

# NATURAL HAZARDS IN THE ALPINE REGION

## DEALING WITH CASES OF OVERLOAD AND THE RESIDUAL RISK



BEYOND THE EXPECTED

## Introduction

Risk governance of natural hazards in the Alpine region is a sensitive and complex issue. In the context of residual risk and cases of overload, it becomes an even greater challenge. The question of how to provide sufficient protection for the affected population may cause quite a headache for policy- and decision-makers at all administrative levels. This dossier has been created to shed light on how to carry out successful risk governance in the context of residual risk and cases of overload and provides information on:

- the concepts of residual risk and cases of overload and their current consideration in Alpine risk governance of natural hazards,
- the necessity of doing research on and informing the public about this topic,
- the reasoning behind why actions to improve the situation are required.

Moreover, this document presents 1) concrete recommendations, and 2) good practice examples for both policy- and decision-makers as well as the affected populations in all Alpine countries that illustrate options of how to improve the risk governance of natural hazards in the context of residual risk and cases of overload.



Bondo (Switzerland) rockfall and debris flow in August 2017

## Point of Departure

In early June 2016, heavy precipitation across the Alps led to a number of severe torrential floods, causing major damage. In August 2017, approximately three million cubic metres of rock broke off Piz Cengalo, a mountain on the Swiss-Italian border with an elevation of 3,369m. The massive rockfall – more than the volume of the Great Pyramid of Giza – resulted in a subsequent debris flow, carrying huge boulders as far as the village of Bondo. Although the community was prepared for the event, eight hikers were caught in debris and died. These are only two of many extreme events that have taken place in the Alpine region in recent years. Even though protection measures have intensified, the region will remain susceptible to the **residual risk** of losses and damages triggered by natural hazards. One reason for this is the increasing concentration of people and activities in the Alps, including in risk-prone areas. This dossier aims to raise awareness of **residual risk** and **cases of overload** that represent major challenges to the governance of natural hazards.

- Risk governance implies enabling societies to benefit from change while minimising the negative consequences of the associated risks. It should enhance the participation of actors in decision-making processes; raise awareness and acceptance of risk; and support the development of a functioning 'risk culture'. It is necessary to communicate that despite all implemented structural and non-structural measures, there always remains a **residual risk**. However, the public

administration cannot carry the responsibility for this alone. Cooperation remains essential amongst all actors involved in risk governance processes, including the affected population.

- Despite considerable progress, there is still a pressing need for more **integrated risk management (IRM)** approaches in the Alps. IRM is an approved, systematic and comprehensive methodology for treating a wide range of hazards and their related risks with appropriate actions. It can help to find the most efficient combination of solutions that address all principles
- of risk governance: (I) risk analysis, (II) risk evaluation and reduction and (III) risk management. IRM aims to address challenges in a transparent manner, in cooperation with all relevant decision-makers and those who are affected.
- There are a number of **uncertainties** related to ongoing and **expected future changes** in the Alps. The most relevant are climate conditions and demographic developments, including an aging population and the migration of people from rural, mountainous areas towards urbanised regions in the main valleys.



The different phases of IRM Source: adapted from FOCP 2014

## Why this Document?

This dossier aims to raise awareness of **residual risk** and **cases of overload** in the context of natural hazards in the Alps. It aims to inform political decision-makers and the interested public about concepts related to these terms and to highlight their importance to risk governance in the Alpine region. A list of recommendations and related good practice examples offers ideas for possible future activities that could help improve risk governance of natural hazards in Alpine countries.

## Thematic Background

Large Alpine territories and communities are exposed to the risk of being adversely affected by geo-hydrological hazards such as river floods, torrential hazards, rockfall, avalanches and landslides. Currently, the risk of loss and damage triggered by these hazards in the Alps is increasing in many municipalities, not least due to potentially adverse impacts of changing climate conditions and an intensified utilisation of land. An example for this is rising temperatures, which has led to the thawing of permafrost, an acceleration of glacier melt, and slope instability. On-going climatic changes threaten the health of humans, menace biodiversity, and undermine ecosystem-services such as those provided by protection forests. In the future, these changes may influence the magnitude and frequency of natural hazards with potentially dangerous outcomes for Alpine communities. Parallel to these trends, societal challenges such as a growing population density in Alpine countries and the accumulation of human assets and settlements in risk prone areas contribute to overall increasing risk in the Alps.

