. From a technical point of view, the increasing building density both in potential flood risk areas and avalanche risk areas poses a challenge too to adapt protection measures to the increased need for protection. Moreover, there is not always enough reliable, well-structured data available and accessible to conduct an adequate risk and vulnerability assessment. Similarly, a lack in evidence alongside a short lead time in case of extreme events make decision processes more difficult.

Collaboration is an aspect both mentioned by the disaster management stakeholders and **scientists**: While the former highlight how transboundary collaboration between emergency management actors can be challenging if not practiced before, the latter call for a more transparent and less bureaucratic collaboration on a higher administrative level. The allocation of responsibilities is mentioned as just as important as the provision of the required resources.
4. Contextual Shifts, New and Emerging Issues and Challenges

This chapter explores contextual shifts that have taken place since 2015 and that are expected to take place in the future. It also casts a glance/look into new issues that arose since the launch of the Sendai Framework and issues that might emerge in the upcoming years. Figure 6 graphically highlights the respectively mentioned topics.

![Figure 6: Most mentioned topics and expressions within the interviews, online surveys and focus group discussions in terms of contextual shifts, new and emerging issues and challenges.](image)


The threat of multi-hazards, their cascading effects and systemic character, as well as the effective communication of related information are perceived as issues that have emerged since 2015. Besides serious natural hazards and the already observed consequences of climate change which includes the increased occurrence of new extremes such as heat waves and wildfires, the COVID-19 pandemic left distinct marks in this respect. Especially concerning the latter, the role of politics in DRM has been challenged. In addition, the role of social media is seen critically as sometimes false information is circulated and the question of information sovereignty has to be dealt with within DRM.

Due to the globally interlinked socioeconomic system, our society and economics are highly vulnerable to multiple crises and especially supply chain shortages.

In terms of climate change, the awareness amongst the consulted actors is very high for the impact it has on the implementation of the Sendai Framework and the
In order to identify context shifts and issues that emerged and occurred during the time between 2015 and 2022, both disaster management actors and scientists were consulted via an online survey.

4.1.1 Emerging issues

In terms of emerging issues, the disaster management actors perceive the occurrence of multiple crises at the same time, so-called multi-hazards and cascading effects as a major issue. They exert high pressure on emergency management actors and in all sectors, due to systemic dependencies and vulnerabilities. The role of social media is seen critically as sometimes false information is circulated and the acceptance of the general public for the topic of disaster risk reduction is not as high as the consulted stakeholders would wish for. Also one scientist mentions difficulties regarding a high participation of the general public. Therefore, one disaster management stakeholder argues to embed DRR in the educational system to raise a “DRR generation”. Aside from these two issues, climate change takes up a prominent role in the answers of these actors. In combination with heat waves and changes in weather situations, this poses an important point in the disaster management community. The consulted scientists identify climate change and not-plannable catastrophes as a major issue too. As two disaster management actors outline, climate change in combination with societal changes, such as migration, thus adding up to global change, pose a challenge in itself. And last but not least, the challenges brought about by the COVID-19 pandemic are identified as emerging issues by both groups, raising the awareness of the vulnerabilities of a modern and interconnected society.

4.1.2 Topics of concern

The topics of concern mentioned by the consulted actors are manifold and range from social and economic to technical aspects: One scientist observes a lack of awareness for DRR. Amongst the disaster management actors, one sees a focus rather on singular natural hazards than taking the entire spectrum of hazards and risks into account. The general public is not prepared for multiple crises and the crisis management is overloaded, according to one disaster management actor. Measures taken are often not long-term but rather short-sighted, as rated by another. The fear of a wide-spread supply shortage and deficiencies in terms of gear are mentioned as well as diverging opinions between politics and the economy. Another topic of concern mentioned by one scientist is how to effectively communicate risks to the public in a way that uncertainties and discussions within the scientific community don’t lead to a loss of trust in science in general.
4.1.3 Impact and Experience from the COVID-19 pandemic

Most of the disaster management actors agree that one of the impacts and experiences from the COVID-19 pandemic are the many findings, the better understanding and awareness for risk and the need of an all-hazard approach. Hygiene measures have been intensified to address a decrease in the number of volunteers, as not all were vaccinated. Successful management has been identified where there was collaboration on a local level, a clear and consistent approach as well as proactivity to deal with the pandemic. An increase in decentralisation and digitalisation are another impact traced back to the COVID-19 pandemic.

However, some point out that it took long to actually implement structures to cope with the pandemic on all administrative levels, and that sometimes there are few political consequences. One observes a loss of trust in politics, while another one perceives hardly a willingness to learn.

One scientist mentions the increased awareness for having to strengthen the resilience of society. Moreover, he argues that the scientific debate on COVID-19 and the diverging opinions have led to a loss of trust in science.

4.1.4 Impact of the Climate Crisis

The impact of the climate crisis on the implementation of the Sendai Framework is seen as very high amongst the consulted scientists. This is confirmed by the disaster management actors, especially in combination with an increase in extreme events which pose a challenge for the emergency management. As one scientist argues, this increase of extreme events has increased the awareness for the need for preventive and reactive measures, for example in terms of better protective measures for buildings against floods. Moreover, the interest in scenarios for the future is high. Still, some points are raised about the unpredictable consequences of the climate crisis or the operationalisation of countermeasures. As one stakeholder argues, DRR has to go beyond natural hazards and thus also has to assess the impact of the climate crisis in other areas. However, one disaster management actor currently sees a decrease in attention for climate change in the face of the threat of war.

4.1.5 Impacts of Shifts in Biodiversity and Ecosystems Health

Similarly, the impacts of shifts biodiversity and ecosystems health are seen as very strong by one scientist, as well as by the consulted disaster management actors. Especially an integral approach as provided by the work around ecosystem services, carbon sinks, protection forests etc. is perceived as crucial. However, the disaster management actors attribute a lack of attention for this field in politics as they feel adequate laws and guidelines are missing. Moreover, biodiversity should also receive more attention in the field of DRR as one stakeholder argues, although another one perceives a strong existing support of respective measures.
4.2 B. Emerging Issues and Future Contexts – Prospective (to 2030 and beyond)

The **increasing societal complexity** has been identified as one of the emerging issues that causes a lot of concern amongst the stakeholders. They perceive an increase in tensions within society and therefore expect an increase of conflicts, leaving vulnerable groups behind. Therefore, they call for strengthening the sense of community. Moreover, it is proposed to take more consideration of the **systemic nature of risks and cascading effects** in the future. To that end, it is suggested to develop new methods such as compounding multi-layer risk scenarios. That would also help to improve the understanding of and awareness for systemic risks in the general public. Due to the complex interplay between environmental (including climatic) and societal risk drivers, **limits to climate change adaptation** will become more relevant for Austria. This will especially be the case as actors around the globe are more and more connected, which becomes apparent for example in terms of supply chains, migration, or infrastructure. Moreover, the stakeholders call for an increase in the **awareness for risk**, in general, throughout society alongside strengthening self-provision. Therefore, it has been proposed that **communication has to become more inclusive**.

A member of the **core group** anticipates continued excessive environmental degradation with impairing of natural “buffers” against upcoming hazards and consequent impossibility on their part to reduce risk associated with these hazards. Moreover, he mentions the interlinkages between fragility/conflict and disaster risk as a topic that needs to be considered to accelerate action, as well as compounding multi-layer risk scenarios with multiple hazards acting simultaneously or overlapping or exerting their effects on the same affected.

From the online survey conducted with **scientists**, one is concerned that the sectors of critical infrastructure (KRITIS) may not become fully resilient. The concept of KRITIS sectors was developed by the German Federal Office of Civil Protection and Disaster Assistance and classifies critical infrastructure into nine sectors (BBK, n.a.).

One of the most frequently mentioned topics of concern by participants of the **focus group discussion on future & emerging issues** is the **increasing societal complexity** that they observe. They perceive an increase in inequality within society alongside an increase in conflicts. Because of these tensions, they see social rifts opening up. One participant fears that this could lead to a situation that favours the “survival of the fittest” in the sense that vulnerable groups\(^1\) would be left behind. Therefore, they call for a development towards a stronger sense of community.

\(^1\) When we use the term vulnerable groups, we mean to include people with disabilities, LGBTQ+, adolescents, elderly people, homeless people, single mothers and women.
Another prominent issue that needs to be considered more in the future is the **systemic nature of risks and their cascading effects**. The participants state that so far, systemic risks are partly analysed and understood. However, not all risks are documented and defined, or there is no awareness of the possibility that a specific multi-hazard could occur. Therefore, new methods should be developed to identify such systemic risks and to manage them accordingly.

Overall, **limits to climate change adaptation** will also become more relevant for Austria in the future, as ‘thresholds’ could be exceeded due to the complex interplay of risk drivers and as the country is not separated from global events, even though it may sometimes feel that way. International relationships, collaborations and interconnectedness become especially apparent in terms of supply chains, migration, financing of climate change adaptation measures, energy supply or food supply. One participant even feels that the dependency on resources is increasing.

One area which the participants identify that should be considered more intensively is to increase **awareness for risk and that it concerns everyone**. This goes hand in hand with raising awareness for residual risk and learning how to deal with it. Moreover, the role of self-provision should be strengthened.

Additionally, one participant states that **communication on risks needs to become more inclusive**. That for example means to communicate in sign language, braille, and easy language. Moreover, communicating risks should happen in time. This, in turn, is complicated by the fact that **predictions are not always possible**, as another participant mentions.

As an example from the **literary review**, Leitner et al. (2020) highlight the importance of integrating future climatic and socio-economic development for climate risk management (CRM), e.g. urbanisation, ageing and population development. Furthermore, they argue that there is little overview regarding who does what in the context of CRM. Moreover, they see the uncertainty regarding socio-economic development as a particular challenge. They argue that this uncertainty has to be addressed by collecting data and factoring the uncertainty into decisions.
5. Prospective Review and Recommendations

Taking a look into the future, this section discusses recommendations to help realise the goal of the Sendai Framework, what progress needs to be made regarding risk assessment, information and understanding, governance and management, investments in risk reduction and resilience, as well as necessary developments regarding future collaborations, partnerships and cooperation. Figure 7 graphically highlights the respectively mentioned topics.

![Figure 7](image)

**Figure 7:** Most mentioned topics and expressions within the interviews, online surveys and focus group discussions in terms of a prospective review and recommendations.

