

Interreg



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Alpine Space

ADAPTNOW

EXTREME, COMPOUND AND CASCADING EVENTS

Topic Brief

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1. INTRODUCTION

Short description: ADAPTNOW: ADAPTation Capacity Strengthening for Highly Affected and Exposed Territories in the Alps NOW will work on strengthening the adaptive capacity of HAET by implementing and evaluating the available climate adaptation and risk mitigation management tools and practices, assessing the Climate Adaptation Plans and developing Climate Services to support the territories and their local public authorities. Ultimately, ADAPTNOW aims at making risk and adaptation planning more integrated, collaborative and inclusive. This will be reached through a more dynamic, agile and participatory planning process in which all local stakeholders need to be involved.

Project website: <https://www.alpine-space.eu/project/adaptnow/>

Introduction to the Topic Briefs

The Alpine region faces increasingly complex climate-related challenges, where extreme weather events often trigger secondary and cascading impacts, such as landslides, floods, and infrastructure failures. These interconnected risks threaten both communities and ecosystems. This workshop aimed to build a shared understanding of extreme, compound, and cascading events, identify gaps in current risk management, and develop tailored strategies to enhance local preparedness and communication.

This series of **topic briefs** has been developed to support municipalities, policymakers, and other stakeholders in integrating Nature Based Solutions, Integrated Planning and Financing Tools, Community Engagement and Communication Methods, and Extreme, Compound and Cascading events solutions into local planning and risk management strategies. Each brief provides concise, evidence-based insights, highlighting their relevance, benefits, and practical applications in different contexts. The objective is to bridge the gap between scientific research and real-world implementation, ensuring that decision-makers have access to actionable knowledge.

The topic briefs can be used in multiple ways:

- **Strategic Planning** – Municipalities can leverage these resources to inform urban planning, infrastructure development, and climate adaptation strategies.
- **Policy Development** – Policymakers can integrate these principles into local and regional policies to enhance ecosystem resilience and reduce disaster risks.
- **Stakeholder Engagement** – The briefs serve as a tool for raising awareness and fostering collaboration among government agencies, private sector actors, and local communities.
- **Project Design & Funding** – Practitioners can use the insights to design projects that align with funding opportunities and international sustainability frameworks.

By providing concrete examples, case studies, and key recommendations, these topic briefs empower local actors to take informed action, ultimately contributing to more resilient and sustainable territories.

You may find the other Topic Briefs in the EUSALP [CAPA Platform](#).

2.THEMATIC WORKSHOP 4 - EXTREME, COMPOUND & CASCADING EVENTS

1.1 DESCRIPTION OF THE CONCEPT

The fourth thematic workshop, focused on **extreme/compound/cascading events**, addressed the increasing complexity of climate-related challenges in the Alpine region. These events often arise from interconnected phenomena, such as extreme weather conditions triggering secondary/compound impacts and domino effects, like landslides, floods, or cascading infrastructure failures, which pose significant risks to alpine communities and ecosystems. And although scientific knowledge and evidence about the increasing intensity and frequency of such singular events is growing, there is still little awareness and knowledge about the management of such complex cascading/compound events and the respective integration in disaster risk- and adaptation planning at the different political levels. The overarching aim of the workshop was to create a common understanding for extreme/compound/cascading events and its impacts, identifying current gaps in the respective risk management and to elaborate tailored approaches how to overcome them and to communicate them at the local level.

In order to answer these questions, the workshop was co-organized together with the Alpine Space-project X-Risk-CC, which aims to help risk managers and policy makers across the alpine area to address the compound risks of climate change-related extremes by developing local actions and transnational guidelines.