Dealing with natural hazards has a very long tradition in Alpine countries. Strategies to protect the society and infrastructure from their impacts have been part of everyday life since time immemorial. Until the second half of the 20th century, structural and engineering measures to reduce risks were predominant. Concrete dams, wooden barriers or safety nets were and are commonly used. However, such structural measures have a number of limitations and are designed for a certain size and intensity of events. Thus, the existing protection concepts do not always consider potential **cases of overload**. In the late 20th century, assets at risk and the associated costs required to protect them continued to increase, making the need for alternative strategies more evident. It was then that the benefits of non-structural and organisational measures – including spatial and land use planning, emergency planning as well as training and communication activities – were taken closer into account as important aspects of IRM. Furthermore, awareness of the value of green infrastructure and of nature-based measures was rising. It has also been recognised that total control of natural hazards is not possible, paving the way for an approach of ‘living with risks’ and accepting certain levels of **residual risk**.

## What are “residual risks” and “cases of overload”?

**Residual risk** is the risk of loss and damages from a natural hazard that remains after the implementation of protection measures. **Cases of overload** refer to events that exceed the capacities of existing protection measures and have the potential to cause damage to people and goods.

Grasping the underlying concepts of these terms presents a challenge to decision- and policy-makers, just as it does to the public. Moreover, beyond the general common understanding there are differences in the interpretation of the details of these terms, which lead to immense difficulties when applying them in risk governance activities. Consequently, several experts expressed the demand for a common definition of **residual risk** and **cases of overload**, as well as a shared understanding of their underlying concepts.



### Remark:

This paper is a first attempt towards a common understanding of “residual risk” and “cases of overload” from the perspective of an integrated risk management. It does not attempt to cover legal aspects or definitions for specific measures, such as spatial planning or technical measures. Such topics should be considered in future work.



## Facing Residual Risk and Cases of Overload

The Alps are host to extremes. There have always been natural events that existing protection measures were incapable of dealing with and thus caused damage. According to many experts, such destructive events are likely to increase in the future. The capacity of a community to deal with **residual risks** associated with these events differs greatly among Alpine countries. The following two examples show extreme events of different intensities: while the torrential floods in Simbach have been extreme, with an approximate size of an event that statistically occurs every few thousand years, the event in Engelberg is estimated to have a return period of approximately 250 years. The examples aim to visualise the thin line between being spared or not when facing natural hazards in the Alps.

### Simbach, Germany

#### What happened?

In Europe, the summer of 2016 was characterised by hot temperatures and unusually high amounts of torrential rainfall. Between May 31 and June 1, more than 270 litres of rain per square metre led to devastating flash floods and a cascade of various consequences in the small town of Simbach, Bavaria.

#### What were the consequences?

All existing water channels and protection measures were completely overloaded, as the discharge reached at least five times the design discharge. Even worse, several culverts and bridges were clogged and dams collapsed, so the city of Simbach was extensively flooded. In addition to the damages in Simbach, overall more than 45,000 people and 5,000 buildings were affected in the administrative district of Rottal-Inn. The total damage was estimated to be equivalent to more than one billion Euros.



Source: Pressefoto Geiring

*In Simbach in Lower Bavaria, the brook of the same name swelled within a few hours to form a torrential hazard and flooded the Innstraße pictured here – 5 people died in the water masses.*

#### Event analysis and actions needed

Simbach shows a **case of overload** during which, amongst other factors, the failure of protection measures led to an uncontrolled flow of water. In the future, such dynamic scenarios need to be taken into consideration. Nevertheless, damages can never be completely prevented, particularly during suddenly increasing run-off when time and possibilities to react are limited.