5.1 A. Recommendations for realising the Outcome and Goal of the Sendai Framework

In order to achieve the largest reduction in disaster risk and the largest increase in resilience, the consulted actors propose various options: Developing risk governance in a way that it becomes more evidence-based and is understood as a common effort. Embedding resilience within the legal framework - e.g. by implementing a resilience-check for investments/measures; and make risk management processes more inclusive and participative, across sectors, disciplines, borders and social groups - is an important concern for the stakeholders.

Action plans for the local level, which is usually the level where action is needed first in case of emergency or disaster, should be implemented nationwide. Practising scenarios and conducting assessments on what municipalities are
especially at risk for could be of help. At the European and/or international level the development of and access to early warning systems (for instance MeteoAlarm, Copernicus emergency systems etc.) should be strengthened. Finally, the importance of training to strengthen the actors’ disaster resilience and competence, as well as more interpersonal aspects such as tailoring communication to target groups, exchange experiences, and increasing knowledge are to be mentioned.

The participants of the focus group discussion on future & emerging issues discuss what deliverables, innovations, processes, transformations etc. would bring the greatest reduction in disaster risk and the greatest increase in resilience.

One aspect that is mentioned multiple times is the strengthening and execution of risk governance structures and management. Risk management should be understood as a common effort and not as activities of individual stakeholders. In order to make risk governance successful, the participants suggest taking more evidence-based decisions. Therefore, special attention should be directed at the competencies of science and data.

Risk Governance in turn is strongly connected to strengthen resilience: The participants articulate the necessity for inclusive and accessible communication and information on disaster prevention and resilience. The legal framework should be made “resilience-fit”, meaning that it should take resilience into consideration. Conducting a study on which actions have what kind of impact - a resilience-check, so to say - could help to make that happen.

Another area where a transformation is needed, according to the focus group participants, is to make risk management processes more inclusive and participative. To think outside the box and collaborate cross-sectoral, cross-disciplinary and cross-border is what the participants aim for. Thus, cooperation should be established on all levels. One option would be to install a (climate) risk council across multiple sectors. Aspects of justice should be explicitly identified, taking procedural, distributive, restorative, inter- and intragenerational facets into account. Participation in the sense of inclusion itself and making risk management processes accessible is highlighted too. Respective measures should take all people and groups into consideration, LGBTQ+ (lesbian, gay, bisexual, transgender, queer, plus other sexual and gender identities), people with disabilities, young and old, etc.

Moreover, risk management processes should also involve actors of all administrative levels. A special focus is put on the local level, as this is the level where the first need for action typically arises and impacts are directly evident. Research- and innovation projects should involve local actors and NGOs. The participants also call for the development of disaster management plans on a municipality level and for practising disasters and emergencies. One positive example that is mentioned is the natural hazard and climate change check (see also chapter 3.2 and 3.6). This could be extended across municipal borders. In addition to actions on the local level, the establishment and strengthening of a European and/or international multi hazard/ risk early warning system taking into account local conditions is proposed. Similar systems such as MeteoAlarm (Europe | Meteolarm – Alerting Europe for Extreme Weather) or ARISTOTLE (Aristotle Project (ingv.it)) already exist.

In order to reach target groups, communication systems should be adapted. The access to information and data - including a suitable preparation - is identified as key.
Last but not least, more technical aspects are drawn upon: The development of scenarios for multiple hazard events are proposed to enable an improved preparedness. Moreover, the limits to adaptation should be proactively identified and defined.

According to the input from the scientists’ online survey, most agree that a solid knowledge and objectivity are key to decrease disaster risk and maximise resilience. In practical terms, this results in assessing residual risks, learning from disaster events and training stakeholders’ disaster competence to help them react accordingly in case of emergency. Helping people to help themselves is another point raised by one scientist. Concrete measures that are listed are the improvement of warning systems and making the KRITIS sectors resilient. They also call for reducing the exposition in alignment with a norm of the German Institute for Standardisation (DIN), the DIN 31000, i.e. by systematically reconsidering land use practices (cf. DIN, 2022). Examples that were mentioned concern agriculture, minimising land sealing, and the concept of sponge cities.

5.2 B. Progress in Risk Assessment, Information and Understanding

A central point in achieving progress in risk assessment, information and understanding is raising awareness, increasing access to information and knowledge, and tailoring the information to target groups. Many actors suggest integrating the topic of disaster risk reduction stronger in education from an early age onwards, e.g. starting already in kindergarten or in school. However, a prerequisite for successfully conveying information on DRR lies in the establishment of a risk-communication culture. Additionally, many actors also see a need for more research on DRR. These insights should then be put into practice. However, practical measures should not just be taken as a reaction to disaster events, but already in advance to prepare society for the occurrence or to prevent them if possible.

In order to systematically integrate risk in decision-making processes, one suggestion is to draw increasingly on simulations and drills to prepare for various scenarios. In general the consulted actors call for a strengthened interface between science and politics in DRR and for informed decision-making the national ASDR platform already provides an opportunity and is expected to become more important in future.

5.2.1 Improving Risk Knowledge and Insight

In order to improve risk knowledge, a member of the core group suggests increasing production of relevant evidence and access to information and knowledge.
Most of the scientists consulted via online survey see great potential in informing target groups via events, campaigns, via media, workshops, and reports. The more tailored the information to the target group, the better. One scientist suggests starting education on risk already in kindergarten and school. Another approach which two scientists propose is the use of scenario-based simulations and to connect research and science with practice. Improving risk knowledge by experiencing disasters is mentioned as a successful, but painful option by one actor.

Similarly, providing suitable information, workshops and training, adapted to different target groups, is also seen as key to improving risk knowledge and insight by the consulted disaster management actors. They highlight the importance of starting to talk about DRR already at a young age and suggest preparing information on that topic for kindergartens and schools. This should help to improve awareness among society and counter ‘panic mongering’. Besides making information and new insights available to the public, it is suggested that inter- and transdisciplinary research in DRR should be fostered and incorporated into the scientific landscape, e.g. by developing a research programme focusing specifically on DRR.

A prerequisite for successfully conveying information to target groups is the establishment of a safety- and risk-communication/-culture. A common and comprehensible language is necessary to gain understanding and acceptance among the general public.

Aside from spreading the word and providing information on DRR, disaster management actors see a need for a practical approach too. Prevention should be fostered, both regarding self-provision and joint action, and not only as a consequence of disaster events, but already in advance. However, one stakeholder argues that it will require being affected by an event to induce action. Moreover, one actor suggests the development of guidelines on how to deal with risk for public authorities on all administrative levels.

5.2.2 Systematically Integrating Risk in Decision-Making

The consulted scientists see several options to systematically integrate risk in decision-making: The current data basis should be made easily accessible and prepared comprehensively. Simulations would allow for an assessment of ‘what if’ situations. Cooperations between science and practice should be established and connected to political processes (decoupled from the daily business). Moreover, the disaster management sector would benefit from clear structures.

As several disaster management actors mention, raising awareness, improving knowledge and promoting a transfer of knowledge between science and practice could play an important part. However, the most crucial part seems to be to apply a practical approach:

In this context, most disaster management actors see the need to actively integrate risk in politics. Proposed examples include the development of guidelines, participating in training, identifying promising political tools, and accountability. On the other hand, the actual risk management needs to become more professional and proactive, to adapt faster, conduct risk assessments, and involve all stakeholders. Some particular measures that are proposed are conducting cost-benefit-analyses as well as documenting and evaluating the outcome of political decisions.
5.3 C. Progress in Risk Governance and Management

Various adjustments in different areas are suggested to capitalise on opportunities and / or mitigate new and emerging threats:

In terms of strategy, suggested adjustments revolve around increasingly including vulnerable groups, fostering accessibility, and - most of all - to put already existing strategies into action, e.g. by developing a plan of implementation. The concept of an expert-based and -supported national crisis coordination council has been considered a promising approach, together with setting up a national climate risk council. Moreover, stakeholders call for the development of action plans that could be anchored in the government programme, for more transparency, and for a clear definition, assignment and implementation of responsibilities in terms of policy. When it comes to investments, suggestions include investing in risk-and resilience-‘checks’ as well as allocating a budget for the implementation of action plans. Moreover, the stakeholders suggest making the assessment of current and future risks part of new laws, e.g. on a municipality level. There are already some laws in place that cover risk and DRR, but their execution is often lacking fervour. In addition, the actors suggest a transition towards focusing more on common welfare along a shift from a reactive to a proactive risk-provision. In general, all stakeholders highlight the importance of communication and transparency. To collaborate across all sectors, foster participation and interconnectedness, and provide access to knowledge, information, and data helps to build trust and ownership.

In terms of shared responsibility, most actors see the need for clearly assigning responsibilities and for accountability. Moreover, they propose to increase collaborations across stakeholder groups, make them more transparent and less bureaucratic, and unite the stakeholders under a joint vision.

In terms of empowering local authorities and local partnerships, raising awareness is the most prominent suggestion, albeit in different areas. While stakeholders see a need for highlighting the interconnectedness of different risks, positive feedbacks and planetary boundaries more in general, they also call for an increase in risk-communication and sensibilisation of local communities for local situations and events. This could be done by making relevant actors more visible and fostering participation in decision-making processes. Based on these insights, action plans should be devised and tested. Additionally, spatial planning should be considered instead of solely relying on technical measures. This could, for example, mean harmonising classification categories for different hazards or, in the worst case, resettlement.

From a bottom-up perspective, the local population should increasingly be taken into account when devising measures. This should include citizen’s initiatives as well as organising and coordinating spontaneous voluntary helpers.

In order to ensure that DRR is systematically applied across all sectors, one general suggestion is to include stakeholders from all sectors and levels.

In case of emergency, a functioning warning system needs to be in place, which is why some call for a functioning cell broadcasting system as well as for an improved alignment of warning systems in general. They highlight the
opportunities that are offered by cell broadcasting and international knowledge exchange in general, especially with regards to respective collaborations within the D-A-CH region.

One strategy that has proven successful and that should be intensified in the future is the maintenance and advancement of existing networks, such as the SKKM - as one actor points out, “complex crises need to be fought with complex networks”. However, networking is not all that matters, as most stakeholders articulate the need for local decision makers to be sensitised for DRR. They suggest offering and conducting training to prepare them for emergency and disaster events.