The workshop itself combined expert-input on extreme weather events and risk management, a compilation of observed local extreme events in pilot areas and an interactive group work:

- At first, the development of a **common analytical framework for extreme events** tailored to the Alpine context was explored, for understanding current trends in future changes in weather extremes and assess future developments. Examples from Italy, Austria, Germany, France, and Slovenia were presented and a WebGIS tool designed for visualizing and assessing the spatial and temporal dimensions of risks, providing local authorities with a practical resource for planning and adaptation, was introduced.
- In an **interactive session**, project partners then provided real-world examples of extreme/compound/cascading events in their pilots, showcasing their direct impacts and applied approaches to overcome them, as well as the impacts on the adaptation-activities in those regions. These discussions provided insights into challenges such as resource limitations, stakeholder coordination, and public awareness, as well as successful strategies for resilience-building.
- To deepen the common understanding of the weather-impact-risk-nexus and the risk concept, **cross-linkages to the X-Risk-CC-project** and the applied methodological concepts – such as impact chains, risk questionnaires and climate risk storylines -, as well as experiences from a case study in the Wipptal (South Tyrol) area were highlighted. A **gap analysis** on risk management of extreme weather events by the Civil Protection Agency of Bolzano – project partner in X-Risk-CC – dived deeper into these experiences and fostered discussions on the missing aspects in risk management, with a special focus on the engagement of stakeholder and respective ways how to include them in the management of extreme events.

The interactive discussions in the following groupwork built on these different inputs and aimed at answering the following questions:

- *Which are the gaps in risk management of extreme events in your area, based on the presented results?*
- *How can your activity in CCA support the governance of risk management of extreme events?*
- *How can findings of this workshop be communicated at local level (e.g., Municipalities)?*

The outcomes of the workshop will be also considered in the policy recommendations from the ADAPTNOW project and in the risk manual from the X-Risk-CC project.

2.1 WHAT ARE THE CONCLUSIONS OF THE WORKSHOP?

The workshop on **Extreme, Compound & Cascading Events** highlighted critical gaps in risk management while providing actionable insights to improve local governance and adaptation practices. The discussions and group work centered around the three main questions:

Identified Gaps in Risk Management

Participants identified a range of deficiencies that hinder effective risk management:

- **Awareness and Perception:** Limited understanding, motivation and skills among citizens and policymakers about the risks associated with extreme and compound/cascading events. This includes especially insufficient knowledge of vulnerabilities and the cascading effects of interconnected hazards.
- **Coordination and Governance:** Weak collaboration across multiple levels of governance (state, region, municipality) and key actors (isolated experts) → lacking holistic approaches (institutional constraints), unclear/inefficient distribution of roles and responsibilities (inter alia in civil protection), lacking legal obligation of regulations or plans (e.g. implementation of SECAP or updating procedures) to anticipate risks (especially in spatial planning), lacking willingness to introduce unpopular measures, lack of resources and staff, and lack of stakeholder integration (bring different fields and interests together).
- **Data and Forecasting:** Insufficient hazard mapping, outdated procedures, over-reliance on models without accounting for uncertainties or residual risks, knowledge of geological and ecological situation.
- **Urban Planning and Prevention:** Construction in high-risk areas, inadequate spatial planning and building legislation, and underutilized prevention measures such as relocation and adaptation of land use.
- **Communication:** Delayed or ineffective communication with citizens and tourists about risks and mitigation strategies.

Governance and Supportive Activities

The discussions emphasized how climate change adaptation (CCA) activities can enhance risk management:

- **Integration of Risk into Planning:** Mainstreaming climate risks into urban planning, building designs, and land-use strategies to mitigate vulnerabilities and cascading effects.
- **Capacity Building:** Organizing workshops, regional conferences, and interactive sessions to raise risk-awareness and improve technical knowledge among municipal policymakers, technicians and citizens.
- **Collaborative Efforts:** Facilitating cross-sectoral dialogue, peer-to-peer education (also among municipalities), and stakeholder cooperation to create a shared understanding and commitment to resilience.
- **Practical Tools and Methods:** Development and dissemination of tools like "ClimaStory" to raise awareness and foster proactive discussions on risks and solutions, precautionary checks for natural hazards in climate change, translate scientific findings into understandable, plain language.
- **Crisis Exercises:** Engaging stakeholders in simulation exercises to prepare for and manage extreme events effectively.