### Engelberg, Switzerland

#### What happened?

In August 2005, a slow-moving low-pressure system carried large amounts of humid air towards and around the Alps. On August 21 and 22, heavy rainfall set in above Switzerland. In some regions including Engelberg, the amount of rainfall reached peaks of more than 200 litres of rain per square metre.

#### What were the consequences?

Thanks to an optimal combination of organisational and non-structural measures (e.g. land use regulations, awareness raising, hazard maps, emergency plans, precise forecast and warning systems and effective communication) as well as structural measures (e.g. overloadable dams with spillway edges and tilting elements, increased size of pipes and drainages, bank stabilisation, discharge corridors and designated retention areas) carried out prior to the event, large scale damages at the Engelberger Aa River could be prevented. Only a construction delay in the town of Ennetbürgen caused damage at all.



Source: Tiefbauamt Kanton Nidwalden

*Thanks to the flood protection project and properly functioning relief corridors, greater damage could be prevented in the part of the Engelberger Aa that had already been upgraded.*

#### Event analysis and actions needed

All protection structures functioned faultlessly. Following the successful damage avoidance, all remaining constructions were finalised and widely supported by the public and affected citizens. During the 2005 flood alone, the investment of 30 million Swiss Francs avoided an estimated damage of 160 million. Further implementation of IRM measures are planned in all cantons of Switzerland as this approach has proven to contribute to a successful risk governance of natural hazards.

## Envisioning Residual Risk Governance in the Alps

The Alpine region is a thriving, living space, which counts many successes regarding the creation of a balanced relationship between human presence and the use of natural resources. However, the frequent occurrence of natural hazards presents severe challenges for Alpine societies, particularly in dealing with **residual risks** and **cases of overload**. Innovative practices may help to address unexpected levels of risk, manage the limited space available and find a compromise between economic development and protection. The following **vision** aims to picture how risk governance could look like in an ideal world:

Imagine you live in a valley in the heart of the Alps, surrounded by steep mountains. There have been small rockfalls in the past, but a major hazardous event is expected. Fortunately, the nearby mountains have been monitored for decades. Sensors are used to recognise the slightest movements of rock material. Accordingly, various protective construction measures were installed: rockfall nets and barriers above streets, hiking paths and settlements; maintenance of existing protection forests; dams for diverging potential flows of material away from houses and critical infrastructure. Over the years, a functional communication network has been established: an early warning system informs your community about potential risks, and inhabitants (e.g. farmers, hikers, forest rangers) share their local expertise on natural processes in the area. The risk communication strategy developed in cooperation with neighbouring communities is functioning faultlessly. It ensures a constant flow of information beyond administrative and even linguistic borders. A long-term spatial planning strategy helps to find a balance between economic development and increases resilience towards existing and future natural hazards. The strategy has been developed in cooperation with the community's stakeholders including private enterprises, media, non-profit organisations, fire brigades and citizens. The strategy prohibits the development of risk zones, defines building regulations and advises inhabitants on how to protect their compound against natural hazards.

As a result of communication efforts, there is a high level of risk competency in your community. In the case of a major hazardous event, an app sends warnings to your community's inhabitants. This app also provides instructions for a possible evacuation if necessary. Training exercises for commonly developed emergency and contingency plans ensure that every citizen knows what to do and how to contribute towards their successful application during the case of emergency. Easy-to-read maps are used to identify assets at risk and help citizens to relocate them before they are damaged or lost.

As a positive effect of the high level of safety provided in your region, your community will also benefit from an increase in tourism. Moreover, the well-structured and innovative risk governance creates a stable environment that attracts investments and supports long-term economic growth.

Obviously, this vision describes an ideal situation that is very unlikely to ever exist. However, it demonstrates the diversity of possible activities within an IRM and helps to identify starting points for the interventions necessary to successfully face **residual risk** and **cases of overload** in the Alps. This vision may help to open minds and to scrutinise your community's existing approach to an IRM. The following recommendations were developed to provide advice and to counsel local decision-makers and citizens with regard to potential activities that could improve the risk governance of natural hazards.