In this context, the ASDR platform members evaluated their approach to this date and agreed on taking on a broader approach in the future, as they ideally want to focus more on nat-tech-hazards, taking into consideration industrial accidents, chemical accidents, technical expertise, cyber crime, energy supply and blackouts.

5.3.1 Necessary adjustments to capitalise on opportunities and/or mitigating new and emerging threats

As one member of the core group states, COVID-19 showed that even the best system in place to manage disaster hazards and risks can fail, if the main resource - the human one - can’t be prevented against such a disease. That means that every DRR system can collapse - even the best organised - if the human resource fails. There might be more sophisticated measures to be needed, to secure key manpower - what would mostly call for more workforce, as the core group member elaborates. Thinking about a second or third row on additional manpower might be a first approach, but in most cases this is not in line with restrictions on human or financial resources.

Another core group member suggests to adapt policy, regulatory and legislative frameworks as well as investments to multi-hazard risk and factor in any relevant cross-sectoral linkages; Be it co-cause compounding towards negative impacts, or co-benefit in the case of opportunities for any sectoral strengthening and/or growth. Additionally, measurement and verification should be increased, and transparency and communication of and access to knowledge, data, information should be ensured.

In terms of necessary adjustments in order to be able to capitalise on opportunities and to mitigate new / emerging threats - based on experiences from COVID-19 and the systemic nature of risk - several suggestions are introduced by the participants of the focus group discussion on future & emerging issues regarding strategies to deal with disaster risk: For one, inclusion of vulnerable groups and accessibility should be increasingly integrated and taken into consideration. Moreover, strategies should revolve around a more comprehensive risk management. However, what is highlighted the most is the need to put strategies into action and actually taking measures to do so. To this end, the development of a plan of implementation that defines specific steps to reach a target is proposed.

When it comes to investments, suggestions include to invest into risk- and resilience-‘checks’. It is also proposed to allocate a budget for the implementation of action plans and to coordinate and potentially align the existing funding instruments. Additionally, investing in research and innovations is suggested, too.
Assessing risks should be part of designing new laws and making amendments to existing ones. However, the participants criticise that often there are laws in place already, but the execution is lacking fervour.

Regarding adjustments in policy, the participants call for more transparency and knowledge-based decision-making. In addition, action plans should be developed that could be anchored in the government programme and that include all actors. The implementation of such action plans also concerns adjustments in organisations. In this regard, the participants suggest further integrating participation, inclusion and communication into organisational frameworks. Moreover, they advise to consider the strengths of the National Crisis Coordination Office for COVID-19 ‘GECKO’ (cf. BKA, 2019). Transferring this concept of an expert-based and -supported national crisis coordination council to address disaster risk reduction could prove successful for future developments. Moreover, one participant suggested setting up a national risk council that considers climate change as one of the relevant risks.

Finally, in terms of epistemology, the participants aim for a transition towards focusing more on common welfare. Moreover, to view risk systemically and cross-sectorally is deemed very important. And last but not least, they advocate for a shift from a reactive risk provision to a proactive one.

Turning to the consulted scientists, one argues that the quality of data has to be increasingly taken into consideration. This can be illustrated with an example of the COVID-19 pandemic: If the quality of the number of cases is questioned, or if the process of calculating them follows a questionable or unknown logic, it is hard to build trust throughout society for the accordingly derived measures. Other necessary adjustments that are put forward concern security, risk, resilience, costs and acceptance in general.

When asking the disaster management actors for their view, many call for more participation and collaboration across all actors. They argue to think DRR comprehensively and not to be blinkered, limited by the borders of a municipality, a federal state or the country. Especially on the local level, they argue for a stronger interconnectedness and more ownership. Actions should include training on how to act in case of disaster or emergency. Moreover, one disaster management actor suggests that municipalities might legally incorporate risk analyses into their tasks.

Several stakeholders highlight the need for a clear definition, assignment and implementation of responsibilities. So far, as one actor states, responsibilities are passed around. Therefore, another actor calls for the definition of clear targets. Additionally, many stakeholders advocate for DRR to be legally anchored as well as for a clear political commitment and a central responsibility on a national level. The national DRR strategy could serve as a basis for implementing the principle of shared responsibility.

Furthermore, some actors identify a need for more communication regarding security and risk. Raising awareness for disaster risk management amongst decision-makers both in policy and administration as well as in the private sector is considered crucial. However, this should also include raising awareness for individual responsibility and self-provision.

### 5.3.2 Ensuring shared responsibilities in risk identification and reduction

When it comes to the principle of shared responsibility, the opinions of the core group members differ: One advocates for the implementation of clear plans and definitions of responsibility...
concerning the delivery of basic and essential services to ensure the continuity of their delivery under risk scenarios. Moreover, he calls for an increase in accountability. On the other hand, another core group member states that in Austria, responsibilities in risk identification and reduction are shared across government and administrative structures. According to him, there is no need to change the given system.

The scientists that were consulted mostly advocate for intensified, more transparent, and less bureaucratic collaboration. One also calls for clearly determined responsibilities in order to make collaborations successful. A joint vision is important to unite actors to act collectively. Moreover, one scientist proposes a return to reason and objectivity, while another one calls for better equipment for emergency management actors. This goes along with an improvement of warning systems and strengthening the resilience of critical infrastructure, as well as land use and settlement development.

### 5.3.3 Empowering local authorities and local partnerships

In order to empower local authorities and local partnerships to strengthen risk reducing action, a member of the core group calls for an increase in communication and dissemination of and access to knowledge, data and information. He argues that we should ensure participation in decision-making processes by including the local perspective and addressing their specific needs as well as potential opportunities.

Of the consulted scientists, one suggests the direct funding of projects to strengthen resilience, whereas another one addresses the issue of fake news. This scientist calls for actively addressing them and explaining why they are fake. Rather than ignoring fake news and just presenting the correct scientific answer, the flaws of fake news should be highlighted, dissected and disproved.

What is mentioned the most by the participants of the focus group discussion on the local level is the need for awareness raising, albeit in different areas: From a more holistic perspective, some argue to highlight the connection between the climate crisis, the anthropogenic share in it, extreme events, and disasters. They suggest pointing out the urgency regarding positive feedback effects and planetary boundaries. In general, they call for an increase in risk-communication and the sensibilisation of society towards risk-topics. In terms of raising awareness for the local situation, some propose to make the local actors more visible – whether they be emergency or disaster management actors or volunteers.

Suggestions revolving around local decision makers include that this increase in awareness should serve as a basis for decision-making. Moreover, one participant proposes to focus more on security of supplies, the awareness of it, devising action plans, and testing them.

In terms of spatial planning, one participant argues that the focus should not only be on technical solutions, but should also include planning measures. In the worst case, resettlement might also be considered. Another approach includes harmonising classification categories for different hazards. As one stakeholder contends, “all residents of a region are affected – not only residents within the red and yellow hazard zones”.

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2 In Austria, hazard mappings are conducted and compiled by the Torrent and Avalanche Control (WLV). Categories include red zones (areas that are highly endangered by torrents and avalanches and therefore not
Taking the **local population** into consideration, one participant suggests taking the concerns of citizen’s initiatives into account. Another focus should be laid upon organising and coordinating spontaneous voluntary helpers. Moreover, bureaucracy should be reduced wherever possible. In terms of **warning** people, a commander of the local fire brigade calls for the implementation of a functioning cell broadcasting system. This could prove especially helpful in terms of warning guests and tourists that are hard to reach otherwise. Moreover, one participant calls for an improved alignment in terms of warning systems in general.

### 5.3.4 Systematically applying DRR across all sectors

In order to ensure that DRR is a practice that is systematically applied across all sectors, one member of the **core group** suggests clearly making the case around the need and the benefit (in terms of “durability” and also in terms of costs, financial and non) of mainstreaming DRR throughout sectors. He suggests doing so with data and evidence. This would be important especially for businesses, small and medium enterprises, and providers, but also for civil population/households, communities and local administration, regulators and service providers both private and public. Moreover, he argues to involve sectoral representatives in the DRR policy dialogue and decision processes, as well as to increase exposure to information about risks at regional, national and local level.

The participants of the **focus group discussion on risk** identify a need for action regarding the development and implementation of respective **laws** as well as in terms of **administrative management**, so turning theoretical concepts and knowledge into practice. From a technical point of view, it is argued that **warning systems** should be advanced. In that context, cell broadcasting is mentioned as a promising way to reach as many people as possible in case of an emergency or disaster. To improve such methodologies, international exchange is mentioned as a key instrument. Especially the collaboration and information exchange within the D-A-CH region (Germany, Austria, and Switzerland) is considered very fruitful. The Swiss approach towards risk analyses is highlighted as a desirable approach to implement in Austria too by some participants.

The participants agree that it is necessary to consider multi-hazards and cascading effects in terms of disaster risk management. One prominent example that is often mentioned is the fear of a blackout. However, to practise what to do in such cases of such **interconnected crises** is very complex and difficult. Another challenge is posed by the outsourcing of services and processes abroad, as in case of emergency or disaster not all resources might be attainable.

Therefore, the establishment and maintenance of functioning **networks** is considered all the more important to successfully address the **systematic nature of risk**. Networks that bridge different sectors and connect actors of all administrative levels enable efficient action in case of emergency. As one participant describes it, “complex crises need to be fought with complex networks”. The SKKM is highlighted as such a complex network. However, as networks grow more and more complex, it also becomes harder to quickly find the stakeholder one might be looking for.

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suitable for settlement) and yellow zones (areas endangered by torrents and avalanches in which permanent settlement is affected). Additionally, there are areas where a certain affectedness is indicated. This includes blue areas (keeping free for protective measures), brown areas (other geogenous hazards, e.g. rockfall or landslides) and violet areas (e.g. necessary flooding areas) (cf. BML, 2022b).
In terms of the exchange between different disciplines and especially between science and practice, participants see a progress to integrate the systemic character of risk. Also here, the SKKM is mentioned as an actor to bridge and bring together the general public and science. Challenges that can hinder putting theory into practice often depend on funding.

In a federal republic such as Austria, the administrative levels are of high importance: On a local level, actors are well connected to address cases of emergency and disaster, especially regarding first responders. Yet, the FGD participants see the need for local decision makers to be sensitised for disaster risk reduction. They would benefit from training regarding what to do and whom to call when something happens (such as the ones the SKKM offers). On a regional level, the participants note that the pandemic has shown how well connected relevant actors are and that coordination efforts are well functioning. On a national level, risk analyses are conducted, as are on the local level. However, to integrate these analyses is still a challenge stakeholders are facing.