Communication of Findings

To effectively disseminate workshop insights to municipalities and stakeholders:

- **Localized Communication Strategies:** Highlight how extreme events impact daily life and use examples to make risks relatable. Proactively address concerns through accessible communication channels and a central contact point.
- **Interactive Tools and Visualizations:** Use tools like hazard maps and risk simulators to make the potential impacts tangible for decision-makers and communities.
- **Workshops and Peer Learning:** Host interactive sessions (between municipalities and beyond), multi-stakeholder action plans, and resilience communities to discuss findings and best practices.
- **Multimodal Media:** Employ newsletters, social media campaigns, and on-site demonstrations to ensure a broad reach and to highlight personal consternation.
- **Depoliticized Messaging:** Frame adaptation measures as practical necessities rather than politically charged actions, supported by monetary incentives and regulatory measures.

The workshop concluded that fostering **awareness, collaboration, and technical capacity** at all levels is essential for building resilience to extreme, compound, and cascading events. By addressing the identified gaps and implementing the proposed strategies, municipalities can better anticipate, manage, and recover from such complex climate challenges.

Detailed results of the workshops in group 1 and group 2:

Which are the gaps in risk management of extreme events in your area, based on the presented results?

- Know and forecast the potential extreme events; Process understanding of complex events; Underestimation of natural (rare) extreme events
- Geological and ecological situation are not enough known or taken into account
- Knowledge about vulnerability
- Lack of awareness; be aware about potential risks and consequences; Believing too much in models
- Sudden occurrence
- Institutional constraints and frameworks; Problems in the definition of roles, competencies and responsibilities at the local level
- Prevention and preparedness: updating of procedures, update of forecasting in procedures
- Lack of Sustainable Energy and Climate Action Plans implemented in municipalities
- Anticipation actions are not considered in planning instruments – e.g. spatial plans are not adapted
- Prevention: hazard zone mapping + adaptation, land use (private), relocation, consideration of residual risk/case of overload
- Impact of extreme events are not enough anticipated. Don't imagine or don't want to be imagined? → by all stakeholders
- Solidarity and good knowledge between stakeholders of risk management (finance, experience)
- Sectorial approach to the topic; no holistic view → bring different stakeholders together
- Lack of staff, knowledge and skills about climate risk by decision makers of the municipalities
- Political choices are more related to visibility and social acceptance; Motivation of the locals (other priorities)
- Organizational structure of civil protection (hierarchy and communication)
- Time to reflect on previous events in wider discussions with many stakeholders

How can your activity in CCA support the governance of risk management of extreme events? (and vice versa)

- Because of extreme events, people understand better climate adaptation
- Are we really prepared as we think we are? Are competencies/responsibilities in adaptation and risk management clear? → precautionary checks for natural hazards in climate change
- Help the people to meet each other to share knowledge, tools, and experiences
- Involve territories in EU projects as ADAPTNOW or X-Risk-CC
- Organize regional conferences in order to favor exchange of experience of territories
- Propose tools to raise awareness in climate change and new conditions and data

How can findings of this WS be communicated at local level (e.g., Municipalities)?

- Shared and common aims for politicians/decision makers
- Practices/exercises
- "Depoliticize" adaptation decisions and actions → also by monetary incentives/regulatory restrictions
- Do a "to do list" of what you need to face risks, climate change, and adaptation. Present it in the risk and resilience communities (with municipalities) → Multi-Stakeholder Action Plans
- Introduce adaptation in planning tools; use good practice + exchange (example KLAR! - Regions)
- Present hazard zones and the affected areas in the field
- Newsletter of the project ADAPTNOW

<p>(territory) and to help own reflection of stakeholders (climastory)</p> <ul style="list-style-type: none"> • Providing technical knowledge & exchange of knowledge • Enhance knowledge of vulnerability and include it in local policies • Raise awareness among policymakers in the municipalities and provide them with proper tools to raise their capacity to act • Help urban planning and building to adapt to climate change and risks • Reduction of risk/vulnerability (local level) • Translate scientific findings (+limitations) into plain language 	<ul style="list-style-type: none"> • Create/implement cooperation activities among municipalities; communicate concrete results • Peer-to-peer education (between municipalities and beyond) • “Team playing” among municipalities
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Figure 5: Results of the groupwork - Group 1