# BEYOND THE EXPECTED - RECOMMENDATIONS & GOOD PRACTICES

The following is a list of recommendations aimed at improving the risk governance of natural hazards in the context of **residual risk** and **cases of overload**. The list does not intend to be exhaustive, nor are the recommendations presented in any order of priority. Each recommendation is accompanied by an example of a good practice to show how the respective action could be implemented in reality.

## 1

### Develop a harmonised approach to integrated risk assessments in the Alps.

Risk assessment represents a basis for decision-making on strategies for risk prevention and should, as much as possible, follow a common methodological approach. The assessment of risks should include technical elements and natural processes (e.g. natural hazard identification, climate change) as well as socio-economic and cultural aspects (e.g. risk perception, desire for economic development and related expansion of built-up areas, abandonment of rural areas). Moreover, after the implementation of protection measures, the assessment should continue to explicitly address the remaining residual risks. Possible concrete steps to realise this are:

- **Improve and harmonise the documentation of hazardous events** and related damages by means of accessible databases. Evidence-based decision-making builds upon accurate statistical analyses.
- **Change the approach from traditional hazard-focused assessment to integrated risk evaluation.** Recognise exposure and vulnerability as equally important components of risk.
- **Reach common procedures for risk evaluation** across different administrative and linguistic borders (e.g. trans-regional or trans-national river basins).
- **Develop tools for assessing multiple and cascading risks** caused by a combination of events. They may lead to unforeseeable consequences for which the society needs to be prepared.



A typical situation of cascading risks exists when an earthquake damages a power plant and thus, for example, computer networks fail. In order to be able to estimate the associated possible financial, organizational or even health consequences, well-founded models and calculation methods are needed.

- **Foster the identification and monitoring of potentially hazardous processes and related risks.** Use the help of innovative and open source technologies (e.g. satellite-based data, information with spatial reference provided by the affected society).



In 2007, the [European Floods Directive](#) came into force establishing a framework for the assessment and management of flood risks. The directive provides respective guidelines and underlines the need to consider extreme events.

## 2

### Reach and share common definitions for the terms 'residual risk' and 'cases of overload'.

**Many experts have pointed out the need for and possible benefits of common terminology.** To achieve this, government institutions and relevant working groups, together with research institutes and representatives of affected communities (e.g. mayors), should develop commonly-accepted definitions. Such definitions are useful for establishing an understanding of terms across the Alpine society and its local, regional and (inter) national administrations. They should be made publicly available as illustrated in the following two good practices:



Alpine-wide definitions exist for various hazard types. The [PLANAT's National Platform for Natural Hazards](#) includes a well-accepted knowledge base, which provides explanations and definitions for various hazard types in the Alps.

A [glossary](#) on geological terms related to mass movements was developed through the Interreg Alpine Space project AdaptAlp. It helps to harmonise the use of relevant terms and provides translations for nine languages.

# 3

## Establish the full and transparent participation of actors in risk governance processes.

Involving different actors enhances the acceptance and awareness of protection measures. In this perspective, important measures are:

- Give individuals and members of the community the opportunity to contribute to risk assessment, determination of protection goals, and risk management activities.
- Enable citizens to contribute to decision-making processes on protection measures, based on their perception of risk.

Transparent and participatory decision-making helps to prepare for unexpected events. The final goal of this process is to achieve a **'risk-competent society'** in which each actor or member of the community has been made responsible for safety at the community and individual level.



Multi-Criteria Decision Analysis (MCDA) is a good practice example for this recommendation, since it could be a valuable tool to solve complex decisions that require choosing between several alternatives. MCDA helps to focus on what is important and easy to implement. At its core, MCDA is useful for (i) dividing decisions into smaller, more understandable parts, (ii) analysing each part, and (iii) integrating the parts to produce a meaningful solution.