In the context of the Sendai Framework MTR, the ASDR platform discussed what they can learn from this process and what they want to focus on in the future. So far, the ASDR platform has a distinct focus on natural hazards. 2022 is the second year that a convention on natural hazards is held which addresses regions, communities and actors that are affected by such events. However, members advocate for a broader approach in the future, as they want to focus more on nat-tech-hazards in the future, taking into consideration industrial accidents, chemical accidents, technical expertise, cyber crime, energy supply and blackouts. – Especially the latter are seen as prominent in current debates of the general public.

Turning to the consulted scientists, one argues to implement legal regulations to ensure the systemic application of DRR across sectors, e.g. when it comes to building planning. Another one rather calls for informing and including the general public into disaster risk management on a voluntary basis. This scientist argues that even if people would not necessarily want to participate in a training, they might still be interested to know where and when it happens and what it is all about. Another scientist proposes to strengthen the engagement of all relevant stakeholders by conducting workshops. - Either via public information events or through regulatory measures: He suggests establishing that depending on the size of a company, it has to appoint a “disaster protection manager”. This person would then have to assess the likelihood of the company being affected by disasters, raise awareness for it, and initiate countermeasures.

### 5.4 D. Progress in Investment in Risk Reduction and Resilience

Regarding proposals for measures that public institutions can take to ensure risk is priced more accurately, both on a national and international level, most of the consulted experts propose to take externalities into consideration. Therefore, suitable approaches should be developed and exchanged. Another suggestion is to analyse potential future fiscal risks and develop a national disaster fund that is fed by deposits following these estimates.

In order to strengthen the resilience of the business and industrial sector, information should be provided to all actors and the awareness for DRR needs to
be raised. Moreover, both non-structural and structural measures can help to deal with risk. For instance, the improvement of methods such as risk assessments and the application of remote sensing methods is pointed out as well as the improvement of governance structures.

Little feedback was received on questions around what **measures public institutions can take** at national and international levels to **ensure risk is priced more accurately** within all financial transactions and not treated as an externality and discounted in public and private investments.

On a **national level**, one **disaster management** actor proposes to make considering externalities in risk assessments compulsory. As an example, the implications of protective forests in comparison to ‘hard’ structural measures are mentioned. Furthermore, the actor suggests for the ASDR platform to collect appropriate approaches and make them available.

Similarly, it is proposed that externalities have to be taken into consideration on an **international level** too. Relevant approaches should be exchanged and compiled. It is indicated though that this is already a task of the Organisation for Economic Co-operation and Development (OECD).

Approaches mentioned in **literature** include the proposal by Schinko et al. (2017, p. 1079), that “one solution for counteracting these potential fiscal risks could be to link the development of deposits of a national disaster fund to ex ante estimates of future expected annual losses, and by doing so maintain a positive balance in the long run”. While this may result in high opportunity costs, Schinko et al. (2017, p. 1079) also point out that by not investing this money in other areas, that “eventually, these foregone investments may even contribute indirectly to a reduction in climate-related risks”.

In terms of **required actions** up to 2030 to **strengthen the resilience of the business sector**, some **disaster management actors** make several suggestions: From a social perspective, one stakeholder calls for awareness raising and providing more information for the general public and decision makers. Moreover, a case is made for improving international cooperation and exchange of experiences, as well as improving governance structures.

Another approach considers more technical aspects, such as taking structural measures to protect people, nature, buildings and infrastructure. This includes nature-based solutions such as green roofs and façade greening, as well as flooding protection measures such as renaturation of rivers and retention systems. Moreover, the stakeholder suggests improving assessments, forecasts and applying remote sensing tools.

One stakeholder in turn calls for non-structural measures such as facilitating insurance solutions for business locations. Moreover, business- and settlement-development should not take place in risk-prone areas. Instead, the actor proposes both removal and protection of buildings and infrastructure in these places.

To **strengthen the resilience of the industrial sector**, the disaster management actors suggest the same solutions, also circulating around improving technical approaches and using structural as well as non-structural measures.
5.5 E. Collaboration, Partnership and Cooperation

In order to foster risk-informed sustainable development, it is proposed to trigger a paradigm shift in order to strengthen a broader ownership on risk related topics and provide citizens/local communities with adequate tools. One option could be to establish ‘risk partnerships’ to ensure more participation and acceptance for measures throughout the general public. Especially on a local level, most of the consulted stakeholders see a need for additional collaborations and partnerships. Two examples include the KLARI regions (model regions for climate change adaptation) as well as conducting risk assessments for municipalities. Moreover, the stakeholders call for a stronger involvement of non-governmental actors, such as private households or businesses. For improved community engagement and participation, suggestions are to look at the global south, where the implementation of such approaches is already a best-practice.

On a national level, one suggestion is to put guidelines in place to regulate that certain investments have to take DRR into consideration. Some actors call for more action from the government in terms of including vulnerable groups and social aspects into DRR considerations. Additionally, the evaluation of current DRR practices based on relevant indicators is suggested, as well as the translation of the Sendai Framework and the guiding questions into more languages and into less technical terms. Moreover, the implementation of an exchange format for DRR actors is proposed both on a national and the EU level.

In terms of successful international cooperation and partnerships, especially for development partners and the international community to provide better support, one suggestion is the mapping of existing programmes to reduce overlaps and identify good practices. The enhancement of early warning- and response-/preparedness-systems should be fostered too. Mainstreaming DRR and setting up guidelines and criteria would be a next step to ensure successful projects and cooperation. Finally, it is suggested to make sure that projects take both DRR and climate change into consideration, and that they are in line with national and international guidelines.

In order to support governments to make risk-informed sustainable development possible, a member of the core group calls for investing in concepts that support ownership of risks (natural hazard proofing, insurance opportunities, and so on). He argues that this is a step towards balancing public and individual demands and interests (risk governance). Fostering the idea to establish and support ‘risk partnerships’ at a local/regional level is a first and proven step towards collaborative risk governance. The stronger engagement of non-governmental actors, such as private households, businesses, and other organisations, in natural hazard management decisions helps these actors to understand the importance of underlying strategies and highlights the benefit of solidarity.

One of the consulted scientists calls for listening more to scientific experts. Another scientist and key informant calls for more action from the government and ministries in terms of addressing social aspects of DRR such as including vulnerable and marginalised groups. Even though respective tasks are often already in their remits, she argues that a successful implementation of measures would
require more manpower and budget, and - unlike in the COVID-19 pandemic - she calls for a kind of ‘non-military management’, which she sees very critically. Moreover, the conduction of an evaluation based on relevant indicators could help to see what areas need changing, which the Sendai MTR is an example of. However, the scientist calls for a translation of the Sendai Framework as well as the questions into various languages and into a less technical language. The media could be a helpful ally in that regard. Another point the scientist mentions is the lack of structures for community engagement and participation. According to her, that is already a best-practice applied throughout the Global South, which should also be applied in the Austrian context. That, in turn, could help to improve the acceptance of the general public for measures. Thus, the development of a comprehensive DRR strategy involving actors from all groups would be the goal.

Turning to ask the disaster management actors for their opinion, many see the need for more partnerships especially on a local level. They support the concept of model regions such as the KLARI programme in the sense of bottom-up multipliers and real-life laboratories for best-practice examples. Moreover, they want to encourage more initiatives established in municipalities to conduct risk assessments and to make use of existing civil protection structures to better reach the local level. Another priority area is identified as the national political level: One stakeholder proposes steering the ASDR platform via the Federal Chancellery or a Federal Ministry. Another one calls for the establishment of exchange formats to put disaster management forward. Additionally, the development of a guideline is suggested which could regulate that certain investments must also have multiple uses in terms of disaster management.

Transcending/Looking beyond national boundaries, two stakeholders feel there should be more partnerships and collaboration on the EU level. One suggests implementing an umbrella association for DRR on that level, the other one appeals to the united European idea and solidarity.

Speaking more generally, one stakeholder states we have to admit massive deficiencies in terms of how we manage and govern disaster risk. Therefore, we should work on our culture of failure and security.

In terms of suggestions how development partners and the international community can provide better support, a member of the core group elaborates on several ideas:

To keep track of good practices, international policies and agreements, he suggests to follow up on international developments and debate. Moreover, we should support the development and capacity building of national preparedness/prevention and early warning and response/preparedness systems. Therefore, a mapping of and coordination with other programmes/donors/organisations to reduce overlaps (which could increase risk) would be beneficial and lead to an increase effectiveness and efficiency in disaster response and risk prevention.

Another step to better embed DRR would be to define principles and/or criteria for improving projects and aid delivery as interventions, investments and financing of international development assistance with regard to DRR. It should be ensured that projects take DRR aspects into account and contribute to reducing vulnerabilities, in line with development cooperation principles such as sustainability, human rights, gender equality, environmental protection. Thus, he sees the need to assess all bilateral and multilateral development cooperation projects with regard to changes in the risk of disaster occurrence triggered by the projects. If this risk increases, it must be minimised through accompanying measures to address the question: How good is the design? In conclusion, he highlights the need for
mainstreaming DRR and conducting DRR-proofing of projects: We need to assess whether a project is exposed to specific risks that make development outcomes unsustainable or not in the long term. Regarding DRR and its relation to climate change, he proposes to ensure coherence between national development plans and strategies: We should assess whether national plans are consistent with national agendas under the Sendai Framework and Paris Climate Agreement, as well as the Rio Conventions. Therefore, projects in the field of DRR (according to the Sendai Framework as well as the Paris Climate Agreement and the Rio Conventions) should be in line with national plans and the national development context (incl. Agenda2030) (“looking at the big picture”). Moreover, we need to ensure climate resilience and climate proofing of projects, and to promote links to low-carbon development, e.g. according to the motto ”1 Euro invested in climate mitigation today equals about 7 Euros in disaster savings tomorrow”.

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6. References


**Federal State of Lower Austria**, 2011. NÖ Feuerwehr-Ausrüstungsverordnung, LGBl. 4400/4-0.


ÖROK, 2021. ÖREK 2030 - Österreichisches Raumentwicklungskonzept - Raum für Wandel (Beschluss der Österreichischen Raumordnungskonferenz (ÖROK)). Wien.