<p>Which are the gaps in risk management of extreme events in your area, based on the presented results?</p> <ul style="list-style-type: none"> • Little awareness of possible dangers related to extreme events • Risk perception of policy/decision makers • Knowledge, awareness, and political will (other priorities) of local authorities for prevention → Empowering needed • Communication happens often too late or there is no focus on it • Improvement of the communication for the citizen • Alert tourists • Implement lessons learned • Isolated experts: Wildbach (CC awareness and communication) • Number of stakeholders in crisis management • Responsibility profiles • Multiple decision levels between the state, region, or municipality 	<p>How can your activity in CCA support the governance of risk management of extreme events? (and vice versa)</p> <ul style="list-style-type: none"> • Hot spots: Mapping, definition; “updating” = weakness • Display examples • Crisis exercise with stakeholders • Working directly with municipal representatives • Not let go of reaching out to stakeholders • Adaptation of building use strategy – no place without risk • Develop new methods and tools to mainstream climate risk in urban planning • Simplification of planning improvements • Prepare buildings and urban areas to potential risks and cascading effects • Workshops with technicians and politicians – hands-on school 	<p>How can findings of this WS be communicated at local level (e.g., Municipalities)?</p> <ul style="list-style-type: none"> • Focusing communication on how these events can affect daily life • “Weather story” in the education of consulters • Proactive communication of what you know, what you don’t know yet; 1 contact point (1. Anlaufstelle) → Address the worry • Example in Grenoble Alpes Metropole: risks and resilience community → gathering elected officials and technicians from municipalities • Proactive citizen participation; Social Media and Information during the event • Workshops by experts (agency on territory) → why does it interest YOU • Highlighting gaps and needs (questionnaires) on capacity to act
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<ul style="list-style-type: none"> • Urban planning – construction/building in high flood risk areas • Mapping: data, model, uncertainty? • Hazard plans • Extreme events are not foreseen (e.g., strong rain) • Cascading is not foreseen • Often lack of risk management plan → chaotic development 	<ul style="list-style-type: none"> • Improve risk cognition and culture for municipalities/citizens • Workshops with all stakeholders to discuss problems & awareness • Awareness-raising, communication strategy to address citizens • Service for private people showing that property might be in danger 	<ul style="list-style-type: none"> • Communication tool/means; services and training to all
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Figure 6: Results of the groupwork - Group 2

3.1 HOW CAN MUNICIPALITIES USE THIS INFORMATION TO INCREASE/IMPROVE/DEPLOY THE SHOWCASE ACTIONS/TOOLS/METHODOLOGIES IDENTIFIED WITHIN THE WORKSHOP?

Many of the direct connecting points for municipalities and the results stated above emerge by directly addressing the outlined gaps in risk management, as many responsibilities affect the local political level, be it regulatory aspects as well as sensibilization/information aspects, such as:

1. Integration of CCA and risk management aspects into Urban Planning and Policies
2. Capacity Building and Knowledge Sharing
3. Adopting Innovative Tools like hazard maps, WebGIS platforms, and interactive visualization resources
4. Improving Stakeholder Coordination and promoting Community Engagement
5. Enhancing Communication Strategies
6. Conducting Crisis Simulations
7. Leveraging Financial Incentives

4.1 WHAT FORMAT SHOULD BE USED TO PRESENT CONCLUSIONS TO MUNICIPALITIES (AT REGIONAL EVENTS)

To ensure municipalities effectively engage with and act upon the gaps in risk management, the following formats could be used:

1. Interactive Workshops where municipal representatives can discuss, practice, and apply the tools and methodologies introduced during the workshop, including networking events to share experiences.

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2. Visual Presentations and digital formats, such as infographics, maps, and simulations, to clearly communicate risks and proposed solutions.
 3. Policy Briefs, tailored to the needs and responsibilities of local governments.
 4. Demonstration Projects to showcase pilot projects or best practice examples from other municipalities that successfully addressed similar risks (peer-to-peer learning).
 5. Digital Platforms to provide online access to workshop materials
 6. Multilingual Newsletters and Flyers to inform about new findings in risk management
 7. On-Site Demonstrations and Field Visits

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