- **Incorporate and communicate uncertainties** deriving from climate change, changing natural hazards dynamics, and incorrect planning.
- **Make use of natural adaptation measures** such as protection forests or buffer and retention zones in land use plans. They reduce potential impacts and allow for a controlled flow of material (from landslides, rockfalls, avalanches, or floods) into areas with less damage potential.
- **Provide mandatory information about residual risk** when planning, selling or buying properties in risk prone areas.
- **Consider acquisition of undeveloped land** in high-risk areas by municipalities to prevent emerging new damage potential and higher risks in such areas.
- **When appropriate, visualise residual risk** and its dynamic aspects in maps and land use plans as part of a risk-oriented spatial planning.



Austria: A law on hazard zone planning, implemented in 2014, defines the recognition of areas possibly affected by **residual risk** when determining hazard zones.

Germany (Bavaria): At the Danube and other Bavarian rivers, flood polders are used to create additional storage during **cases of overload** and to minimise the damage potential of dyke breaks. Furthermore, the measure directs discharge of water masses into spaces with less damage potential (e.g. agricultural land). Compensation of landowners is foreseen.

Liechtenstein: As stated in the PLANALP publication on strategies for climate change adaptation in the field of natural hazards, all slope water-courses in Liechtenstein eventually drain in the Rhine valley and into the inland canal, whose drainage capacity is very limited. During peak discharge, retention basins and spillway edges at lower parts of the dyke are useful measures to deal with unexpected or unusually high amounts of rainfall and runoff. The controlled overflow of existing flood protection measures may thus be used to avoid an uncontrollable event and high levels of loss and damage.

# 4

## Consider residual risk and cases of overload in land-use and spatial planning.

Spatial and urban development must be planned thoroughly to reduce the exposure of communities and their assets. This can be done in the medium and long-term perspective through land use and spatial planning. Important steps in this regard are:



# 5

## Introduce an integrated set of measures to increase the overall resilience of a community and its critical infrastructure.

When dealing with **residual risk**, the aim must be to reduce direct and indirect adverse effects of hazards on settlements, infrastructure and citizens. Possible concrete steps are:

- **Take into account the possible failure of a protection measure and prepare for the case of overload.** Ensure that the communities in risk-prone zones are prepared and reduce potential damage by building up a certain level of redundancy in protection measures.



Switzerland: Employees at fire brigades, civil protection, military and emergency planning are participating in a joint training program to be able to carry out tasks associated with the planning and implementation of measures. More information can be found at the [website](#) of the Swiss Federal Office for the Environment (FOEN) amongst the listed organisational measures to deal with natural hazards.

- **Develop and implement innovative protection measures against natural hazards, and assure the maintenance of those that already exist.** In parallel with taking into account green infrastructure and nature based measures as one pillar of protection systems, new measures should be designed to allow for a controllable and 'smooth' overloading that limits damages. In any case, a sudden failure of protection measures that could potentially lead to uncontrollable consequences must be avoided. Steering a hazard's impacting force into areas of low damage potential is of crucial importance and technically feasible in many cases. Within the Alpine region, this approach represents a rather new perspective on how to deal with natural hazards. It requires the commitment of all the actors involved in decision-making processes or who are affected by a hazard.



Austria: Flood retention areas as well as longitudinal, transverse and annular dams are foreseen as second line of defence. This project represents a technical protection system with limited use of space and solidary co-financing. Further information can be found in the news section on the [website](#) of Carinthia.

Germany: Various possible nature-oriented solutions to increase run-off capacities in **cases of overload** have been identified by integrating information from different sources such as hazard zone maps, hydrological modelling and site inspections. The final decision about the implemented solution was based on a cost-effectiveness calculation and minimal usage of natural areas. This project was carried out as a participation process with universities, engineers, natural protection services and citizens. Further information can be found on the [website](#) of the Oberammergau municipality.