7. Annexes

7.1 List of members of the ASDR Platform

- Federal Chancellery of the Republic of Austria (BKA)
- Federal Ministry of Education, Science and Research (BMBWF)
- Federal Ministry of European and International Affairs (BMEIA)
- Federal Ministry of Finance (BMF)
- Federal Ministry of Social Affairs, Health, Care and Consumer Protection (BMSGPK)
- Federal Ministry of the Interior (BMI)
- Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)
- Federal Ministry of Agriculture, Forestry, Regions and Water Management (BML, formerly BMLRT)
- Federal Ministry of Defence (BMLV)
- Federal Governments and current representative of all Federal Governments
- Regional Hazard Warning Centre of Vorarlberg (orig. Landeswarnzentrale Vorarlberg)
- City of Vienna’s Chief Executive Office – Division Organisation and Security (orig. Stadt Wien MD-GB Organisation und Sicherheit)
- Geological Survey of Austria (GBA)
- Environment Agency Austria (UBA)
- Austrian Development Agency (ADA)
- Austrian Mountain Rescue (orig. Österreichischer Bergrettungsdienst)
- Board for Traffic Safety (orig. Kuratorium für Verkehrssicherheit)
- Austrian Firebrigade Association (orig. Österreichischer Bundesfeuerwehrverband)
- Austrian Association of Municipalities (orig. Österreichischer Gemeindebund)
- Austrian Association of Cities and Towns (orig. Österreichischer Städtetbund)
- Austrian Red Cross (orig. Österreichisches Rotes Kreuz)
- Samaritan Union (orig. Samariterbund)
- Statistics Austria
- Austrian Research Promotion Agency (FFG)
- Austrian Hail Insurance - (orig. Österreichische Hagelversicherung)
- Association of Insurance Companies Austria (orig. Verband der Versicherungsunternehmen Österreich)
- national meteorological and geophysical service – Zentralanstalt für Meteorologie und Geodynamik (ZAMG)
- Austrian Representative of the World Meteorological Organisation (WMO)
### 7.2 Mixed-Method Approach

<table>
<thead>
<tr>
<th>Method 1</th>
<th>Method 2</th>
<th>Method 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
<td>Qualitative</td>
<td>Mixed</td>
</tr>
<tr>
<td>Data Collection</td>
<td>Analysis</td>
<td>Interpretation</td>
</tr>
<tr>
<td>Observation</td>
<td>Participant</td>
<td>Observation</td>
</tr>
<tr>
<td>Surveys</td>
<td>Interviews</td>
<td>Ethnographic</td>
</tr>
</tbody>
</table>

#### Description:

This mixed-method approach combines quantitative and qualitative data collection and analysis. The advantage of this approach is that it allows for a more comprehensive understanding of the research topic by using multiple data sources and methods. It can provide a more nuanced and complete picture of the phenomena being studied.

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**Note:** The table above provides an overview of the mixed-method approach, where Method 1, Method 2, and Method 3 represent different types of research methods used in the study. Quantitative methods focus on numerical data, while qualitative methods are concerned with non-numerical data. The mixed-method approach integrates both types of data to enhance the research findings.
7.3 Focus Group Discussions

7.3.1 Focus Group Discussion on Emergency Management
7.3.2 Focus Group Discussion on Risk
Welche Fortschritte wurden zur Analyse des Katastrophenrisikos für unterschiedliche Gefahren (inkl. Bewertung der Verwundbarkeit und Exposition) in den letzten Jahren erreicht?

Gefahren
- Treiber
  - Ursachen
  - Charakteristika
  - Ursachen
  - Gefährdungen
  - Entscheidungen

Vulnerabilität
- Verwundbarkeit
  - Verwundbarkeit
  - Vulnerabilitätsfaktoren
  - Risikoeinflussfaktoren
  - Bewertung
  - Maßnahmen

Kapazitäten und Resilienzen
- Kapazitäten
  - Maßnahmen
  - Resilienzen

Fortschritt
Wechselbeziehungen

Sachstandsberichte versucht, Klimawandel mit verschiedenen anderen Risiken zu vernetzen
ISO 14091 zur Anpassung an den Klimawandel
Erkenntnisse aus der Klimawandel- Forschung -> Integration mit Naturgefahren
Projekt "RESPECT"
Projekt "Pathways"
Naturgefahrenrencheck des Umweltbundesamts

Fortschritt

Exposition von Personen

Team Österreich: Überprüfung der Resilienz eines Haushalts mit App

Exposition von Vermögenswerten

Integration vorhandener Datensätze, z.B. BEAM Projekt
systemischer Charakter von Risiko

Herausforderung: Ausleger von Diensten und Prozessen ins Ausland als Herausforderung

Herausforderung: Übung von vernetzten Krisen sehr komplex

systemischer Charakter von Risiko

verschiedene Sektoren

- Vernetzung von Krisen entscheidend
- SKOM als zentrales Netzwerk
- Herausforderung: Zulassung bis sich relevante Stakeholder im Netzwerk gefunden haben

verschiedene Disziplinen

- von der Forschung in die Praxis
- Integration von SKOM, Bevölkerung und Wirtschaft
- technische Realisierung: z.B. Modulierung aber schon auf gutem Weg

Verwaltungsebenen

- Gemeindeebene: wichtig: Sensibilisierung von lokalen Entscheidungs trägern
- lokale Netzwerke sind gut verteilt und engagiert
- nationale Risikobewertung
- regionale Risikobewertung
- lokale Risikobewertung

Rolle der ASDR Plattform

- ASDR Plattform: Naturgefahren, Vernetzung und Ausleger
- ADER: Naturgefahren, Vernetzung und Ausleger
- industrielle, ökonomische und soziale Zusammenhänge
- Neben Technologie: Zukunft, Möglichkeiten als Schwerpunkt
- zunder: Technologie, Zuhilfenahme von Analysen in der Bevölkerung

Beispiel Pandemie: Zeigt Wechselbeziehungen auf

Bundeskrisen sicherheitsgesetz, dass versucht mehrere Risiken abzudecken
7.3.3 Focus Group Discussion on Future & Emerging Issues
Welche Annahmen sind in den folgenden Bereichen notwendig?

Organisation
- Partizipation
- Inklusion
- Kommunikation
- Stärken
- Gleichstellung
- Umsetzen

Strategie
- Implementierungsplan
- Maßnahmen
- Umsetzen

Epistemologie
- am Gemeinwohl orientieren
- systemische Sicht
- Risikovorsorge
- proaktiv

Politik
- Grounded
- Einbeziehungsfindung
- Transparenz

Gesetz
- Risikobeschaffung bei Gesetzesverdichtung
- Divergenz
- Theorie + Umsetzung

Investitionen
- Roko-/Resilienzcheck
- Investitionen in Forschung + Innovationen

Budget zur Umsetzung von Akteursplänen
- Förderinstrumente
- Eruppen, kommunizieren
- Maßnahmen
STIMMUNGSBAROMETER
Wie besorgt sind Sie persönlich in Hinblick auf die Zukunft?

[Graph with smiley faces indicating levels of concern]

schwer
mittel
leicht

(unhappy face)

(happy face)
7.3.4 Focus Group Discussion - Local Level

Wie werden lokales Wissen und Gemeinschaften in die Bewertung von Naturgefahren, Risiko und Entscheidungsfindung einbezogen?
Welche Maßnahmen müssen in Zukunft priorisiert werden, um lokale Akteure, Behörden & Partnerschaften zu stärken?

- Bürger*innen-Initiativen
- Spontanhelfer-Organisationen & Team/Support-Gruppen
- Bildungsinstitutionen
- Informations- & Erreichbarkeit

Grundlagen als Basis für die Entscheidungsfindung
Flüssigkeit & transparentes Vorgehen
Weiterbildung & Seminare

Beteiligung aller Stakeholder
Verständnis & Akzeptanz

Öffentlichkeitsarbeit
Umsatz mit dem Publikum
Gemeinsame Aktionen

Kernpunkte:
- Bürgerrechte stärken
- Kommunikation verbessern
- Zusammenarbeit verstärken
7.4 Online Surveys - Forms

Sendai Midterm Review – Katastrophenmanagement

Risiko Governance und Management

(Q. 5) Anpassung von nationalen, regionalen und lokalen Richtlinien, Gesetzgebung, Planung und Organisation in Bezug auf Katastrophen-Risiko

- Was wurde verändert? Welche Maßnahmen wurden getroffen?
  - Offene Antwort: ____________________________________________
    __________________________________________________________
    __________________________________________________________

- Welche der folgenden Personengruppen sind dabei involviert?
  - Frauen
  - Männer
  - Jugendliche
  - Personen mit Beeinträchtigung
  - Sonstige

(Q. 7) Einbindung von Katastrophenrisiko als „due diligence“ in den Bereichen:

- Verständnis von und Wissen über Katastrophenrisiko
  - gar nicht  ○ eher nicht   ○ eher schon  ○ definitiv   ○ weiß nicht / nichts zutreffend

- Öffentliche Entscheidungsprozesse
  - gar nicht  ○ eher nicht   ○ eher schon  ○ definitiv   ○ weiß nicht / nichts zutreffend

- Private Entscheidungsprozesse
  - gar nicht  ○ eher nicht   ○ eher schon  ○ definitiv   ○ weiß nicht / nichts zutreffend

- Investments
  - gar nicht  ○ eher nicht   ○ eher schon  ○ definitiv   ○ weiß nicht / nichts zutreffend
(Q 8) geteilte bzw. gemeinsame Verantwortung

- Wird das Prinzip der geteilten/gemeinsamen Verantwortung zwischen Regierung, Gemeinden, Sektoren und Interessensgruppen angewandt?
  ○ gar nicht    ○ eher nicht    ○ eher schon    ○ definitiv    ○ weiß nicht / nichts zutreffend

- Bestehende Maßnahmen, die integriertes Katastrophenmanagement und geteilte/gemeinsame Verantwortung fördern:
  o Offene Antwort: __________________________________________________________
    __________________________________________________________
    __________________________________________________________

- Notwendige Maßnahmen für die Zukunft (Q 21):
  o Offene Antwort: __________________________________________________________
    __________________________________________________________