# 6

## Establish legal and policy frameworks that support residual risk management.

Binding regulations at different administrative levels are needed to deal with **residual risk** and **cases of overload**. This may be achieved through:

- **Select critical infrastructure** (e.g. schools, public buildings, roads, power plants, etc.) in areas potentially affected by natural hazards, **define stricter building standards** and develop regulations that consider the possible relocation of such facilities. Assess the development of new assets thoroughly.
- **Define taxation and fiscal policies** in hazard-prone areas (e.g. incentives for reducing land-use intensities in hazard-prone areas). Revenues from these fiscal policies can be redirected to support emergency management services.



The Upper Austrian construction law BauTG §47 (ROG §21) serves as a good practice example for this recommendation. It establishes compulsory spillways for water runoff during **cases of overload** in zones affected by flooding, and prohibits constructions in risk zones.

# 7

## Promote a cross-sectoral approach to risk governance, which fosters synergies between technology, economy and the lifestyle of the society.

Risk governance involves many issues of risk perception, the acceptance of risk and the trade-off between risk protection and local development. Moreover, risk governance of natural hazards comprises many steps and related actors, administrative levels and entails potential conflicting interests among the actors. Therefore, a cross-sectoral approach to risk governance is necessary. Possible measures to achieve this goal are:

- **Support cooperation across sectors and hierarchical levels** through task forces and round tables composed of representatives from various departments and administrative levels.
- **Establish cross-sector information platforms and generate publicly accessible databases.**
- **Involve all actors** through structured participation processes.
- **Establish sound decision-making mechanisms** to support the actors' participation.



Liechtenstein developed a general strategy for a cross-sectoral approach in the case of flooding that includes:

- > the elaboration of hazard maps and contingency plans, taking into account possible **cases of overload**;
- > the transfer of knowledge from experts to the public about the catchment area, as well as information on the function, capacity and limitation of protection measures;
- > the establishment of 'water brigades' at the community level that can take the lead during events caused by torrential hazards;
- > the education of fire brigades and a quality check of their operational procedures;
- > the involvement of the affected population and local authorities including civil protection and foresters.

# 8

## Create a risk culture, in which the community is aware about residual risks.

To maximise the use of existing knowledge, experiences and data must be shared appropriately across administrative levels. The correct communication of risks is a prerequisite for the efficient coordination of all relevant actors. Important aspects in this regard are:

- **Involve schools:** Schools play an important role in children's education about natural hazards, vulnerabilities and related risks.
- **Inform the public about residual risks** associated with natural hazards during communication with decision makers and the general public without scaremongering.
- **Establish cross-border communication strategies** that improve the management of **residual risk** and overcome administrative barriers.
- **Include storytelling** as a way to learn from prior natural hazards and how the society and individuals have dealt with them in the past.



The Swiss FOEN has carried out a number of projects in the context of climate change adaptation and management of natural hazards that are potentially relevant to dealing with the **case of overload** and **residual risk**. One of the projects aims to consider risks associated with natural hazards in spatial planning. Based on the needs of affected actors, the project presents suggestions for the adaptation of local planning processes under the consideration of land-use and potential climatic changes. More information can be found within the pilot programs listed on the FOEN [website](#).

# 9

## Risk Communication: Create a lively risk dialogue and foster the distribution of information through multiple channels.

The dialogue around risk needs to be open, conscious, and transparent. It also needs to consider all hazards and risks. Further considerations are:

- **Use digital and print media** accessible for all citizens.
- **Cooperate with local media** to benefit from their networks.
- **Foster the use of interactive communication** devices such as mobile phone applications.
- **Make use of local infrastructure** to organise public debates and presentations that give insight into decision-making processes related to **residual risk** and the **case of overload**.
- **Organise communication campaigns** to inform the public of the fact that there is **no absolute safety** against natural hazards.
- **Pay attention to the wording:** be clear in your messages and give concrete guidance. Always be aware that there is a fine line between informing and overwhelming society on such sensitive topics as **residual risk** and **cases of overload**.



Austria: In Lower Austria, along the river March, a special alert plan explicitly addressing **residual risk** events, has been implemented by regional authorities and carried out on numerous occasions with all the relevant actors. Further information can be found in a [presentation](#) of Lower Austria's department for fire brigades and civil protection.