Kooperationen, Kollaborationen und Partnerschaften

(Q 13) Erfolgreiche Partnerschaften und Kollaborationen auf verschiedenen Ebenen und Gründe für ihren Erfolg:
  o Gemeindeebene: __________________________________________________________
  o Regional: __________________________________________________________
  o Nationale Ebene: ______________________________________________________
  o grenzüberschreitend: ____________________________________________________
  o Sonstige: __________________________________________________________

Q 14) Entstehung von Kooperationen und Kollaborationen seit 2015 mit Fokus auf internationalen Rahmenwerken und Konventionen:
  o Offene Antwort: __________________________________________________________
    __________________________________________________________
    __________________________________________________________

(Q 26) Was für Initiativen und Partnerschaften müssen sich entwickeln, um Regierungen bis 2030 zu unterstützen risiko-informierte nachhaltige Entwicklung zu ermöglichen?
(Q 15) **Bisherige Erfolge und Herausforderungen**

**Sterblichkeit durch Katastrophen / Naturgefahrenereignisse**  
○ ○ ○ ○ ○ ○ ☐ weiß nicht / leicht erhöht leicht gesenkt gesenkt nichts zutreffend

**Anzahl der betroffenen Personen**  
○ ○ ○ ○ ○ ○ ☐ weiß nicht / leicht erhöht leicht gesenkt gesenkt nichts zutreffend

**Ausmaß des wirtschaftlichen Schadens**  
○ ○ ○ ○ ○ ○ ☐ weiß nicht / leicht erhöht leicht gesenkt gesenkt nichts zutreffend

**Beschädigung kritischer Infrastruktur und Störung von Kerndienstleistungen**  
○ ○ ○ ○ ○ ○ ☐ weiß nicht / leicht erhöht leicht gesenkt gesenkt nichts zutreffend

**Internationale Zusammenarbeit**  
○ ○ ○ ○ ○ ○ ☐ weiß nicht / leicht erhöht leicht gesenkt gesenkt nichts zutreffend

**Zugang zu Multi-Gefahren-Warnsystemen**  
○ ○ ○ ○ ○ ○ ☐ weiß nicht / leicht erhöht leicht gesenkt gesenkt nichts zutreffend

**Bisherige Herausforderungen:**  
○ Offene Antwort: __________________________________________

________________________________________________________________________

(Q 16) **Veränderung des Kontexts seit 2015**

- Neue Herausforderungen: __________________________________________

xx
• Sorgen und Bedenken: 

• Einfluss und Learnings aus der COVID-19 Pandemie auf Risiko-Governance und Risiko-Management: 

• Einfluss der Klimakrise: 

• Rolle von Biodiversität und Ökosystemen: 

(Q 19) Katastrophenrisiko – Einschätzung, Information und Verständnis

• Wodurch kann das Wissen um Risiko verbessert werden?
  o Offene Antwort: 

• Maßnahmen, um dieses Wissen in Entscheidungsprozesse einzubinden:
  o Offene Antwort: 
Sendai Midterm Review – Wissenschaftliche Einblicke

Katastrophen-Risiko – Einschätzung, Information und Verständnis

(Q 3) Wie haben sich das Verständnis und die Einschätzung von Vulnerabilität, Gefährdung von Personen und Gütern, Charakteristika von Gefahr an sich und deren Wechselbeziehungen in den letzten Jahren verändert?

- Offene Antwort: ________________________________________________________________

(Q 4) Wie werden traditionelles Wissen und einheimische bzw. lokale Gemeinschaften in die Bewertung von Risiko und Entscheidungsfindung einbezogen?

- Offene Antwort: ________________________________________________________________

(Q 19) Wodurch kann das Wissen um Risiko verbessert werden?

- Offene Antwort: ________________________________________________________________

Wie kann das Wissen in Entscheidungsprozesse eingebunden werden?

- Offene Antwort: ________________________________________________________________

Risiko Governance und Management

(Q 6) Bedeutung nationaler, regionaler und lokaler Strategien zur Minderung von Katastrophenrisiko

Auf welchen Ebenen wurde eine Strategie zur Minderung von Katastrophenrisiko implementiert?

- Bundesebene
(Bundes-)Länderebene
Einzelne Regionen
Gemeindeebene
Sonstige

Bisheriger Erfolg dieser Strategien:
☐ gar nicht  ☐ kaum  ☐ ein bisschen  ☐ deutlich  ☐ weiß nicht/nichts zutreffend

Zusammenarbeit mit bzw. Integration in andere Strategien:
• Lokale Agenda 2030
• Pariser Klimaabkommen
• Sonstige

(Q 7) Einbindung von Katastrophenrisiko als „due diligence“ in den Bereichen
• Verständnis von und Wissen über Katastrophenrisiko
☐ gar nicht  ☐ eher nicht  ☐ eher schon  ☐ definitiv  ☐ weiß nicht/nichts zutreffend

• Öffentliche Entscheidungsprozesse
☐ gar nicht  ☐ eher nicht  ☐ eher schon  ☐ definitiv  ☐ weiß nicht/nichts zutreffend

• Private Entscheidungsprozesse
☐ gar nicht  ☐ eher nicht  ☐ eher schon  ☐ definitiv  ☐ weiß nicht/nichts zutreffend

• Investments
☐ gar nicht  ☐ eher nicht  ☐ eher schon  ☐ definitiv  ☐ weiß nicht/nichts zutreffend

(Q 8) geteilte bzw. gemeinsame Verantwortung
• Wird das Prinzip der geteilten/gemeinsamen Verantwortung zwischen Regierung, Gemeinden, Sektoren und Interessensgruppen angewandt?
☐ gar nicht  ☐ eher nicht  ☐ eher schon  ☐ definitiv  ☐ weiß nicht/nichts zutreffend


- Bestehende Maßnahmen, die integriertes Katastrophenmanagement und geteilte/gemeinsame Verantwortung fördern:
  
  o Offene Antwort: ____________________________________________
    ____________________________________________
    ____________________________________________

- Notwendige Maßnahmen die Zukunft (Q 21):

  o Offene Antwort: ____________________________________________
    ____________________________________________
    ____________________________________________

(Q 20) Angesichts der systemischen Eigenschaft von Risiko sowie den Erfahrungen mit der Covid-19 Pandemie - welche Anpassungen sind in den Bereichen Politik, Gesetz, Organisation, Strategie, Investitionen, Epistemologie und Investitionen notwendig, um auf neue Chancen und Herausforderungen in Bezug auf Katastrophenrisiko reagieren zu können?

  - Offene Antwort: ____________________________________________
    ____________________________________________
    ____________________________________________

(Q 22) Welche Maßnahmen müssen priorisiert werden, um lokale Behörden und Partnerschaften zu stärken?

  - Offene Antwort: ____________________________________________
    ____________________________________________
    ____________________________________________

(Q 23) Welche Maßnahmen und Anpassungen müssen vorgenommen werden, damit Katastrophenrisiko-Management sektorübergreifend systematisch in die Praxis eingebunden wird?

  - Offene Antwort: ____________________________________________
    ____________________________________________
    ____________________________________________
Katastrophenvorsorge, Bewältigung und „Build Back Better“

(Q 12) Wie haben sich die folgenden Bereiche seit 2015 verändert?

- Vermeidung:
  - verschlechtert
  - eher schlechter
  - eher besser
  - verbessert
  - weiß

- Vorsorge:
  - verschlechtert
  - eher schlechter
  - eher besser
  - verbessert
  - weiß

- Bewältigung:
  - verschlechtert
  - eher schlechter
  - eher besser
  - verbessert
  - weiß

- Wiederherstellung:
  - verschlechtert
  - eher schlechter
  - eher besser
  - verbessert
  - weiß

- „Best Practice“ Beispiele:

Kooperationen, Kollaborationen und Partnerschaften

(Q 13) Erfolgreiche Partnerschaften und Kollaborationen auf verschiedenen Ebenen und Gründe für ihren Erfolg:

- Gemeindeebene:
- Regional:
- Nationale Ebene:
- grenzüberschreitend:
- Andere:
(Q 14) Entstehung von Kooperationen und Kollaborationen mit Fokus auf internationalen Rahmenwerken:

- Offene Antwort: ________________________________________________________________


(Q 26) Was für Initiativen und Partnerschaften müssen sich entwickeln, um Regierungen bis 2030 zu unterstützen risiko-informierte nachhaltige Entwicklung zu ermöglichen?

- Offene Antwort: ________________________________________________________________


(Q 15) Bisherige Erfolge und Herausforderungen

- Sterblichkeit durch Katastrophen / Naturgefahrenereignisse
  - erhöht
  - leicht erhöht
  - leicht gesenkt
  - gesenkt
  - weiß nicht / nichts zutreffend

- Anzahl der betroffenen Personen
  - erhöht
  - leicht erhöht
  - leicht gesenkt
  - gesenkt
  - weiß nicht / nichts

- Ausmaß des wirtschaftlichen Schadens
  - erhöht
  - leicht erhöht
  - leicht gesenkt
  - gesenkt
  - weiß nicht / nichts

- Beschädigung kritischer Infrastruktur und Störung von Kerndienstleistungen
  - erhöht
  - leicht erhöht
  - leicht gesenkt
  - gesenkt
  - weiß nicht / nichts

- Internationale Zusammenarbeit
  - weiß nicht /
erhöht  leicht erhöht  leicht gesenkt  gesenkt  nichts
zutreffend

- Zugang zu Multi-Gefahren-Warnsystemen

  erhöht  leicht erhöht  leicht gesenkt  gesenkt  weiß nicht / nichts
zutreffend

- Bisherige Herausforderungen:
  - Offene Antwort: ____________________________________________
                             ____________________________________________
                             ____________________________________________

Veränderung des Kontexts und neue Herausforderungen

(Q 16) Retrospektive (seit 2015 bis heute)

- Neue Herausforderungen:
  - Offene Antwort: ____________________________________________
                             ____________________________________________
                             ____________________________________________

- Sorgen und Bedenken:
  - Offene Antwort: ____________________________________________
                             ____________________________________________
                             ____________________________________________

- Einfluss und Learnings aus der COVID-19 Pandemie auf Risiko-Governance und Risiko-Management:
  - Offene Antwort: ____________________________________________
                             ____________________________________________
                             ____________________________________________

- Einfluss der Klimakrise:
  - Offene Antwort: ____________________________________________
                             ____________________________________________
                             ____________________________________________
● Rolle von Biodiversität und Ökosystemen:
  o Offene Antwort: __________________________________________
    __________________________________________
    __________________________________________

(Q17) Blick in die Zukunft (bis 2030 und darüber hinaus)
  o Offene Antwort: __________________________________________
    __________________________________________
    __________________________________________

Ergebnis und Ziel

(Q18) Nennen Sie 5 Innovationen, Prozesse, Maßnahmen, Änderungen etc., die Katastrophenrisiko nachhaltig senken und die Resilienz der Gesellschaft erhöhen können!
● Idee 1: __________________________________________
● Idee 2: __________________________________________
● Idee 3: __________________________________________
● Idee 4: __________________________________________
● Idee 5: __________________________________________
Sendai Midterm Review – Governance und Politik

Investition in Minderung von Katastrophenrisiko – aktuelle Situation

Wie wird Risiko aktuell ein Preis zugewiesen?

- Offene Antwort: ____________________________________________________________

Investition in Minderung von Katastrophenrisiko – Ausblick in die Zukunft

(Q 24) Welche Maßnahmen können öffentliche Institutionen treffen um sicherzustellen, dass Risiko bei allen Finanztransaktionen besser eingepreist und nicht als Externalität behandelt wird zu Lasten öffentlicher Institutionen und Privatpersonen?

- Auf nationaler Ebene:
  - Offene Antwort: ____________________________________________________________

- Auf internationaler Ebene:
  - Offene Antwort: ____________________________________________________________

(Q 25) Welche Maßnahmen müssen bis 2030 gesetzt werden, um ...

- ... die Resilienz des Wirtschaftssektors gegenüber Katastrophenrisiko zu stärken?
  - Offene Antwort: ____________________________________________________________

- ... die Resilienz des Industriesektors gegenüber Katastrophenrisiko zu stärken?
  - Offene Antwort: ____________________________________________________________
7.5 Survey Output Tables and Figures

7.5.1 Question 5 - Alignment of National and Local Public Policy, Legislation, Planning and Organisation with the Sendai Framework

Survey Disaster Management Actors:

- Welche der folgenden Personengruppen sind dabei involviert?

[Graph showing distribution of involvement by gender and other categories]

7.5.2 Question 6 - Importance of the Establishment of Disaster Risk Reduction Strategies and Plans for the Realisation of the Outcome, Goal and Targets of the Sendai Framework

Survey Scientists:

- Auf welchen Ebenen wurde eine Strategie zur Minderung von Katastrophenrisiko implementiert?

[Graph showing distribution of implementation by level]

xxx
Bisheriger Erfolg dieser Strategien:

Zusammenarbeit mit bzw. Integration in andere Strategien:

7.5.3 Question 7 - Disaster Risk as ‘Due Diligence’

Survey Scientists:

- Einbindung als “due diligence” Verständnis von und Wissen über Katastrophenrisiko
Einbindung als “due diligence”

- öffentliche Entscheidungsprozesse
- private Entscheidungsprozesse
- Investments
Survey Disaster Management Actors:

- Einbindung als “due diligence” Verständnis von und Wissen über Katastrophenrisiko
  - gar nicht
  - eher nicht
  - eher schon
  - definitiv
  - weiß nicht / n...

- Einbindung als “due diligence” öffentliche Entscheidungsprozesse
  - gar nicht
  - eher nicht
  - eher schon
  - definitiv
  - weiß nicht / n...

- Einbindung als “due diligence” private Entscheidungsprozesse
7.5.4 Question 8 - Application of the Guiding Principle of Shared Responsibility

Survey Scientists:

- Wird das Prinzip der geteilten/gemeinsamen Verantwortung zwischen Regierung, Gemeinden, Sektoren und Interessensgruppen angewandt?
Survey Disaster Management Actors:

- Wird das Prinzip der geteilten/gemeinsamen Verantwortung zwischen Regierung, Gemeinden, Sektoren und Interessensgruppen angewandt?

7.5.5 Question 12 - Changes since 2015

Survey Scientists:
Wie haben sich die folgenden Bereiche seit 2015 verändert?

- Vermeidung:
- **Vorsorge:**
  - verschlechtert
  - eher schlechte...
  - eher besser
  - verbessert
  - weiß nicht / n...

- **Bewältigung:**
  - verschlechtert
  - eher schlechte...
  - eher besser
  - verbessert
  - weiß nicht / n...

- **Wiederherstellung:**
  - verschlechtert
  - eher schlechte...
  - eher besser
  - verbessert
  - weiß nicht / n...
7.5.6 Question 15 - Progress in Achieving the Sendai Targets

**Target 1 - Mortality**
- Increase: 1
- Slight increase: 2
- Slight decrease: 5
- Decrease: 4
- Don't know / nothing applicable: 6

**Target 2 - Number of Affected People**
- Increase: 0
- Slight increase: 1
- Slight decrease: 2
- Decrease: 3
- Don’t know / nothing applicable: 4

**Target 3 - Economic Loss**
- Increase: 0
- Slight increase: 1
- Slight decrease: 2
- Decrease: 3
- Don’t know / nothing applicable: 4
### 7.6 List of policy-relevant information & tools and research projects & findings