Germany: In the city of Kelheim, water-level marks (so called „blaue Linie“) on the sides of buildings inform citizens how high the water may rise in case of a dike burst, and how to react (e.g. escape to upper floors).

Switzerland: The Federal Office for the Environment FOEN lists a number of organisational and communication measures that help to reduce loss and damage during **cases of overload**. Measures include forecasts, warnings and alarms, closure of affected areas, mobile protection measures, as well as evacuation and assistance of the affected population.



## Final Considerations

The recommendations listed in this dossier are based principally on input received from experts through questionnaires and interviews. These recommendations bring to light a number of concrete measures that can help to improve the IRM of natural hazards. However, they represent the point of view of specialists and stakeholders who are dealing with the topic on a daily basis. Some questions arise when we step back for a moment and look at the role of risk management in everyday life, particularly when it comes to residual risk. These questions should be discussed not only by experts but by the entire community.

First of all, these questions address issues of acceptance of certain risk levels and the sharing of the burden that protection and preparedness measures represent for society:



What level of risk is a community or society willing to accept? When do the costs for protection and preparedness against natural hazards exceed the willingness and/or capacity of the community, given that they may require cutting funds to other sectors or budgets needed to protect against other risks?



To what extent should costs that are covered by the whole society benefit only certain segments of the society?



How should the responsibility for risk management be shared between the public administration, the community and individuals?



Where are limits to the participation of the public within the multifaceted procedure of IRM? Where is the line between fostering participation by being transparent in risk communication and scaremongering with counterproductive affects? Who decides what level of protection from natural hazards are implemented, and who bears the related costs? Who makes decisions in cases where the protection is beneficial for one region or part of the community, but disadvantageous for another?

These types of questions are of everybody's interest to ask, and should therefore be discussed by the general public. These discussions could also foster the development of a risk-competent society. This dossier and the study that underpins it can be considered as an early contribution to shed light on risk governance of **cases of overload** and **residual risk** in the Alpine region. Besides the above-mentioned public discussion, this topic strongly requires further in-depth scientific analyses to improve the current knowledgebase.

## Study Context

The content of this dossier is based on the findings of the study “Dealing with Residual Risk and the Case of Overload: Status Quo and Possible Improvement in the EUSALP Region”. The study was carried out by Eurac Research on behalf of the Bavarian State Ministry of the Environment and Consumer Protection (STMUV) between March 2017 and March 2018 within the scope of the project ‘AlpGov’ (Implementing Alpine Governance Mechanisms of the European Strategy for the Alpine Region). The AlpGov project is co-financed by the European Regional Development Fund (ERDF) through the Interreg Alpine Space Program. The AlpGov’s main objective is to support an effective and efficient implementation of the EU Strategy for the Alpine Region (EUSALP). It thereby supports the activities of the EUSALP Action Group 8, whose specific task is to improve risk governance in the Alps and to improve the management of major natural hazards such as river floods, torrential hazards, avalanches, rockfall and landslides. The project had the concrete goal of:

1. delivering a compendium of the different existing definitions of **residual risk** and **cases of overload** in the EUSALP area;
2. presenting the status quo of risk governance in the context of **residual risk** and **overload** events in the EUSALP area, taking into account legal, technical and political aspects;
3. presenting the variety of approaches to risk management in the EUSALP area paying particular attention to the phases of the risk management cycle, communication and the consideration of climate change;
4. providing a collection of ‘good practice’ examples of **overload** events with respect to the abovementioned natural hazards;
5. and, elaborating shared recommendations for improving the status quo of risk governance processes in the EUSALP area.

Website: <http://www.alpine-region.eu/action-group-8>





## [www.alpine-region.eu/action-group-8](http://www.alpine-region.eu/action-group-8)

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**Grafikdesign:** StMUV, PKG und Elisabeth Aster (Eurac Research, Bozen, Italien)

**Illustration Titelseite:** Oscar Diodoro (Eurac Research, Bozen, Italien)

**Druck:** StMUV

**Stand:** März 2018

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