<table>
<thead>
<tr>
<th>Name</th>
<th>Remits and area of expertise</th>
<th>area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A methodological framework to operationalize climate risk management</td>
<td>Schinko et al. (2017, p. 1078) state that “the Austrian CRM approach is currently characterized by a single-loop learning process, which is reacting to the new normal and focusing on improving the efficiency of current practices without questioning underlying mental models”.</td>
<td>research projects &amp; findings</td>
</tr>
<tr>
<td>ADA</td>
<td>The Austrian Development Agency ADA takes measures to increase resilience, reduce vulnerability and decrease disaster risk (cf. ADA, 2022, 2018, 2016).</td>
<td>policy-relevant information &amp; tools</td>
</tr>
<tr>
<td>Agenda 2030</td>
<td>DRR and the prevention of disaster risk are part of the Agenda 2030’s targets: One sub-target of target 13 aims to improve the resilience and adaptive capacities of municipalities, especially in the context of climate-related (natural) hazards. Climate protection measures shall be incorporated into national strategies, politics and planning (cf. Wegscheider-Pichler and de Cillia, 2020).</td>
<td>policy-relevant information &amp; tools</td>
</tr>
<tr>
<td>AAR14 Austrian Assessment Report 2014</td>
<td>The AAR14 deals with the assessment of changes in climate and the implications that has on extreme weather events and natural hazards (cf. Kromp-Kolb et al., 2014). The publishing date has to be taken into consideration though.</td>
<td>policy-relevant information &amp; tools</td>
</tr>
<tr>
<td>ARISE Adaptation and Decision Support via Risk Management through Local Burning Embers</td>
<td>The ARISE project (Adaptation and Decision Support via Risk Management through Local Burning Embers) aims to address global problems and local risks on a local level. First, the vulnerability of a local community or region is assessed. Based on that, measures and actions are derived to improve adaptation and increase resilience. According to the ARISE guideline (Projektteam ARISE, 2016), these actions serve as local answers to the IPCC’s project „global burning embers“. It is designed to help local and regional decision-makers to identify future risks and derive adaptative measures that can then be implemented. At the same time, it is possible to identify opportunities and minimise risk not only in disaster prevention, but also in the tourism sector, economy, and agriculture. That way, the resilience and adaptive capacity of local communities can be fostered. That way, the ARISE project addresses local decision makers as target group and aims to provide them with the necessary tools to tackle local burning embers. Lienz is the first town worldwide to identify local burning embers and derive adequate adaptation measures. ARISE uses a step by step approach, first defining the general conditions, followed by local climate and socioeconomic development scenarios, defining local burning embers, developing adaptation measures and evaluating their implementation (Projektteam ARISE, 2016).</td>
<td>research projects &amp; findings</td>
</tr>
<tr>
<td>ASDR convention on natural hazards</td>
<td>One ongoing activity of the ASDR platform is hosting conventions on the topic of risk and natural hazards. In 2016, the Understanding Risk (UR) conference, which is a format of the World Bank, was held in Vienna (UR, 2016). A second UR conference was held in Vienna in 2019 on the topic of heavy rain (UR, 2019). Due to the outbreak of the Covid-19 pandemic in 2020, these kind of activities were paused. In 2021, the ASDR platform established their own format: an annual convention on natural hazards (ZAMG, 2022a). Its debut took place in Öblarn, Styria under the motto “natural hazards at our door: flood risk, avalanches and landslides”. In 2022, the convention took place for the second time, this time in Zell am See, Salzburg with the motto “Between Living Space and Disaster Protection: Understand – Network – Prepare”. With the new format, the ASDR platform aims at building awareness and improving preparedness of</td>
<td>policy-relevant information &amp; tools</td>
</tr>
<tr>
<td>Domain</td>
<td>Description</td>
<td>Policy-relevant information &amp; tools</td>
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<tr>
<td>ASRDR</td>
<td>The Austrian Society for Disaster Risk Reduction (ASDRR) explicitly promotes developing resilience and accelerating recovery in order to “build back better”. Their vision is to support countries of the global south to do that by sharing Austrian Know-How with them through workshops, courses and an annual summer school (ASDRR, 2020).</td>
<td></td>
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<tr>
<td>CESARE</td>
<td>The CESARE project developed a database compiling existing multi-hazard national event-based loss and damage data from various administrative units and federal agencies. A process was formulated to standardise this data regarding their spatial and temporal resolution, level of detail, hazard types, the time period covered, the focus of documentation (processes, events, damages), and vocabulary. The result is a demonstrator that enables “event identification, loss accounting and disaster forensics according to international standards” (Themessl et al., 2022, p. 1). So far, the demonstrator focuses on the three hazard types of floods, storms and mass movements between 2005 and 2018 in the two Austrian federal states of Styria and Lower Austria. It can support DRM activities of relevant actors such as the compilation of reports like the Sendai Monitor reporting. The aim is to expand the reach of the database and demonstrator to include both more federal states and more hazard types such as avalanches, forest fires, and earthquakes. Integrating insurance data as well as loss and damage data on federal assets into the CESARE database would help to improve the reliability for assessments.</td>
<td>policy-relevant information &amp; tools / research projects &amp; findings</td>
</tr>
<tr>
<td>Cooperation between BMF and World Bank Group</td>
<td>Cooperation of the BMF with the world bank group as well as with the Global Facility for Disaster Reduction and Recovery (BMF, n.a.).</td>
<td>policy-relevant information &amp; tools</td>
</tr>
<tr>
<td>EUSALP Action Group 8</td>
<td>The EUSALP action group 8 – risk governance, of which Austria is a member, “aims at improving risk management and better managing climate change in the Alpine Region” (EUSALP, n.a.).</td>
<td>policy-relevant information &amp; tools</td>
</tr>
<tr>
<td>EUSDR</td>
<td>As a member of the EUSDR, Austria aims to take collective measures to increase disaster response and implement joint flood risk management plans (EUSDR, n.a.).</td>
<td>policy-relevant information &amp; tools</td>
</tr>
<tr>
<td>ExtremA Report</td>
<td>The ExtremA report (Glade et al., 2020) elaborates on the understanding of vulnerability and distinguishes between physical, institutional, economic and social vulnerability. Moreover, it conducts an assessment regarding the economic loss arising from disaster events in an attempt to understand the correlations between exposition, vulnerability and hazard. In terms of determining, how the preparedness for response, recovery, rehabilitation and reconstruction has changed, we want to draw on the following two examples: In terms of cases of overload, Schneiderbauer et al. (2020) observe a shift towards considering whole catchment areas instead of single river segments. Moreover, ecosystem services are taken into consideration in order to gain additional safety and reduce costs for structural measures. Additionally, due to increasing frequency and intensity of extreme events, protection targets are reconsidered and adapted to this shift. The approach to evaluate protective measures economically is slowly emerging, but not applied regularly to this day. “Forests play a major role in protection against floods, landslides, rockfall and avalanches”, as Kleemayr et al. (2020, p. 624) state. In 2014, a comprehensive modeling of protection forests in Austria was carried out which can serve as a basis to integrate forest in general into protective measures. Moreover, Kleemayr et al. advocate for an active approach in maintaining protection forests and making them climate-fit.</td>
<td>policy-relevant information &amp; tools</td>
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<tr>
<td><strong>HORA</strong> Natural Hazard Overview &amp; Risk Assessment Austria</td>
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<td><strong>HORA</strong> is an open source internet platform that visualises data of various natural hazards and their occurrence in Austria within a map (BML, 2022a). In 2002, HORA started out as a platform providing information about flood risk, thus answering a call after a flood event in 2002 for raising awareness for risk, the limits of protective measures and the interaction between the public sector, the insurance sector and private actors. That way, the platform enables people to assess the hazard of flooding in a specific area as well as allowing for an optimisation and prioritisation of protective measures for municipalities, federal states and the state (BMLFUW, Sektion VII/5, 2011). Today, citizens can additionally inform themselves about various other hazards such as storms, earthquakes, landslides, hail, snow load and current weather warnings concerning their home by entering their address in the search bar (BML, 2022a). The input parameters for the underlying models are maintained and updated (BMLFUW, Sektion I, 2021).</td>
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<tr>
<th>Implementation of property-level flood risk adaptation (PLFRA) measures</th>
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<td><strong>Attems et al.</strong> (2019) investigate how PLFRA (property-level flood risk adaptation) measures can help to increase the preparedness of households. They draw on examples that are already implemented in Austria, such as sandbags, building on elevations or flood proof windows.</td>
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<th>KIRAS</th>
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<tr>
<td>The <strong>KIRAS</strong> program for safety research, a collaboration between the BMLRT and the FFG, supports national research programmes focussing on improving safety. These measures range from the APCIP project (BMI, n.a.) or systematic risk management and resilience planning for the security of food supplies to an emergency planning and decision-making system in case of an accident related to hazardous substances (KIRAS Sicherheitsforschung, 2022).</td>
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<th>National Risk Analysis</th>
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<tr>
<td>The National Risk Analysis compiles various disaster scenarios of national importance that are within the scope of the responsibility of the federal government. The National Risk Analysis of 2018 compiled a total of 18 disaster risk scenarios of which eleven were related to natural hazards and seven to man-made hazards. The man-made hazards include traffic accidents, power outage, nuclear accidents, terror- and cyber attacks and industrial accidents (BMI, 2018a). The National Risk Analysis is carried out every three years.</td>
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<tr>
<th>Natural hazard and climate change check for municipalities</th>
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<tr>
<td>The <strong>natural hazard and climate change check for municipalities</strong> supports the self-assessment of municipalities regarding their exposition and vulnerability to natural hazards and climate risks. The goal is to sensibilise municipal decision-makers for locally relevant natural hazards and climate risks and to strengthen, raise awareness for risk and existing capacities: “This method identifies existing potentials and preparedness of the municipality, as well as possible needs for action for the four pillars of precaution (spatial, constructive, behavioural, and risk based). This way, the community is better prepared for natural hazards and the challenge of adverse climate change effects.” (UBA, 2022a). The precautionary check follows a guideline of several steps, from assessing the current situation to a prioritisation of relevant hazards and finally a look into the future. It is executed by two auditors together with local decision-makers working in the context of natural hazards and climate risks. The three thematic areas cover hydrological natural hazards, gravitational natural hazards and climate-related natural hazards (UBA, 2022b).</td>
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<tr>
<th>ÖREK</th>
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<td>Another important tool in order to take the spatial dimensions of risk into account is the <strong>ÖREK</strong>, the Austrian Spatial Development Concept (orig. Österreichisches Raumentwicklungskonzept). It is a set of guidelines that are developed, implemented and followed by all members of the ÖROK, the Austrian Spatial Planning Conference (orig. Österreichische Raumordnungskonferenz) (ÖROK, n.a.). In the ÖROK 2030, the spatial development until 2030 is planned. One special focus is the adaptation to climate change and to improve protection against natural hazards through preventive spatial development, for example by maintaining free spaces as such or infrastructural corridors in a climate resilient way (ÖROK, 2021).</td>
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</table>
| **RESPECT**  
<table>
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<tr>
<th>Responsibility and Risk: Operationalizing comprehensive climate risk layering in Austria (orig. Rolle und Verantwortlichkeiten im Klimarisikomanagement in Österreich)</th>
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<tr>
<td>The <strong>RESPECT</strong> (Responsibility and Risk: Operationalizing comprehensive climate risk layering in Austria among multiple actors) project is the product of a collaboration between the Environment Agency Austria, the International Institute for Applied Systems Analysis (IIASA), the department Z_GIS of the University of Salzburg, the Wegener Center of the University of Innsbruck, and the Spatial Services GmbH. The aim is to integrate natural hazard management that focuses on events caused by natural climate variability with climate adaptation measures that deal mostly with increasing risks resulting from climate change. Together, these measures form a holistic approach, a so-called climate risk management approach, which the project aims to operationalise (Lintschnig et al., 2019). The authors argue that it is often the ill-defined roles and responsibilities that hinder effective climate risk management. A guideline by Lintschnig et al. (2019) explains how to conduct a role play simulation game for public and private actors in order to collectively develop a strategy and measures as well as defining responsibilities to address flood risk and droughts. Actors from one area of expertise play a character from a different area of action in order to improve awareness and understanding amongst the actors. Furthermore, Lintschnig et al. recommend to implement the <strong>RESPECT</strong> concept together with the ARISE approach, as they argue that it is important to know the concrete local burning embers in order to enable forward-looking and climate-sensitive action. This participative process helps to uncover gaps in the climate risk management of local communities and regions and increases the readiness to act.</td>
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| **SKKM**  
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<tr>
<th>National Crisis and Disaster Protection Management (orig. Staatliches Krisen- und KatastrophenschutzManagement)</th>
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<tr>
<td>The <strong>SKKM</strong> was launched in 1986 as a reaction to the nuclear accident in Chernobyl. Since 2003, it is integrated into the Federal Ministry of the Interior and was reorganised merging several coordination bodies into a single coordination committee in 2004. This committee comprises federal ministries, federal states, rescue and emergency organisations and some media organisations. The principal task of the <strong>SKKM</strong> is “to ensure a quick coordination between the federal authorities and the provinces […] in the case of complex crisis and disasters” (BM, n.a.). The <strong>SKKM</strong> Strategy 2020 (SKKM, 2009) serves as a policy guideline, defining its goals and setting priorities. It covers the entire emergency management cycle, ranging from actions of prevention and preparedness to response and rehabilitation. The <strong>SKKM</strong> promotes self-help on a local level combined with subsidiary intervention of higher administrative levels and the federal states. The federal government only engages in situations of supra-regional disasters/emergencies/events. In a guideline released in 2018, the <strong>SKKM</strong> describes an international paradigm shift away from a sole disaster management and towards a disaster risk management approach, thus referring to the Sendai Framework (BM, 2018b). They now promote an approach that anticipates risks and reaches beyond reactive measures. Based on different scenarios that depend on the respective risks in a region or community, a limit as to what risk can be tolerated and what not is set. Finally, it is illustrated which measures can be taken to minimise the non-tolerable risks. The role of risk communication is highlighted as an essential part in disaster risk management.</td>
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| Team Austria  
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<tr>
<td>The <strong>“Team Austria”</strong> is a project initiated by the Austrian Red Cross: Since 2007, volunteers can register in a database, already before emergencies or crises. In case of an event, these volunteers can be called upon to support emergency forces (Österreichisches Rotes Kreuz, 2020).</td>
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| The status of climate risk management in Austria  
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<tr>
<td>According to <strong>Leitner et al.</strong> (2020), the latest revision of the national flood risk management starts to implement climate risk management (CRM) aspects into disaster risk management (DRM).</td>
</tr>
</tbody>
</table>

| Trends in torrential flooding in the Austrian Alps  
|---|
| **Schlägl et al.** (2021, p. 1) argue that due to the efficiency and the effectiveness of technical mitigation structures, there has been no increase in the magnitude, frequency and seasonality of damage-inducing torrential flooding:  

> “While the indices of triggering precipitation and the number of exposed buildings increased steadily, frequency, magnitude and seasonality of damage-inducing torrential flooding did not show clear trends. This contradiction was


attributed to a compensatory effect of the increasing number of technical mitigation structures."

This signifies an increase in preparedness, as the coping mechanisms in place intercepted the increase in risk.

| ZaB (orig. Zentrum am Berg, English: Mountain Centre) | The Zentrum am Berg is a research centre located at the Styrian Erzberg and coordinated by the Montanuniversität Leoben. It focuses on constructing and operating underground facilities and also deals with the topic of safety, providing a tunnel safety training as well as an escape and rescue training (ZaB, n.a.). | research projects & findings |